Benban, 50 MW

Solar Photovoltaic (PV) Power Facility

Aswan Governorate, Egypt

Environmental Impact Assessment Form B

Volume 1. Attachments

Prepared for: Access Building Energy Solar One

March 2016

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List of Acronyms

Abbreviation	Meaning
CAA	Competent Administrative Authorities
EBRD	European Bank for Reconstruction and Development
EEAA	Egypt Environmental Affairs Agency
ABESO	Access Building Energy Solar One
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESIA	Environmental and Social Impact Assessment
ESSR	Environmental and Social Scoping Report
FIT	Feed-in-tariff
IBA	Important Bird Area
IFC	International Finance Corporation
IFI	International Finance Institution
NREA	New and Renewable Energy Authority
PBF	Priority Biodiversity Feature
PR	Performance Requirement
WB	World Bank

1 Introduction

The Government of Egypt and the New and Renewable Energy Authority (NREA) are promoting the construction of a photovoltaic solar power complex under the Egyptian Solar Plan. In 2014 the government adopted a feed-in-tariff (FiT) scheme for solar PV with a target of 2,300 MW. The land is leased by NREA to private investors to construct, operate and own solar photovoltaic power generation plants of between 20MW and 50MW capacity (each project). The entire solar complex (Benban Complex) is divided on 41 plots of 37.3 km^2. The total capacity of the site is 1,800 MW.

Access Building Energy Solar One (ABESO) is one of the pre-qualified developers that has been assigned a plot to develop a single 50MW Photovoltaic Power Plant in Aswan Governorate, 43km to the north of Aswan.

A Strategic Environmental and Social Impact Assessment (SESA) has been prepared for the entire Benban Complex with the objective to asses the environmental and social impacts associated to all projects as a whole. Following the approval and disclosure of the SESA, EEAA will categorise individual developments as a Category B project.

According to the Guidelines of Principles and Procedures for Environmental Impact Assessment (Egyptian Environmental Affairs Agency, 2009), Category B Projects: "*The proponent has to fill in the environmental impacts form B included in annex five (5) of the guidelines as well as attach the required documentation*".

Volume 1 and 2 contain the documentation required for the compilation of the environmental impact Form B included in Annex five (5) of the Guidelines of Principles and Procedures for Environmental Impact Assessment (EIA). This **Volume 1** contains all the documentation required on the Form B (see Table 1-1), with the exception of the EMP, which is presented as a standalone document on Volume 2.

1.1 Documentation included

The following table outlines the documentation submitted to EEAA, as per the Guidelines of Principles and Procedures for Environmental Impact Assessment (Category B Projects).

Table 1-1 Documentation provided

No.	Attachment	Was it attached? (Yes/No)	Reasons (If not attached)
1	EEAA approval of the EIA for the original project (in case of extensions)	No	New Project
2	Copy of the project license (in case of extensions)	No	New Project
3	EEAA Approval of the integrated EIA of the development (in case the project is located in a wider development)	Yes, Volume 1, ANNEX 1, page 61	-
4	General description of the Project Site with a map	Yes, Volume 1, Chapter 2	-
5	General description of the Project Site	Yes, Volume 1, Chapter 4	-
6	Description of the project activities with illustrative figures	Yes, Volume 1, Section 2.2	-
7	Expected analysis for air emissions	No	Not required, not air emissions expected
8	Specifications of the sewage and/or industrial wastewater treatment unit	No	No sewage treatment onsite
9	List of environmental laws and regulations	Yes, Volume 1, Chapter 3	-
10	Assessment of Environmental Impacts	Yes, Volume 1, Chapter 5	-
11	Analysis of Alternatives	Yes, Volume 1, Chapter 2.4	-
12	Environmental Management Plan (EMP)	Volume 2. Environmental and Social Management and Monitoring Plan.	-

2 Project Background

2.1 Project Location

The proposed Ben Ban 50MW PV Plant will be located in Aswan Governorate, which is located in Southern Egypt, 18km to the west bank of the Nile river and 43km to the north of Aswan.

Aswan Governorate borders Qena Governorate to the north, Red Sea Governorate to the East, New Valley Governorate to the West and Sudan's Northern State to the south. It has a population of 1,394,687 inhabitants and occupies an area of 62,726 km^2.

Physically, the proposed Ben Ban 50MW PV Plant lies approximately on latitudes 24^o 26^l and 24^o 27^l *North* of the equator, 32^o 41^l degrees East of the Prime Meridian and is 0 m above Sea Level. The site coordinates are provided below.

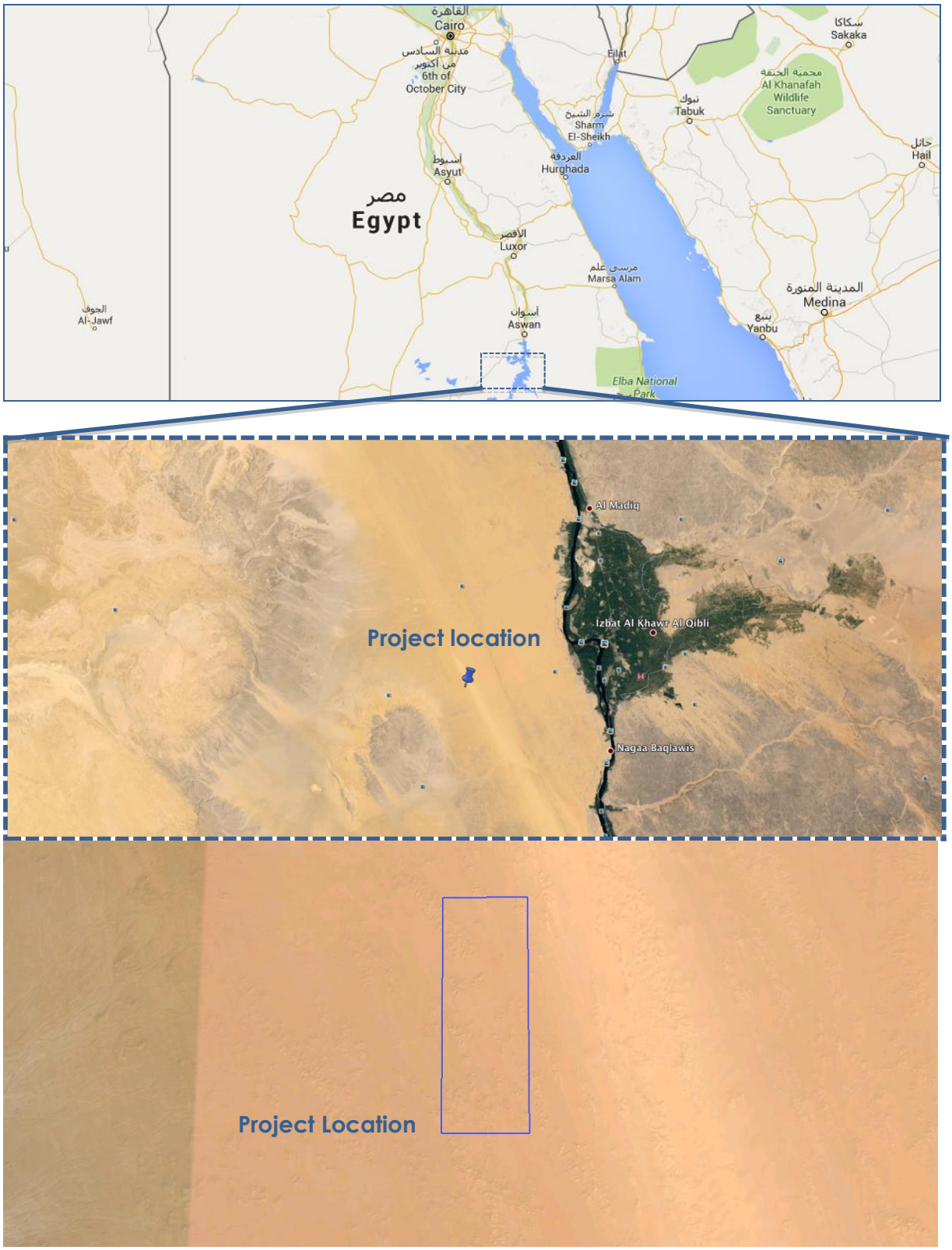
The proposed plant will be located approximately 5,7km West to Luxor-Aswan Road.

Table 2-1 Site Location, Coordinates

Project Site Coordinates		
Point	**Latitude**	**Longitude**
1	24°26'24.66"N	32°41'23.34"E
2	24°26'24.80"N	32°41'44.48"E
3	24°25'31.46"N	32°41'23.35"E
4	24°25'31.46"N	32°41'44.77"E

A new 220 kV power line is proposed to be constructed and connected into an existing HV Transmission line located approximately 12 km to the east of the Complex and to a new 220/500kV Substation. The proposed alignment of the 220 kV power line is not known at this stage.

Figure 1 Project Location



2.1.1 Existing Land Uses on the Proposed Site

The proposed site for the 50MW PV Plant is located within a vast rocky plateau with no human settlements or vegetation coverage, and is considered to be part of the habitat known as Sands and Dunes of the Western Desert (BioMap Project, 2007).

Figure 2 Existing Land Uses in the Proposed Site and the nearby.

2.1.2 Neighbouring developments

Currently there are no neighboring developments around the Project Site. However, it is expected that a significant number of PV plants will be developed concurrently. It is also possible that temporary worker accommodation facilities could be developed close to the Benban Complex (Figure 7).

The Project Site is 5,7km west of the Luxor-Aswan Highway, running from Luxor to Aswan. Internal roads within the Benban Complex will be developed to connect individual Projects with the highway.

2.1.3 Archaeological sites

The nearest cultural and archaeological site is Temple of Kom Ombo, and this is located 23,5 km to the east of the proposed development, on the eastern side of the Nile River. For more information see Section 4.2.4)

2.1.4 Natural protectorates

There are no environmentally protected areas close to the proposed site. The nearest protectorate is located approximately 41 km to the south of the Benban Complex (For more information see Section 4.1.6.1)

2.1.5 Site Location Map

A Site Location Map, to scale and stamped by the Competent Administrative Authority is presented on ANNEX 2.

2.2 Project Design

The proposed 50 MW PV Plant will consist of numerous PV cells within modules arranged in arrays upon mounting structures in a specific arrangement across the proposed site. The arrays will be designed to ensure the most efficient alignment to capture solar rays.

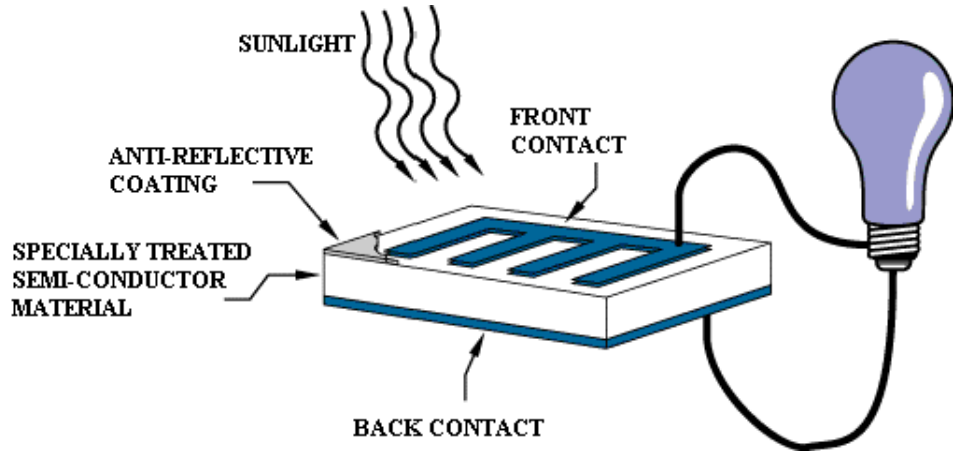
The electricity generation process using photovoltaic technology and the main components required for this process are briefly described below.

PV Cell: A single photovoltaic cell comprises a specially treated semi-conductor material (typically silicon) with separate front and back electrical contacts (positive and negative) that are connected to form a circuit. Upon exposure to light, electrons are knocked from the semi-conductor material under the photoelectric effect and are transported around the electrical contacts to form a direct current.

PV Module: A module is the assembly of multiple PV cells mounted into a module. Modules are designed to supply electricity at a certain voltage. PV modules typically are covered with an anti-reflective glass or coating to protect the solar cells and to limit the amount of reflected sunlight.

PV Array: Multiple modules wired together form an array, or 'panel' that are then arranged to form the solar plant. The arrays will be mounted onto a structure to provide the optimum solar alignment.

Figure 3 PV Cell



Source: science.nasa.gov, How Do Photovoltaic Work (2011)

Figure 4 PV Cell, Module & Array (left) machine of ramming spikes (right).

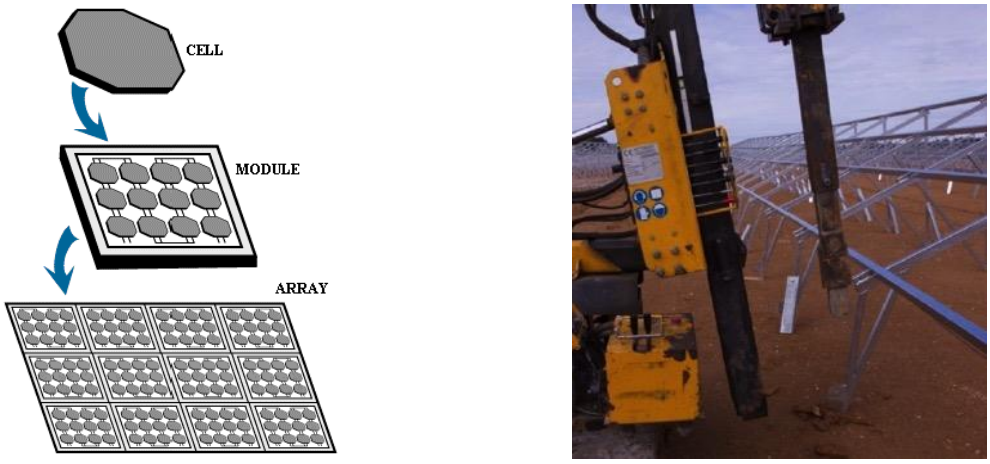


Table 2-2 presents the characteristics of the PV Arrays.

Figure 5 Mounted 1-axix tracker PV (example)

2.2.1 Layout

ANNEX 2 shows the layout of the proposed 50MW PV Plant.

2.2.2 PV Elements

2.2.2.1 PV Array Characteristics

The following Table present the main characteristics of the PV Arrays.

Table 2-2 Characteristics of the PV Arrays

Equipment	Characteristics
Total Area of the PV Arrays	338.070m^2
Number of modules	3 x 200,000
Number of structures	3 x 10,000 (rows)
Alignment direction	N - S
Slope of arrays	~0°
Distance between rows	4.10 m
Percentage of ground slope	0
Assembly structure	1-axis tracker
Assembly of Metal foundations	Direct ramming

2.2.2.2 Trenches

DC and AC low voltage and AC medium voltage cables will be buried directly in the trenches, while communication cables and optical fiber will be placed inside PVC ducts, so different types of trenches in size will be dug during the PV plant construction.

MV trenches will be approximately 1.15 meters deep while LV trenches (between the rows of solar panels) will be 0.8m deep.

Sand will be used to backfill trenches and will be compacted to match existing conditions.

2.2.2.3 PV Support structures

The foundation design will be appropriate to the soil conditions of the PV Plant area. The different types of foundation will be in accordance with the Geotechnical, Soil Report and Pull Out tests to be carried out by the Contractor.

Galvanized steel H-beams will be installed to anchor the solar panel foundations to the ground. At the current stage the EPC is considering driven/hammered Pile Foundation. If the soil investigation's findings prove this type not feasible, the EPC will be review the design accordingly.

A 0.5 m excavation will be undertaken to place the foundation of the inverter buildings, and the sand will be compacted. Due to flooding considerations some of the building will have to be elevated.

2.2.2.4 Electrical Configuration

The electrical diagrams in the PV Facility will be as follows: 22 units of 2.5MW$_{AC}$, feed by 456 (228+228) strings.

There will be a single switchgear and this will be located on the north-east of the Project site.

Inverters will be located inside the 2MW Power Conversion station (please see Project Layout ANNEX 2 for location of power conversion station).

A diagram of the SLDs (LV and MV) is attached on ANNEX 4.

2.2.3 Associated Facilities

2.2.3.1 Laydown Areas

The laydown area for the construction phase will be located within the boundary of the proposed project and it will cover approximately 1,250m^2

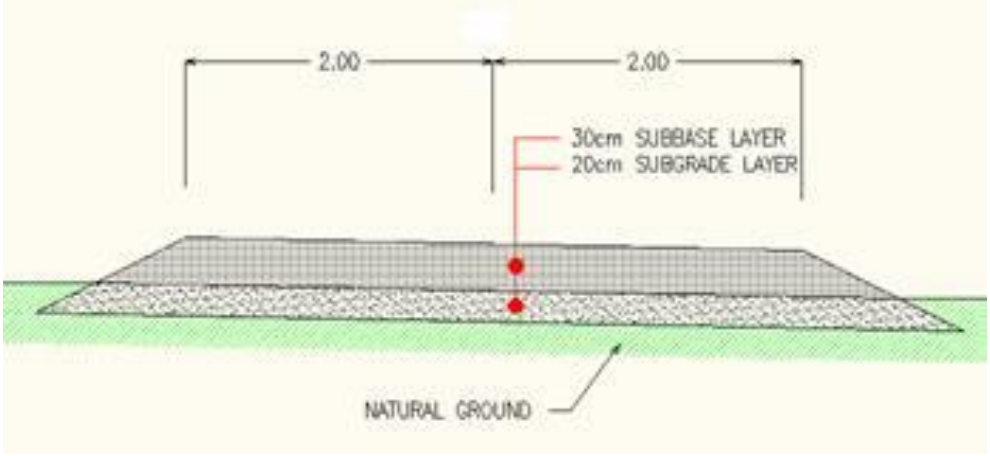
2.2.3.2 Access Roads and Temporary Internal Roads

The proposed access road location for the proposed 50MW PV will be developed by NREA or by the Developer's Association, and has been assessed in the SESA approved by EEAA. It will not be constructed as part of individual projects.

The plant will have internal roads to facilitate access. The roads will be constructed according to the following specifications: refilling based on stone-gravel/quarry-run, and compacted soil (Width 4 m/Thickness 0.25 m).

These inner service roads in the plant will be approximately 4 meters wide. The drawing below depicts the size of the road. The sub base layer material will be brought in from a nearby source to the PV Plant site location.

Figure 6 Internal Roads



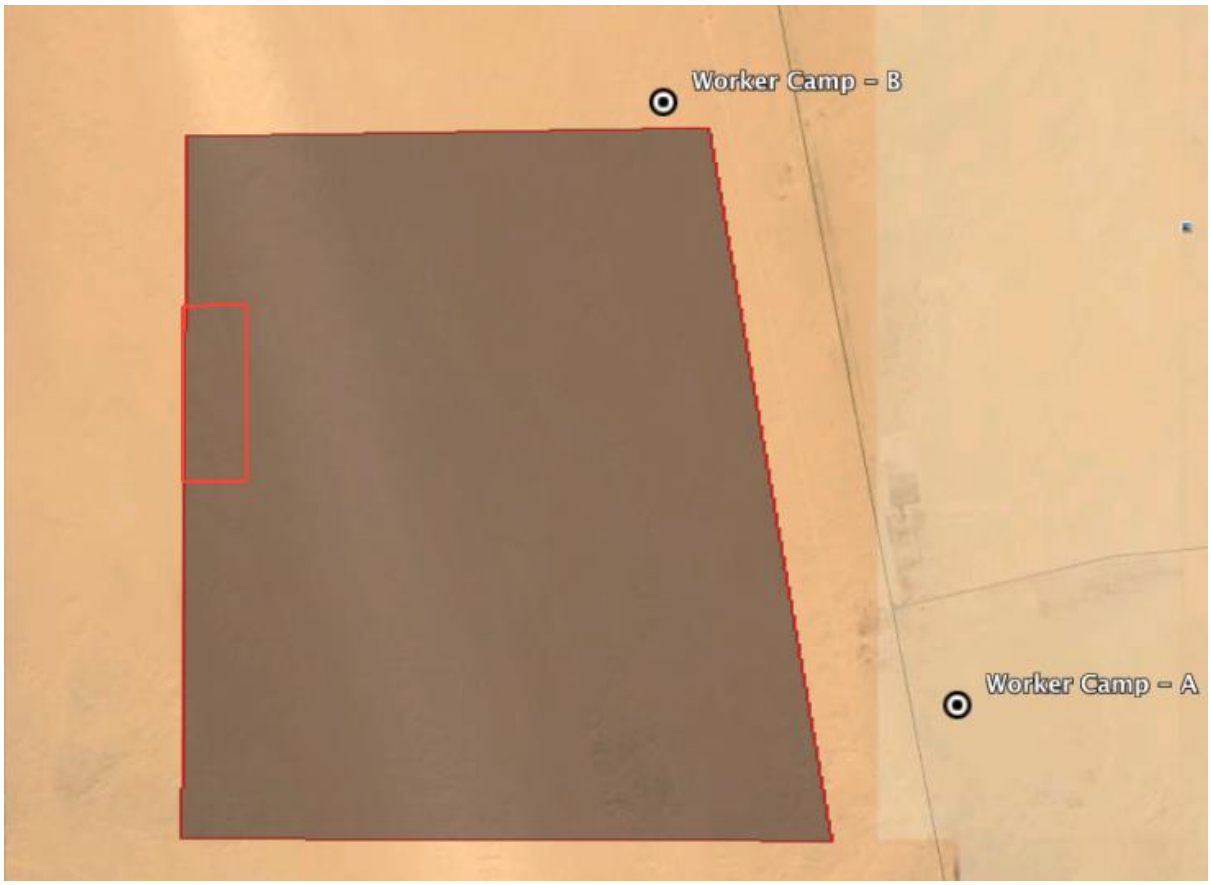
2.2.3.3 Ancillary Buildings

A Control Building, Warehouse and Gatehouse building will be constructed at the Benban PV Power Plant.

2.2.3.4 Work Camp

The final location for the work camp is still under consideration. The following figure shows the locations being considered (Camp A and B).

Figure 7 Potential locations for Workers Accommodation



The design will take into consideration the following features in order to minimize environmental and social impacts associated to the work camp:

- Hiring of local population will be maximized and daily public transport will be provided in order to reduce traffic, CO_2 emissions, habitat destruction for the location of the work camp and provide socioeconomic benefits;
- The work camp will be included on a land with no economic or ecological value, avoiding agricultural, grazing areas, riparian and wadi habitats;
- Work camps will be constructed outside of the existing population centers, to avoid conflicts with local communities, and
- Work camps will be constructed near Aswan-Luxor Highway, and near the PV plant if possible to reduce CO_2 emissions from vehicles and traffic to the site.

2.2.3.5 Water Supply

Potable Water Supply

Potable water will be supplied to the site by an authorized local contractor via portable water tanks, although the storage onsite is unknown at this stage.

Dust Suppression

Water will be supplied to the site via portable water tanks by an authorized subcontractor. The expected consumption rate for this use is 4000m^3/year.

2.2.3.6 Wastewater

A septic tank for wastewater will be installed onsite. Wastewater will be tankered offsite and treated by an authorized local utility following national requirements on wastewater treatment.

2.2.3.7 Solid Waste

The main types of expected waste types are: plastic, paper, cardboard, wood and metal scraps. Waste handling will include storage in separate containers in a dedicated area within the site and transportation by an authorized local subcontractor.

2.2.3.8 Hazardous Waste

Hazardous waste will be disposed at designated areas following the containment measures outlined in the Volume 2. Environmental Management Plan (EMP).

2.2.3.9 Energy

Diesel generators will be the source of electricity during the construction phase.

2.2.3.10 Work Environment

Protective equipment (gloves, glasses, helmets, etc.) will be provided according to local applicable standards and Contractor's policies.

2.2.4 Project Phasing Plan & Schedule

The expected commencement of construction is on 1st September 2016. The expected end of construction is scheduled for October 2017.

ANNEX 3 show a detailed Project Phasing Plan for Benban 50MW.

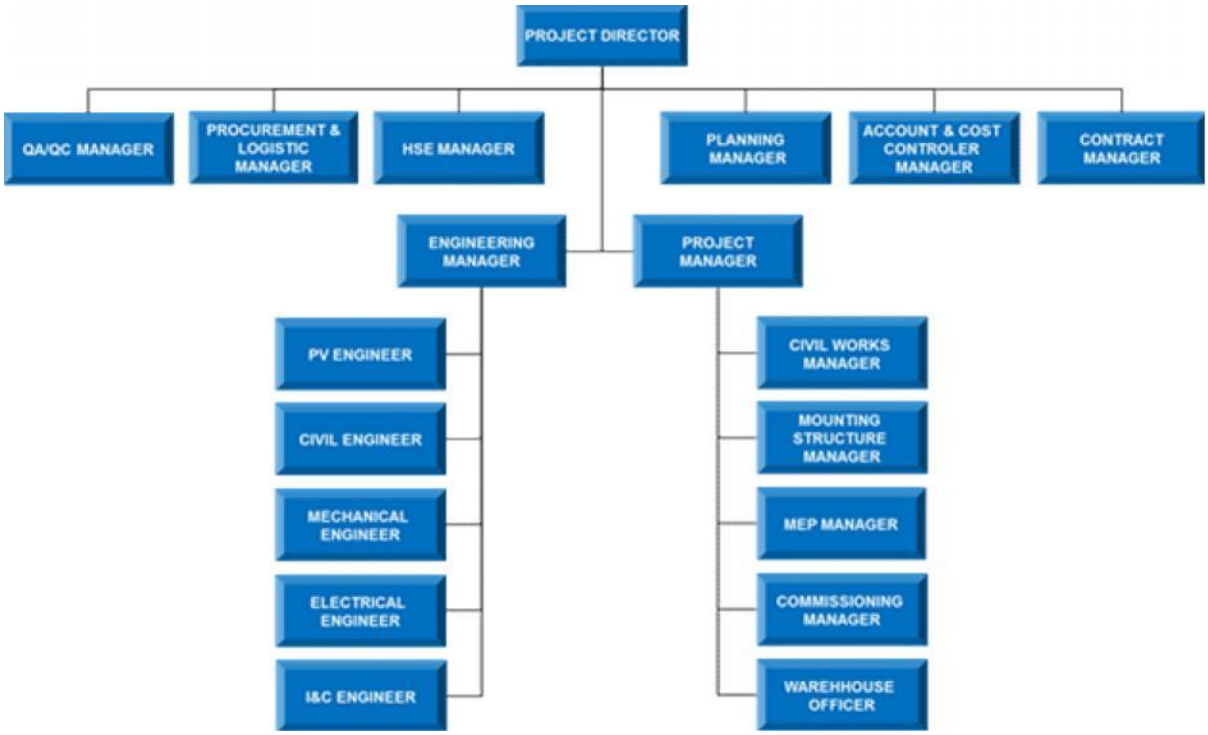
2.2.4.1 Workforce Requirements

The construction phase of a 50 MW Plant requires significantly more staff than the operational phase. The estimated workforce requirements during the construction phase will be approximately 300 workers.

Project Organizational Chart

The figure below summarizes the proposed organizational chart of the EPC contractor during Construction Phase. These key positions will be coordinating the involvement of the various subcontractors or specialized personnel that will be engaged during the construction phase of the project.

Figure 8 Project Organisational Chart



2.3 Project Description. Operation

2.3.1 Associated Facilities

PV Cleaning

ABESO PV will include dry panel-cleaning equipment. This technology will not require water to remove dust and other particles accumulated on the panels.

Potable Water

Potable water will be provided for workers, and sourced from an existing licensed provider. Water consumption rate is expected to be 100m^3/year.

2.3.1.1 Energy

Electricity for the auxiliary consumptions will be sourced from the utility Company by means of a dedicated connection at the MV Switchgear.

2.3.1.2 Wastewater

A septic tank will be used as a temporary storage method for domestic wastewater. It will be transported offsite and treated by an authorized service provider following national requirements.

There will be no other wastewater sources.

2.3.1.3 Solid Waste

The main types of expected waste types are: plastic, paper, and cardboard. Waste handling will include storage in separate containers in a dedicated area within the site and truck transportations.

2.3.1.4 Hazardous Waste

Small amounts of hazardous waste will be generated as a result of maintenance operations. This waste will be storaged in adequate containers and taken offsite by an authorized hazardous waste management company.

2.3.1.5 Work Environment

Protective equipment (gloves, glasses, helmets, etc.) will be provided according to national applicable standards and Contractor's policies.

2.3.2 Worker Force and Local Employment

For the operational phase less staff will be required as the functioning of the plant will be automated and only maintenance, security and module cleaning will be required. Approximately a total of 11 O&M workers (including security) will be required.

2.4 Analysis of Alternatives

High-level alternatives (e.g. no project alternative, alternative locations of the Solar PV Development) have been assessed in the SESA. On a project-specific level, the analysis of alternatives was focused on alternative panel cleaning options to minimise water use, and alternative locations for project ancillary facilities (e.g. worker accommodation) in order to avoid economic displacement and minimise social impacts while ensuring worker welfare.

The selected alternatives (i.e. dry cleaning for PV panels and the areas being consider for the worker accommodation) have minimum environmental and social impacts.

3 Legal Framework, Standards and Guidelines

The following national and international laws and policies applies to the proposed PV project and are described as follows:

3.1 National Requirements

3.1.1 Constitution of The Arab Republic of Egypt 2014

The Constitution of the Arab Republic of Egypt in article 46 states that every person has the right to a healthy environment. 'The State shall take necessary measures to protect and ensure not to harm the environment; ensure a rational use of natural resources so as to achieve sustainable development; and guarantee the right of future generations thereto'.

3.1.2 Environmental Framework

3.1.2.1 The Egyptian Environmental Affairs Agency (EEAA) Guidelines of Principles and Procedures for Environmental Impact Assessment

EEAA Guidelines for EIA studies, January 2009 define the EIA scoping and different procedures, requirements and tools of the EIA process and to ensure fulfill application as well as emphasize the role of involved parties in the EIA process. The guideline aims to:

- Describe the objective of the EIA process and its legal requirements;
- Identify the projects for which EIAs are required;
- Indicate the criteria for classification and the different levels of assessment;
- Describe the requirements for EIA of different categories; and
- Describe the requirements for public consultation.

3.1.2.2 Egyptian Environmental law No. 4 of year 1994

The Egyptian environmental law No. 4 of year 1994 that was amended by law No. 9 of 2009, and its executive amendment no. 338 of 1995 modified by ministerial decrees no. 1741 of 2005, no. 1095 of 2011 and no. 964 of 2015.

The Statute provides tools for environmental management including EIAs. It imposes a mandatory duty on project developers to have an EIA conducted and approved for new establishments/projects and for expansions/renovations of existing establishments before construction. The law considers the EIA as a main condition for licensing and thus the project that does not prepare an EIA or does not abide by the EIA conditions could be subjected to its license being revoked.

The National Environment Management Policy, 1994, aims to promote sustainable economic and social development taking into consideration the needs of future generations. EIA is one of the tools it considers necessary to ensure environmental quality on long-term basis. The

policy requires that projects likely to have significant adverse ecological or social impacts undertake an EIA before their implementation.

Law Number 4 provides environmental standards. It includes standards for hazardous materials and waste, air quality, noise, water quality, and soil quality. A number of supporting articles have been developed in order to protect workers environment with regards to safe and security standards.

3.1.2.3 Protected Areas

Law No 102 of 1983 for Nature Protectorates. This statute provides information about the actions that are forbidden, permitted and penalties within a Nature Protectorate in Egypt, defining a Nature Protectorate as any area of Land, or coastal or inland water characterized by flora, fauna, and natural features having cultural, scientific, touristic or esthetic value.

This law is not applicable onsite, as no direct or impacts on protected areas are expected at this stage.

3.1.2.4 Wastewater

For wastewater and groundwater contamination the following legislation is applicable:

- Law No. 93 of 1962 on industrial wastewater disposal;
- Law 48 of 1982 regulates discharge into underground reservoirs and branches or canals of the Nile, to the main stream of the Nile, and to municipal and industrial drains.

Measures to prevent groundwater contamination are provided in the EMP and no wastewater discharges to the environment will be allowed in the project. All wastewater will be tankered away by licensed contractors.

3.1.2.5 Solid Waste

For solid waste the following legislation is applicable in Egypt

- Law 38/1967, and Law 31/1976, which amended law 38/1967 which addresses public cleanliness, regulates the collection and disposal of solid wastes from houses, public places, commercial, and industrial establishments.
- Ministry of Housing, Utilities and Urban Communities (MHUUC) decree No. 134 of 1968, which provides guideline from domestic and industrial sources, including specifications for collection, transportation, composting, incineration and land disposal.

3.1.2.6 Hazardous Materials

Law 4/1994 includes information regarding control of hazardous materials and waste. Articles 29 and 33 of the law make it mandatory for those who produce or handle dangerous materials in gaseous, liquid or solid form, to take precautions to ensure that no environmental damage shall occur. Articles 25, 31 and 32 of the executive regulations (Decree 338/1995) specify the necessary precautions for handling hazardous materials. Article 33 of the

executive regulations (Decree 338/1995) specifies that the owner of an establishment whose activity results in hazardous waste shall hold an environmental register of such waste and the method of disposal.

3.1.2.7 Noise

Noise is regulated by article 42 of law 4/1994.

3.1.3 Social and Economic Framework

3.1.3.1 Law No 204 of 2014 regarding the Stimulation of Producing Electricity from Renewable Energy Sources

This law was established in order to secure the provision of the electric energy and encouragement of investment, research, development upgrading and protection of competition, preserving the environment and strengthening the cooperation with the other states in the field of electricity.

3.1.3.2 Cultural Heritage

- Law No. 117of year 1983 on antiquities and cultural heritage.
- New Building Law No. 119/2008

3.1.3.3 Labor Law and Public Participation

- Labor Law No. 12/2003
- Public participation is included within a declaration in the Constitution of The Arab Republic of Egypt 2014.

3.1.3.4 Human Rights

- Law No. 94/2003 on the establishment of the National Council for Human Rights (NCHR).

3.1.3.5 Traffic and Transportation

- Law no. 142 of 2014 on Traffic (modifying some provisions of Law no. 66 of 1973).

3.2 International Treaties and agreements signed by Egypt

Egypt has signed and /or ratified several international agreements relating to the environment. Those that can potentially be applicable are outlined below:

Table 3-1 International Agreements signed and/or Ratified by Egypt.

Category	Name of Multilateral Environmental Agreement	Date of Ratification	Date of Entry Into Force	Date of Signature
Biodiversity and Natural Resources	Convention on Wetlands of International Importance Especially as Water Fowl Habitat (RAMSAR)	09/09/88	09/09/88	
	Convention Relative to the Preservation of Fauna and Flora in their Natural State	21/02/35	14/01/36	
	International Plant Protection Convention	22/07/53		
	African Convention on the Conservation of Nature and Natural Resources	16/03/72		
	Protocol to Amend the Convention on Wetlands of International Importance Especially as Water Fowl Habitat	09/09/88		
	Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	04/01/78	04/04/78	
	Convention on the Conservation of Migratory Species of Wild Animals (Bonn)	11/02/82	01/11/83	
	Convention on Biological Diversity (CBD)	02/06/94		
	Agreement for the Establishment of the Near East Plant Protection Organization	13/04/95		
	Convention Concerning the Protection of the World Cultural and Natural Heritage	07/02/74		
	United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	07/07/95		
	Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East	06/07/67	21/04/69	
	International Tropical Timber Agreement	16/01/86		

Category	Name of Multilateral Environmental Agreement	Date of Ratification	Date of Entry Into Force	Date of Signature
	International Tropical Timber Agreement, 1994			08/11/94
	Protocol Concerning Mediterranean Specially Protected Areas	08/07/83		
	Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean			10/06/95
Hazardous Materials and Chemicals	Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents	25/03/82	25/03/83	
	Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal	08/01/93	05/05/92	13/02/92
	Amendment to the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal	13/12/03		22/09/95
	Bamako Convention on the Ban of the Import into Africa and the Control of Trans-boundary Movement and Management of Hazardous Wastes within Africa	15/05/04	12/05/94	30/01/91
	Stockholm Convention on Persistent Organic Pollutants (POPs)	02/05/03	17/05/04	17/05/02
Atmosphere and Air Pollution	United Nations Framework Convention on Climate Change	05/12/94	05/03/95	09/06/92
	Kyoto Protocol	12/01/05	16/02/05	15/03/99
	Vienna Convention for the Protection of the Ozone Layer	09/05/88		
	Montreal Protocol on Substances that Deplete the Ozone Layer	02/08/88		
	(London) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	13/01/93		
	(Copenhagen) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	28/06/94		
Health and Worker Safety	Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration		04/05/88	
	Convention Concerning the Protection of Workers Against Ionizing Radiation	18/03/64		
Human Rights	Convention on the Elimination of All Forms of Discrimination against Women	18/09/81		16/07/80

Category	Name of Multilateral Environmental Agreement	Date of Ratification	Date of Entry Into Force	Date of Signature
	Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa	Not Ratified		Not Signed
	International Convention on the Elimination of All Forms of Racial Discrimination	01/05/67		28/09/66
	Convention on the Rights of the Child	05/02/90		06/07/90
	Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour	Ratified		Signed
	Abolition of Forced Labour Convention	Ratified		Signed
	Right to Organize and Collective Bargaining Convention	03/07/54		

Source: Arab Republic of Egypt. Ministry of Foreign Affairs.

3.3 International Requirements

3.3.1 The World Bank / IFC Environmental Safeguard Policies and Performance Standards

The World Bank Group / International Finance Corporation (IFC) Environmental, Health and Safety (EHS) General Guidelines of April 2007 superseded the World Bank EHS Handbook issue of 1998.

In addition, a number of sector specific guidelines have been revised or are undergoing peer review. Both the IFC Sustainability Framework (which defines the IFC approach towards sustainability and the environment) and the IFC/WBG performance Standards (which define the clients' responsibilities for managing their environmental and social risks) have been updated in 2012.

The updated EHS Guidelines serve as a technical reference source to support the implementation of the Performance Standards. The Performance Standards are outlined below.

Performance Standard 1 covers several types of Environmental Assessment instruments, including ESIAs. These standards require the Environmental Assessment to be undertaken to a high standard and compliant with International Best Practice. Specifically, the objectives of PS1 are:

- To identify and evaluate environmental and social risks and impacts of the project;
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment;
- To promote improved environmental and social performance of clients through the effective use of management systems;
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately;
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

Performance Standard 2: Labor and Working Conditions aims to promote the fair treatment, non-discrimination, and equal opportunity of workers; to establish, maintain, and improve the worker-management relationship; to promote compliance with national employment and labor laws; to protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain; to promote safe and healthy working conditions, and the health of workers and to avoid the use of forced labor.

Performance Standard 3: Resource Efficiency and Pollution Prevention, aims to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities, to promote more sustainable use of resources, including energy and water and to reduce project-related GHG emissions.

Performance Standard 4: Community Health, Safety, and Security aims to anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances and to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

Performance Standard 5: recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use.

Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. This standard aims to:

- Protect and conserve biodiversity;
- Maintain the benefits from ecosystem services; and
- Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Performance Standard 7: Indigenous People. This PS includes requirements in terms of establishing and maintaining an on-going relationship based on Informed Consultation and Participation (ICP) with the local communities affected by a project throughout the project's life-cycle that will be complied with.

Performance Standard 8: Cultural Heritage. The PS aims to Protect cultural heritage from the adverse impacts of project activities and support its preservation and to promote the equitable sharing of benefits from the use of cultural heritage.

3.3.2 European Bank for Reconstruction and Development (EBRD)

European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy (EBRD Performance Requirements); EBRD has adopted a set of specific Performance Requirement (PRs) covering key areas of environmental and social impacts. These reflect EBRD's commitment to promote EU environmental standards as well as the European Principles for the Environment. The PRs are presented in the table below.

Table 3-2 EBRD Performance Requirements (PRs)

EBDR Performance Requirements (PRs)	Objective of PR s
PR1: Assessment and Management of Environmental and Social Impacts and Issues	The objectives of this PR are to: • Identify and evaluate environmental and social impacts and issues of the project • Adopt a mitigation hierarchy approach to address adverse environmental or social impacts and issues to workers, affected communities, and the environment from project activities • Promote improved environmental and social performance of clients through the effective use of management systems • Develop an ESMS tailored to the nature of the project, for assessing and managing environmental and social issues and impacts in a manner consistent with relevant PRs. **PR 1 is applicable to the project.**
PR2: Labor and Working Conditions	The objectives of this PR are to: • Respect and protect the fundamental principles and rights of workers • Promote the decent work agenda, including fair treatment, non-discrimination and equal opportunities of workers • Establish, maintain and improve a sound worker- management relationship • Promote compliance with any collective agreements to which the client is a party, national labor and employment laws • Protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions **PR 2 is applicable to the project.**
PR3: Resource Efficiency and Pollution Prevention and Control	The objectives of this PR are to: • Identify project-related opportunities for energy, water and resource efficiency improvements and waste minimization • Adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project • Promote the reduction of project-related greenhouse gas emissions.

EBDR Performance Requirements (PRs)	Objective of PR s
	PR 3 is applicable to the project.
PR4: Health and Safety	The objectives of this PR are to: • Protect and promote the safety and health of workers by ensuring safe and healthy working conditions and implementing a health and safety management system, appropriate to the relevant issues and risks associated with the project. • Anticipate, assess, and prevent or minimize adverse impacts on the health and safety of project-affected communities and consumers during the project life cycle from both routine and non-routine circumstances. **PR 4 is applicable to the project**
PR5: Land Acquisition, Involuntary Resettlement and Economic Displacement	The objectives of this PR are to: • Avoid or, when unavoidable, minimize, involuntary resettlement by exploring alternative project designs • Mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to assets and land by: (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected • Restore or, where possible, improve the livelihoods and standards of living of displaced persons to pre-displacement levels. • Improve living conditions among physically displaced persons through the provision of adequate housing, including security of tenure at resettlement sites. **PR 5 is not applicable to the project. Land acquisition onsite has been covered by the SESA. Temporary land acquisition for the worker accommodation does not trigger the safeguards of this PR.**
PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	The objectives of this PR are to: • Protect and conserve biodiversity using a precautionary approach

EBDR Performance Requirements (PRs)	Objective of PR s
	• Adopt the mitigation hierarchy approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity • Promote good international practice (GIP) in the sustainable management and use of living natural resources. **The requirements on this PR in relation to the project area have been assessed in the SESA. The project design and the location of the worker accommodation does not trigger additional safeguards.**
PR7: Indigenous Peoples	There are no Indigenous Peoples in the Project area. **PR 7 is not applicable.**
PR8: Cultural Heritage	The objectives of this PR are to: • Support the protection and conservation of cultural heritage • Adopt the mitigation hierarchy approach to protecting cultural heritage from adverse impacts arising from the project • Promote the equitable sharing of benefits from the use of cultural heritage in business activities • Promote the awareness and appreciation of cultural heritage where possible. **PR 8 was addressed in the SESA. Additional requirements are applicable at a project level, namely a chance find procedure.**
PR9: Financial Intermediaries	This project does not involve Financial Intermediaries **PR 9 is not applicable.**
PR10: Information Disclosure and Stakeholder Engagement	The objectives of this PR are to: • Outline a systematic approach to stakeholder engagement that will help clients build and maintain a constructive relationship with their stakeholders, in particular the directly affected communities • Promote improved environmental and social performance of clients through effective engagement with the project's stakeholders • Promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that meaningful environmental and social information is disclosed to the project's stakeholders

EBDR Performance Requirements (PRs)	Objective of PR s
	• Ensure that grievances from affected communities and other stakeholders are responded to and managed appropriately. **PR 10 will be addressed mostly by the developers association, but there will be some requirements for project level disclosure, project level grievance mechanism, etc.**

3.3.3 Relevant EU Regulations

European Union (UN) Commission Directives are applied on a case-by-case basis to EBRD Projects. The following directives are considered to be applicable.

- **Directive 2011/92/EU** of the European Parliament and of the Council of 13 December 2011on the assessment of the effects of certain public and private projects on the environment applies to the assessment of the environmental effects of those projects which are likely to have significant effects on the environment.
- **Directive 2014/52/EU** amends the above directive in Article 3, requiring the EIA to "identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors: a) Population and human health b) Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC c) Land, soil, water, air and climate d) Material assets, cultural heritage and the landscape e) The interaction between the factors referred to in points a) to d).

3.4 Applicable Standards, guidelines and requirements

The standards included in the laws, regulations and procedures mentioned in the previous section, which have to be complied with during the project lifecycle.

This section specifies the most relevant standards that will need to be taken into consideration.

3.4.1 Soil and Groundwater Standards

3.4.1.1 National Standards

Egypt has no specific standards soil and groundwater contamination.

3.4.1.2 International Standards

The IFC EHS regulations do not specify pollutant standards for soils or groundwater. Therefore, sector-specific guidance documents on pollution prevention and good practices produced by the IFC (e.g. IFC 'Environmental Health and Safety Guidelines (EHS) Guidelines: Contaminated Land' (2007) will be referred to in the assessment. Such guidance includes the following:

- The General EHS guidelines detail that the '…Transfer of pollutants to another phase, such as air, soil, or the sub-surface, should be minimized through process and engineering controls.'
- Section 1.8 of the IFC's General Guidelines details the specific requirements with regards to contaminated land. It notes that: " *Contamination of land should be avoided by preventing or controlling the release of hazardous materials, hazardous wastes, or oil to the environment. When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and corrected to avoid further releases and associated adverse impacts*."

As specific standards and guidelines for soil protection are currently unavailable, internationally recognized assessment values for soil contamination set by the Dutch Ministry of Housing, Spatial Planning and Environment have been applied. Table 3-5 provides a list of the Dutch Soil and Groundwater standards regarding heavy metals.

The use of the Dutch standards (ESDAT, 2000) is common practice for the analysis of soils and groundwater, as they are viewed as international best practice.

In the Netherlands, environmental quality values have been established based on the philosophy of protecting ecosystems, environmental functions and ensuring the multi-functionality of soil and groundwater quality. These are discussed below:

- **Target Value**: average background concentration or detection limit; exceeding this value indicates a possible diminishing of the functional abilities of the soil for humans, plants or animals.
- **Intervention Value**: concentration level above, which there is a serious or threatening diminishing of the functional abilities of the soil for humans, plants or animals.

With reference to these standard values, the target values for soil represent the level at which environmental sustainable soil quality is present. For shallow groundwater (<10 m), the environmental quality objectives for soil and water have been adopted as target values.

Table 3-3: Dutch Soil and Groundwater Heavy Metal Guidelines

Contaminant	Dutch Soil Sediment		Dutch Groundwater	
	(mg/kg dry weight)		(µg/l)	
	Target	Intervention	Target	Intervention
Antimonium	3	15		20
Arsenic	0.9 L	55	10	60
Barium	160	625	50	625
Beryllium	1.1	30 S		
Bromine	20			
Cadmium	0.8	12	0.4	6
Chromium^{III}	<0.38 L	220 L		
Chromium^{VI}	<0.38 L	220 L		
Chromium (total)	100 L	380 L	1	30
Cobalt	2.4 L	120 L	20	100
Copper	3.4	96	15	75
Cyanide (total complex)	5	50 (pH>5)		
Cyanide (total free)	1	20		

Contaminant	Dutch Soil Sediment		Dutch Groundwater	
	(mg/kg dry weight)		(µg/l)	
	Target	Intervention	Target	Intervention
Fluorine	500			
Lead	55 L	530	15	75
Mercury (Methyl)	0.037 L	4 L		
Mercury	0.3	10	0.05	0.3
Molybdenum	3	190 L		
Nickel	0.26 L	100 L	15	75
Selenium	0.7 L	100 S		
Silver		15 S		
Tellurium		600		
Thallium	1	15 S		
Tin	19 background	900 S		
Tin as triphenyltin		<2.5		
Vanadium	42	250 S		
Zinc	16 L	350 L	65	800
L: Environmental Risk Limits				
S: Serious Contamination Level				

Constituent levels greater than the target value indicate that the soil has lost some of its multi-functional properties and can be considered as contaminated soil. If the contamination level is exceeding the target value, further investigation should be carried out. The soil intervention values indicate when the functional properties of the soil are seriously impaired or threatened.

It should be noted that Dutch Soil standards are specific for each specific site, and therefore values will need to be adjusted for the specific soil conditions at the project site according to the referred Guidance Note (ESDAT, 2000).

Finally target values are not specific clean up criteria. They represent targeted objectives. Also, in the latest (2009) version of the Dutch Standard, Target values for soils have been removed for all compounds except Metals.

3.4.2 Waste Water Standards

3.4.2.1 National Standards

Law No. 93 of 1962 on industrial wastewater disposal: Limits for pollutants in wastewater vary depending on the type of receiving water body. The parameters that should be monitored

and/or inspected are BOD, COD, pH, temperature, total phosphorous, phosphates, nitrates, fluorides, ammonia, sulphates, nickel, iron, zinc, nitrogen, TSS, TDS, Oil and Grease.

The following Table shows the permissible limits for discharges to the different recipients (sea, Nile, canals, agricultural drains, public sewer) according to the different relevant laws.

Table 3-4: Egyptian Environmental Legal Requirements for Industrial Wastewater

Parameter (mg/1 unless otherwise noted)	Law 48/82:			
	Discharge into :			
	Nile		Drains	
	Underground Reservoir & Nile Branches/Canals	(Main Stream)	Municipal	Industrial
BOD (5day,20 deg.)	20	30	60	60
COD	30	40	80	100
pH	6-9	6-9	6-9	6-9
Oil & Grease	5	5	10	10
Temperature (deg.)	35	35	35	35
Total Suspended Solids	30	30	50	60
Settable Solids	__	20	__	__
PO_4	__	1	__	10
Total phosphorus	__	__	__	__
Fluoride	0.5	0.5	__	0.5
Total Dissolved Solids	800	1200	2000	2000
Ammonia	__	__	__	__
Nitrates	30	30	50	40
Sulphides	1	1	1	1
Nitrogen	__	__	__	__
Iron	1	1	__	__
Zinc	1	1	__	__
Nickel	0.1	0.1	__	__

3.4.2.2 International Standards

According to IFC Environmental, health and Safety Guidelines (IFC, 2007), sanitary wastewater from industrial facilities may include effluents from domestic sewage, food service, and laundry facilities serving site employees. Miscellaneous wastewater from laboratories, medical infirmaries, water softening etc. may also be discharged to the sanitary wastewater treatment system. Recommended sanitary wastewater management strategies include:

- Segregation of wastewater streams to ensure compatibility with selected treatment option (e.g. septic system which can only accept domestic sewage); (
- Segregation and pretreatment of oil and grease containing effluents (e.g. use of a grease trap) prior to discharge into sewer systems; (
- If sewage from the industrial facility is to be discharged to surface water, treatment to meet national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater discharges shown in Table 3-7.
- If sewage from the industrial facility is to be discharged to either a septic system, or where land is used as part of the treatment system, treatment to meet applicable national or local standards for sanitary wastewater discharges is required. (
- Sludge from sanitary wastewater treatment systems should be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety , and conservation and long term sustainability of water and land resources. (

Table 3-5: Indicative Values for Treated Sanitary Sewage Discharges (IFC, 2007)

Pollutants	Units	Guideline Value
pH	pH	6–9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPN[b] / 100 ml	400[a]
Notes:		
a Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.		
b MPN = Most Probable Number		

When National regulations and IFC Guidelines differ, the project is expected to achieve whichever is more stringent.

3.4.3 Noise and Vibration Standards

3.4.3.1 National Standards

With regards to heavy machinery, noise is regulated by article 42 of Law 4/1994, article 44 of the executive regulations and table (1) in annex (7).

Table 3-6: Maximum Permissible Noise Levels (law 4/1994)

No	Type of Place and Activity	Maximum Permissible Noise Decibel (A)
1	Work place with up to 8 hour and aiming to limit noise hazards on sense of hearing	90 dB
2	Work place where acoustic signals and good audibility are required	80 dB
3	Work rooms for the follow up, measurement and adjustment of high performance operations	65 dB
4	Work rooms for computers, typewriters or similar equipment	70 dB
5	Work rooms for activities requiring routine mental concentration	60 dB

The value given hereafter is indicated on the basis of not affecting the sense of hearing.

- Intensity of noise shall not exceed 90 decibels (A) during a daily 8-hour work shift.
- In case of increasing noise level intensity over 90 dB (A), the period of exposure must be reduced according to the following table:

Table 3-7: Noise intensity Level Related to the Exposure Period

Noise Intensity Level Decibel (A)	95	100	105	110	115
Period of Exposure (hour)	4	2	1	½	¼

Table 3-8: Noise intensity Levels in Intermittent Knocking Places

Noise Intensity dB	Max Allowable Knocks During Daily Work Period
135	300
130	1000
125	3000
120	10000
115	30000

3.4.3.2 International Standards

According to IFC Environmental, health and Safety Guidelines (IFC, 2007), noise impacts should not exceed the levels presented in the following Table or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site:

Table 3-9 IFC standards for noise levels (IFC, 2007)

Noise levels				
	Workplace dB	Outdoor* dB		
			Daytime	Nighttime
Limit	90	Residential, Institutional and educational	55	45
		Industrial and commercial	70	70
Standard/ Guideline	Occupational Safety and Health Administration (OSHA)	IFC Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines: Environmental Noise Management		
* Noise impacts should not exceed the levels presented, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.				

When National regulations and IFC Guidelines differ, the project is expected to achieve whichever is more stringent.

3.4.4 Waste Minimisation Standards

3.4.4.1 National Standards

Law No. 4 of 1994 for the Protection of the Environment, and the Executive Regulation Decree 338 of 1995, Part I – Chapter II Hazardous Materials and Waste provide the policies and mechanisms for ensuring that solid wastes are appropriately handled and disposed.

Law No.4 defines Hazardous Substances as "substances having dangerous properties which are hazardous to human health, or which adversely affect the environment, such as contagious, toxic, explosive or flammable substances or those with ionising radiation"; and hazardous waste are defined as "waste of activities and processes or its ashes which retain the properties of hazardous substances and have no subsequent original or alternative uses, such as clinical waste from medical treatments or the waste resulting from the manufacture of any pharmaceutical products, drugs, organic solvents, printing fluid, dyes and painting materials".

The handling and disposal procedures for waste streams must also comply with the guidelines of Law 38/1976 on Municipal Waste Management.

Finally, Decree No. 673 (1999), issued by the Ministry of Petroleum, has defined hazardous substances in the petroleum sector. The Guidelines specify that the handling and transportation of hazardous waste is prohibited unless carried out by an authorized

hazardous waste treatment/disposal contractor or authority. Authorisation is also required for the temporary and permanent storage of hazardous wastes.

3.4.4.2 International standards

Hazardous Materials Management

Section 1.5 of IFC General EHS Guidelines (IFC, 2007); describe recommended management for Hazardous Materials.

The overall objective of hazardous materials management is to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their production, handling, storage and use. This objective can be achieved by:

- Establishing hazardous materials management priorities based on hazard analysis of risky operations identified through Social and Environmental Assessment; (
- Where practicable, avoiding or minimizing the use of hazardous materials. For example, non-hazardous materials have been found to substitute asbestos in building materials, PCBs in electrical equipment, persistent organic pollutants (POPs) in pesticides formulations, and ozone depleting substances in refrigeration systems; (
- Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion; (
- Using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard; (
- Implementing management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures. (

Waste Management

Section 1.6 of "the IFC General EHS Guidelines" is entitled Waste Management and is applicable to all projects that generate, store or handle any quantity of waste.

The waste management guidelines state that facilities that generate and store wastes should practice the following:

- Establish waste management priorities at the outset of activities based on an understanding of potential;
- Identify EHS risks and impacts and consider waste generation and its consequences;
- Establish a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes;
- Avoid or minimize the generation of waste materials, as far as practicable;
- Identify where waste generation cannot be avoided but can be minimized or where opportunities exist for, recovering and reusing waste; and
- Where waste cannot be recovered or reused, identify means of treating, destroying, and disposing of it in an environmentally sound manner.

4 Biophysical and Socio-economic Baseline

This description is based on a combination of desktop research, analysis of maps and aerial photography and an initial site inspection.

It should be noted that the SESA has provided detailed baseline information for the Benban site and area. This section complements the information of the SESA where necessary.

4.1 Biophysical Baseline

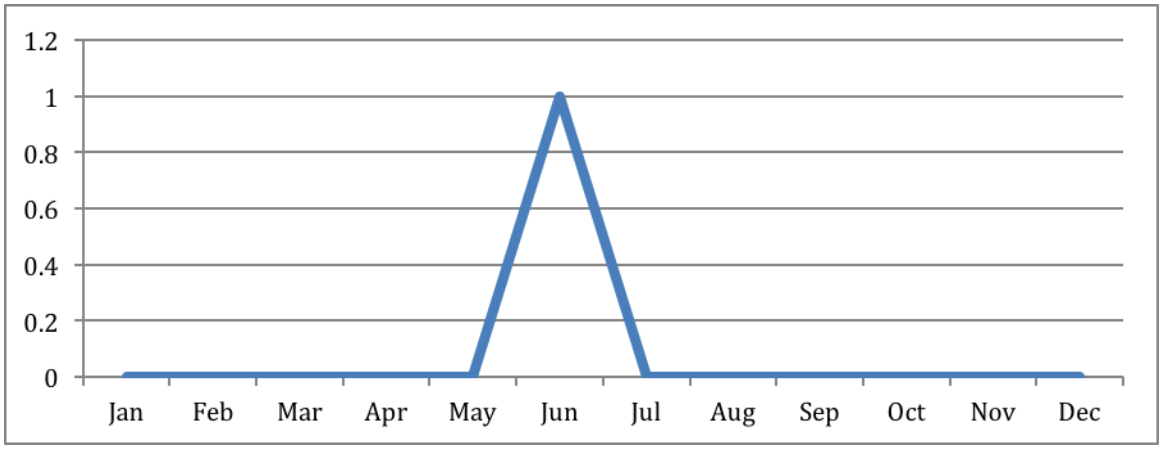
4.1.1 Climate

Aswan region occupies a portion of the extremely arid belt of Egypt where the rainfall is negligible only with exception of the occasional heavy torrential rainfall on the eastern height lands. The average maximum temperature varies from 21.6 C° in winter to 37.9 C° in summer, and the average minimum temperature varies from 6.7 C° in winter to 21.7 C° in summer. The maximum relative humidity is 51% in winter and 27% in summer. Prevailing winds are dominantly from NW to SE.

4.1.1.1 Rainfall

Rainfall in Aswan region normally ranges from 0.0mm to 1mm coming in spring (April and May). There is normally a long dry spell between May and December. The figure below shows the monthly and long-term average rainfall for Aswan.

Figure 9 Aswan 2015 monthly rainfall



Source: Climatemps statistical abstract 2015.

4.1.1.2 Temperature, Humidity, Wind and Evapotranspiration

Aswan region generally records a mean annual maximum temperature of around 34.2° C and a mean minimum of around 19.3°C. Its extreme highest temperatures are in the month of August when it records approximately 41.9°C. Relative humidity ranges from 15% in April

and May to 37% in December. Relative humidity, temperature, humidity and Wind speed are presented in the table below.

Table 4-1 Mean values for climate parameters at Aswan Region

Month	Air Temperature		Relative Humidity	Wind Speed
	Mean (max)	Mean (min)	%	(knots)
Jan	23.7	9.9	35	5.6
Feb	25.9	11.0	24	6.5
Mar	30.4	14.3	16	7.0
Apr	35.5	16.9	15	7.4
May	39.6	23.4	15	7.2
Jun	41.7	25.6	13	7.7
Jul	41.5	26.3	19	7.1
Aug	41.9	26.4	19	7.1
Sep	39.6	24.0	21	7.1
Oct	36.9	24.0	23	7.3
Nov	30.8	21.6	32	6.2
Dec	25.5	16.4	37	6.6

Source: Climatemps statistical abstract 2015.

No information on monthly temperature is available for the Project Site; however, similar characteristics to Aswan regions are expected.

4.1.2 Topography and Landscape

Aswan Governorate embraces the Nile River floodplain, and immediately adjacent territories. The sandstone, granite, and diorite hills flanking the Nile are dissected by ancient, long-dried-up streams.

The area proposed for the development is mainly flat with hard sandy and gravel ground. Ground levels vary from 145m to 150m with an average of 147m.

4.1.3 Soil and Geology

In the Aswan region, the sedimentary succession is differentiated into the following lithostratigraphic units; these are described from the younger to the older units. This description also applies to the proposed Project Site for Benban 50MW PV Plant, located approximately 43 km north of Aswan.

The Quaternary- Pliocene Rock unit, differentiated into the following subunits:

- The Aeolian sand deposits, sand sheets and sand dunes, (thickness < 10 m).
- Clay deposits of the present Nile flood plain, outwash deposits of the desert wadis, etc. (Holocene - Pleistocene), (thickness < 50 m).
- Graded sand and gravel containing the main aquifer, (thickness < 200 m).

- Mixed clay sand and gravel containing a secondary aquifer, (thickness < 100 m).
- Main clay layer with inter-beds of sand (Paleocene) (thickness >50m).

The Upper Cretaceous-Paleozoic Sandstone Rock Unit composed of sandstone with shale inter-beds and comprising an exposed thickness of about 300 m. In the subsurface the thickness is expected to increase to more than 1000 m.

Precambrian Rock Unit, highly fractured igneous and metamorphic rocks, with a limited geographical distribution on the surface. In the subsurface these extend almost all over the area and exist at varying depths below the surface.

Sand drifts. The predominant north winds drive fine sand southward, drifting across roads and into agricultural areas. In some places, the sand drifts form long, narrow windrows in the lee of fixed objects. Such windrows can extend for hundreds, even thousands of meters, downwind from the fixed objects.

Sand can also accumulate in croissant-shaped "barchan" dunes, which can be hundreds of meters across and tens of meters high, and which can move several m per year in the direction of the prevailing wind. A barchan dune is an arc- shaped sand ridge, comprised of well-sorted sand. This type of dune possesses two "horns" that face downwind, with the slip face (the downwind slope) at the angle of repose, or approximately 34 degrees. The upwind side is packed by the wind, and stands at about 15 degrees. Simple barchan dunes may stretch from meters to a hundred meters or so between the tips of the horns.

Sheets of yellow sand and gravel cover most of the area within the project footprint. A darker area comprised by old alluvial plains is located in the eastern side of the site. These areas are comprised by medium gravel, mainly quartz.

No signs of ground contamination was located onsite during the preliminarily assessment.

4.1.4 Seismic activity

Some areas such as Kalabsha (southern Aswan) in Aswan Governorate are known to be active in terms of seism activity. Kalabsha population is located approximately 55km to the south of the proposed development.

In general, the rate of seismicity and tectonic activity is considered to be low at the Project Site.

4.1.5 Hydrology and Hydrogeology

The Western Dessert habitat on which the project is located (see Section 4.1.6.2) is formed by the following hydrological systems: irrigation canals, River Nile and wadis. Wadis are dry ephemeral riverbeds that contains water only during short periods of time when heavy rain occur.

The River Nile is located approximately 18km to the east of the site. The nearest wadi is located approximately 12km to the south of the proposed development.

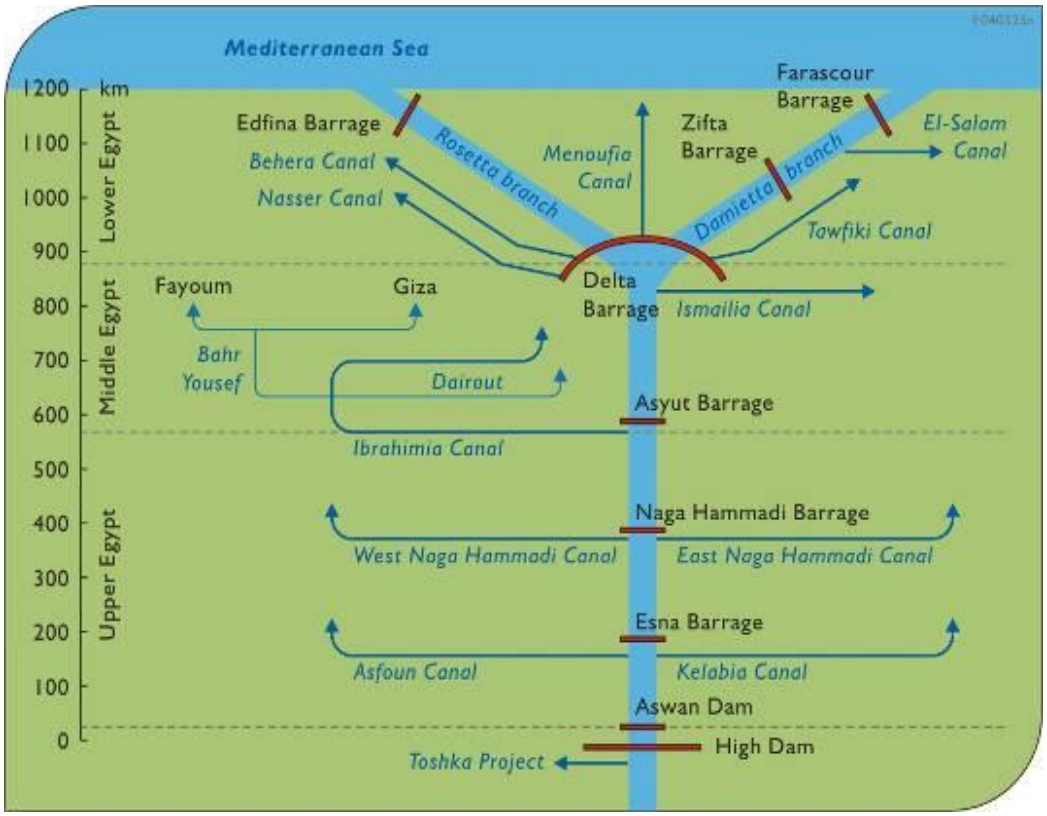
The Nubian sandstone aquifer underlies a large part of Egypt and neighboring Sudan, Chad and Libya, covering about 1.65 million km^2. The aquifer is up to 4000 m thick, and extends downward to 2000 m below sea level in the Kharga Oasis, which is located 251,3 km

northwest of the proposed development. Groundwater modeling indicates that the aquifer contains about 135,000 billion m^3 of water.

Hydrogeological data from the Project Site was obtained due to the construction of wells drilled onsite. The information obtained onsite includes groundwater levels. Results obtained during the study suggest that groundwater is located more that 150m deep and the extracted water is brackish.

No surface water was identified in the Project Site.

Table 4-2 Hydrology control structures along the Nile River



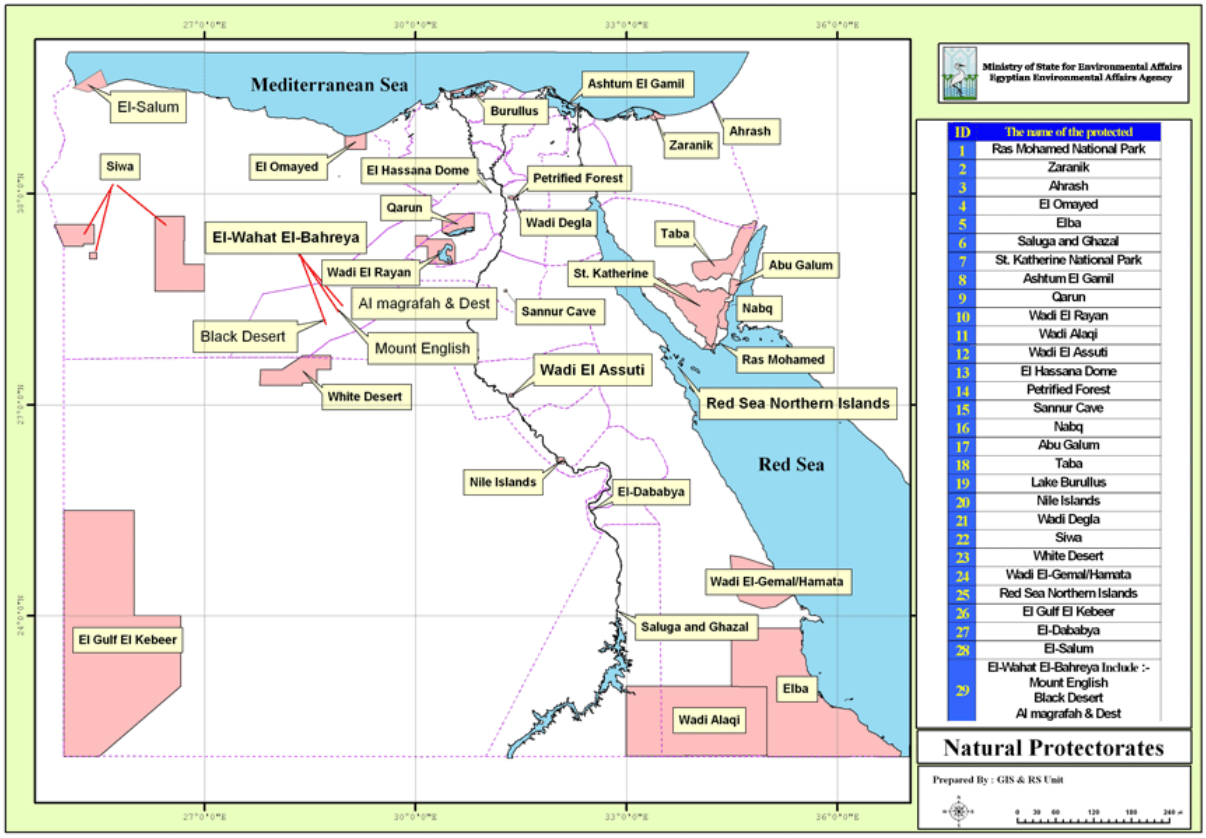
4.1.6 Ecology and Biodiversity

4.1.6.1 Protectorates and other Protected Areas

The 50MW PV footprint does not have any special features to qualify as a protected area. The nearest Protectorate is located about 41km to the proposed Project Site. Wadi Allaqi is located more than 186 km to the south of the proposed development and is also listed as a Biosphere reserve.

The Following Protectorates are located in Egypt:

Figure 10 Protectorates in Egypt



Source: Egyptian Ministry of Environment, EEAA.

The following Protectorates are located in Aswan Governorate.

Table 4-3 Protectorates within Aswan Governorate and distance to Benban 50 MW PV.

Protectorate	Declaration	Area (km2)	PM Decree	Coordinates		Distance to project (km)
				Latitude	Longitude	
Saluga and Ghazal	1986	0.5	928/1986	22°50'16.22"N	33°11'58.91"E	41 S
Wadi Allaqi	1989	30000	945/1989 and 2378/1996	24° 5'37.00"N	32°53'13.00"E	186 S

Source: Egyptian Ministry of Environment, EEAA.

No Ramsar Sites are located in Aswan Governorate.

The nearest Important Bird Area (IBA, BirdLife, 2015) Aswan Reservoir, is located approximately 53km to the south of the proposed development.

4.1.6.2 Habitats

A single habitat was identified within the proposed polygon for the 50 MW PV Plant according to the Egyptian Biodiversity Monitoring Project (BioMap 2005-2007) and this is Sand and Dunes of the Western Dessert.

Sand and Dunes of the Western Dessert

Although the Western Desert is essentially a flat rocky plateau, much of its vast expanse is covered by wind blown sand and the Great Sand Sea of Egypt is part of one of the largest sand-covered areas on earth.

The Sand Dunes cover a large part of the Western Desert; have a variety of forms and complexity that depend on the wind regime and sand abundance. In the north, longitudinal dunes known as *seif* (sword) or *irq* predominate, while to the south barchan or crescent-shaped dunes are more common. Some other forms, such as parallel wavy dune complexes are found but are less common. Dunes move at a more or less fixed rate in the direction of the prevailing wind. Thus, the southernmost fingers of the Great Sand Sea are encroaching on the wadis of Gilf Kebir.

The proposed 50MW PV Plant was composed of desert sandy and rocky plains characterised by a variable layer of gravel and small plateaus mainly comprised by boulders and conglomerates. No vegetation nor flora was found onsite.

4.1.6.3 Flora

Typical Flora within Sand and Dunes of the Western Dessert habitats

Between large longitudinal *seif* dunes there are often inter-dune valleys that can support a wealth of plant and animal life. Mobile dune types are less well supplied with wildlife. Phytogenic mounds that form round such plants as *Nitraria retusa*, *Calligonum comosum* or *Tamarix* spp. add greatly to this habitat's diversity and create niches for animals and birds.

Flora Species in the Project Site

No flora species were found at the proposed project site.

4.1.6.4 Fauna

Typical Fauna within Sand and Dunes of the Western Dessert habitats

The waterless expanse of this desert is home to an assemblage of animals that are well adapted to living without water. Fauna species have evolved behavioral or morphological features that enable them to survive the extreme climate. The Lesser Sand Viper, *Cerastes vipera*, is only found in sandy habitats. Another denizen of the sands is the Sandfish, *Scincus scincus*.

Mammals of the region include the extremely rare Slender-horned Gazelle, *Gazella leptoceros*. This animal lives largely on such plants as *Nitraria retusa*, *Cornulaca monacantha* and *Calligonum comosum*. An immensely appealing animal of the sands is the tiny Fennec Fox, *Vulpes zerda*, which may be one of the most well adapted desert carnivores in the

world. They dig rather deep burrows so that exposure to heat during the day is reduced to a minimum and appear to be the only desert carnivores that can live entirely without direct water.

Fauna Species in the Project Site

No fauna species nor burrows were found within the proposed project site.

However, it is important to note that migratory soaring birds use the site as a migratory path.

4.1.6.5 Ecosystem services

No ecosystem services were identified onsite. The site is characterized by the lack of water resources, vegetation and wildlife.

4.1.7 Resource Efficiency and Pollution Prevention

4.1.7.1 Air Quality

No sources of air pollution were identified on the proposed area for the 50MW PV Plant.

The available data from Aswan Governorate indicate that the air in Aswan city comply with the national air quality standards as indicated in law 4/1994. However, air pollution problems may occur locally at the KIMA factory in Aswan city.

Air pollution is a big problem in connection with the sugar factories in Kom Ombo and Edfu and the ferrosilicon factory in Edfu. The air in Kom Ombo and Edfu is polluted in the surrounding areas around the factories. The quality standards for small particles (PM_{10}) are severely violated as indicated in law 4/1994 limits.

4.1.7.2 Water quality

No sources of water pollution were identified on the proposed area for the 50MW PV Plant.

Aswan Governorate is fortunate in having water of good quality of Lake Nasser and the Nile, the water quality generally meeting the water quality standards stipulated by Law 48/1982. The following drains have lower water quality and suffer from pollution;

- El Sail (KIMA canal) in Aswan City,
- Ganayen drain, and
- El Berba drain.

There are problems with high bacterial counts in many of the agricultural drains indicating that drain water may be a potentially health hazard to the public.

Aswan Governorate tap water considered good quality and exceeds the Egyptian recommended standard (109-140%). Tap water in rural areas including Daraw, KomOmbo, and Edfu city don´t reach national recommended standards and is not considered of good quality (60-73% of the recommended standard).

Households in Aswan Governorate discharge an estimated amount of wastewater of about 130,000m^3/day. Approximately one third of this water is treated and the other two thirds is

discharged as raw wastewater. The level of domestic wastewater treatment is poor in rural areas. However, treatment in large cities is considered of good quality.

Industries following are considered major sources of water pollution: KIMA factory in Aswan, the sugar cane and integrated industries in Edfu and Kom Ombo. Other sources of water pollution are the resultant from farmland and, agricultural wastewater and wastewater from Nile cruisers.

4.1.7.3 Waste and Hazardous waste

No sources of waste or hazardous waste were identified at the project site.

Households in Aswan Governorate generate an estimated 665 tones of waste /day. Only 35% of this waste is collected by public waste collection systems. Public waste collection systems in villages are almost non-existent. Aswan City has the best coverage of waste collection, followed by Edfu -, Daraw - and Kom Ombo City.

An estimated amount of hazardous waste of 650 kg/day is generated in Hospital in Aswan region. No source separation of hazardous and non-hazardous fractions is available and a single waste incinerator is available (Aswan Fever Hospital).

4.1.7.4 Noise

Noise is 'unwanted sound' and can be considered a nuisance, particularly when sensitive receptors are exposed to it at high magnitudes or unusual frequencies. Vibration can also cause a nuisance, whilst potentially causing damage to structures.

Noise levels are expressed as micro Pascal (μPa). The human ear can detect sound levels from 20 μPa to 100,000,000 μPa. A special logarithmic scale is used to represent this enormous range, namely decibels (dB), which in most cases is A-weighed to correspond to a similar range of human hearing sensitivity. The corresponding unit is dB (A).

During the preliminarily site visit it was noted that the main source of noise at the site and the project vicinity is:

- Traffic on the Luxor-Aswan Highway and;
- Prevailing wind.

No sensitive receptors were identified during the site visit. In general, sound levels were low and it is not expected that potential issues could appear due to existing noise levels.

4.2 Socio-Economic Baseline

This section describes the social and economic baseline in the Project Site and the neighbor areas.

4.2.1 Administrative structure

Aswan is one of the Governorates of the Upper Egypt Region that also includes Sohag, Qena, Red Sea, and Luxor City.

Benban village and New Benban village are the nearest localities within the project's area, both belongs to Daraw Markaz district, one of the five Aswan's Governorate districts. Benban Al Gdeeda is located 18km to the East of the proposed Benban 50MW PV Plant.

No households are located within the Project Site or the nearby.

Agriculture and tourism are the main activities in Aswan region. The total area of cultivated land covers 646 km^2 where sugar-cane cultivation covers 50.0% of this area, followed by palm trees, and hibiscus.

Aswan also comprises some industrial activities such as sugar refining, chemical fertilizers, phosphate, and fishery activities. These are mainly situated in the industrial zone of El Shalal.

4.2.2 Economic Status

In 2010 Aswan region labour force represents 29.4% of the total population where 21.9% of are females. Agriculture workers represent 30.3% of the total labour force while those who work in services activities represent 43.0%. The industry has a less relevant economical position with a 26,7% of the total labour force.

Unemployment rate recorded in Aswan Governorate is approximately 12.9% among which 34.5% are females, and it is higher in rural areas.

Population with education degrees below secondary and university education do not suffer from severe unemployment, whereas, those with up to secondary education face severe unemployment rates of approximately 85.7% (United Nations, 2010).

4.2.2.1 Sources of water

Aswan Governorate depends almost entirely on the Nile River as a water source. In general, accessibility to potable water is high, where almost all households in Benban Al Gdeeda have access to potable water.

Access to a proper Sewage System is not common in Aswan Governorate, where the connectivity rate is about 27.1% in both Daraw and Kom Ombo districts.

4.2.2.2 Land Use

No land uses were identified on the proposed area for the 50MW PV Plant, no natural resources were identified and the land located on the proposed area is considered unsuitable for any agricultural, or grazing use.

Agriculture is the main land use in Aswan Governorate. Aswan Governorate has a cultivated area of about 150,000 feddans in the Nile Valley. Furthermore an area of between 15,000 and 23,000 feddans are cultivated on the shores of Lake Nasser and an additional 3,000 feddans are cultivated in the upland areas at Abu Simbel. Agriculture depends on irrigation by pumping water from the Nile and Lake Nasser. The saline nature of the cultivated soils requires efficient drainage networks. Drainage is usually by gravity through lateral drains ended by main drains, but in some cases drainage water is pumped back through pump station to the Nile.

Sugarcane is the most important cash crop, covering 57% of the cultivated area. Wheat covers 15 %. Other crops include bersim, clover, barley, maize, onion, garlic, beans, chickpeas, sesame, karkade and henna. The main crops around Lake Nasser are tomatoes and watermelon. Cultivation of sugarcane mainly takes place in Edfu and Kom Ombo markaz, followed by Nasr El Nuba.

The average farm size in the Nile Valley is generally less than two feddans and cropping patterns are intensive. Farmers are using traditional surface water irrigation rather than sprinkler or drip irrigation, which result in severe water losses. In the lake area the Lake Nasser Development Authority distributes five feddans per farmer. The farming system is intensive but not sustainable. Crop rotation is hardly ever practiced, few livestock are kept and the soil is supplied with very little organic matter.

Date is considered the second crop in Aswan Governorate. The number of fruitful Balm trees is 1735000. The average productivity increased from 35kg/tree per year in 1987 to 82kg/tree per year in 2002.

4.2.2.3 Sources of Energy

Access to electricity in Upper Egypt is estimated at 99% (EHDR 2010). Scattered areas also have access to electricity regardless of their formality and legality. This indicates the stability of infrastructure in most areas.

4.2.2.4 Education

Aswan Governorate has a total of 1119 pre-university schools.

There is a number of schools in Daraw district including: kindergarten, primary and secondary schools, agriculture and vocational schools, etc.

Table 4-4 Schools located in Aswan Governorate and Daraw Markazs.

Educational level	Aswan Governorate	Daraw District
Pre schooling (kindergarten)	268	24

Educational level	Aswan Governorate	Daraw District
One class schools	60	10
Primary	456	36
Preparatory	272	19
Public Secondary	39	3
Vocational 3-5 years	39	3
Commercial and hotels schools	16	1
Agriculture schools	5	1
Special needs	35	1
Total	1119	98

- No information available

No schools are located within the proposed Project Site.

4.2.2.5 Health facilities and status

There is a single Public Hospital in Daraw district with a total of 63 doctors and 161 nurses.

Many of the health care problems in Aswan Governorate are attributed to poor standards of sanitation and hygiene. Registrations from the Ministry of Health Aswan show, that the most frequent registered diseases among population in the Governorate are the water borne deceases Hepatitis and Typhoid.

4.2.3 Social Status

4.2.3.1 Vulnerable groups and Gender

Vulnerable people are people who due to any specific characteristic, such as gender, age, ethnicity, disabilities, economic situation or social status, may be more adversely affected by the land acquisition process or have a more limited ability to take advantage of compensation or livelihood restoration measures than others.

In the context of the project, we can identify the following potentially vulnerable groups:

- Women. In 2013, the UNDP´s Gender Inequality Index (Human development reports) rated Egypt 110th out of 187 countries, with an overall value of 0.58, where 1.0 is a perfect score. These indicators suggest strong gender-based disparities in areas of reproductive health, economic functioning, and overall empowerment. Reasons for inequalities are numerous; social norms and attitudes, economic pressures, religious beliefs, and structural forces all help maintain the status. Furthermore, the relatively low representation of women in parliament, gender disparities in labour force participation, and other factors combine to place the region near the bottom of the Gender Inequality Index.

- Illiterate people, as they have difficulties accessing information and participation mechanisms;
- Disabled people, seriously ill people or the elderly, particularly when living alone;
- Households that have very limited resources;

There are no ethnic minorities, indigenous peoples or internally displaced people in the Project Site.

4.2.3.2 Demographics

The total population of Aswan Governorate was estimated at 1,323,315 in 2014, females represent 48.1% of the total population. A total of 54,8 % of the population lives in rural areas.

Daraw Markaz district had a population of 109,400 in 2014, in 24,488 households. The population in Benban Al Gdeeda is estimated in 8,806 people, representing a 8,3% of Daraw's total population. New Benban Al Gdeeda includes 100 households, five of them are inhabited.

Main tribes in this district are El Ansar and El Ababda. Most of the inhabitants are Muslims, with a small percentage of Christians (3%).

The age-distribution of the population in Aswan Governorate is represented by a majority of young community, with nearly 80% between 0 and 15. Only a 6,4% of the population is over 60 (CAPMAS census 2006).

4.2.4 Cultural Heritage and Archaeology

There are numerous sites of archaeological and cultural importance within Egypt of which the preservation and protection of such resources is vital in maintaining the culture and heritage associated with the nation.

The nearest cultural and archaeological site is Temple of Kom Ombo, and this is located 23,5km to the east of the proposed development, on the eastern side of the Nile River. Temple of Kom Ombo was an important crossroad site between the caravan routes from Nubia to the eastern desert and was built during the Ptolemaic dynasty 180-47 BC.

Figure 11 Temple of Kom Ombo

Although considered unlikely, it is prudent to consider the possibility of archaeologically or culturally important artifacts, features, or landscapes to be present and/or affected by the Project construction and operation.

During the site investigations undertaken, no signs or visual evidence of cultural/archaeological facets were identified on the site itself or in the surrounding areas.

4.2.5 Traffic and Transportation

The Project Site is not directly linked to any road. However the nearest town, Benban Al Gdeeda is linked to the rest of the country, Aswan and Luxor, through Luxor-Aswan Highway, running from Luxor to Aswan. Daraw district is also linked to the Red Sea and the Eastern part of Egypt via Edfu - Marsa Alam Road and connected to the Western part of Egypt via Luxor – Al Kharga Road.

5 Potential Impacts

The following section describes potentially significant impacts based on the site visit, desk studies, project design, and available information on the environmental impacts of similar solar energy developments. These impacts are addressed through the implementation of appropriate mitigation and management measures, as described in the Environmental Management Plan (EMS) in volume 2.

5.1.1 Biophysical

5.1.1.1 Soil

Construction Phase

Trenches will need to be excavated in order to install the PV structures, and cables/pipes, potentially increasing risk of erosion. However, this will be temporary and trenches will be rapidly covered. Therefore, negligible impacts are expected at this stage.

Soils will be susceptible to contamination from various sources during the construction phase of the project, especially when considering accidental interactions of soils with hazardous substances.

There are various construction activities that could potentially cause one of these impacts:

Spillage or leakage of hazardous materials: from inadequate handling or improper methods of storing or transferring chemical products, paints, oils, fuels, lubricants, vehicle oil changing or refueling, sanitary wastewater from worker compounds and cleaning agents used during construction.

Inadequate waste management: from improper temporary storage and handling of solid and hazardous waste and liquid wastes generated during the activities that involve the construction of the proposed project.

Operational Phase

Soil contamination could be expected only from the inadequate handling or improper methods of storing or transferring fuels, vehicle oil, or cleaning agents during maintenance activities, or improperly management of leaking oil from transformers.

5.1.1.2 Hydrology and Hydrogeology

No hydrological systems were identified on the Project Site. Results obtained during the study suggest that groundwater is located more that 100 m deep, therefore no impacts on the hydrological/hydrogeological systems are expected.

5.1.1.3 Ecology and Biodiversity

Construction Phase

The project area and the locations being considered for ancillary facilities show a low biodiversity and its footprint should not cause a significant impact. Risks to fauna and flora could come from hunting, fauna entering the project area, vehicles running animals over, and the introduction of invasive species.

Operational Phase

Minor impacts on biodiversity could be expected during operational phase, mainly due to direct mortality as a result of increased traffic levels and hunting.

An additional risk during the operational phase is mortality of migratory soaring birds due to the collisions with panels. This impact has been reported by the US EPA for PV plants located in desert areas.

5.1.1.4 Air Quality

Construction Phase

During construction, the ambient air quality may potentially be affected by:

- Increased dust,
- Gaseous and particulate emissions,
- Emissions of VOCs and other hazardous volatiles,

Dust is a significant concern due to the desert environment, and sensitive receptors include workers, nearby PV projects and road users. The cumulative impact of a large number of project being developed concurrently can be very significant. The main sources of these emissions and dust during construction will be:

- Excavations and earthworks, such as ground breaking, cutting, filling and levelling;
- Truck movements on unpaved, or compacted surfaces;
- Particulate dispersion from uncovered truckloads, and
- Stored VOCs and other volatile hazardous materials.

Some GHG emissions are to be expected during construction, and these will be due to vehicle and machinery use. There will also be minor emissions of SO_2 and NO_2 but these will dissipate quickly. VOCs can be a localised risk due to the use of certain hazardous materials during construction.

Operational Phase

During operational phase negligible impacts are expected in the form of dust and gaseous and particulate emissions generated by vehicle movements.

5.1.1.5 Water pollution

Construction Phase

There is no surface water onsite or around the site area. During construction the main issues regarding water contamination are:

- Sanitary and domestic wastewater generation; and
- Storm water runoff events on site.

Sanitary and domestic wastewater generation: A septic tank for wastewater will be installed onsite. The wastewater will be tankered offsite and treated by an authorized local utility following national requirements on wastewater treatment.

Storm water has the potential to run off into areas containing hazardous materials and either leach these into the soil or carry these offsite. Any storm water pollution will most likely result in soil contamination.

Operational Phase

During operation, the main issues regarding wastewater would be the same as during construction phase, but even less hazardous materials will be stored onsite.

5.1.1.6 Waste and Hazardous Waste

Construction Phase

Waste from construction activities may arise from a range of sources, including the following:

- Excavated material (e.g. rock and soil);
- Waste from construction workers; and
- Waste from packaging and other materials.

Although the hazardous fraction of construction waste represents a relatively small portion of the total amount of construction waste likely to be generated, its disposal requires careful consideration. Typical hazardous waste streams that may arise during construction include, but are not limited to: solvents, used oil, hydraulic fluid, resins and paints, etc.

The hazardous fraction of the construction waste could potentially cause significant adverse impacts on human health and the environment if managed improperly. Inappropriate handling through lack of personnel training on site may lead to accidental spills or leaks to the soil or groundwater may lead to a contamination event, resulting in a potential health risk to workers and environmental impacts.

Operational Phase

Waste generation during the operational phase will be minimal. Waste from the operation activities may arise from a range of sources, including the following: Waste from workers; and waste from equipment or packaging materials.

5.1.1.7 Noise and Vibration

Construction Phase

Activities related to construction phase could potentially lead into an increase of noise and vibration levels.

Noise levels are very likely to be affected by the following work activities during construction phase:

Site preparation - Back filling, levelling and grading and excavations in areas where foundations are to be constructed. It is assumed that these activities will require the use of dozers, excavators and muck-away lorries.

Civil Works – Piling may be required for some of the building foundations during this phase.

Construction and Installation – PV Support structures will be rammed into the sandy soil.

Drainage and road construction – construction will comprise of several operations that will likely include excavation for and laying of drainage pipes and road surfacing, to include use of planers, dozers and pavers.

Certain construction processes, particularly those involved with site preparation and civil works, e.g. ground breaking and excavations, have the potential to create **vibrations** within the vicinity of the works. Vibrations are also anticipated to occur sporadically around the construction site due to the movement of materials and equipment.

Key receptors for noise and vibration will be workers and nearby projects.

Operational Phase

Negligible noise impacts are expected during operational phase, mainly generated by vehicles movement and maintenance works.

5.1.2 Socio-Economic

5.1.2.1 Socioeconomic Status

Construction Phase

The following positive socio-economic impacts are likely to occur during construction:

- Employment creation, and
- Dissemination of skills.

The primary economic impact during construction is likely to result from employment creation during this phase, whereby money earned on the project will be expended locally and re-circulate within the local economy.

In addition to the above, there also exists the potential for the project to promote the dissemination of construction and construction support skills from expatriate workers into the local labour force.

A further secondary impact is likely to arise from spending on local and foreign goods and services during the construction process. The nature of the development, and specialised nature of required materials, suggests that these will be sourced internationally, apart from construction materials (e.g. concrete, cabling, etc.).

Traffic impacts could cause secondary negative socioeconomic impacts to the nearer local residents, such as depreciation of houses, along the high way.

Negative socioeconomic impacts may result from the interaction between the local population and expatriate workers, the potential proliferation of informal settlements around the site of people looking for work, social conflict resulting from the discrimination against particular social groups in the share of the project benefits (employment or CSR) or the interaction between the local population and the security forces protecting the site.

Social impacts will be addressed through management plans, most of them at the common level by the Developer's Association.

Operational Phase

A lack of available local experts for the PV Plant management could lead on the importation of qualified workers and a reduction in the benefit to the local economy.

5.1.2.2 Traffic and Transportation

Construction Phase

The transportation of materials for the construction of the 50MW PV Plant will result into an increase of traffic and transportation levels at Luxor-Aswan Highway.

Potential impacts relating to the increase of vehicles may include congestion, increased journey times and higher accident risks, or higher fear of accidents. The cumulative impact from all the projects that will be built simultaneously is a key risk.

Operational Phase

Negligible impacts are expected at this stage as the operational phase of the proposed PV plant is not expected to have a significant increase of traffic onsite.

5.1.2.3 Topography and Landscape

Construction Phase

One of the first stages of construction activities will result in the leveling, grading and preparation of the site, ahead of construction beginning.

The movement of heavy construction vehicles and earthworks on sandy surfaces result in visual impacts and changes to the landscape character.

Impacts to landscape character and the visual envelope of surrounding receptors will also occur at night where the addition of lighting during construction will illuminate this area that has previously been free of any light sources. The addition of light and eventual widespread use of lighting across the 50MW PV construction site will result in a night-time light haze being emitted in the air above the general site area.

The nearest visual receptor (Luxor-Aswan Highway) is located 5,7km to the proposed PV Plant, and drivers on the road will be able to notice the changes outlined above.

Operational Phase

Negligible impacts over visual receptors are expected at this stage, the nearest visual receptor is located 5,7km to the proposed PV Plant, however due to the nature of this type of infrastructure it will have minimal landscape and visual impacts during operational phase.

5.1.2.4 Cultural Heritage and Archaeology

Construction Phase

The baseline study comprising site observations and consultation has not identified any specific cultural or archaeological features at the proposed 50MW PV site. However, there is always potential for unknown buried artifacts to be disturbed or unearthed during earthworks. Should such an impact occur, this might result in the damage or destruction of such items, with resulting losses in the value of such features.

Operational Phase

Negligible impacts over archaeological receptors are expected during this phase as no receptors were identified onsite and no excavation processes are expected during maintenance works.

6 References

AccountAbility, the United Nations Environment Programme, and Stakeholder Research Associates (2005) The Stakeholder Engagement Manual Volume 2: The Practitioner's Handbook On Stakeholder Engagement;

BioMap, 2005 - 2007. Biodiversity Monitoring and Assessment Project. United Nations Development Program, Egyptian Environmental Affairs Agency and Italian Cooperation Project.

BirdLife International (2012) IUCN Red List for birds. http://www.birdlife.org.

BP Statistical Review of World Energy (2014), Excel workbook of historical data, 2014

Department of Immigration and Citizenship (2008) Stakeholder Engagement Practitioner Handbook. Australia;

Egypt New and Renewable Energy Authority (2012/2013), Annual Report 2012/2013

ESDAT (2000). Dutch Target and Intervention Values. Esdat Environmental Database Management Software

Glasson, J. (1994) 'Life after the Decision: The Importance of Monitoring in EIA', Built Environment, 20 (4): 309-320

IFC (2007) The Stakeholder Engagement Manual – Volume 1: The Guide to Practitioners Perspectives on Stakeholder Engagement. Stakeholder Research Associates;

IFC (2009) Addressing Grievances from Project-Affected Communities. Guidance For Projects And Companies On Designing Grievance Mechanisms. Good Practice Note;

IFC, (2013). Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets.

IUCN. (1999). IUCN Red List categories. World Conservation Union

M.A. Omran (2000), Analysis of Solar radiation over Egypt. Theoretical and Applied Climatology, Al-Azhar University, Cairo. 67, 225-240 (2000).

UNDP, (2013). Gender Inequality Index. Human Development Reports, United Nations.

US EPA (2007) Guide to Stakeholder Engagement;

ANNEX 1: EEAA Approval of the integrated EIA of the development

ANNEX 2: 50MW PV Plant Layout and Location

ANNEX 3: Project Phasing Plan

ANNEX 4: (LV and MV) Single Line Diagrams (SLDs)