PROJECT:  Alcazar I Solar PV Project

COUNTRY:  Egypt

SUMMARY OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

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<th>Project appraisal team</th>
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SUMMARY OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

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1. INTRODUCTION

Egypt has one of the best solar resources in the world, with daily sunshine averaging 9-11 hours, low humidity, and global horizontal irradiation of around 2230-2330 kilowatt hour (“kWh”)/m² per year. Despite strong solar and wind resources in the region, installed wind and solar capacity is limited to the 687MW under public ownership. In order to meet the increasing energy demand, diversify the national energy mix, and improve the environmental and climate footprint of the power sector, Egypt has developed an overarching regulatory framework for the development of renewable energy capacity with the aim of securing 20% of its energy generation from renewable sources by 2022. Within this framework, the GoE, in September 2014, launched a Feed-in-Tariff (FiT) Program for a total of 4,300MW including 300MW of roof top Solar photovoltaic (“PV”) systems. The Bank is considering the financing of the Alcazar Solar project (Alcazar) which entails the design, construction, operation, and maintenance of a turnkey solar PV project with a nominal capacity of 50 MW, and will be located in Benban, 50 km North of Aswan, Egypt.

This ESMP summary is prepared in accordance with the African Development Bank’s (AfDB) Integrated Safeguard System (ISS) and Environmental Assessment Procedures (ESAP) for Alcazar. The ESIA/ESMP report dated April 2017 was prepared for the project by a local consulting company (EcoConserv) in accordance with the Egyptian Environmental law no. 4 / 1994 amended by law no. 9 / 2009 and its executive regulations, and is considered to largely meet the requirements of OS-1 in line with the ISS requirements for category 2 projects. It provides information on project activities; anticipated impacts of the project activities; measures to be put in place to mitigate identified adverse impacts; and institutional arrangements to facilitate implementation and monitoring of the Environmental and Social Management Plan (ESMP).

2. BRIEF PROJECT DESCRIPTION AND KEY COMPONENTS

The Alcazar Project entails the design, construction, operation, and maintenance of a turnkey solar PV project with a nominal capacity of 50 MW, and will be located in Benban, Egypt. The proposed photovoltaic plant consists of the following main components:

- **Solar field:** Main components of photovoltaic power plant or “solar field” consists of a large group of semiconductor technology based silicon solar cells arranged in what is known as solar PV panel or solar module. Solar panels convert impinging sunrays (photons) to electrons. The electrons’ flow generates direct current (DC) electricity which gets collected and channeled into an electronic device “inverter” to invert the DC current into Alternating Current (AC); the form of electricity used to power homes, neighborhoods, factories, cities, etc;

- **Racking:** Structural components which support the PV panels. These structures could be stationary (fixed) or movable thru utilizing a “tracking system” to track sun movement during the day, thru out the entire year;

- **Tracking:** This is a mechanical system attached to the racking system to enable it to track sun movement. This could be a one axis tracking system (similar to the system used in this project) and it could also be a two axis tracking system, as another alternative;

- **Other electric and/or electromechanical system components**, such as cables, inverters, transformers, switchgear and controls are used to control and condition the power output of the solar field.

- **Other associated facilities:** Buildings, including onsite substation, guard cabin, and spare parts storage; access road and internal road network; water supply; underground 22 kV cabling (each Benban project will transmit its power from its site boundary to one of the four on-site substations using the 22 KV line).
**Planning and Construction Phase:** This phase includes preparation of a detailed design for the Project, planning and transportation of the various Project components to the site (e.g. PV modules), and onsite preparation activities for installation of the PV arrays and various other components. Site preparation activities could include excavations, grading, levelling, and land clearing activities.

**Operations Phase:** This phase involves power production and maintenance of the PV Power Arrays and all the various electrical equipment. This includes, notably, regular PV module cleaning to prevent dust build-up which could affect their performance.

**Decommissioning Phase:** After 25 years if NREA does not take ownership of the Project and continue operating it will be completely decommissioned including the disconnection of the various Project components for final disposal.

Based on the project description and anticipated impacts/risks, the specific Operational Safeguards (OS) triggered by the proposed project are described hereunder:

- **OS 1:** Environmental and Social Assessment. This OS is triggered because this is an investment project with potential environmental and social risks and impacts in its area of influence. The assessment is therefore required in line with the ISS requirements
- **OS 2:** Involuntary resettlement: land acquisition, population displacement and compensation. This OS is not triggered because the project does not involve land acquisition or displacement;
- **OS 3:** Biodiversity and Ecosystem services: This OS is not triggered because there is no fauna and flora of importance in the project area (desert), no critical habitat or ecosystem service will be affected by the project;
- **OS 4:** Pollution prevention and control, hazardous materials and resource efficiency. There are risks of pollution of water resources in the project area. The project may also generate solid and liquid waste. Therefore, this OS is triggered
- **OS 5:** Labor conditions, Health and Safety: Workers will be exposed to occupational Health and Safety risks during the works which triggers this OS.

3. **BRIEF DESCRIPTION OF PROJECT'S KEY ENVIRONMENTAL, SOCIAL AND CLIMATE CHANGE COMPONENTS**

**Location:** The proposed 50MW PV Power plant Plot of Land No. SBN (13-2) with circa 0.98 km² total area would be located within the NREA land designated for Benban Solar PV. This land is located in western desert, which is one of the driest areas in Egypt, approximately 40 km northwest of Aswan city. The area designated for the Solar Park is approximately 37 km² owned by NREA within Aswan governorate administrative jurisdictions. The Nile River is approximately 15 km east of the site. Settlements in the vicinity of the project area includes Benban Al Gdeeda (approximately 12 km to the east) and Faris Village (approximately 20 km to the northeast).

**Land use and ownership:** the project site is a state owned desert land transferred to NREA in 2013. Prior to this transfer the land, was completely bare desert owned by Aswan Governorate and allocated for investments. The project has never been in private ownership or subject to informal use. Based on presidential decree number 274, Aswan Governorate approved the transfer of ownership to NREA.

**Climate:** The Aswan region is part of the arid belt of Egypt where rainfall is negligible; the exception is the occasional heavy torrential rainfall on the eastern highlands. The average maximum temperature varies from 21.6 C° in winter to 37.9 C° in summer, and the average minimum temperature varies from 6.7 C° in winter to 21.7 C° in summer. The maximum relative humidity is 51% in winter and 27% in summer. Prevailing winds are NW to SE with an average maximum monthly speed of 10 knots/hr (August) and an average minimum
speed of 6 knots/h (January). The climate in Aswan is called a desert climate. There is virtually no rainfall during the year.

**Climate change:** The project site is not directly exposed to climate change risk such as floods given the type of climate prevailing in the area (desert). However, sourcing of water may be an issue during construction. Furthermore, results of vulnerability assessment of water resources in Egypt in the Nile Basin indicates that a 20% decrease of average rainfall, with a 2°C rise in temperature above its range, could lead to a 12% reduction in surface flow below the average. Increases in ambient air temperatures.

**Air Quality and Noise levels:** The main sources of noise in the project vicinity are traffic on the Aswan -Luxor Highway and prevailing wind. Air quality and noise levels in the Benban area comply with Egyptian legislation.

**Topography:** The surface of the site is mainly flat, with sand and gravel dunes. Round levels vary from 140 m to 150 m and rarely exceed 150 m. There is no natural vegetation and there are no human activities.

**Soil and geology:** Yellow sand and gravel sheets cover most of the area, plus darker coloured sheets at the eastern side. These dark sheets (old alluvial plain) are of a brownish yellow layer (about 1m thick) of coarse and medium gravel (mainly quartz) over a dark gray sandy mud layer of about 1m thickness. Yellow sand and gravel sheets lie directly over the Nubian Sandstone. In the Aswan region, the sedimentary succession can be differentiated into the lithostratigraphic units described below (from the younger (top) to the older unit), this also applies to the KCSP project site located approximately 47 km north of Aswan.

**Seismic activity:** Aswan during the interval from 27 BC to 1984 and estimated the occurrence of earthquakes of a magnitude of 5.5 or more as once in approximately 300 years. The rate of seismicity and tectonic activity in the wider project area is therefore low although earthquakes of a higher magnitude can occur.

**Hydrogeology and Hydrology:** The productivity of the Benban aquifer in the Benban area is expected to be moderate to high. This aquifer is slightly recharged from the present rainfalls both on eastern highlands in Egypt as well as outside Egypt to the southwest. Local flow patterns are mainly influenced by the irrigation system, the intensity of groundwater extraction and the inflow from other aquifer systems. Two hydrologic systems exist in the Project area: the man-made and the natural. The man made system includes the irrigation canals. The natural system includes the River Nile and the wadis. The wadis are complex series of dry channels which dissect both the eastern escarpment and the western escarpment.

**Flora and Fauna:** The area has virtually no flora or fauna species because of the lack of water. There are no important habitats, protected areas, or rare and endangered species present or reported. Natural flora and weeds such as *Hyphaena thebaica*, *Calotropis procera*, *Alhagi graecorum*, *Tamarix amplexicaulis*, *Tamarix passeroides*, *Tamarix nilocita*, *Cynodon dactylon* and *Polygogon monspeliensis* also exist near farmlands, sides of village roads, canal banks, pasture areas, and the settlements themselves. Tracks found during the Kom Ombo study suggest the presence of one or more of the fox species likely to live in similar habitats, e.g. *Vulpes vulpes* and *Vulpes rueppelii*. There are no birds nesting on the Benban site itself but many species nest in the agricultural land near Benban and at the riverbank.

**Archaeology and Cultural Heritage:** The Benban site as such has no man-made structures. There are no buildings on the Benban site as it is entirely vacant desert lands. The Antiquities Authority confirmed that no archaeological finds have been reported on the site and thus issued a no-objection” for the Benban Solar Park. However, archaeological/antiquities chance finds remain a possibility. As per the antiquities law, a procedure in case of chance finds must be developed for the site as a whole and for individual investors.

**Population:** The total population of Aswan Governorate is 1,323,315 inhabitants, in 310,679 households. Females represent 48.12% of the total population. The nearest settlement to the Benban PV site is the New Benban village which is located about 12 km east of the site. Benban village itself is located 13 km east of the project boundaries. Fares village is located 23 km away from the project site. The total population of the Benban village is 26220 people. New Benban consist of 50 residential buildings (all sold, around 15 inhabited). The
number of people living in New Benban is around 75 persons. The Local Governmental unit plans to construct an additional 50 residential units. The average family size in

Access to electricity: The total number of customers who have formal contracts with the electricity distribution company is 6,640: 2,600 units in Benban Bahary; 1,960 units in Benban Qebly; and 2,080 units in El Raqaba.

4. MAJOR ENVIRONMENTAL AND SOCIAL IMPACTS AND CLIMATE CHANGE RISKS

This chapter summarizes the main environmental and social impacts/risks during construction and operation, which are generally of low to medium importance.

4.1 During mobilization and construction phases

- **Air quality, noise and vibration:** Construction of buildings and associated groundworks for foundations are likely to be very limited that custom-made containers are a preferred option for buildings. The Company will use piling for construction of panel frames. Excavation and particularly piling could lead to local noise affecting workers. Construction will include excavation; transportation of construction material and other equipment; assembly of frames and arrays; burial of cables etc. Those activities will lead to local air emissions, particularly from generators and dust blow. This will cause: (i) Fugitive dust emissions (PM10, PM2.5); (ii) Exhaust emissions from (mainly diesel) vehicles and equipment such as temporary generators. Impacts of dust emissions from unpaved roads and gaseous emissions from vehicles and electricity generators will be local and can be temporarily significant at site entrances, requiring control and good management of delivery logistics at peak construction time. Residential areas are too far at a distance to be directly affected, unless a large proportion of delivery vehicles use the Benban to Fares road as an alternative to the Aswan – Luxor Highway, this is unlikely. Greenhouse gas emissions during construction will be primarily from fuel consumption by equipment such as generators and trucks. Such quantities of emissions are expected to be low and linked directly to the amount of fuel used, and are anticipated to be significantly below 25,000 tonnes CO$_{2}$eq.

- **Traffic and transport:** Transportation of construction materials and equipment from sea ports (most likely in the Gulf of Suez) will be mainly be via the Luxor-Aswan Highway. At peak construction time the increase in overall traffic density can be important, with associated noise, dust, exhaust fumes and road safety risks.

- **Water consumption:** During construction, large volumes of water will be required for sanitary purposes. Assuming 50 liters per capita this can amount around 17.5 m$^3$ per day (350 workers) during peak time based on 7 working days a week, plus any water required for construction (concrete production for building work; equipment cleaning). There can also be a requirement to control fugitive dust (e.g. from vehicle traffic on unpaved roads) by water. The waste consumption for construction activities and fugitive dust emission control is estimated on 10m$^3$/day. Assuming 350 workers, a monthly consumption of 525 m$^3$ is expected for workers consumption and 825 m$^3$ for construction and dust control activities.

- **Occupational Health and Safety:** Community Health, Safety and Security impacts arising from the construction and operations (and eventual decommissioning) are likely to be as follows: (i) increased risk of traffic hazards and incidents associated with the use of the highway; (ii) for freight and local roads for workers; (iii) increased incidence of communicable disease; (iv) risks associated with the presence of security personnel on site (within the project area) and at offsite operations and activities (within the community); and Personal safety and well-being impacts associated with worker influx. Throughout the construction phase there will be many occupational health and safety risks to workers on site. These are generic risks associated with construction sites and include slips and falls; moving lorries and machinery; exposure to chemicals and other hazardous materials; exposure to electric shock and burns; weather related impacts (dehydration; heat stroke).

- **Workforce:** The local community of Benban and Fares could theoretically provide a proportion of this temporary labour force depending on skills needed and the strategies of the individual developers in
sourcing their workforce. To avoid the potential negative impacts associated with sourcing a local workforce (including but not limited to issues such as discrimination, people trafficking, forced and child labour, community health impacts through worker influx, and avoidance of community tensions) a coordinated and comprehensive policy to Benban workers will be required to be developed. Risks that need to be further assessed and adequately managed include: (i) labour and working conditions; (ii) Inter-tribal issues; (iii) expectations management given the temporary nature of job opportunities; (iv) Community impacts of worker influx;

- **Climate change:** The project site is not directly exposed to climate change risk such as floods given the type of climate prevailing in the area (desert). However, sourcing of water for construction may be an issue in the context of climate change.

### 4.2 During operation phase

- **Air quality, noise and vibration:** no adverse impact is expected, except wind and very limited noise from vehicles used on site are expected during normal operations;

- **Landscape and visual:** Once completed, the Benban PV site will be an important feature of this largely flat and uniform landscape. However, as structures are low (arrays of panels; single story maintenance and storage buildings), this will not be visually dominant from a longer distance, but will be clearly visible from the Aswan- Luxor Highway which runs parallel to its eastern border, at a distance of approximately 1 km and for a length of 7 kms. A potential issue is glare (and glint) caused by sunlight reflected off the PV panel arrays. There are no aircraft landing strips in the immediate vicinity of Benban; the nearest commercial airport is in Aswan. Road users on the Aswan-Luxor Highway are highly unlikely receptors for glint/glare from Benban panel arrays;

- **Water consumption:** Dry cleaning mechanism will be utilized, alternating with ‘wet cleaning’ every two months to optimize the use of water resources an maximizes water use efficiency. Cleaning with water could require between 2 and 3 liters per panel for each cleaning cycle. Annually water requirements are estimated to 3870 m³

- **Workforce:** During normal operations only a very limited number of workers will be required. Alcazar I will need 20 permanent staff on site during daytime, plus additional workers for panel cleaning. Most permanent staff is likely to live locally and should be sourced on the basis of non-discrimination and in line with internationally accepted employment conditions.

- **Occupational Health and Safety:** Permanent staff employed for normal operations are likely to be well trained and aware of H&S requirements and company H&S policies and management systems. The risk of accidents would therefore be much lower. and can be managed by continuing to apply the H&S management practices introduced during construction.

- **Climate change:** The project site is not directly exposed to climate change during operation.

### 4.3 Main positive impacts of the project during construction and operation

- During normal operations only a very limited number of workers will be required. The project need 20 permanent staff on site during daytime, plus additional workers for panel cleaning. Most permanent staff is likely to live locally and should be sourced on the basis of non-discrimination and in line with internationally accepted employment conditions.

- The main environmental and climate change positive impact is on the mitigation of CO₂ emissions. Once operational, the project avoid the emission of an equivalent of 56 000 tons per year of CO₂ if, as
an alternative to solar PV, thermal generation were to be used to provide the same amount of electricity to the grid;

- The project will contribute to improving the energy supply and security of the country with direct and indirect effects on the economy, conditions living of populations, etc. Quantified benefits will be estimated during appraisal.

4.4 Cumulative negative impacts
The SESA for the Benban PV site prepared for NREA in 2015 concluded the following:

- **Visual impact**: Once all the Benban 39 Projects are constructed including Alcazar I project, the site appearance from the air will have changed over the entire 37.2 km² area. There is a potential for disorientation of birds from dense arrays of panels which may resemble water bodies. The potentially negative effect of glare and panel appearance at Benban on soaring birds cannot be assessed at this stage. As this is not an area with high bird sensitivity an impact if any at this stage is considered to be minor. However, as a precautionary measure, site management (once such an entity has been set up) should commission a study;

- **Traffic and transport**: A large number of vehicle movements will take place each day, off and onto the highway. The turn-off of large numbers of vehicles from the highway to the site poses a some risks; this is also the case when slow-moving vehicles with slow acceleration enter the highway where traffic is generally at high speed. The risk increases when vehicles have to cross the highway if they are bound to go back to their point of origin to carry back empty containers or to bring workers back to their accommodation;

- **Water requirements**: Assuming 2 cleaning cycles per months, for 100% of the panels, as a worst case scenario then total monthly water usage during operation could reach 57,600 m³ for all solar projects on the Benban site. This is equivalent to 1.3 m³ per second and is considered negligible compared to river flow rate of 700 m³ per second. This worse scenario is very unlikely given that projects like the Alcazar I will be using dry cleaning instead, which will significantly reduce the potential impact.

4.5 Cumulative positive impacts

- **Climate change mitigation**: The volume of CO₂ emissions avoided by all Benban Projects together is estimated to be around 2 million tons of CO₂ per year;

- **Employment**: If all projects were to be carried out, and all were to require 500 workers per plot at peak construction time (2-3 months) then all the projects on site (39 developers) will generate 18,000 temporary jobs during construction.

- **Supply chain benefits**: Social and economic opportunity at the local level and throughout the supply chain. In addition to direct and indirect employment, services and resources provided to the project will include the following: (i) Implementation of works and provision of supplies related to construction; (ii) Provision of transportation, freight and storage services to the Project; (iii) Provision of food supplies and cleaning services; (iv) Provision of building and auxiliary materials and accessories, engineering, installation and maintenance; (v) Provision of white goods, electronic appliances, communications and measurement equipment; (vi) Security personnel; (vii) Accommodation, laundry and clothing; (viii) Retail services; and Provision of fuel.

5. ENHANCEMENT/MITIGATION MEASURES AND COMPLEMENTARY INITIATIVE

The ESIA/ESMP has been prepared defines the mitigation measures and implementation arrangements for all key impacts that will occur during preparation, construction and exploitation/maintenance including monitoring. The following will constitute the minimum mitigation measure:
Landscape and visual impact: Typical panels are designed to reflect only 2% of incoming sunlight. To further minimize nuisance from reflections an antireflective coating is commonly added to the surface of PV cell. It is recommended to assess, during operation the potential of glare at the highway roadside and, if significant, to put a screen or a low landscaped wall of local gravel along the highway or along the southern, eastern and northern borders of the Benban PV site;

Air and noise impacts: Implement an occupational health and safety plan which includes: (i) Provisions of Personal Protective Equipment (e.g. ear protectors); (ii) Training on how and when to use protective equipment to be part of the workers’ induction training; (iii) Clear instructions in areas where noise emissions are significant; (iv) Optimize the use of noisy construction equipment and turn off any equipment if not in use; (v) Regular maintenance of all equipment and vehicles. Implement a construction site management plan which includes the following measures: (i) Use gravel collected on site to improve roads and reduce dust emissions; (ii) Develop and implement a site delivery plan to regulate traffic and to avoid build-up at the site entrances; (iii) Regulation of speed to a suitable speed (30 km/h) for all vehicles entering the site; (iv) Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fumes;

Traffic and transport: To minimize risk of collision may well require applying effective traffic management measures that must include training of the drivers; traffic signals placed on site and trained supervisors “traffic marshals” that control the transport activities on the site, considering that many developers will have the same activities during the same periods. Implement a traffic management plan including: (i) Scheduling of deliveries to avoid bottle-necks (i.e. queues of lorries waiting for site entrance); (ii) Construction of long slip roads or provision of sufficient space for temporary parking prior to entrance of the Benban site will be necessary; an underpass should be considered; (iii) Placing of warning signs at 50, 100, 500 and 1000 m north and south of the site entrance/exit. Warning signs to be clear and visible at night; (iv) Limiting the speed on the road from the highway to the site and on the Benban PV site; (v) Coordination of road traffic management with the Ministry of the Interior and the police; (vi) Use of trained ‘traffic marshals’ to regulate traffic flow; (vii) Good road maintenance of the Luxor-Aswan Highway and the Benban – Fares connecting road.

Occupational Health and Safety: The Alcazar I Developer confirmed that they operate their own H&S systems, mainly based on OHSAS 18001. Common H&S Manual and easy-to-follow instructions (inclusive of graphic instructions for illiterate workers) for contractors and visitors should also be developed for use on the entire site. Worker training and site audit protocols could also be standardized to achieve uniformly high standards of performance. Permanent staff employed for normal operations will be well trained and aware of H&S requirements and company H&S policies and management systems. The risk of accidents would therefore be much lower and can be managed by continuing to apply the H&S management practices introduced during construction. A community development plan should be developed including a strategy to manage a large population influx. A definitive, enforceable and standardized worker Code of Conduct is required to ensure community interactions are positive. A worker and community health strategy will be required to manage both project related risks and population influx risks.

Cumulative impacts: As the project is part of a larger development there are potential cumulative impacts associated with the construction, and to a lesser degree the operational and decommissioning phases, which need to be managed in a coherent and coordinated manner. A Strategic Environmental and Social Assessment (SESA) was developed for the whole Benban PV Solar Project site. The overall objective of this SESA is to provide support for the assessment and subsequent management of the aggregate and cumulative environmental, health and safety, and social impacts of the proposed developments at the Benban PV site. The SESA has identified a number of actions and plans that have to be considered for the individual projects, however some plans and strategies must be implemented collectively.
• **Environmental and Social Management System**: Alcazar I has established an Environmental and Social Management System (ESMS) for the 50 MV PV Plant in Benban Park project in Aswan Governorate, Egypt. The ESMS details the policy, procedures and workflow that were developed, and will be followed during implementation of the project under the management and administration of Alcazar I. The documents and procedures forming the ESMS will be followed and periodically updated to ensure that the ESMS remains responsive to changing environmental, human health and safety, and other social management needs, as well as provide a level of detail that is commensurate with available resources and the nature of the activities being conducted;

Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities. The Developers had decided to form an Association (the Benban Developers Association (BDA)) in order to ease the communication and coordination among the different developers of the projects and with NREA, other Governmental bodies and any other third party(ies). To address forseen challenges, the presence of a professional Service Provider with experience of managing common areas and infrastructure for multiple stakeholders and perform the required E&S assessment is required. Below are the list of key plans that ar developed or will be developed by Alcazar I to manage site specific issues as well as meeting common management plans prepared by the Facility Management Company (FMC):

• **Labour and Working Conditions Strategy and Employment Plan** including worker accommodations requirements during construction: This Policy has therefore been prepared to achieve the following objectives: (i) Promoting the fair treatment, non-discrimination and equal opportunity of workers; (ii) Achieving compliance with Egyptian labor law; (iii) Protecting workers, including in particular vulnerable categories of workers such as children, women and migrant workers; (iii) and Promoting safe and healthy working conditions. This Plan that will be integrated into the overall requirements of the common work-force management plan. The recruitment of workers will comply with FMC’s recruitment procedures which will seek to place jobs locally, before recruiting from further afield in Egypt. During construction, workers employed by the project will be expected to be transported from the local communities and Aswan, or accommodated in FMC managed worker accommodation at the Benban PV site. All aspects related to workers’ accommodation will be managed by the FMC or conform to the FMC’s workers’ accommodation standards;

• **Security Management Plan**: Alcazar I will prepare a project-specific Security Management Plan (SMP) that will be integrated into the overall requirements of the Common Security Management Plan. In making such SMP, the sponsors will be guided by the principles of proportionality and good international practice in relation to hiring, rules of conduct, training, equipping, and monitoring of such workers, and by applicable law;

• **Emergency Response Plan**: In accordance with the requirements of the SESA, the FMC will develop a Common Emergency Response Plan and Procedure. The OHS procedures will also include project-specific Emergency Preparedness and Response Procedures (EPRP) which will include fire risk assessment and control systems, fire alarm systems and drills, emergency preparedness and planning, as part of OHS Procedures for both the construction and operation phases. The EPRP will be aligned with and describe the reporting requirements and roles and responsibilities in relation to the FMC’S EPRP;

• **Community H&S and Population Influx Plan**: As part of the ESMP, Alcazar I will be required to develop a Community Health and Safety Plan as well as a Plan for Training and Awareness which will be aligned to the FMC plans. The FMC plans will need to address the influx of construction workers
coming into the Benban area for the project development, and their impact on the community at large including the risk of infectious diseases, proper buffer zones;

- **Traffic Management, Logistics and Road Safety Plan:** As noted in the SESA, during peak construction there will be an estimated 1,400 vehicles/day accessing the various projects within the solar park, which could present a potentially significant risk to the workers and personnel on site, and the local community along the main and access roads unless it is well managed. The traffic movements to the project will include a substantial number of containers movements during the construction phase. Project-specific traffic management will need to be coordinated with the BDA and FMC and aligned with the FMC’s traffic management plan ensure that risks to workers and community members are mitigated;

- **Stakeholder Engagement Plan:** All stakeholder engagement will be managed through the FMC and build on the engagement undertaken as part of the SESA and the developed Master Disclosure and Engagement Plan. Engagement as part of the SESA included meetings with local villagers, both individually and as a group. The project is located on desert land which is owned by the Egyptian Government and project access is along newly constructed NREA roads from the local public highway. There will be no road or land impacts on the local villages, and there are no stakeholders directly affected by the project. The FMC will develop a SEP which covers the whole Benban PV solar park and therefore there is no requirement for the sponsors to develop a project-specific SEP. The FMC will develop a Community Grievance Mechanism in alignment with PS1, and will be responsible for responding to any grievances which are raised in relation to the overall site or individual developers. The sponsors will develop a subsidiary Community Grievance Mechanism which will include details of how it will be responsible for responding to any grievances identified by FMC as being caused by the activities of the project;

- **Community Development Strategy and Corporate Social Responsibility Programme:** After studying the nature of the project and the Standards required by the Government, the international Financial Institutions working on these projects, the Developers have seen the need of hiring a consultant for the development of the Corporate Social Responsibility (CSR) Plan and create a vision for the Community Development of Benban. The CSR is being developed based on: (i) knowledge about local community stakeholder mapping and needs assessment; (ii) ongoing activities in the area; (iii) potential activities in the area. The study is expected to be ready in August 2017. The E&S related CPs will include, inter alia, the finalization and implementation of the CSR.

The water supply is addressed collectively by the Benban developers with NREA in a cost sharing agreement. NREA shall provide to Benban developers underground water intake. NREA shall liaise with the competent authority and manage all requirements for underground water abstraction on Benban solar park for use by Benban Developers. As for potable water, Alcazar I shall arrange for shipments of potable water with tank trucks and on-site storage deposits.

6. **ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM**

6.1 **Monitoring roles and responsibilities**

The basic purpose of the environmental control and monitoring plan is to guarantee compliance with the indications and protection measures contained in this Assessment. The monitoring of the mitigation of the impacts generated can be considered as one of the most important planning components, as well as the design of the Environmental Management programs. The purpose of this program is to verify the severity and distribution of the negative impacts and, in particular, when any unforeseen impacts occur, to assure the development of new mitigation measures or the appropriate compensations when needed.
The E&S management team will consist of one on-site Environmental, Health and Safety (EHS) officer to act as a focal point for the construction and one EHS focal point during operation based off-site. Alcazar I will retain an external consultant to fulfill the role of the EHS focal point within their company to supervise the project, as well as appoint an independent owner’s engineer to supervise the construction phase. In addition, SP will appoint an EHS manager to act as the focal person on site. The Alcazar I EHS focal person will liaise closely with the FMC to coordinate all “common issues” needed between the project and the overall solar park.

Details on capacity and roles and responsibilities are provided under section 8.

**6.2 Components of the Monitoring Program**

All documents relevant to the EPC will be controlled onsite. The controlled documents include the reports, procedures, audit reports, incident reports, non-conformities, records and community complaints. The EPC HSE manager will be responsible for the review its procedures and its implementation on site. If any new process is introduced on site or new impacts are found, the existing procedures will be updated accordingly.

The following parameters will be regularly monitored during construction and commissioning phases, all the measures will be recorded and there will be an historic register of all the inspections, samples, analysis that have been done during the works. The environmental parameters will be monitored as per the plan to have a track on environmental impacts if any due to the construction activities. The E&S Coordinator will be responsible to coordinate for the same. The following parameters will be tracked periodically to monitor the impact to the environment during project construction phase:

- Noise
- Soil
- Wastewater discharges
- Gaseous emissions
- Ambient air quality
- Stack emission testing (PMx, SO2, NOx, CO)
- Waste streams generated
- Recruitment of local population
- Public complaints

A monitoring program for the proposed project is also suggested in the following sections. It is suggested to incorporate these individual monitoring plans developed during construction and commissioning phase. These are the parameter to be monitored. Table 8 below presents the environmental parameters to be monitored during the project construction and commissioning phase.

<table>
<thead>
<tr>
<th>Environmental Aspects</th>
<th>Monitoring location</th>
<th>Frequency</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality - dust</td>
<td>Site and access road</td>
<td>Monitoring will be Daily during significant dust generating activities (for dust monitoring) or during periods of high winds (&gt;20Knots), otherwise weekly</td>
<td>Site Project Manager / E&amp;S Coordinator</td>
</tr>
<tr>
<td>Air quality - PM10 &amp; PM2.5</td>
<td>Site boundary</td>
<td>Monthly</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>Waste and Hazardous Waste Management</td>
<td>Onsite and worker accommodation</td>
<td>Daily</td>
<td>Site Project Manager / E&amp;S Coordinator</td>
</tr>
<tr>
<td>Noise</td>
<td>Site Boundaries</td>
<td>Biweekly/ High noisy activities</td>
<td>Site Project Manager / E&amp;S Coordinator</td>
</tr>
<tr>
<td>Grievance Mechanism</td>
<td>Onsite</td>
<td>Regularly</td>
<td>Site Project manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------</td>
<td>------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Traffic Management</td>
<td>Onsite, access roads</td>
<td>Weekly</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>Ground water contamination</td>
<td>Onsite</td>
<td>Monthly</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>Solid Waste disposal</td>
<td>Solid Waste Storage Areas</td>
<td>Daily</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>Hazardous Materials</td>
<td>Hazardous Materials storage collection, storage and transfer areas</td>
<td>Daily</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>Soil Quality</td>
<td>Hazardous materials and liquid and solid waste storage areas as a minimum</td>
<td>Soil samples will be analysed following the release of hazardous substances onto the soil and the required restoration</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>Emergency monitoring</td>
<td>Not applicable</td>
<td>Every time there is an emergency</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
<tr>
<td>Social/labor recruitment</td>
<td>The project will seek to employ local workers where possible and where appropriate will offer training to enhance the development of skills within the local workforce</td>
<td>The number of local population employed in the project need to be monitored to assess the effectiveness of the Recruitment Policy that will be developed for the construction phase of the Plant</td>
<td>Site Project Manager/ E&amp;S Coordinator</td>
</tr>
</tbody>
</table>

An HSE management and performance report regarding the on-going works on the Project Site on a monthly and quarterly basis. Each report shall be delivered to the client and branch HSE In-charge by no later than the fifth (5th) Day of the Month following the end of the relevant quarter and contain the following data as per the Project Company’s HSE Monitoring and Reporting procedure.

- Summary of Accidents/Incidents within the past month.
- Summary of daily & cumulative man hour worked
- Loss time due to accident / incident.
- First aid data
- Near miss / unsafe condition reported
- Emergency mock drill conducted
- Number of training hours including tool box training
- Safety audit and meeting related information
- Waste collected and disposed
- Water consumption
- Electricity consumption
- Fuel consumption
- Environmental monitoring data

7. PUBLIC CONSULTATIONS AND DISCLOSURE

7.1 Requirements

Public consultation shall be held prior to the approval of the ESIA for a proposed project in line with the Egyptian environmental law no. 4/1994 and its executive amendment no. 9/2009 modified with ministerial decrees no. 1095/2011 and no. 710/2012. This law requires that number of institutional stakeholders
(representatives of the Egyptian Environmental Affairs Agency "EEAA" and its regional branches, related governmental authorities, governorate where the project is located, local parliaments and influenced groups of nearby institutions or residents) must be represented in the public consultation held prior to the approval for proposed projects that need an ESIA/ESMP. Other parties may participate such as the NGOs and the universities.

According to AfDB’s ISS, the client is responsible for conducting and providing evidence of meaningful consultation (i.e., consultation that is free, prior and informed) with communities likely to be affected by environmental and social impacts, and with local stakeholders. Consultation shall be undertaken with reference to the updated IESIA Guidance Notes on consultation, participation and broad community support. Consultation is based on stakeholder analysis and is preceded by disclosure of adequate project information and environmental and social information to ensure that participants are fully informed. It begins at an early stage during project preparation and continues as needed. It is conducted in a timely manner in the context of key project preparation steps, in an appropriate language, and in an accessible place. The results of the consultation are adequately reflected in the project design and in the project documentation.

The same is also requires for the other financiers such as EBRD, EIB and IFC.

7.2 Stakeholders consultation during SESA and Alcazar I ESIA

As there is a SESA for the wider development of the Benban solar park, the individual projects within the solar park have been categorized as requiring a Form B ESIA by the Egyptian Environmental Affairs Agency (EEAA) which was submitted to EEAA in May 2016 for SP. A form B ESIA does not require individual stakeholders’ consultation, public scoping and disclosure activities. Public consultation was therefore part of the solar park as a whole and is referenced in the SESA. As a result, the SESA supports the ESIA/ESMP process for the individual projects, results in a more consistent approach at the project level for the Form B ESIA preparation, and reduces the need, and cost, for some baselines and removes the need for a project-specific consultation process.

During the scoping phase of SP consultations were carried out as follows:

- Public consultation session with the different project’s stakeholders was held on the 11th October 2016 in Aswan for Benban Solar Park Substations and Interconnection works;
- Scoping meetings were conducted with the community developers in NREA premises on the 15th September 2015;
- Scoping meetings were conducted with the governmental and non-governmental entities in Aswan Governorate during September 2015;
- Scoping meetings with the community people in order to identify their needs in the September 2015;
- On the 8th September 2015, an interview was broadcast on air for one hour with the SESA consultant about the project and potential impacts. As well as, the importance of community engagement;
- Public consultation session with the different project’s stakeholders was held on the 17th September 2015 in Aswan

With regards to the Alcazar I project, stakeholder engagement activities were carried out in parallel to those held as part of the SESA being prepared for the whole Benban PV Solar Park. Following are the main stakeholder engagement activities to date:
• Meetings were conducted between the local mobilizers and the consultants during August 2015 in order to develop an engagement plan that is locally tailored for the residential communities with the study team members;
• Based on the identification of stakeholders, various questionnaires and guidelines were prepared in order to engage: i) the residents in the project areas, ii) NREA, iii) the NGOs, iv) Governmental entities, v) health and safety department, vi) the environmental departments, vii) developers and EETC.
• The study team divided the various engagement activities of the project to Pre-project designing, Scoping phase, Data collection phase and, Public consultation phase. All activities conducted were documented with photos, videos and lists of participants in order to warrant an appropriate level of transparency.

In total, over 822 people were directly consulted through meetings, interviews, public consultation events, workshops, etc. Over 60% of the attendance were made of men. The main feedback received from the various consultations are summarized below:

• All stakeholders were pleased with consultation approach as the project consulted them in their village;
• All of them had positive perception of the project due to its limited impacts;
• Most of them requested, that job opportunities be given primarily to the community, Capacity building activities, to address, Water resources issues, etc.

During the public consultation events, a long list of feedback was raised that included: project’s impact, technical specifications, job opportunities and community role in the project. All the queries were addressed and where applicable included in the project design.

In line with national requirements, the ESIA/ESMP was approved by EEAA in May 2016. In line with AfDB’s requirements, the ESMP summary will be disclosed on its website at least 30 days before the project proposal is submitted to its Board of Directors.

7.3 Further Planned Consultation Activities

7.3.1 Stakeholder engagement plan

A Stakeholder Engagement Plan is necessary to ensure that stakeholders are kept well informed about the project throughout its lifecycle. Stakeholders should have the opportunity to express their views about the project and also to raise complaints.

All stakeholder engagement will be managed through the FMC and build on the engagement undertaken as part of the SESA and the developed Master Disclosure and Engagement Plan. Engagement as part of the SESA included meetings with local villagers, both individually and as a group. The project is located on desert land which is owned by the Egyptian Government and project access is along newly constructed NREA roads from the local public highway. There will be no road or land impacts on the local villages, and there are no stakeholders directly affected by the project. The FMC will develop a SEP which covers the whole Benban PV solar park and therefore there is no requirement for the sponsors to develop a project-specific SEP. The FMC will develop a Community Grievance Mechanism in alignment with PS1, and will be responsible for responding to any grievances which are raised in relation to the overall site or individual developers. The sponsors will develop a subsidiary Community Grievance Mechanism which will include details of how it will be responsible for responding to any grievances identified by FMC as being caused by the activities of the project;

7.3.2 Grievance Redress Mechanism
Anyone will be eligible to submit a grievance to the Project if they believe a practice is having an adverse impact on the community, the environment, or on their quality of life. They may also submit comments and suggestions to the Alcazar I project through the social development officer assigned by developer association.

The following are the key elements of the Grievance Redress Mechanism:

- **Objectives**: The objective of a grievance procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner;

- **Disclosure of the GRM**: The Community will be fully informed about the Grievance procedures in simple language. Information about grievance mechanism will be tailored according to the community. Community leaders, social entities and the governmental units will be informed about the GRM;

- **Mode of Grievance**: The Company will accept all comments and complaints associated with the project from any stakeholder. Comments can be made via email, post, fax, on the telephone or in person. The comments and complaints will be summarized and listed in a Complaints/Comments Log Book, containing the name/group of commenter/complainant, date the comment was received, brief description of issues, information on proposed corrective actions to be implemented (if appropriate) and the date of response sent to the commenter/complainant;

- **Response to grievances**: All comments and complaints will be responded to either verbally or in writing, in accordance to preferred method of communication specified by the complainant. Comments will be reviewed and taken into account in the project preparation; however they may not receive an individual response unless requested;

- **Registration of GRM**: All grievances will be registered and acknowledged within 6 working days and responded to within one month. The project management will keep a grievance log and report on grievance management, as part of annual project progress reports;

- **Grievance channels**: Comments and concerns regarding the project can be submitted in writing in through the following channels until the developer association assigns a social officer. For the time being NREA will be the responsible entity of any grievance:
  
  Email: reic@nreaeg.com
  
  By telephone : 22725891 and /fax 22717173
  
  By post or hand delivered to: Ibrahim Abu el Naga St. Abas El Aqad, Nasr City Cairo Governorate

8. **INSTITUTIONAL ARRANGEMENTS AND CAPACITY BUILDING REQUIREMENTS**

The roles and responsibilities of the key E&S team are as follows:

- **Project Manager**: (i) Understand Company HSE Policy and appreciate the responsibility allocated to each grade; (ii) Determine at the planning stage (The most appropriate order and method of working; Allocation of responsibility with subcontractors and others; Hazards which might arise from overhead or underground power lines and other situations which might lead to unnecessary improvisations on site; (iii) Facility for welfare and sanitation; (iv) Coordination off site agencies during emergencies; (v) Provide instruction to establish working method, to explain the sequence of operations, to outline potential hazard, at each stage and indicate precautions to be adopted; (vi) Check over working methods and precautions with the site team before work starts; (vii) Ensure that work, once started is carried out as planned and the Construction regulations and other relevant legislation are observed at site; (viii) Make certain that section heads; engineers supervisors and foremen understand & follow the HSE rules during their work; (ix) Take appropriate disciplinary action against the repeated violator of the stated
HSE rules; (x) Arrange resource for implementation of safe operational practice at site Engage authorized waste recycler

- **HSE Manager / Officer / Supervisor:** (i) Carry out inspection of work area, work method, men, machine & materials and other tools and tackles; (ii) Conduct training & awareness programs at site including Tool box; (iii) Liaison with client’s HSE representative with regard to safe job execution at site; (iv) Representing the organization in contractor’s HSE meeting; (v) Conduct investigation of all incidents/dangerous occurrences and recommended appropriate corrective & preventive measures; (vi) Plan procurement of Personnel Protective equipment’s and safety devices and inspect before use as per laid down norms; (vii) Design & campaign, HSE programs to promote HSE in the work place; (viii) Conduct fire drill and facilitate Emergency preparedness; (ix) Advice and Co-ordinate for implementation of work permit system; (x) Facilitate inclusion of HSE elements into work method statements; (xi) Overall implementation of waste management plan and ensure proper housekeeping;

- **Project / Site Engineer:** (i) Ensure that all machineries, equipment’s, plants deployed at site are safe and fully efficient; is guarded and equipped with safety devices and is tested in accordance with the Construction Regulations; (ii) Make sure that all operators are employed only on equipment for which they have been thoroughly trained; (iii) Direct the project execution team under his control to follow emergency evacuation process; (iv) Attend promptly to all plant defects notified or call the attention of Site Management to the need for dangerous plant, machinery and equipment to be put out of service until it can be properly repaired; (v) Ensure that, where necessary, required Personnel Protective equipment’s are provided and worn; (vi) Check that hired equipment and vehicles are safe and those, where appropriate copies of current test certificates are available; (vii) Check that periodic tests, inspections and maintenance are carried out; (viii) Proactively carryout the hazardous situation related to the job under their control and to adopt the necessary precaution after consulting the HSE Manager/officer/supervisor.

- **Site Supervisor:** (i) Organize sites so that work is carried out to the required standard with the minimum risk to men, machinery & materials; (ii) Make sure that suitable protective clothing / PPE is available, where appropriate and that is used; (iii) Direct the project execution team under his control to follow emergency evacuation process; (iv) Give all workmen/technicians precise instructions on their responsibilities for correct working method; see that they do not require taking unnecessary risk; (v) Ensure workers are following site housekeeping and waste segregation process;

- **Environmental /Social Coordinator:** (i) Set up program for regular monitoring; (ii) Follow up community complaints; (iii) Conduct inspections to monitor environmental performance and compliance by contractors; (iv) Check compliance with legal requirements on regular basis; (v) Ensure the environmental and social meetings are held on a regular basis; (vi) Communicate and advise PM and subcontractors on environmental and social aspects; (vii) Participate in regular site meetings, so that environmental and social issues are on the agenda; (viii) Report, investigate and follow up on incidents (environmental and social); (ix) Establish corrective action plan for any non-compliance including action plan for prevention of such misconduct or incident; (x) Develop, implement and manage the environmental and social training program; (xi) Has been trained to identify environmental and social issues in order to convey any observed issues.

Where applicable, the EEAA will carry out the external monitoring of the ESMP.

**9. ESMP ESTIMATED COSTS**

The ESMP plans/procedure shall form part of the EPC Contract. The related cost is include in included in the EPC contract. Other plans shall form part of BDA’s cost share agreement with NREA and EETC. Alcazar I
has signed the amended Cost Sharing Agreement with EETC and NREA on 12th April 2017. A preliminary breakdown of budget for the Environmental, social and health and safety management and activities is as follows:

- 1 HSE Manager on-site full time - $110,000
- 2 HSE Officers on site full time - $90,000
- Back office Support - $30,000
- Internal auditing on site HSE practices - $10,000
- HSE Equipment - $8,000
- First Aid Equipment – $1,000
- HSE Training - $12,000

Total: $333,000

In addition to the above, the FMC will develop a CSR Plan and create a vision for the community development of Benban. Alcazar I will abide by this Plan.

10. IMPLEMENTATION SCHEDULE AND REPORTING

The summary of the implementation schedule is provided below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desing &amp; Engineering Submissions &amp; Approvals</td>
<td>82 days</td>
<td>01 November 2017</td>
<td>22 February 2018</td>
</tr>
<tr>
<td>Desing &amp; Engineering Submissions</td>
<td>68 days</td>
<td>10 November 2017</td>
<td>February 2018</td>
</tr>
<tr>
<td>Ordering of Material</td>
<td>62 days</td>
<td>30 November 2017</td>
<td>23 February 2018</td>
</tr>
<tr>
<td>Subcontracting and Services Ordering</td>
<td>47 days</td>
<td>17 November 2017</td>
<td>22 January 2018</td>
</tr>
<tr>
<td>MC , Manufacturing, Inspection &amp; MDCC</td>
<td>187 days</td>
<td>09 December 2017</td>
<td>13 June 2018</td>
</tr>
<tr>
<td>Transportation from Exworks to On-site Store Delivery</td>
<td>169 days</td>
<td>20 January 2018</td>
<td>07 July 2018</td>
</tr>
<tr>
<td>Civil &amp; Structural Works</td>
<td>203 days</td>
<td>24 November 2017</td>
<td>18 July 2018</td>
</tr>
<tr>
<td>PV Plant Installation Works</td>
<td>95 days</td>
<td>09 April 2018</td>
<td>27 July 2018</td>
</tr>
<tr>
<td>Testing &amp; Comissioning</td>
<td>48 days</td>
<td>09 July 2018 01</td>
<td>September 2018</td>
</tr>
</tbody>
</table>

Given the relative limited duration of the works for the project, it is recommended that Alcazar I prepares: (i) a quarterly report on the implementing and monitoring of the ESMP during the construction and; (ii) an annual report during at least during the first 2 years of operation. These reports will be submitted to AfDB.

11. CONCLUSION

The Benban project meets all the requirements of site suitability as mentioned above; is in line with the development strategy of the country; and uses a technology which is environmentally beneficial (low impact; avoidance of CO₂ emissions). It is sufficiently distant from residential areas to have a transient and manageable impact during construction and an almost negligible impact during operation. In conclusion, the project as envisaged meets all the positive criteria and can be considered beneficial with minimal long-term impacts.
12. REFERENCES AND CONTACTS

List of documents consulted

- Ecoconserv. 2016. Strategic Environmental and Social Assessment (SESA) report for the Benban PV Solar Park, 220 p;
- Various specific environmental and social management plans developed for the Alcazar I project

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