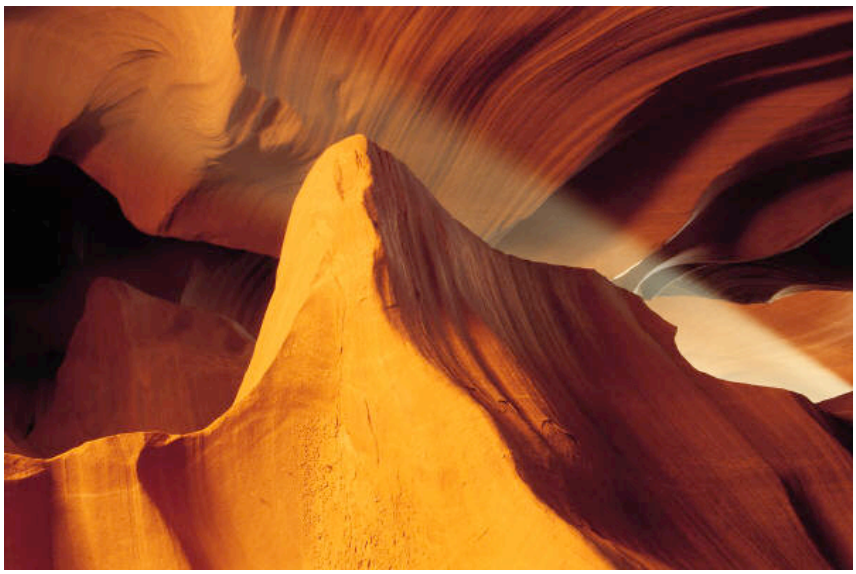
Benban 50 MW Photovoltaic Power Station

Aswan, Egypt

Environmental Impact Assessment
Form B



Prepared for: ACWA Power

April 2016

Document Information

Project	BenBan 50MW Photovoltaic Power Station
Project Number	1305/001/022/002
Report Title	Environmental I Impact Assessment Form (B)
Client	ACWA Power
Project Manager	Carlos Ponte
Project Director	Ken Wade

Document Control

Issue	Issue Date	Version	Author	Reviewed	Approved
-	07 April 2016-	Internal Draft	AGL	-	-
1	14 April 2016	Draft for IFC	AGL	CPM	KW

1 Content

List of Acronyms

Acronym	Abbreviation
BOO	Build-Own-Operate
CAA	Competent Administrative Authority
CMP	Common Management Plans
DA	Developer's Association
EA	Environmental Approval
EEAA	Egypt Environmental Affairs Agency
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
E&S	Environmental and Social
FIT	Feed-in-tariff
GIPP	Greenfield Independent Power Project
IFC	International Finance Corporation
IFI	International Finance Institution
MoERE	Ministry of Electricity and Renewable Energy
NREA	New and Renewable Energy Authority
PPA	Power Purchase Agreement
PS	Performance Standard
PV	Photovoltaic
SCADA	Supervisory Control And Data Acquisition
SESA	Strategic Environmental and Social Assessment
WB	World Bank

2 Introduction

The current installed capacity in Egypt is not sufficient any longer to meet energy demand. The Egyptian government and the Ministry of Electricity and Renewable Energy (MoERE) are committed to diversify the energy mix and increase national capacity whilst meeting sound environmental and social standards.

In line with the Egypt 4.3 GW Feed-in-tariff (FiT) program, the New and Renewable Energy Authority (NREA) is furthering the 1,800 MW BenBan Solar Photovoltaic Park (the Park) located in Benban, South Egypt. The FiT program assigns 40 plots for a total 18 GW in 20 and 50 MWac PV plants. The number of projects being currently developed is 38.

ACWA Power will develop a 50 MWac photovoltaic Greenfield Independent Power Project (GIPP) –henceforth Acwa PV- under a Build-Own-Operate (BOO) contract for the 25-year term proposed in the Purchase Power Agreement (PPA). ACWA will therefore lead the development, design, procurement, construction, erection, installation, commissioning, financing and operations and maintenance of the PV.

The group of Lenders funding projects in the Park facilitated the preparation of a Strategic Environmental and Social Impact Assessment (SESA) to assess social and environmental (E&S) risks and impacts associated to the Park. The Developers have formed a Developer's Association (DAto representing the interest of the Park as a single unit. The DA will manage common E&S issues through the implementation of Common Management Plans (CMP) in line with SESA findings. CMPs are key for the effective management of cumulative E&S impacts and risks.

Following the approval of the SESA, the Egyptian Environmental Affair Agency (EEAA) classified individual PV developments as Category B projects. In line with the EEAA Guidelines of Principles and Procedures for Environmental Impact Assessment, Category B Projects are required to complete the EIA Assessment Form (B).

There will be a number of shared facilities (Park roads, substation, power line, etc.). This EIA Assessment Form (B) for the ACWA PV itself does not consider other facilities that -even though are associated to the development- these have been covered in the SESA or will be subject to further E&S studies in line with the EEAA Environmental Approval (EA) following SESA review.

Environmental Impact Assessment Form (B)

The following Environmental Impact Assessment Form (B) and attachments have been developed in line with the requirements set out in EEAA- EIA Guidelines.

INSERT EIA FORM HERE

Arab Republic of Egypt
The Cabinet of Ministers
Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency

The information required in this form should be filled in an accurate and legible way. The Competent Administrative Authority should review and stamp the form, then send it to EEAA for review and feedback. Site visit report or any additional attachment should be also submitted.

Environmental Impact Assessment Form (B)

1. General Information

1.1 Project title: Benban PV

1.2 Type of the project (infrastructure-industrial, agricultural, energy, health care project, tourism, etc.): Energy

1.3 Address of the Project: Plot (SBN 43-4) of the PV Power Plant Project in Benban 40 km North of Aswan City, Aswan Governorate, Egypt

1.4 Name of the owner: (individual, company, etc)
ACWA BenBan One of Energy

1.5 Name of person in charge: Mohamed Nassef Masoud
Telephone: +2 011 154 55548
Fax: +971 4 3859 625
E-mail: mnassef@acwapower.com

Entity/individual preparing the form: -------Integral----------
----
Telephone: ---------- Fax: ----------
E-mail: ----------

1.6 Competent Administrative Authority: NREA**----------**

1.7 Type of project:
X New ☐ Extension and its type: ----------

- If the type of project is an extension, has an EIA study been submitted for the original project? ☐ Yes ☐ No
- Date of obtaining the previous EEAA approval (attach the approval): ----------
  Attachment no (1)----------
- Date of obtaining the first project license: ----------
  Attachment no (2)----------

1.8 Is the project located in a larger development (industrial estate, tourism center, etc.) ☒Yes ☐ No

If yes, state the name of the development - Benban Solar Photovoltaic Park

Has an EIA been submitted for this development? ***X*Yes** **No**

Date of obtaining EEAA approval and attach the approval: ---17-March-2016------

Attachment no (3)-Included----------

2. Project Information

2.1 Total area of the project (m^2): -----859,732----------

Total area for project buildings (m^2): ----------

2.2 Project Location and Site

Attach a general description of the project location from all directions showing the project boundaries with respect to the neighboring developments, landuse, roads as well as archeological sites and natural protectorates, if any. (Attach a detailed map to scale, stamped by the Competent Administrative Authority and indicate the wind direction on the map).

Attachment no (4)---Included----------

2.3 Distance between the site and the nearest residential area: --------12 Km----------

2.4 Nature of the area in which the project is located (could be more than one selection)

☐ Separate building	☐ A building with residence above	☒City
☐ Village	☐ In a residential area	☒X Outside residential area
☐ Agricultural area	☐ Desert area	☒Industrial area
☐ Vocational area	☒Coastal area	☒Protected Area

☒ Archeological area ☐ Other (please specify) ------Unoccupied desert land---------

2.5 General Description of the Project Area

Attach a description of the project area in terms of physical, biological, social and cultural environment.

Attachment no (5 Included----------

2.6 Infrastructure:

Water supply (network)	☐ Available	☐ Not available
Electricity supply (network)	☐ Available	☐ Not available
Sewers	☐ Available	☐ Not available
Roads/railways	☐ Available	☐ Not available
Sources of fuel	☐ Available	☐ Not available

3. Description of Project Phases

3.1 Construction stage

- **Construction date: ----------From 7-Nov-2016 to 20-July-2017----------**
- **Time schedule for construction: ----------Annex 2----------**

3.1.1 Brief description of the activities during the construction phase

1. Civil works: site leveling, internal roads construction, trenches digging;
2. Mechanical works: foundations and assemblies, modules mounting;
3. Electrical works: cables laying, inverters and transformers installation, earthing system installation, string and grid connections, security system installation;
4. Commissioning and testing, and
5. Functional tests.

- **Water sources**: ---external supply-----**Uses**: ---Human consumption, Sanitary and domestic uses, dust suppression, panel cleaning (commissioning)-- ---**Consumption rate**: --- Human consumption (1,000 l/day) , Sanitary needs (2,000 l/day), dust suppression (10 water trucks/day), panel cleaning-commissioning (0,25 l/m^2)------
- **Fuel type: ----Diesel--------Source of fuel: ----externally supplied-------Consumption rate**: ---XXXXX-----
- **Expected workforce and accommodation location: ----------** 250-300 (400 peak) –Workers' accommodation facilities will likely be developed in association with other developers (leaded by the Developer's Association) in two plots yet to be developed in the Park

3.1.2 Waste generated from construction and methods for disposal

- **Solid waste: ----------Types: carton, wood, plastic, metal scrap**

  Quantities: ----------XXXXX---------Disposal methods: collection by licensed operator(s)

- **Wastewater: ----------Types: sanitary facilities**

  Quantities: ---------- XXXXX--------Disposal methods: septic tanks / chemical toilets – collected by pump trucks

- **Air emissions (smoke, odor, particulates): -Dust and gaseous emissions (generators and vehicles).**
- **Noise: Mostly form machinery (e.g. generators, drilling machines) and vehicles (graders, trucks, etc.)**
- **Others: ----------**

3.2 Operation stage

3.2.1 Detailed description for operation phase (attach illustrative figures)

- **Main components of the project: Photovoltaic cells, inverters, cables, transformers, SCADA**
- **Sources of water (municipal/groundwater/surface water/---) externally supplied**
  Consumption rate (m^3/day): -----400 l/day + 160 m^3 per cleaning cycle (1 cycle every 20 days)
- **Type and source of fuel: None**

Consumption rate: None

- **Electric energy used: 1,000 MWh/yr Source: Grid**
- **Attach a description of activities for each project component (supported by illustrative figures and activities flow charts) while illustrative the inputs and outputs of each component and their quantities.**

  Attachment no (6)-----**Included**----------

Alternatives taken into consideration for inputs or technologies or design or layout, etc.

High-level options included technology alternatives (wind and CSP) and alternative locations of the Solar PV Development). At a project level, different cleaning technologies were evaluated and the proposed project incorporate the most sustainable and efficient approach with regards to water consumption and energy generated.

Expected workforce and accommodation location: 6 + 30 (wet cleaning overnight) – each employee will be responsible for its own accommodation

3.2.2 Wastes, their treatment and disposal

- **Air emissions: None**

  Discharge rate for air emissions: ----------(m^3/hr)----------

  Description of the treatment of air emissions and expected quality after treatment: ----------

  ------

  Attach the expected analysis for air emissions in comparison to allowable limits of law 4/1994.

  Attachment no (7)----------

- **Wastewater:**

  Domestic wastewater: ----------

  Discharge rate: ---XXXX----(m^3/day)

  Disposal method: (public sewer system-septic tanks, others) –septic tank----

  In case there is a sewage treatment unit: not applicable

  Attach a description of the components of the unit and method to dispose of sludge and treated wastewater as well as the characteristics of the unit effluent.

  Industrial wastewater: not applicable

  Discharge rate: ----------(m^3/day)

  Disposal method:

  - Directly on the public sewer system
  - Collected in a septic tank with no treatment to be swept afterwards

□ Discharged to a water body, indicate its name----------

□ Others ----------

In case there is an industrial wastewater treatment unit: not applicable

Attach a description of the components of the unit while indicating chemicals used and the disposal method for treated wastewater and the characteristics of the unit effluent.

Attachment no (8)----------

- **Solid and hazardous waste:**

  Types of waste and rate of generation: Plastic, paper, cardboard and domestic

  Methods for transportation, handling and storage: ----------

  ----

  Methods for disposal (contractor, landfill, others): Licensed operators will collect all waste generated onsite

- **Work environment:**

  Work environment parameters: -----dust and noise----------

  Measures for workers protection (protective equipment, gas suction systems, etc.): The H&S Management Plan in line with national and IFC requirements will be implemented and applied in the project site. This H&S will assess the occupational risks associated with the facility and include all the mitigation measures necessary to project workers.

- **Others: ----------**

  ----

4. Legal Framework

Attach a list of all relevant requirements of applicable environmental laws while indicating the aspects governed by the regulations and the articles no.

Attachment no (9)----------Included----------

5. Analysis of Environmental Impacts

Attach an analysis of potential environmental impacts of the project in both construction and operation phases. This could include impacts on air, soil, surface water or groundwater quality as well as social environment or infrastructure or neighboring development, and other impacts according to the nature of the project and its location. The analysis should also include impacts during emergency situations such as spills and leaks. Also attach the potential impacts of the environment on the project (such as earthquakes, flash floods, previous landuse, impact of neighboring activities, etc.)
Attachment no (10)----------

6. Environmental Management Plan (see Annex 4 EMP)

6.1 Summary of environmental impacts:

6.2 Description of mitigation measures for each impact:

6.3 Description of environmental monitoring program:

6.4 Description of the institutional requirements (identification of responsibilities, requirements and arrangements needed to implement the mitigation measures and monitoring program)

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7. Attachments

Insert a table of contents for the attachments. Attach the required documents and provide justification for any unattached document. (other attachments could be added as needed).

No.	Attachment	Was it Attached, (Yes, No)?	Reasons It Was Not Attached
1	EEAA approval of the EIA for the original project (in case of extensions)		
2	Copy of the project license (in case of extensions)		
3	EEAA Approval of the integrated EIA of the development (in case the project is located in a wider development)		
4	General description of the project site with a map		
5	General description of the project area		
6	Description of the project activities with illustrative figures		
7	Expected analysis for air emissions		
8	Specifications of the sewage and/or industrial wastewater treatment unit		
9	List of environment laws and regulations		
10	Assessment of environmental impacts		

Declaration of the Project Proponent

I, the undersigned, certify that the statements made by me are true, complete and correct and that in case of any modification of the information stated above, the EEAA shall be instantly informed through the Competent Administrative Authority.

Name : ----------

Identity Card number and address: ----------

Position: ----------

Date: ----------

Form filled in by the Competent Administrative Authority

Name: ----------

Professional title: ----------

Signature: ----------

Official Stamp

3 Attachment 1 ~ EEAA EIA Approval for a project extension

This attachment is not required as this project is not an extension of an existing project

4 Attachment 2 ~ First Project License

This attachment is not required as this project is not an extension of an existing project

5 Attachment 3 ~ EEAA EIA Approval for a larger development

جمهورية مصر العربية
رئاسة مجلس الوزراء
وزارة البيئة
جهاز شئون البيئة
الإدارة المركزية لتقييم التأثير البيئي

17 MAR. 2016

رقم القيد : 606
التاريخ : ١٧/٣/٢٠١٦

الموضوع: دراسة تقييم تأثيربيني

السيد المهندس/ محمد صلاح السبكي
الرئيس التنفيذي هيئة تنمية واستخدام الطاقة الجديدة والمتجددة
وزارة الكهرباء والطاقة

تحية طيبة وبعد ،،،

إلحاقاً بكتابنا للسيد الرئيس التنفيذي لهيئة تنمية واستخدام الطاقة الجديدة والمتجددة والصادر بتاريخ ٨/٣/٢٠١٦ وبالإشارة الى كتاب سيادته المرفق به الدراسة البيئية الإستراتيجية المتكاملة (ج) لمشروعات إنتاج الكهرباء من الخلايا الفوتوفولتية قدرة ١,٨ جيجاوات في بنبان، بمساحة ٣٧,٢ كم٢ ، التابعة لهيئة تنمية واستخدام الطاقة الجديدة والمتجددة، بالعنوان/ قرية بنبان ٤٠ كم شمال مدينة أسوان.

أتشرف بالإحاطة بأنه بعد مراجعة وتقييم الدراسة المقدمة ، فأن جهاز شئون البيئة يوافق على إقامة المشروع بشرط الالتزام بجميع المواصفات والاجراءات التي وردت للجهاز بالدراسة المقدمة والالتزام بجميع الأسس والاشتراطات التي نص عليها القانون رقم ٤ لسنة ١٩٩٤ والمعدل بالقانون رقم ٩ لسنة ٢٠٠٩وتعديلاته بالقانون رقم ١٠٥ لسنة ٢٠١٥ ولائحته التنفيذية المعدلة بقرار رئيس مجلس الوزراء رقم ١٠٩٥ لسنة ٢٠١١ ، القرار رقم ٧١٠ لسنة ٢٠١٢ والقرار رقم ٩٦٤ لسنة ٢٠١٥ مع الالتزام بالإشتراطات الآتية:

١. أن تقتصر المشروعات المزمع إقامتها على توليد الكهرباء من الخلايا الشمسية الفوتوفولتية فقط طبقاً ورد بالدراسة.
٢. الإلتزام بتقديم دراسة بيئية محددة للمحطات الفرعية وخطوط نقل الكهرباء والتنسيق مع الشركة المصرية لنقل الكهرباء لربط خرج المحطة الشمسية بالشبكة القومية الكهربية.
٣. الإلتزام بتقديم دراسة بيئية محددة لمأخذ المياه على نهر النيل متضمنة مواصفات محطة الرفع ومحطة التنقية ومد خط الأنابيب من نهر النيل إلى موقع المشروع ودراسة للتأثيرات المتوقعة على الطيور المقيمة والمهاجرة بمنطقة إنشاء المأخذ باعتبارها موئل للطيور كما ورد بالدراسة مع مراعاة اختيار الوقت المناسب لعمليات الإنشاءات وتجنب مواسم التكاثر وهجرة الطيور.
٤. الإلتزام بالحصول على موافقة وزارة الموارد المائية والري على إنشاء مأخذ المياه على نهر النيل.
٥. الإلتزام بالحصول على موافقة وزارة الزراعة على خط سير خط أنابيب نقل المياه خلال الأراضي الزراعية من نهر النيل وصولا إلى موقع المشروع.
٦. الإلتزام بتجميع مياه الصرف الناتجة عن عمليات الإنشاء في خزانات والتخلص منها في أقرب محطة معالجة للصرف والالتزام بإنشاء بيارات معزولة ومصمتة بطاقة استيعابيه مناسبة لإستقبال مياه الصرف الناتجة عن عمليات تنظيف الخلايا الشمسية بعد التشغيل وكسحها بصفة دورية للتخلص السليم منها عن طريق جهة معتمدة كما ورد بالدراسة.
٧. الإلتزام بإحاطة الخلايا الشمسية بإطارات ذات لون أبيض للحد من تشابه هذه الألواح مع المسطحات المائية لتفادي عدم جذبها للطيور وتغيير مساراتها.

هذه المرافقة من صفحتين (٢/١)

٣٠ طريق مصر حلوان الزراعي – خلف فندق سوفيتل المعادي – القاهرة الرقم البريدي ١١٧٢٨ ت : ٢٥٢٥٦٤٥٢ فاكس : ٢٥٢٥٦٤٩٠
30 Misr Helwan El-Zyrae Rd., Maadi - Cairo Egypt. P.O. 11728. Tel : 25256452 - Fax : 25256490

5.1 Project Location and Site Description

The project is located in Benban, Aswan Governorate, South Egypt. The site is located approximately 16 km inland from the Nile and 40 km north-west from Aswan City.

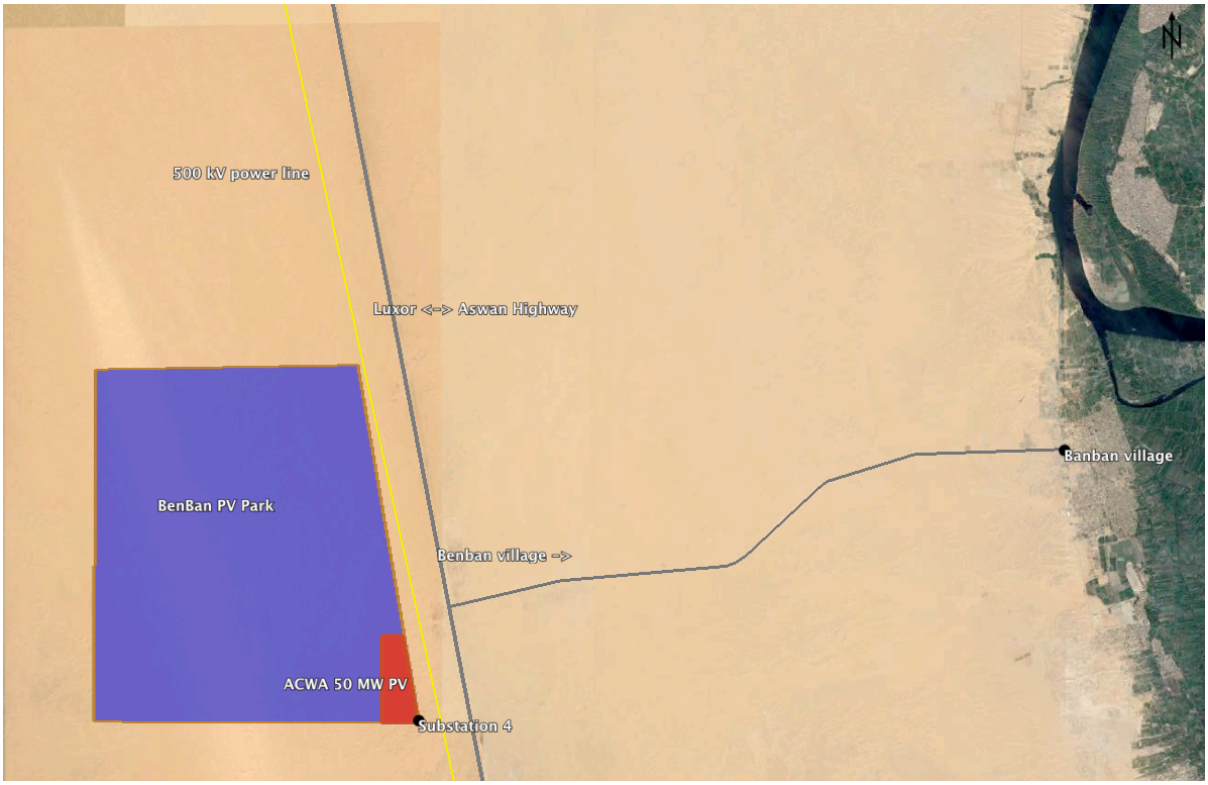
Figure 1 Project Location (region)

5.2 Project site

The site is located on dessert land (see plates below). The total area of the Park is 3715 Ha (figure bellow). ACWA PV occupies 86 Ha and is located in the southeast corner of the Park. ACWA PV will strictly obey the boundaries established by NREA and during construction the laydown area will always be within the project boundary.

As depicted in the figure below, the Luxor-Aswan highway is 1 km away from the project site. There is an existing 500 kV power line parallel to the Park, 0.4km from the ACWA PV site. One of the four substations (the SS4) that EETC will construct to evacuate the electricity of the Park will be located adjacent to the southeast corner of the ACWA PV site.

Figure 2 Project Site Location



Note: An improved map stamped by the Competent Administrative Authority is included in Annex 1.

Coordinates
UTM Zone 36R

E	N
474358.47	**2699668.55**
474606.26	**2698168.16**
474516.90	**2698153.70**
474538.88	**2698018.17**
473965.56	**2698019.36**
473968.96	**2699669.35**

Plate 1 Project site - west view

Plate 2 Existing power line from project site – south view

5.2.1 Nearby developments

The site is currently unoccupied and free of structures. Even though it is not yet confirmed, workers' accommodation facilities might be located in two plots yet to be assigned and developed in the Park. Precise locations are still unknown.

There is no operative industrial or residential complex in the surrounding area (10 Km buffer). The closest structures to site (ambulance station) are currently abandoned. During construction, it is likely that a number of temporary accommodation facilities for other PV sites will be developed near the Park.

The nearest residential areas are New Benban (12 km East), Benban (13.72 km East), New Faris (20 km N-East), Faris (23 km N-East) villages.

In line with the SESA, there are no archeological elements identified in the surrounding area or in the project site. The nearest archeological site -Temple of Kom Ombo- is located 19 km from the site, on the east side of the Nile River-. The closest protected area (Saluga – Ghazal) is approximately 38 km southeast form the project site

6 Attachment 5 ~ General Description of the Project Area

6.1 Physical Environment

6.1.1 Meteorological Conditions

The project is located in an arid belt where rainfall is very low. This section briefly describes the meteorological conditions prevailing at the project site and it is in line with the SESA.

6.1.1.1 Temperature

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.

6.1.1.2 Precipitation

Maximum precipitation is roughly 1 mm in April and May whilst no events typically occurs in other months.

6.1.1.3 Humidity

The maximum relative humidity is 51 % in winter and 27% in summer.

6.1.1.4 Wind

Prevailing winds are NW to SE. Maximum average monthly speed of 10 knots/h in August and minimum average monthly speed of 6 knots/h in January. Following SESA specifications, sandstorms are uncommon.

6.1.2 Ambient Conditions

6.1.2.1 Air Quality

As discussed in the SESA, air quality surveys for CO, NO_X, SO_2, PM_{10}, and $PM_{2.5}$ were undertaken in 2015. The results showed levels below national requirements.

6.1.2.2 Noise

There are no noise sources at the project site other than traffic on the highway and wind.

6.1.3 Topographic & Geologic Features and soil characteristics

The project site is flat with hard sandy and gravel ground.

The site soil is composed by light brown calcareous gravely sand with some silt - i.e. fine sand and gravel-

No sign of soil contamination or wastes were identified onsite.

6.1.4 Seismic activity

According to the SESA, the degree of seismicity and tectonic activity is low in the project site. Desk-based research estimated a 300-years, 5.5-magnitude earthquake occurrence. The closest known active area (Kalabsha) is 100 km SW from the Park.

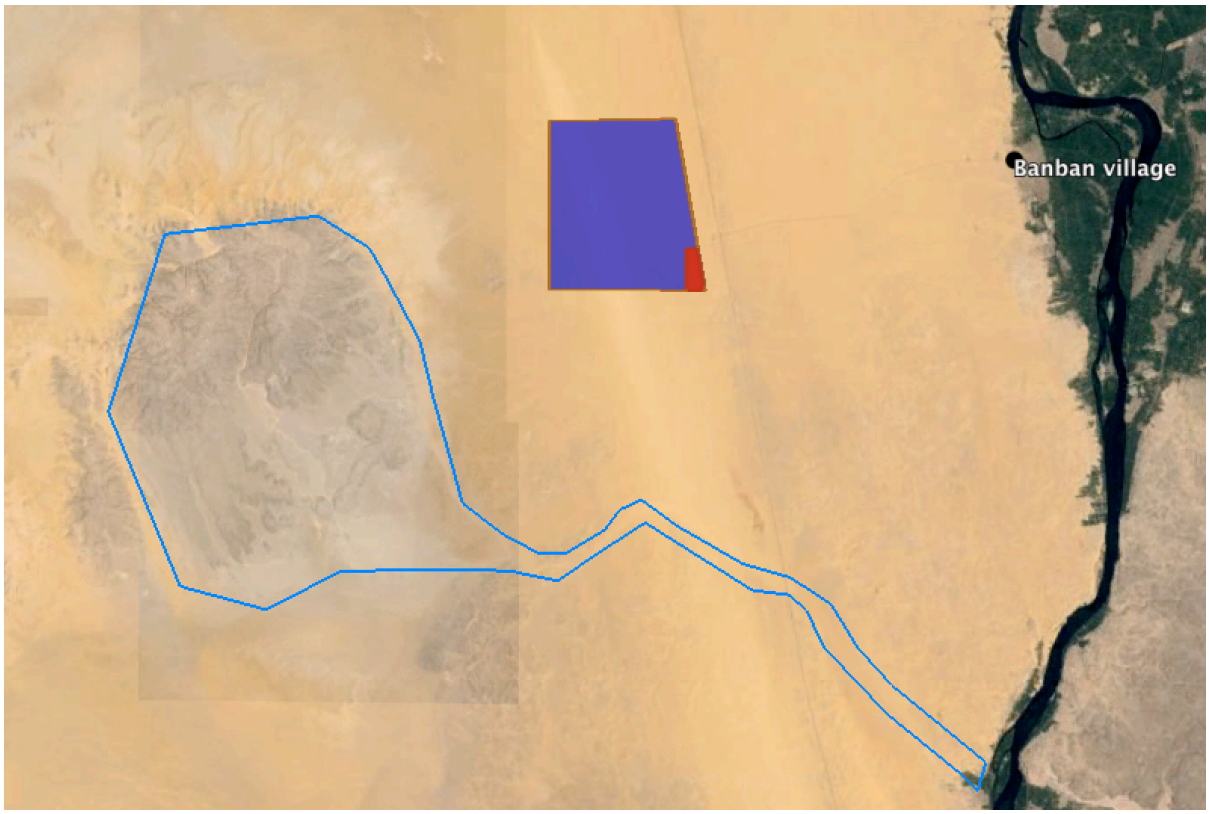
6.1.5 Hydrology

6.1.5.1 Surface water

There are no surface water bodies crossing the project site or in the adjacent areas. The Nile River and adjoining irrigation canals are the closest surface water - 14km away from the project site.

As shown in the figure below, the nearest wadi is located approximately 9 km south of the project site.

Figure 3 Hydrologic surface system



6.1.5.2 Groundwater

Groundwater on the project site is approximately 240 m deep, as a nearby brackish water well indicates.

There are two main aquifers in the region:

- The Aquifer in the Upper Cretaceous-Paleozoic Rocks: The Upper Cretaceous sandstone beds and the older sandstone beds have a area widely distributed in the subsurface and are part of the regional aquifer. The SESA noted that the areas at the East of the project site are sourced from this aquifer which productivity is expected to be high to moderately, and
- The Aquifer in the Quaternary Rock is mainly delimited to the valley of the Nile and recharged by the Nile River, specifically infiltration of irrigation water. The residential areas closest to the Nile depend on this aquifer.

Groundwater will not be abstracted during any phase of the proposed project unless the Developer's Association undertakes a study that finds this option suitable and obtains the relevant permits. If the permit is obtained, the Project will consider wells as a potential water source.

6.1.6 Archaeological elements

No archeological elements were identified onsite during the SESA.

The nearest cultural and archaeological site is Temple of Kom Ombo located 20 km to the east of the proposed development, on the eastern side of the Nile River.

6.2 Biological Environment

The project site is characterized by a single habitat, a flat rocky plateau covered by wind-borne sand, being one of the largest sand-covered areas of the Globe.

The are no protected areas close to the project site. Saluga and Ghazal, the closest protected area, is roughly 38 km form the project site.

6.2.1.1 Flora

No flora species were found at the project site. No endangered species following the IUCN Red List have been recorded in the project area.

The nearest vegetation (crops reliant on the irrigation canals) is found near Benban village

6.2.1.2 Fauna

No fauna species -including birds, reptiles and insects- or burrows were found in the project site.

The SESA and previous ecological surveys found no endangered species following the IUCN Red List. The SESA highlighted that previous studies undertaken in the area in 2013 suggested the presence of foxes and insect.

Bird species can be found in areas closer to the Nile River, 16 km from the project site. Key species in these habitats might include wheatears, larks, shrikes and warblers. Migratory birds temporarily habit the coastlines of the Nile river during the migration season. Raptors are also likely to be found in the riverbanks.

6.3 Social & Cultural Environment

6.3.1.1 Neighboring developments

As previously mentioned, the site is currently unoccupied and free of structures. There are no operative industrial or residential developments or in the neighboring areas (10 Km buffer). The closest structures to the site (ambulance station and other demolished buildings) are currently uninhabited and abandoned.

New Benban (12 km East), Benban (13.72 km East), and Faris (20 km N-East) villages are the nearest residential neighborhoods to the project site, located in Daraw Markaz district, one of the five districts within Aswan Governorate.

The closest area that will potentially be prolonged in the near future is New Banban –which currently consists of 50 dwellings, only 15 inhabited- but which master plan intends to double the number of residences.

6.3.1.2 Land Use

No land uses were identified on the project site. Furthermore, the area is not suitable for any sustainable agricultural or farming exploitation.

Agriculture is the main land use in the region, which depends on irrigation, mostly sourcing water from the Nile and the Lake Nasser.

6.3.1.3 Land Acquisition

The project site is on public land owned by NREA after handover from Aswan Governorate. NREA will lease the plot to the Project Company for the 25-year term specified in the PPA.

Land acquisition procedures will not be necessary as constructions workers are likely to be accommodated in areas proposed by the DA (potentially in two plots in the Park that are not yet being developed).

6.3.1.4 Demographics

The number of inhabitants in Aswan Governorate was estimated at 1,323,315 in 2014 in 310,679 households. Women represented the 48.1% of the total, and rural population the 54,8 % of the total. In Benban, 50% of the population is 15 to 45 years old, and 30% under 15.

The population in Benban village is estimated in 26,220 inhabitants (13,492 women). New Benban includes 50 households, presently only 15 occupied.

6.3.1.5 Economic Activities

Agriculture and tourism are the main activities in Aswan region. The total area of cultivated land covers 646 km^2 ,50% sugar, followed by palm trees, and hibiscus. The industrial sector is limited - some industrial activities such as sugar refining, chemical fertilizers, phosphate are active.

Agriculture is the main sector in Benban, including processing activities and trade of agricultural products. The total cultivated land is over 7.8 thousand feddans and there are ten co-operatives. Sugarcane, date tree and wheat are the most important elements cultivated area. Other crops might include clover, barley, maize, onion, garlic, beans, chickpeas, sesame, and henna.

There is also small brick factory.

6.3.1.6 Occupation

The employed labour force reached 29.4% in Aswan (region) in 2010, 21.9% females. Farmers represented 30.3% of the total labour force and the workforce in the service business represented 43.0%. The industry employed the 26,7% of the total labour force.

The unemployment rate reached 12.9%, 34.5% females, showing a higher percentage in rural areas.

In Benban village, estimations based on interviews anticipated a 40% unemployment rate due to limited government jobs and little investment in this area.

6.3.1.7 Living Conditions

Electricity supply

Access to electricity in Upper Egypt is estimated at 99%. In Benban village (over 5,797 households) the number of formal contracts with the supply company is roughly 6,640. Benban faced occasional blackouts in 2013-2014 but the network was improved in 2015.

Water supply

The water needs of the region mostly depend on the Nile river. Groundwater is required in isolated areas.

In Benban, there is a water pretreatment plant with a piping system connected to the river. Additionally, there are nine wells and eleven pumping stations. Water is treated to ensure that national standards on potable water are met. Access to potable water is available in most households in Benban. Average individual consumption of potable water is about 151 m^3, 54 m^3 in rural areas, in Aswan Governorate.

Sanitation

The sewage system is almost nonexistent in the area, where connectivity rate is under 30%. Septic tanks are emptied by the local authorities and private companies at a rate (EGP 30 - 50).

Waste collection

The public waste collection systems in villages are almost non-existent. Households in Aswan Governorate generate an estimated 665 tones of waste/day. Only a 35% of this waste is collected by public waste collection systems.

Public Health

Many of the health care problems in Aswan Governorate are attributed to poor standards of sanitation and hygiene. Recordings 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.

Health facilities

There are six primary care units and one ambulance in Benban village. There are five hospitals in the Governorate, none in Benban.

There is one health unit in Benban and one ambulance station approximately 10 km away (there is one closer but currently not in operation as the facility needs restoration).

Social Services

There are limited social services in the region. One social unit is located in Benban. With regards to community based organizations and recreational areas, there are NGOs (7, 2),

event halls (4, 1), nurseries (2, 3) and recitation centers (3, 1) respectively in Benban and Faris. Access is limited to adult men in these recreational places.

Fire & Security Services

There is a police unit and a fire department in Benban village.

The project site is currently protected by members of the Benban Community as commissioned by NREA. The existing tribes in the community are equally distributed in the security personnel to prevent tensions. The group is formed by 16 guards in 2 shifts, led by one resident in cooperation with local security forces. The arrangements include a small shelter, two cars and two tractors to patrol the project site. As discussed in the SESA, the security personnel are trained for the use of firearms -and some carry them- but have been instructed not use them.

Transport network

The project site is near the Luxor-Aswan Highway (which extends to Alexandria). The road network also links with the Rad Sea ports (Safaga, Noeiba and Hurghada).

The road network at Benban village is basic and unpaved.

6.3.1.8 Education

Population with primary and secondary education is over 97.1% in the Governorate of Aswan. In Benban, male illiteracy was estimated on 23.3% while female reached 43.7%. Faris showed close figures.

There are ten primary schools in Benban with 142 teachers (52 females) and over 2,700 students (48.5% women), one secondary school with 287 students (168 female), five preparatory schools with over 1,153 students (nearly half women). Other educational centers on agriculture with 742 apprentices and "vocational school for girls" with 160 schoolgirls are also present in Benban. In addition, religious educational centers are also found in Benban.

6.3.1.9 Social vulnerable groups

The following potentially vulnerable groups are identified:

- Immigrant children facing undesirable working conditions (exploitation, working outdoors in summer) malnutrition, health issues;
- Women. In 2013, Egypt ranked the 11th out of 187 countries in the UN Gender Inequality Index, indicating strong gender-based disparities;
- Illiterate people, as they have difficulties accessing information and participating in consultations;

- Disabled people, seriously ill persons or the elderly, and
- Households with limited resources.

6.3.1.10 Community needs

The SESA identified the needs of the local communities and recommended areas were social investment is desirable. The areas included:

- Actions to build capacity for young;
- Improve infrastructure (electricity supply in Faris, solar panel streetlights, ambulance station) and waste collection system,
- Termite control, and
- Enhance the transportation (bus network) and health systems.

6.3.1.11 Cultural Heritage

During the site visit undertaken, no signs or visual evidence of cultural/archaeological facets were identified on the site itself or in the surrounding areas. The following features of cultural heritage are found in the area:

6.3.1.11.1 Intangible Cultural Heritage

Cultural identity is represented by different ethnic groups, which biggest are El Ansar and El Ababda. Some Nubians might be in the villages as well. Most of the inhabitants are Muslims, with minor Christian representation (3%).

These communities tend to respect the central authority in Egypt. Generally, they are not receptive to liberal or revolutionary attitudes.

Benban village holds a horse and camel riding competition each year with over 10,000 visitors.

6.3.1.11.2 Physical Cultural Heritage

The nearest cultural and archaeological site is the Temple of Kom Ombo, which is located 19 km east to the site, on the eastern side of the Nile River.

Plate 3 Temple of Kom Ombo

7 Attachment 6 ~ Project Design

The PV Station will generate 52.6 MWac (capacity power 60.2 MWp DC) and will consists on the following main components (layout in Annex 2):

7.1 Technology

The PV station will consist on the following elements:

- 188,160 PV cells (solar photons to DC) framed with silver-white colored aluminum;
- 20 inverter (DC to AC) stations (2650 kVA AC), each consisting on:
    - 2 x 1385 kVA inverters;
    - MV transformer;
    - MV SF_6 switchgear;
    - Fuses and on-load disconnector;
    - Auxiliary transformer.
    - DC combiner boxes;

7.2 Arrangement

The 188,160 PV cells will be distributed in 8,960 linear series with 21 modules each. Cells will be arranged in N-S arrays across the proposed site with a 50% GCR upon single axis tracker hot-galvanized structures.
Foundations and earthworks will be designed in accordance with the geotechnical and soil studies undertaken by the Project Developer.

7.3 Cables and earthling

Above ground cables will be selected considering weathering. Buried cables will be either direct-lay or in ducts and will be installed in accordance with the latest standards and recommendations regarding depth, protection, backfilling, and segregation. Sand from the project site will be used to backfill trenches and will be compacted to match existing conditions. The facility will also include an earthing system in accordance with best practice.

7.4 Security

Security equipment will include cameras with motion detection recording the perimeter of the facility.

7.5 Monitoring and control

The facility will be equipped with a SCADA system. This system reports operational details and maintenance requirements so that the plan is operated in line with supplier's recommendations.

7.6 Resource use and waste streams during the operational phase

7.6.1 PV Cleaning

Wet cleaning technology will be used to ensure that dust and other particles accumulated on the panels do not compromise the efficiency of the PV facility. Water will be tankered to site and It is estimated that each cleaning cycle (one every 10 days) will require over 160 m^3. If future studies undertaken by the Developers Association and NREA show that groundwater abstraction or a pipeline from the river Nile is feasible and obtains the necessary approvals (including an environmental permit), the Project will consider sourcing the necessary water in that way.

7.6.1.1 Wastewater

Wastewater will be limited to sanitary effluents, which will be stored in a septic tank and collected by authorized operators.

There will be no other wastewater sources as the quantity of water required from panel cleaning will be minimised and evaporate.

The facility will include a storm water system that will prevent rainfall from accumulating in the parcel and protect the equipment. The common management plans prepared by the Facilities Management will ensure that stormwater management is coordinated between plots.

7.6.1.2 Solid Waste

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

7.6.1.3 Hazardous Waste

Other than sanitary wastewater, small amounts of hazardous waste, if any, will be generated as a result of maintenance operations. If any, this waste will be stored in adequate containers and taken offsite by an authorized hazardous waste management company.

8 Attachment 7 ~ Air Emissions

This attachment is not required as no air emissions will be produced from the operation of the plant.

9 Attachment 8 ~ Industrial Wastewater Unit

This attachment is not required as this project does not include any industrial wastewater treatment plant. In line with the SESA Environmental Approval, all effluents will be safely stored and securely taken offsite for further treatment in appropriate facilities in line with national requirements on wastewater treatment.

10 Attachment 9 ~ Regulatory Framework

The following section aims to identify and outline the main the requirements applicable to the proposed PV. The main requests are sourced form the following:

- National legislation, regulations and standards;
- International Treaties and Agreements ratified by Egypt;
- Conditions set out in the environmental permit following SESA approval, and
- World Bank / IFC standards.

10.1 National Requirements

The table bellow outlines the national regulations applicable to the project on the subjects normally pertinent to an environmental and social perspective. Applicable national standards –in line with the SESA and EEAA approval- are also included in the table.

General	
Constitution of The Arab Republic of Egypt 2014	The Constitution of the Arab Republic of Egypt states in article 46 that every person has the right to a healthy environment. Furthermore, it states that '*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'*

<table>
<tr><td>Guidelines of Principles and Procedures for Environmental Impact Assessment</td><td>• Determine the scope of the EIA;
• Describe the procedures, requirements and tools to be considered during the EIA process.
• EIA legal requirements;
• Identify the projects for which EIAs are required (this PV plant is considered a Category B project upon SESA approval);
• 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</td></tr>
<tr><td>Law No. 4/1994 - amended by Law No. 9/2009, executive amendments no. 338/1995, and ministerial decrees no. 1741/2005, no. 1095/2011 and no. 964/2015</td><td>• It requires to project developers to conduct an EIA –and get approval-for new projects;
• Includes environmental standards (applicable described below)</td></tr>
<tr><td>National Environment Management Policy, 1994</td><td>Aims to promote sustainable economic and social development taking into consideration the needs of future generations</td></tr>
<tr><td colspan="2">Air Quality</td></tr>
<tr><td>Resolution no. 1095/ 2011 – Annexes 5, 6 and 8</td><td>INTEGRAL to add</td></tr>
<tr><td colspan="2">Noise</td></tr>
<tr><td>Resolution no. 1095 of 2011 - Annex 7</td><td><table><tr><td>AREA TYPE</td><td>Maximum level [dB(A_{eq})]</td></tr></table></td></tr>
</table>

			Day	Night
			7AM to 10 PM	10PM to 7AM
		Residential areas with low traffic flow	55	45
		Residential areas (public roads less than 12 meters)	65	55
		Industrial areas with light industries	70	60
		Industrial Zone with heavy industries	70	70
Protected Areas				
Law No 102/1983	• Defines 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 aesthetic value; • Provides information on activities forbidden/allowed within a Nature Protectorate, and • Establishes penalties. • This law is not applicable onsite since there is protected areas nearby nor direct impacts on protected areas are anticipated			
Wastewater				
Law No. 93/1962, decree 44/2000	Industrial wastewater disposal			
Law 48/1982	Discharges to the river Nile, underground reservoirs, and municipal collecting systems			
Note: national standards on wastewater discharges do not apply as EEAA Environmental Approval requires construction and operational wastewater to be storage onsite and taken offsite for final treatment				
Solid Waste				
Law 38/1967, Law 31/1976, and	Address public cleanliness, regulates solid waste collection and disposal from households, public spaces, and			

Law 38/1967	commercial and industrial establishments
Decree No. 134/1968	Guideline to handle wastes from domestic and industrial sources, including specifications for collection, transportation, composting, incineration and land disposal.
Hazardous Materials	
Law 4/1994	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"; Defines 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"; Articles 29 and 33 requires to those who produce or handle dangerous materials in gaseous, liquid or solid form, to take precautions to provide the necessary means to ensure that no environmental damage shall occur.
Decree 338/1995	Provide mechanisms and precautions to ensure that hazardous wastes are appropriately handled and disposed
Decree No. 673/1999	Handling and transportation of hazardous waste is prohibited unless carried out by an authorized hazardous waste treatment/disposal contractor or authority; Requires an authorization for the temporary and/or permanent storage of hazardous wastes.
Cultural Heritage	
Law No. 117/1983	Antiquities and cultural heritage requirements on protection and procedures to follow upon detection and fundamental ownership
Traffic and Transportation	
Law no. 142/2014 and 121/2008	Prohibits drivers to dump wastes or any other material. Including accidental releases of cargo;

	Forbids vehicles emitting high levels of noise, heavy smoke, odours and emissions non-compliance with environmental requirements; Not permitted to drive vehicles leaking flammable or harmful material (to public health and/or road safety).
Economic Aspects	
Law No 204/2014	This law secures 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
Law 87/2015	Private generation, third party access to national grid
Land acquisition	
Law 10/1990	Property expropriation for public benefit
Law 143/1981 (amendments 55/1988, 205/1991, & 96/1995)	Land acquisition on desert land
Law 49/1977 amended by Law 6/1997	Land leasing
Social Aspects	
Law 79/1975 on social insurance	Social insurance conditions
Guidelines of Principles and Procedures for EIA (2nd Edition - January 2009)	• Public consultation requirements; • Public disclosure (scope, methodology, and documentation)
Law 94/2003	Application of the Human Rights on Egypt
Labour and Working Conditions	

Labour on Law No. 137/1981, amended by Decision 12/2003 (Unified Labour Law) Book 1	General provisions on labour and working conditions
Labour on Law No. 137/1981, amended by Decision 12/2003 (Unified Labour Law) Book 2	• General working conditions, • Wages; • Contract termination; • Leaves
Labour on Law No. 137/1981, amended by Decision 12/2003 (Unified Labour Law) Book 3	Vocational guidance and training
Labour on Law No. 137/1981, amended by Decision 12/2003 (Unified Labour Law) Book 4	Collective association; Child labour; Female labour
Decree No.118/2003	Child labour
Decree 155/2003	Working conditions for female workforce
Occupational Health and Safety	
Resolution no. 1095 /2011	Health and safe work environment
Resolution no. 1095 of 2011 - Annex 7	Indoor noise standards
Resolution no. 1095 of 2011 - Annex 8	Indoor air quality standards, ventilation requirements
Resolution no. 1095 of 2011 - Annex 9	Indoor humidity and temperature standards
Resolution no. 1095 of 2011 - Annex 9	Heat stress exposure
Labour on Law No. 137/1981, amended by Decision 12/2003 (Unified Labour Law) Book 5	Occupational Health and Safety

Labour on Law No. 137/1981, amended by Decision 12/2003 (Unified Labour Law) Book 6	Inspection by authorities
Decree No. 126 (2003) defining procedures and forms for the notification of work-related accidents, injuries, fatalities and diseases	H&S reporting
Decree No. 211 (2003) specifying conditions and precautions essential for the provision of OSH measures at the workplace	H&S specific to vulnerable categories
Decree No. 134 (2003) defining the types of establishments covered, OSH services and committees, and related OSH training institutions	OHS unit/department

10.2 International Treaties and Agreements Ratified by Egypt

The following table outlines the International treaties ratified by Egypt and potentially applicable to this PV project

Table 10-1 International Agreements ratified by Egypt.

Biodiversity and natural resources
RAMSAR Convention on Wetlands of International Importance.
London Convention. Relative to the preservation of fauna and flora in their natural state.
International Plant Protection Convention.
African Convention on the Conservation of Nature and Natural Resources.

Protocol to amend the Convention on Wetlands of International Importance especially as Waterfowl Habitat.
CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora.
CMS or the Bonn Convention - Convention on the Conservation of Migratory Species of Wild Animals.
CBD - Convention on Biological Diversity.
Establishment of the Near East Plant Protection Organization.
Convention concerning the Protection of the World Cultural and Natural Heritage.
United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa.
Agreement for the establishment of a commission for controlling the desert locust in the Near East.
International Tropical Timber Agreement.
Protocol Concerning Mediterranean Specially Protected Areas.
Pollution
Stockholm Convention on Persistent Organic Pollutants (POPs)
United Nations Framework Convention on Climate Change and Kyoto Protocol to the UN
Vienna Convention for the Protection of the Ozone Layer
Montreal Protocol on Substances that deplete the Ozone Layer
Health & Safety
Convention Concerning Protection of Workers Against Occupational Hazards in Working Environment due to Air Pollution, Noise and Vibration
Convention concerning the prevention and control of occupational hazards caused by carcinogenic substances and agents
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
Bamako Convention on the ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes

within Africa
Convention concerning the Protection of Workers against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration
Others
Treaty establishing the African Economic Community (AEC)

10.3 Environmental Approval

The EEAA endorsed the development of the Benban Park following SESA review. The Environmental Permit (Record No. 606) presented by the EEAA Central Department for Environmental Impact Assessment incorporated the following requirements:

- Conform all the specifications and procedures included in the SESA;
- Comply with national regulations, including those on OH&S, electromagnetic field exposure, and noise and air pollutant levels (all included above);
- Only implement photovoltaic technology,
- Supplementary study assessing the environmental impacts of the power line and the substations;
- Additional studies to assess the environmental and social impacts associated to the water pipe from the Nile, and impacts from associated facilities. Special attention will be given to birds. The pipe will need to be approved by the Ministry of Water Resources and Irrigation, and the Ministry of Agriculture;
- Wastewater generated during construction and operation will be storage in tanks onsite and transferred to the nearest wastewater treatment facility;
- The design of the PV plant will include a system to collect water from panel cleaning;
- Insulated soil groves;
- PV panels will include a white frame to avoid birds confusing panels with water.

10.4 International Finance Corporation (IFC) Performance Standards

In line with the International Finance Corporation's Policy on Environmental and Social Sustainability (2012), IFC funded projects are required to manage project-associated environmental and social risks/impacts following IFC Performance Standards. Furthermore, the IFC Environmental, Health and Safety (EHS) General Guidelines serves 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.

10.5 Standards

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.

10.5.1 Soil and Groundwater

10.5.1.1 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 10-2: 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		
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
Notes: 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 need to be adjusted for the specific soil conditions at the project site.

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.

10.5.2 Waste Water Standards

This project will fully comply with the requirements instructed from national regulation, the SESA and the Environmental Permit following SESA review by EEAA. Therefore, wastewater produced from the activities undertaken during the contraction and operational phase will be storage onsite and taken offsite by licensed operators to manage the different effluents as stipulated in the law. Consequently, standards on industrial & domestic wastewater discharges do not apply to the proposed project.

10.5.3 Noise

10.5.3.1 National Standards

Environmental noise standards are included in the previous section. Indoor levels are noted below.

Table 10-3: 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 10-4: 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 10-5: 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

10.5.3.2 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 10-6 IFC standards for noise levels (IFC, 2007)

Noise levels				
	Workplace	Outdoor* dB		
		Area	Daytime	Nighttime
Limit (dB)	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.

10.5.4 Waste Minimisation

10.5.4.1 International standards

10.5.4.1.1 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.

10.5.4.1.2 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.

11 Attachment 10 ~ Assessment of Impacts

This section identifies and describes the potentially significant impacts of the proposed project. The methodology to determine whether a given alteration or modification of normal conditions is a significant impact or not follows a robust and consistent approach based on the assumption that the significance of an impact on resources or receptors is considered a result from an interaction between three factors:

- The nature and magnitude of the impact or change;
- The number of resources or receptors affected; and
- The environmental value of those resources or receptors to the change.

Impacts identified will be addressed by implementing the mitigation measures integrated in the Environmental Management Plan (EMS) included on this EIA Form (B).

Physical

11.1 Soil & Groundwater

11.1.1 Construction Phase

Impacts can occur from the spillage of liquid materials, leaks from storage containers or pipes, and improper management of generated waste.

Additionally, soil erosion risk potentially higher due to earthworks and consecutive loosened soil particles after closure. Erosion due to surface water runoff is unlikely as rain episodes are infrequent. Aeolian erosion is usual in the desert environment and will not significantly change soil characteristics.

Groundwater contamination is unlikely as the water table is more than 200 m deep and only small amounts of potential pollutants (i.e. sanitary wastewater) will be stored onsite.

Soil protection measures are outlined in the EMP.

11.1.2 Operational Phase

Very small amounts of materials that could potentially cause soil contamination will be stored onsite during the operational phase. Measures to contain these small amounts of hazardous substances are outlined in the EMP.

11.2 Air Quality

11.2.1 Construction Phase

The main sources of particulate and gaseous emissions 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;
- Unregulated stockpiles;
- Vehicle, generators and other mechanical equipment emissions, and
- Stored VOCs and other volatile hazardous materials.

Dust is a concern due to the desert environment. Dust resulting from construction activities typically comprises large diameter particles, which settle rapidly and close to the emission source, e.g. within 500m under low/calm conditions. Far field dust impacts from construction works are therefore not considered significant. Therefore, sensitive receptors will be workers, adjacent PV projects and road users. The cumulative impact of a large number of project being developed simultaneously can be substantial.

The significance of dust impacts from construction works will largely be based on the direction of the wind conditions and the proximity of sensitive receptors. Dust generated by construction is likely to be dispersed to the southeast as per the prevailing wind direction.

The key receptors will be workers and nearby projects.

11.2.2 Operational Phase

The main source of particulate and gaseous emissions will be vehicle movements - which occurrence is expected to be low. Therefore, minor impacts are expected in the form of dust and gaseous during operation.

11.3 Wastewater management

11.3.1 Construction Phase

The only expected water effluent during construction will be sanitary/domestic sewage. In line with the SESA Environmental Approval, all effluents will be safely stored and securely taken offsite for further treatment in appropriate facilities following national requirements on wastewater treatment.

11.3.2 Operational Phase

In line with the SESA Environmental Approval, all effluents will be safely stored and securely taken offsite for further treatment in appropriate facilities following with national requirements on wastewater treatment.

11.4 Solid waste and Hazardous Waste

11.4.1 Construction Phase

The solid waste generated as a result of the construction activities will include:

- Domestic waste;
- Concrete remains, and
- Packaging (cartons, wood, plastic, metal scrap) and other general waste.

Among others, typical hazardous waste streams that may arise during construction include: solvents, used oil, hydraulic fluid, resins and paints, etc. 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.

11.4.2 Operational Phase

Waste generation during the operational phase will be limited to domestic and other general waste. The only hazardous waste during the operational phase will be small amounts of cleaning products.

11.5 Noise

11.5.1.1 Construction Phase

Activities related to construction phase (site preparation, civil works, and panels installation) could potentially lead into an increase of noise levels. The key noise receptors will be workers and adjacent projects.

11.5.1.2 Operational Phase

No noise sources are expected during operational phase other than those generated by vehicles movement and maintenance works.

11.6 Traffic and Transportation

11.6.1 Construction Phase

The transportation of equipment will result into an increase of traffic levels at Luxor-Aswan Highway. Increased traffic might lead to congestion, increased journey times and higher accident risks. The cumulative impact of a large number of project being developed simultaneously can be substantial.

Key receptors will be road users and closest residential areas.

11.6.2 Operational Phase

Negligible impacts are expected at this stage as the expected number of vehicle movements is small.

11.7 Topography and Landscape

11.7.1 Construction Phase

The size of the construction site (Park) will result in visual impacts and changes on the landscape character.

11.7.2 Operational Phase

The photovoltaic panel will become the dominant feature in the landscape.

11.8 Archaeology

11.8.1 Construction Phase

No archaeological elements were identified onsite. However, there might be buried artifacts that could be unearthed and damaged during earthworks.

11.8.2 Operational Phase

Impacts on archaeological elements are unlikely during this phase as no earthworks expected will be required under normal operational and maintenance works.

Biological

11.9 Ecology

11.9.1 Construction Phase

In line with the SESA, the project site and adjacent areas contain limited terrestrial biodiversity and no vulnerable species, thus no direct impacts are expected.

11.9.2 Operational Phase

Impacts on terrestrial biodiversity are unlikely during the operational phase. Bird collision with photovoltaic panels by water bird migrating over the site area has been documented and some solar plants.

Social

11.10 Socio-Economic

11.10.1 Construction Phase

No major negative socioeconomic impacts were determined in the SESA.

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

- Employment creation;
- Economy growth;
- Dissemination of skills from expatriate workers into the local labour force, and
- Enhanced social benefits through CSR measures.

Negative socioeconomic impacts may result from:

- Interaction between the local population and foreign workers – including social and cultural differences and health and safety issues;
- Increased accidents as a result of increased traffic;
- Proliferation of informal settlements around the site of people seeking jobs;
- Social conflict resulting from the discrimination against particular social and/or ethnic groups in the share of the project benefits (employment or CSR);
- Social conflict resulting from the interaction between the local population and the security forces guarding the site;
- Social conflict resulting from unbalanced representation of ethnic groups in the security personnel guarding the site;

Negative social impacts will be addressed through management plans at common level, led by the Developer's Association.

11.10.2 Operational Phase

No major negative socioeconomic impacts were identified in the SESA.

The following positive impacts are likely to occur during operation:

- Generation of green energy;
- Employment creation;
- Economy growth, and
- Enhanced social benefits through CSR measures.

Negative socioeconomic impacts may result from:

- Interaction between the local population and workers – including social and cultural differences and health and safety issues,
- Social conflict resulting from the discrimination against particular social and/or ethics groups in the share of the project benefits (employment or CSR);
- Social conflict resulting from the interaction between the local population and the security forces protecting the site;
- Social conflict resulting from unbalanced representation of ethnic groups in the security personnel protecting the site.

Negative social impacts will be addressed through management plans at common level, leaded by the Developer's Association.

Note: The wind rose included in the map shows data at the Aswan Dam, which direction coincides with the one at the project site

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12 ANNEX 2: Construction Schedule

CONSTRUCTION	**148 dys**	**Mon 07/11/16**
CIVIL WORKS	**121 dys**	**Mon 07/11/16**
Temporary compound installation	2 wks	Mon 07/11/16
Site Leveling works	6 wks	Mon 07/11/16
Fence	6 wks	Fri 18/11/16
Internal roads	8 wks	Fri 18/11/16
Station foundations	6 wks	Fri 13/01/17
LV, COMM Trenches	14 wks	Thu 12/01/17
MV, COMM Trenches	8 wks	Tue 28/02/17
MECHANICAL WORKS	**107 dys**	**Tue 27/12/16**
Structure Foundation	16 wks	Tue 27/12/16
Structure Assembly	16 wks	Mon 23/01/17
Modules mounting	16 wks	Thu 02/02/17
100% of Modules installed	0 dys	Wed 24/05/17
ELECTRICAL WORKS	**99 dys**	**Fri 13/01/17**
LV, COMM cables laying	14 wks	Mon 23/01/17
MV, COMM cables laying	8 wks	Mon 06/03/17
Earthing system	16 wks	Fri 13/01/17
Comb boxes installation	12 wks	Mon 20/02/17
Inverter installation	8 wks	Tue 07/03/17
transformers + sgs installation	8 wks	Tue 07/03/17
Transfer Station and O&M buildings installation	4 wks	Tue 04/04/17
Strings connections	12 wks	Thu 09/03/17
MONITORING & CCTV WORKS	**50 dys**	**Tue 21/02/17**
Monitoring System Installation	10 wks	Tue 21/02/17
Security System Installation	10 wks	Tue 21/02/17
CONTIGENCY	**22 dys**	**Thu 20/07/17**
FNTP to 12 months	0 dys	Fri 18/08/17
Buffer	4,4 wks	Thu 20/07/17
Mechanical Completion	0 dys	Wed 31/05/17
Cold Commissioning Completion	0 dys	Thu 08/06/17
Grid Connection Readiness	0 dys	Thu 08/06/17
COMMISSIONING	**74 dys**	**Mon 27/03/17**
COLD COMMISSIONING	**54 dys**	**Mon 27/03/17**
DC strings	9 wks	Fri 07/04/17
DC cables to inverters	6 wks	Tue 11/04/17
Inverters	6 wks	Mon 27/03/17
Transformers and switchgears	6 wks	Mon 27/03/17
AC cables to substations	3 wks	Mon 17/04/17
Transfer Station and LV supply	2 wks	Mon 24/04/17
Owner - ENERGISATION	**0 dys**	**Thu 08/06/17**
Connection to the Grid	0 dys	Thu 08/06/17
HOT COMMISSIONING	**20 dys**	**Fri 09/06/17**
HOT COMMISSIONING	**20 dys**	**Fri 09/06/17**
Electrical Commissioning and Testing Plan	2 wks	Fri 09/06/17
Commissioning of Inverter group connected to Feeder 1	2 wks	Fri 09/06/17
Commissioning of Inverter group connected to Feeder 2	2 wks	Fri 09/06/17
Commissioning of Inverter group connected to Feeder 3	2 wks	Fri 09/06/17
Reliability period	10 dys	Fri 23/06/17
MONITORING & CCTV COMMISSIONING	**10 dys**	**Fri 09/06/17**
Monitoring system commissioning	10 dys	Fri 09/06/17
Security system commissioning	10 dys	Fri 09/06/17
Substantial Completion - COD	0 dys	Thu 06/07/17
PAC	**30 dys**	**Fri 07/07/17**
PR test	10 dys	Fri 07/07/17
functional tests	10 dys	Fri 07/07/17
PAC documentation package submission	10 dys	Fri 07/07/17
PAC documentation revision	3 wks	Fri 21/07/17
Punch List Corrections	4 wks	Fri 21/07/17
PAC certificate issue	0 dys	Thu 20/07/17

13 ANNEX 3: Layout

Additional file

14 ANNEX 4: Environmental Management Plan

14.1 Mitigation measures

This Environmental Management Plan provides the measures that will be implemented to mitigate identified E&S impacts. The table also includes the responsible party to implement the mitigation measure, the project phase in which it will be implemented and the inspection frequency..

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
Solid and Groundwater	Contamination from spills, uncontrolled releases during transportation, transfer, handling, and storage, and improper waste management..	Develop and implement a Hazardous Materials Handling Plan and Hazardous Waste Management Plan. This will include measures during transport of liquids and/or hazardous materials	Associated to the Plan		Contractors and Subcontractors	Previous to the commencement of activities
		Develop an Emergency and Response Plan	Associated to the Plan			
		Store chemicals, hazardous substances and waste only in purpose built areas / structures. Chemical storage areas will be impermeable and bunded.	Daily	Weekly		All phases
		Routinely inspect storage areas and all containers for any spills and leaks. Deploy spill trays.	Daily	Weekly		
		Routinely inspect all equipment handling hazardous materials for leaks and spills.	Daily	Weekly		
		Spill kits will be readily available near refueling stations, chemical storage areas and any potential spillage area	Weekly	Weekly		
		All chemicals will be handled in accordance with	Daily	Weekly		

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
		the relevant SDMSs				
		Reduce quantity of chemicals and fuels on site to minimum practicable levels	Daily	Monthly		
		Only personnel with adequate training will be allowed to handle fuel and chemicals	Daily	Weekly		
		All servicing, refueling, storage and waste disposal will be carried out in designated, impermeable areas.	Daily	Weekly		
		Ensure all workers are aware of their responsibilities to avoid soil and groundwater contamination.	Weekly	Quaterly		
	Erosion risk	Adequate storm water and drainage systems will be provided to minimize and control surface run off and associated erosion.	N/A	N/A	Contractors and Subcontractors	Construction
		Road gradient will be avoided or minimized (contour and slopes) in order reduce run-off induced erosion.	N/A	N/A		
		Stockpiles will be located on flat and impermeable areas.	Weekly	N/A		
		Stockpiles will be covered and the height and slope limited.	Weekly	N/A		
		Disturbed areas will be stabilized to minimise further erosion.	Weekly	N/A		
Solid and Hazardous	Waste storage, handling and	No solid waste, wastewater or hazardous waste will be deployed at any hydrological system (water	Weekly	Quaterly	Contractors and	All phases

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
Wastes **Air quality**	management	body, natural or man-made drainage, etc.) within the site or on the nearby areas.			Subcontractors	
		Only licensed contractors will carry out waste collection and disposal.	Weekly	Quaterly		
		Prepare a site-specific Waste Management Plan	Associated to the Plan			
		Ensure collection areas for putrescible waste are fenced in order to avoid any rodents, and other pest vectors	Daily	Weekly		
		A log will be kept to record the waste streams and volumes/weight of all wastes generated, treated and transported from the facility.	Daily	Weekly		
		Minimise the time waste is stored on site.	Daily	Weekly		
		Hazardous waste will be segregated from non-hazardous waste at the source. Hazardous wastes will be handled and stored in accordance with the relevant management plans.	Daily	Weekly		
		The design and maintenance of waste containers will conform to national and international standards.	N/A	N/A		
		Liquid waste will be stored in tanks designed to international standards and placed in bunds with a capacity equal to 110% of the storage tank.	Daily	Weekly		
	Resources	Materials will be purchased with minimum of packaging waste. "Buy-back" arrangements will	Daily	Weekly		

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
		be made with key suppliers so that any surplus chemicals or materials can be returned.				
		Re-use or recycle construction waste such as wood and metal.	Daily	Weekly		
	Dust	Minimise vehicles and plant movements over unpaved roads. Establish paved/tarred access roads in order to minimise dust.	Daily	Weekly	Contractors and Subcontractors	All phases
		Vehicle speeds will be restricted to 30Km/h on haul roads and un-surfaced areas of the site.	Daily	Weekly		
		All vehicle loads will be covered by a tarpaulin and will not be overloaded.	Daily	Weekly		
		Regular wetting down –soil conditioning- by water trucks, if significant dust impacts are detected through monitoring.	Daily	N/A		All phases
		Any aggregate or dusty material stockpiles will be stored in enclosed structures. Alternatively temporary piles can be covered with impervious sheeting.	Daily	N/A		Construction
		Avoid or minimize excavation activities on windy days.	Daily	N/A		
		Routinely inspect visually dust generation and recommend corrective actions.	Daily	Weekly		All phases

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
		No burning of wastes will be allowed on site	Daily	Weekly		All phases
	Gaseous emissions (mostly vehicles and generators	Suitable fuels will be used for construction machinery and vehicles (particularly low sulfur diesel).	Weekly	N/A	EPC and Subcontractors	Construction
		Trained personnel will operate machinery properly and efficiently.	Weekly	N/A		
		Modern machinery and equipment will be used	Weekly	Monthly	Contractors and Subcontractors	All phases
		Regular maintenance and inspection for all vehicles (to be documented and checked by site supervisor's representative).	Weekly	Monthly		
		Schedule deliveries to maximise efficiency and load.	Weekly	Monthly		
		Scheduled plant maintenance will be carried out off-site in appropriate premises	N/A	Monthly	O&M and Subcontractors	Operation
		Routinely check equipment for smoky exhausts, and recommend appropriate corrective actions. Smoky equipment to be given defect notices until repaired and approved for re-deployment by site supervisor.	Daily	N/A	EPC and Subcontractors	Construction
	Volatile hazardous materials (e.g. fuel storage)	Chemical storage areas will be purpose built and well maintained. A data log of all chemicals with MSDSs will be provided at the storage facility within easy access.	Weekly	Monthly	Contractors and Subcontractors	All phases
		Volatile fuels and chemicals will be in sealed	Weekly	Monthly		

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
		containers and at shaded areas. On site storage of large quantities of volatile fuels will be avoided, equally prolonged exposure to direct sun and heat will be avoided.				
Noise	Generated mostly during site preparation, civil works, panel installation activities	Plan activities with the greatest potential to generate noise during the day.	Weekly	N/A	EPC and Subcontractors	Construction
		Mufflers will be used on all noisy plant and vehicles when needed	Weekly	N/A		
		Regularly maintain all machinery and vehicles. Replace any broken parts immediately.	Weekly	N/A		
		Ensure efficient operation of all plant and vehicles.	Weekly	N/A		
		Switch off the equipment and machineries when not in use i.e. 'no idling'	Weekly	N/A		
		Provide personnel with hearing protection and advised of its proper use when required by the Health and Safety Management Plan to be developed by the DA	Weekly	N/A		
		Monitor noise level at the site boundary to assess noise increase against baseline conditions and to ensure compliance with regulations.	Weekly	N/A		
		Ensure that noisy tasks will not be undertaken near the workers accommodation during night-time.	Weekly	N/A		
Resources	Water needs	Water needs will be minimized by implementing best available techniques for wet panel cleaning	N/A	Monthly	O&M and Subcontractors	Operation

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
		procedures.				
Wastewater		No wastewater will be treated onsite. Only domestic wastewater will be generated and stored in a septic tank to be collected by licensed operators. Mitigation measures to avoid leaks from pipes, tanks or chemical toilets are included in the Soil and Groundwater section of this table.	N/A	N/A	Contractors and Subcontractors	All phases
Ecology	Direct mortality of fauna	Cells framed with silver-white colored aluminium	N/A	N/A	EPC and Subcontractors	Design
		Bird impact collision and mortality monitoring during the operational phase	N/A	Weekly	O&M	Operation
	Landscaping	Landscaping on site (if any) should only consider indigenous xerophytic plant species to minimise irrigation requirements and the ovoid fertilizers/pesticides.	N/A	N/A	Contractor and Subcontractors	All phases
Traffic and road safety	Increase traffic levels, congestion, journey times and higher accident risks	Schedule major deliveries for off-peak hour traffic, whenever possible.	Weekly	Monthly	Contractor and Subcontractor.	All phases
		Appropriately implement the Traffic and Road Safety Management Plan to be developed by the DA	Weekly	Monthly		
		Designate parking / staging areas. Provide adequate parking stations for the estimated numbers of visitors to the site (workers and suppliers).	Weekly	Monthly		

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
		Clearly identify truck routes and entry points for heavy vehicles entering the site.	Weekly	Monthly		
		Clearly post site entry / exit signs. Use 24hr security and document all vehicles entering/exiting the site.	Weekly	Monthly		
Security provisions		Implement the Security Management Plan to be developed by the DA	Weekly	Monthly	Contractor and Subcontractor.	All phases
Emergency Preparedness and Response		Implement an Emergency Preparedness and Response Plan in line with the common practices agreed in the DA	Monthly	Quaterly	Contractor and Subcontractor.	All phases
Occupational Health and Safety		Implement an Occupation Health and Safety Management Plan in line with the common practices agreed in the DA	Weekly	Monthly	Contractor and Subcontractor.	All phases
Archaeology	Archaeological unburied artefacts	Develop and implement a Chance Find Procedure	Weekly	N/A	Contractor and Subcontractor.	Construction
Surface water		No surface water onsite or adjacent areas				
Social	Labour and working conditions	Establish and maintain HR Policy, which covers the following: Child labor and forced labor; Non-discrimination and equal opportunities and Workers' Organizations	Monthly	Quaterly	Contractors and Subcontractors	All phases
		Prepare an employee handbook outlining employee rights conferred by national laws on labor	Monthly	Quaterly		

Summary of E&S impacts		Mitigation measure	Inspections		Mitigation measures	
			Construction	Operation	Responsibility	Phase
		and employment and benefits offered by the Company				
		Develop a grievance mechanism, outlining how to handle complaints mechanism for employees and an action plan to address them.	Monthly	Quaterly		
		Introduce in contracts a requirement to hire a percentage or a fixed number of local workers	N/A	N/A		
		Protect and promote the health of employees, especially by promoting safe and healthy working conditions	Monthly	Quaterly		
		Establish and maintain a sound worker-management relationship and a grievance mechanism	Monthly	Quaterly		
		Design workers accommodation facilities aligned with the principles detailed on IFC guidelines	N/A	N/A	Contractors and Subcontractors	
		Implement the Labour and recruiting procedures developed by the DA	Monthly	Quaterly		
	Affected Community	Engagement with stakeholders and CSR, and social mitigation measures measures will be implemented through the DA. The Company will provide the contribute through funding and expertise	Monthly		Company	All phases

14.2 Monitoring and Control

The control procedures (inspections, audits) and the monitoring program will ensure the correct implementation of the above mitigation measures and evaluate the performance of the management plans. Inspections of work areas by the E&S supervisors will be conducted following the frequency included in the table above, to identify any non-compliance with the required mitigation measures.

An inspection checklist will be prepared to document the results of the inspections. The main subcontractors will also be required to undertake inspections and fill in their own checklist with the mitigation measures relevant to their work. Further monitoring procedures will be included in the Environmental and Social Management Plans compliance with national and IFC standards to be implemented through the different project phases (construction-commissioning, operational and decommissioning phases).

External audits will also need to be undertaken quarterly during construction period and annually during operational phase by an external and independent party. This audit will check the following aspects:

- Compliance with all standards and regulatory requirements;
- Auditing the contractor and subcontractor activities for non-conformances, and
- Checking monitoring records, inspection checklists, grievance records and other relevant documentation.

14.3 Organizational Capacity and responsibilities

The Environmental and Social Management Plants (ESMP) associated to each project phase and developed by the Contractor will need to detail the organizational management structure encompassing all staff responsible for the E&S tasks, including the implementation, monitoring and audit of the mitigation measures.

The following table offers a general representation of the likely structure and assigned responsibilities. Contractors will assign these responsibilities to the concerned personnel and ensure the appropriate training.

Level	Role & Responsibilities
Project Company	**Project Director/ Manager**

		Understands the requirements and objectives of the ESMP; Ensures that resources (personnel and financial) are provided to prepare and implement the ESMP in line with the mitigation measures included above; Overall responsibility for environmental and social performance; Overall responsibility for the implementation of the mitigation measures; Approves reports of E&S issues and non-conformance to the Contractors when issues arise; Facilitates proactive communication between all role-players in the interest of effective environmental and social management, including with the DA; Overall responsibility for implementations of the requirements agreed with the DA; Implements temporary work stoppages where serious environmental or social infringements and noncompliance occur; Enforces compliance with the ESMPs and all legal regulations; Ensures all employees undergo environmental and social training; and Ensures the ESMPs are updated and approves the final updates
Project Company	**Environmental /Social Coordinator**	Sets up program for regular monitoring; Follows up community complaints in coordination with the DA; Conducts inspections to monitor E&S compliance with the ESMPs by contractors; Checks ESMPs compliance with legal requirements on a regular basis; Ensures the environmental and social meetings are held on a regular basis; Communicates and advise PM and subcontractors on environmental and social aspects; Participates in weekly (construction), monthly (operation), weekly (decommissioning) site meetings, so that environmental and social issues are on the agenda; Reports, investigates and follows up on incidents (environmental and social); Establishes corrective action plan for any non-compliance including action plan for prevention of such misconduct or incident; Develops, implements and manages the environmental and social training program; Has been trained to identify environmental and social issues in order to convey any observed issues.

Contractor	**Manager and Site Manager**	Responsible for overall environmental performance of the contractor, subcontractors and other third parties in the supply chain; Allocates sufficient resources to ensure compliance and effectiveness of ESMP; Ensures sub-contractors have a copy of the ESMP and are aware of their environmental and social obligations; Enforces compliance with ESMP and all legal regulations; Communicates environmental and social aspects with PM and HSE managers; Ensures Environmental training is undertaken; Ensures community complaints are addressed; Ensures that an Environmental and Social coordinator is assigned to all teams; and Maintains document registers for training, incidents, waste management and other related environmental reporting requirements.
Sub Contractor	**Foreman**	Implements the requirements of the ESMP; Allocates the necessary resources to ensure compliance and effectiveness of the ESMP; Cooperates with the Environmental/Social team to ensure that site inspections and training are conducted; Complies with the observations and requirements for corrective actions, which are issued by the inspector; Reports all incidents and non-compliance to Site manager; Notifies the Manager/Site Manger of any changes on the program or methods which may affect the environmental mitigation measures and ability to comply with the ESMP and regulations; Maintains a register of incidents and waste management for future audits; Maintains a register of complaints and correction actions

Workers	Undergo environmental and social awareness training; Undergo Health and Safety awareness training (provided by an H&S specialist in accordance with H&S guidelines provided under a separate study) Understand environmental procedures and environmental /social aspects relevant to activities; In case of any accident or non-compliance report that immediately to the foreman.
Visitors	All visitors must comply with the ESMP, must receive an induction before entering the site and must comply with the instructions given by site staff.