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Strategic Environmental & Social Impact assessment Benban 1.8 GW Photovoltaic solar Park (NREA), Egypt

Non -Technical Summary

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1 Non-Technical Summary

1.1 Introduction

Egypt's expanding economy and growing population require a reliable electricity supply which can meet the rapidly increasing demand. Residential power demand increased by 40% between 2008 and2013, and overall power demand by 28%. In recent years, this increase has led to blackouts as the generating capacity could not cope. The increased demand has also led to pressure on Egypt's gas supply and reserves. The existing installed generating capacity of c.34 GW is no longer sufficient. With demand growth expected to remain at the levels above, significant additional capacity is required each year. At present electricity generation is dominated by thermal power stations.

Table 1: Installed electricity generating capacity in Egypt (Source: Egyptian Electricity Holding Company, Annual Report 2013/14)

Total Installed Capacity	MW	32,015	% Share
Hydro	MW	2,800	8.75
EEHC Thermal	MW	26,480	82.75
Renewable (Wind and Solar)	MW	687	2.10
Private Sector (Thermal)	MW	2,048	6.40

In order to meet the increasing demand, diversify the national energy mix and improve the environmental and climate footprint of the power sector, the Government of Egypt and the Ministry of Electricity and Renewable Energy (MoERE) are committed to exploit Egypt's renewable energy potential. To stimulate the development of renewable energy Egypt has introduced an overarching regulatory framework with the aim of securing 20% of its energy generation from renewable sources by 2022. Within that framework, Egypt has initiated a programme offering feed-in tariffs for generation from wind or solar projects up to 50 MW capacity, with an initial aim of securing 2,000 MW of wind capacity, 2,000 MW of solar capacity from installations greater than 500 kW and a further 300 MW of solar capacity from installations below 500 kW (the FiT Scheme).

Under the FiT Scheme the state-owned transmission system operator, the Egyptian Electricity Transmission Company (EETC), will offer a long-term Power Purchase Agreement (PPA), with a price guarantee for 20 years (for wind) and 25 years (for solar). The New and Renewable Energy Agency (NREA)- Under MoERE- will make available multiple plots of land for usufrct. Each individual plant is expected to have its own contractual arrangements and be designed, developed, financed, constructed and operated as a standalone project by a dedicated special purpose vehicle (SPV).

The Egyptian government has allocated a 37.2 km^2 plot of land located in Benban in the Kom Ombo area of Upper Egypt (the Benban PV site) to NREA for use for renewable energy generation. The NREA has in turn divided the site into 41 separate but contiguous plots which it is making available to Project Companies to implement individual solar photovoltaic projects (the Benban Projects). NREA is granting initial access to the plots under memoranda of understanding to allow for project development. Prior to construction and operation NREA will sign long-term (25 year) usufruct agreements with the Project Companies. All plots are now allocated to developers. Once constructed, Benban will be the world's largest solar PV park, at an estimated total cost of between 3.5 and 4 billion USD.

NREA initiated a Strategic Environmental and Social Impact Assessment (SESA) for the entire Benban site. The objective is to provide an over-arching assessment of the environmental and social impacts of the Benban site (and thus of all Benban Projects as a whole). This will contribute to a consolidated framework for the assessment and subsequent management of environmental, health and safety, and social impacts of the 41 projects

1.2 Project Description

The project is the construction and operation of 41 individual solar photo-voltaic electricity generating facilities with a total generating capacity of 1,800 MW on a 37.2 square kilometre site west of Benban village in the Aswan Governorate of Upper Egypt. NREA is renting the plots of land to developers as well as providing basic infrastructure, in particular two access roads connecting the site to the nearby highway and a road network on the site.

The project also includes the construction and operation by EETC of 4 high voltage electricity substations to which the individual plots are to be connected and an approximately 12km high voltage line connecting those substations to the 220 kV High Voltage Overhead Line east of the site.

1.2.1 Location

The proposed project site is located in the western desert, approximately 40 km northwest of Aswan city and within the Aswan governorate. The following maps show the location of the site. The site is located on land that has never been used and is owned by the Government of Egypt.

The River Nile 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 Fares Village (approximately 25 km to the east).

Figure 1: Map of the site location (approximate distance to Cairo 650 km)

Figure 2: Site in relation to Benban and Fares villages

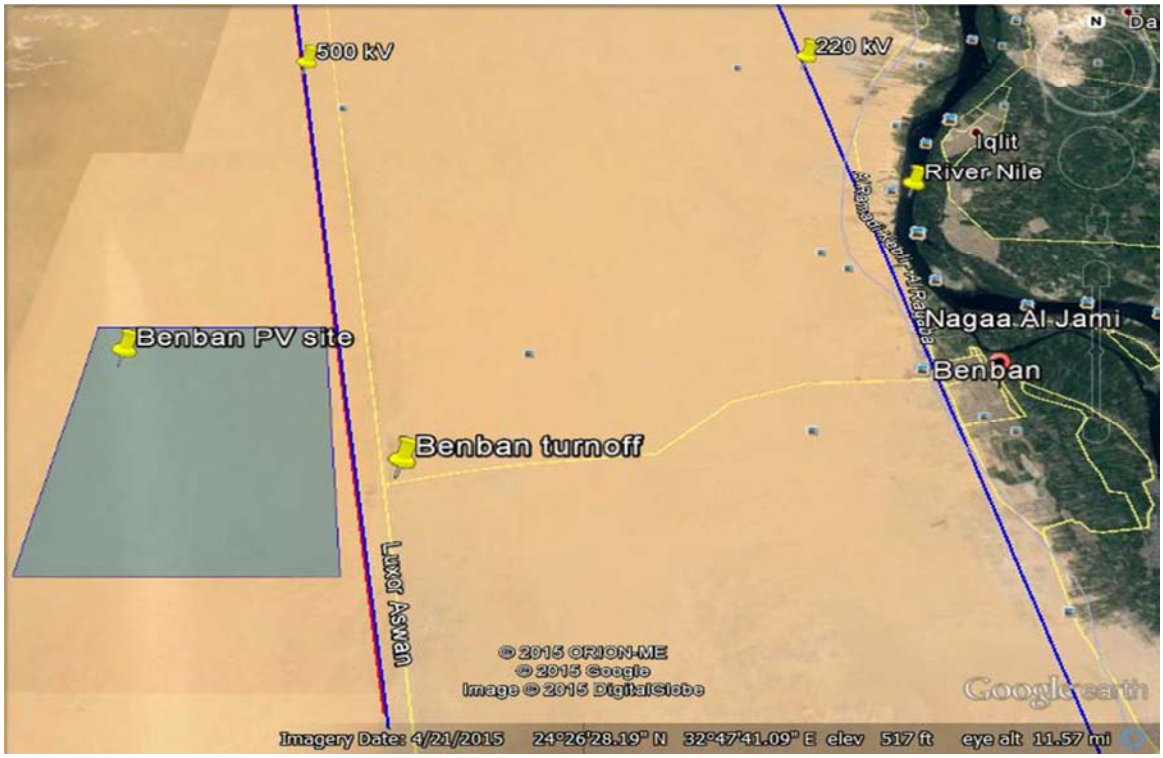

Figure 3: Plot in relation to Benban village, Aswan – Luxor Highway and 220 and 500 kV high voltage lines

1.2.2 Project Layout

The project site is subdivided into 41 plots. These are arranged in 4 rows as shown in Figure 4 below, which also shows the four substations.

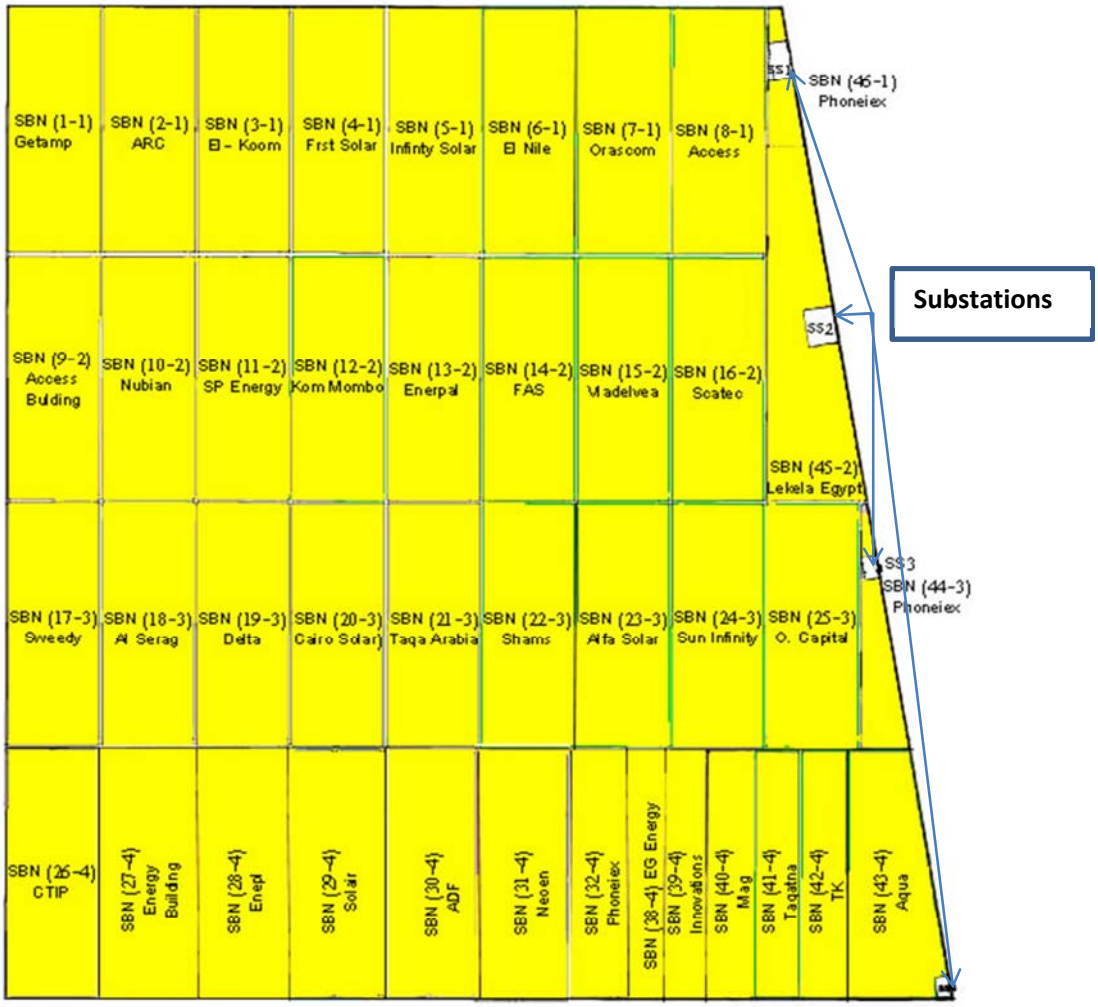

Figure 4: Project site layout

1.2.3 Technology

Renewable energies avoid the pollutant emissions that are the result of conventional thermal power generating stations which may release large volumes of sulphur dioxide, oxides of nitrogen and carbon dioxide (CO_2). A key argument for wind power and solar power is the avoidance of CO_2, the most common greenhouse gas. The volume of CO_2 emissions avoided by all Benban Projects together is estimated to be around 2 million tons of CO_2 per year.

Structure and Components of a Commercial PV System

The individual Benban Projects will use photovoltaic panels which convert solar energy into electricity. The panels produce direct current which is then converted into alternating current using an inverter and is stepped up to a higher voltage as required to feed it into the electricity grid.

The solar cells are the basic components of the panels. PV cells are commonly constructed from mono or polycrystalline silicon or thin film technology. All photovoltaic cells produce direct current (DC). Standard silicon solar cells have an efficiency of 15 – 20 %.

Figure below shows the components of a typical commercial solar PV system.

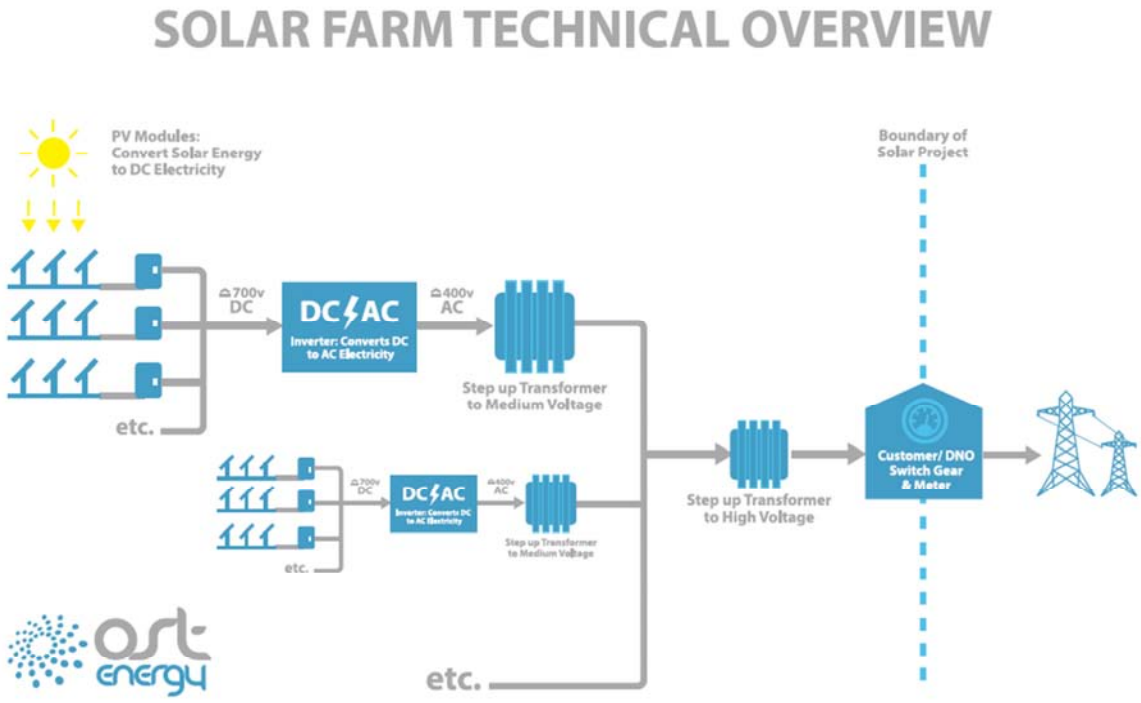

Figure 5: Schematic of the components of a solar PV system (source: OST Energy)

The PV panels are mounted on frames and set out in arrays. Panel sizes vary; common sizes are 2,000x1,000 mm and 1,200x600 mm. Panels can be mounted on fixed, immovable frames or on frames which track the sun and provide best exposure of the panels; Figure 6 below shows panels on a single axis tracker system. Panels are connected together to form arrays, which in turn are connected to inverters to convert the DC power to alternating current (AC) power. The voltage of the power is stepped up by a transformer to the required voltage of the nearby electricity grid. The electricity is then fed from the site to the closest grid substation for distribution into the wider electricity grid.

The key components associated with a PV power plant as shown in Figure above include:

- PV modules
- Mounting structures and tracking systems/motors
- Cabling
- DC-AC current inverters
- Transformers
- Medium Voltage (MV) & High Voltage (HV) Switchgear
- Electrical connection cabin
- Supervisory Control And Data Acquisition (SCADA) System
- Transmission to grid.
- Associated infrastructure and utilities, including:
  - Site security, including fencing and CCTV
- Buildings, including onsite substation, connection building, control building, guard cabin, and spare parts storage.
- Access road and internal road network
- Water supply infrastructure (for panel cleaning).

Figure 6: Single axis tracker system

1.3 Overview of Project Phases and Activities

The general development phases for such a large scale solar PV projects are as follows:

- Pre-construction: such as site preparation, mobilisation of equipment and materials to site.
- Construction and Installation: including civil works, electrical works, and equipment installation.
- Operation: Plant operation and routine maintenance.
- Decommissioning: Dismantling of equipment and associated facilities and site restoration.

1.3.1 Mobilisation Phase

The mobilisation phase takes place before installation work can begin at the project site and it includes the ordering of materials and equipment, signing contracts with subcontractors and hiring of staff.

This phase involves the mobilization of workers, materials and equipment to site, as well as site preparation which involves clearing and levelling of the site and establishment of on-site facilities, including potentially worker accommodation.

Heavy-duty and other pieces of equipment will be moved to the project site at the beginning of construction activities for civil work activities and equipment installation. All PV, electrical and structural equipment is planned to be shipped and then trucked to site via road in "containers". Material and equipment will be transported in standard 40ft containers and it is estimated that each development would require around 600 such containers. Each project would also require large construction vehicles and equipment, such as bulldozers, excavators, cranes etc. to assemble the facility; around 30 such vehicles may be required per project.

During the site preparation period, the workforce required for site security, manual labour, civil works, transportation of goods and other similar services will most likely be drawn from the local labour pool. During this period each developer will establish a team of workers specific to the tasks required.

It is anticipated that this phase will take around 2 months.

1.3.2 Construction Phase

The construction phase of the each project will include activities such as:

- Construction/improvement of internal access roads
- Levelling of the ground
- Fencing around the site
- Construction of a water connection pipeline from the river Nile.
- Installation of inverters/transformers
- Driven piles for mounting structure
- Construction of electrical substation and foundations
- Excavation, trenching and cable laying
- Fixing and wiring of the panels
- Installing CCTV around the fence line and access points
- Installing water tank for staff and O&M activities
- Installation of septic tank
- Construction of buildings
- testing and commissioning of equipment and the project as a whole
- Site clean-up.

During the construction phase the piles need to be driven into the ground to form the structural base of the PV arrays. Once the PV components have arrived on site, technicians will supervise the assembly of the panels and test the facility. The PV panels will be installed on the galvanized steel structures. There will be a basic dirt road layout for the construction activities. A phased approach is recommended during construction to minimise the consequent adverse impacts, especially in terms of traffic management.

Although it will vary by developer, an estimated 250-300 workers (peaking to around 500-600) will be needed during the construction period. A section of the site may be used as a laydown area where shelters, equipment, washing and toilet facilities (portable) and containers will be located. Workers accommodation may need to be provided through temporary construction camps onsite for non-locals/influx workers. The employment and labour arrangements for each developer should be a part of their project specific plans and should also be integrated with relevant collective plans to be coordinated by the developers association.

The need for cut and fill areas and/or borrow pits at each project site, along roads and at substation/ transformer sites, will be established during each project design phase.

It is anticipated that the construction activities phase will take around 8 months for each project.

1.3.3 Operation Phase

Once the facility is complete and operational, it is expected that it will have a lifespan of approximately 25 years.

Day to day facility operations will involve both regular on site preventive and corrective maintenance tasks in order to keep the PV power plant in optimal working order throughout the operational period. The preventive maintenance follows a routine service schedule aimed at preventing faults from occurring and keeping the plant operating at its optimum level. The frequency of the preventive maintenance depends on a number of factors such as the technology selected, environmental conditions of the site, warranty terms and seasonal variances. It contains for example activities like PV module cleaning, inverter servicing and checks on structural integrity of the mounting structure. Corrective maintenance is carried out in response to failures, for example the repair/exchange of damaged or faulty equipment.

Job opportunities will arise during the operation phase, including skilled and semi-skilled labour (such as electrical and mechanical technicians) and unskilled labour (such as module cleaners and security personnel) for the duration of the PV power plant lifespan.

1.3.4 Decommissioning Phase

Typically the following steps would be followed during plant decommissioning:

- PV panels will be removed from the fixed aluminium frames and tracker systems.
- Fixed aluminium frame and tracker system structures will be removed.
- PV panels will be transported to recycling facilities (alternatively used at other operational sites).
- Electrical equipment (transformers) will either be re-used on other developments/projects or recycled.
- Underground cable runs (where applicable) will be removed and recycled.
- Gravel/chipstone on the access roads, onsite service roads, guardhouse foundations will be removed and reused.
- For buildings, all the reusable material will be removed, the structures demolished and the rubble transported to a municipal waste site.
- Disturbed land areas will be rehabilitated.

The PV power facility will be decommissioned at the end of its projected 25 year operational life time. Alternatively, with regular maintenance, the facility could be upgraded, with the useful lifespan of the project extending beyond the design lifespan.

It is recommended that a comprehensive decommissioning plan be developed discussed with relevant stakeholders, at least one year prior to scheduled decommissioning.

1.3.5 Road Connection and Site Road Network

The Benban PV site is located approximately 1 km west of the Aswan – Luxor Highway. This is the major road connection along the River Nile. Travel to/from Aswan takes approximately 45-60 minutes by car. The highway is a modern, single carriageway with moderate traffic including a large proportion of heavy goods vehicles. Figure 7 below shows the turnoff from the highway to Benban village. The Benban PV site has its own road network to provide access to the individual plots and to connect the site to the Aswan – Luxor Highway.

Figure 7: Aswan-Luxor Highway at Benabn Intersection

There are two major site roads perpendicular to the highway; these roads have a tarmac surface. The connection to the highway is via two turnoffs. Any other roads connecting to the plots will consist of compacted sand and gravel. Site access arrangements from the highway are still to be determined.

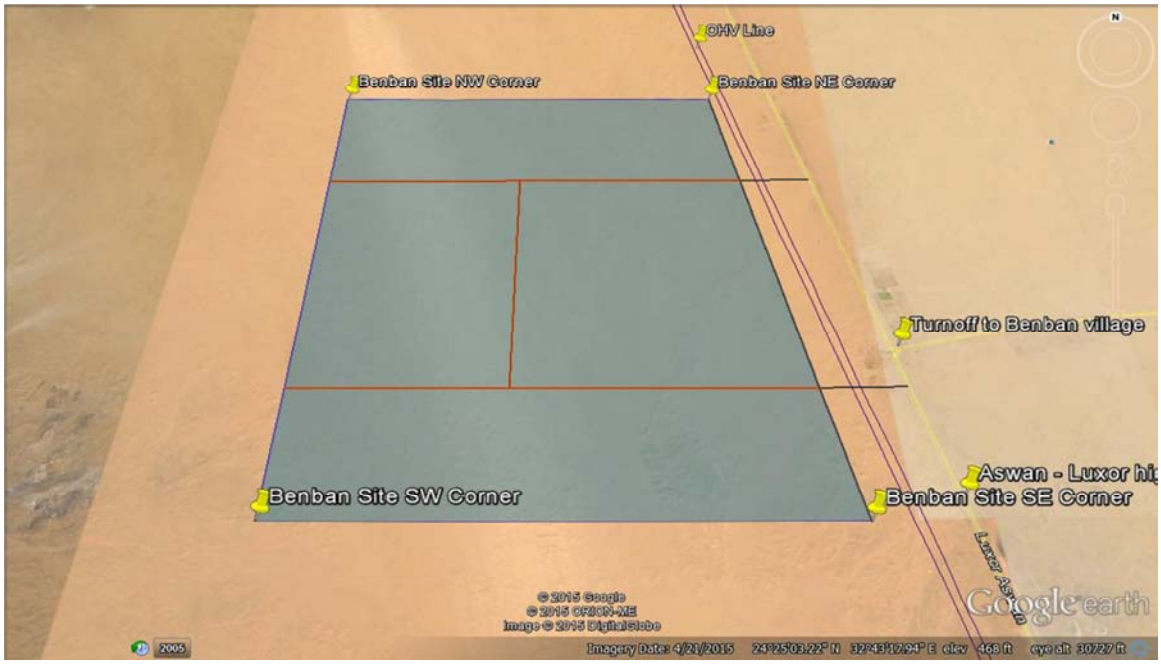

Figure 8: Site road network (paved roads)

1.3.6 Associated Projects

Associated projects which are required for the operations of the 41 Benban Projects include:

- the construction of four electricity substations and a control centre on the site;
- connection to the electricity grid through a new high voltage transmission line; and
- potentially, water abstraction at the River Nile and a pipeline to the Benban PV site,

On-Site Substations and Control Centre

The Benban PV site will have four substations at the eastern side towards the Aswan – Luxor Highway as shown on Figure 4 above. The four substations are on the Benban PV site. Three (identical in layout) each cover 15,000 m^2 in area, with 175 MVA transformers and 22/220 kV switchgear. The fourth one covers 50,000 m^2, with 175 MVA 22/220 MVA transformers and 22/220/500 kV GIS switchgear. Figure 9 below shows the layout of the smaller substations. The substations will be subject to separate environmental permitting. In addition there will be a control centre containing monitoring and communications equipment for the four substations.

As all substations and the control centre are on the Benban site there are no additional land ownership issues to consider. The substations will be state-of-the-art design and construction, with good access to equipment and storage space and will be designed and operated in compliance with environmental regulations and good industry practice (e.g. oil spillage protection).

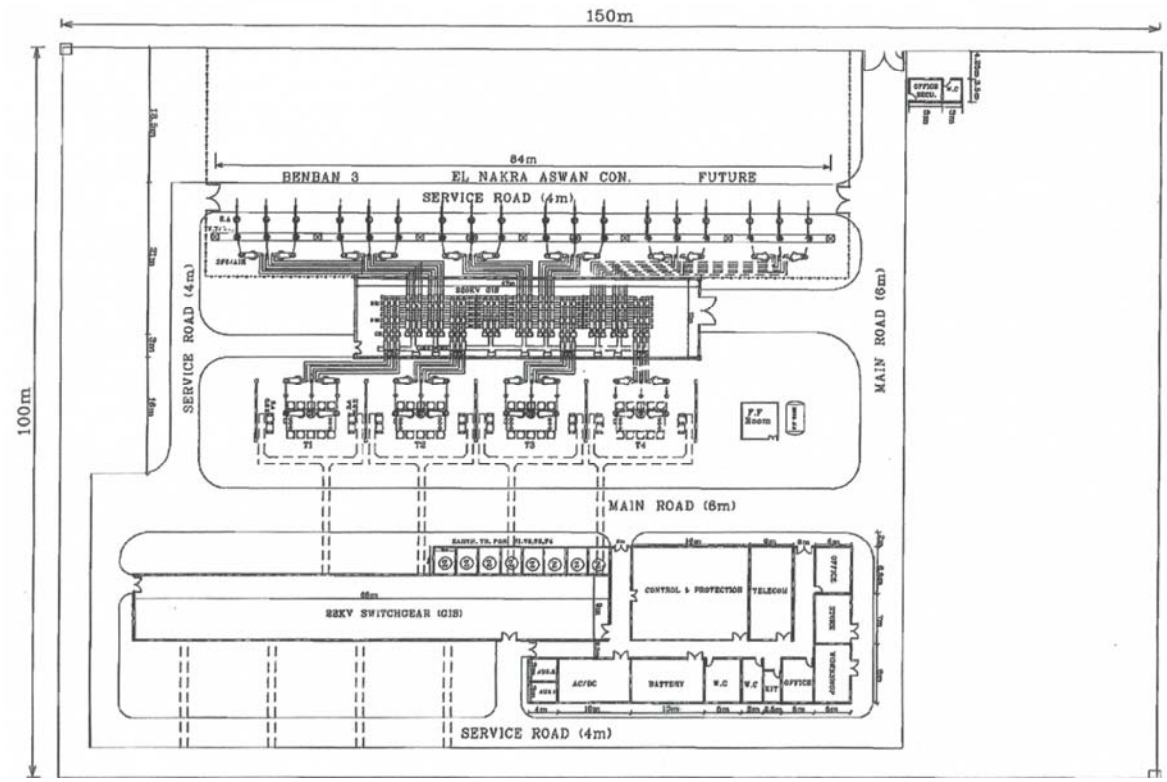

Figure 9: Layout of the 3 smaller substations

Grid Connections

Each Benban project will transmit its power from its site boundary to one of the four on-site substations using underground 22 kV cabling. At the substations the voltage will be increased to 220 kV and potentially 500 kV. For the further evacuation of power from those substations the Benban site is close to two transmission corridors. One corridor has 2 x 500kV HVTL at a distance of approximately 0.5 km from the eastern site border, between the site and the Aswan – Luxor Highway; the other corridor is located approximately 10 km to the east and includes 220 kV lines. The locations of both corridors are shown in Figure 3 above. The four substations on site will be connected to the 220kV line via high voltage overhead lines, across uninhabited and unused desert land; see Figure 10 for photo showing the existing 220kV lines line. This grid connection is subject to a separate ESIA. At a later stage EETC may also construct an additional connection to the neighbouring 500 kV line.

Figures 10 and 11: 220 kV and 500 kV Lines

River Nile Water Abstraction and Pipeline Connection

A reliable and sustainable water supply is required during construction (mainly water for sanitary and construction purposes). During operations water will be required for cleaning of the panels to remove dust which reduces efficiency although it is also possible to clean the panels without water depending on the cleaning technology used by each developer. The required water volumes are particularly high if many or all of the Benban Projects choose to use wet panel cleaning. Water will be supplied from the River Nile.

The figures below show the potential route of such a pipeline and the location of the water abstraction point at the Nile (Figures below). The sustainability and E&S impacts of a water connection along this route has previously been assessed as part of another project configuration which determined that this would be a feasible option. This needs to be reassessed and confirmed as part of the Benban development.

Figure 10: Water pipeline and abstraction point

1.4 Legal Framework of the Project

The 41 individual Benban Projects require construction and operations permits as set out in Egyptian law. Benban Projects which seek financing by International Financial Institutions (IFIs) will also need to comply with their respective environmental and social policies.

This NTS describes the overall Benban project and refers to the Strategic Environmental and Social Assessment prepared for that overall project (the SESA). The Egyptian Environmental Affairs Agency (the EEAA) will review the SESA. Each individual PV project will also need to obtain an environmental permit from the EEAA. Following the EEAA's approval of the SESA, individual projects, categorized as B for the purposes of Egyptian environmental permitting, are required to prepare and submit a plot-specific 'Form B' ESIA to the EEAA. The Form B should assess and manage plot-specific activities and impacts; and includes explicit commitment of the individual developers to comply with the SESA requirements

Egyptian legislation related to environmental aspects includes:

- National environmental legislation law 4/1994, amended by Law 9/2009 with decree No 1095/2011
- EEAA guidelines and requirement for Environmental Impact Assessment; Articles 19, 20, 21 and 23 in law 4/1994
- Guidelines of Principles and Procedures for "*Environmental Impact Assessment*" 2nd Edition January 2009
- Health and Safety Laws and Decrees.
- Traffic and Urban planning laws.

Egyptian legislation related to social aspects includes:

- EEAA guidelines related to the Public Consultation; Guidelines of Principles and Procedures for "*Environmental Impact Assessment*" 2nd Edition January 2009 that describes engagement activities and disclosure requirements
- Egyptian legislation specifically related to land acquisition and involuntary resettlement includes: Law 94/2003 on the National Council for Human Rights (NCHR) and Law Number 10 of 1990 on property expropriation for public benefit
- Egyptian legislation specifically related to protection of human rights includes Law no. 94/2003 on establishing the National Council for Human Rights
- Laws and regulations related to Antiquities (Law No. 119 of year 2008 and Law No. 117 of year 1983)
- The Procurement Law No.89/1998 related to tendering and purchasing arrangement

A wide range of International Financial Institutions are considering financing the Benban Projects, including the European Bank for Reconstruction and Development (EBRD), the International finance Corporation (IFC – part of the World Bank Group), the European Investment Bank (EIB), the Overseas Private Investment Corporation, FMO, Proparco, the

Commonwealth Development Corporation and the OPEC Fund for International Development. These IFIs have separate, but largely compatible, environmental and social requirements which have to be met by companies seeking their financing. For the purposes of this NTS reference has been made to the policies of EBRD and its 10 Performance Requirements; IFC and its 8 Performance Standards and EIB and its 10 Environmental and Social Standards.

1.5 Site Selection and Project Alternatives

The availability of a sufficiently large land area which is unused and where ownership can be obtained easily is a key requirement for site selection. Additionally, there should be few (or no) sensitive receptors for environmental impacts; the site should be sufficiently distant from residential areas to avoid disturbance during construction and operation; the site should be close to a well-developed road network for delivery of components and also close to the electricity grid.

The Benban project meets all the requirements of site suitability as mentioned above. It is also in-line with the development strategy of the country and it uses a technology which is environmentally beneficial (low impact; displacement of CO_2 emissions). It is, in summary, a relatively environmentally benign technology at a suitable site.

1.6 Baseline Conditions

1.6.1 Physical and Environmental Conditions

Climate: The Aswan region is part of the extremely arid belt of Egypt where rainfall is negligible. 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 predominantly from NW to SE. Solar radiation levels are high throughout the year.

Soil and Topography: The surface of the site is mainly flat, with sand and gravel dunes. There is no natural vegetation and there are no human activities.

Figure 11: Panoramic view of the site

Figure 12: Gravel area at Benban

Figure 13: Sand area towards the west of the site

Hydrogeology: 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.

Hydrology: The project as initially envisaged by NREA did not include any supply of water. Should water extraction from the River Nile be chosen for the Benban water supply, water

abstraction can take place as identified for the Kom Ombo Concentrated Solar Project originally planned on a 5.6 km^2 site in the south-eastern part of the Benban PV site. An Environmental and Social Impact Assessment was carried out for the Kom Ombo project in 2013. This included a detailed assessment of a water supply from the River Nile, with a 16 km pipeline to the Benban site.

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.

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. The nearest areas with vegetation and wildlife are the agricultural lands in the Nile valley, at a distance of approximately 13 km (Figure below).

Figure 14: Agricultural area near Benban, in the Nile valley

Archaeology and Cultural Heritage: The temple at Kom Ombo located at the eastern bank of the river Nile, 45 km away from Aswan City, is the nearest archeological site to the Benban site. 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.

1.6.2 Social and Socio-Economic Baseline

Background and Population

The project is located in Aswan Governorate, 40 km northwest of Aswan City, on land owned by the New and Renewable Energy Authority of the Ministry of Electricity. Aswan is the southernmost governorate in Egypt. It is part of the of the "Upper Egypt" region that includes Souhag, Aswan, Qena, Red Sea, and Luxor governorates.

Aswan governorate has an area of about 62,726 km^2 (6.2% of Egypt's total area). The populated areas are a mere 5.2% of the total area of Aswan: Residential areas cover 2.25% while agricultural land is limited to about 1% (646.4 km^2). The governorate includes 5 Markaz (regions/municipalities), 10 cities, 33 rural local units composed of 79 villages and 342 hamlets. According to the 2006 census, the Aswan population is about 1,323,315 million: 42.5 % in urban areas and 57.5% in rural areas. The natural annual population growth rate is 22.8 per thousand.

The nearest settlement to the boundaries of the Benban PV site is the New Benban village which is located in the jurisdiction of Daraw Markaz[1], about 12 Km east of the site. Benban village itself is located 13 Km east of the project boundaries. Additionally, Fares village is located 23 km away from the project and New Fares is about 20 km away from the project. Benban and New Benban represent the closest human settlements. Benban village encompasses three main villages, Benban Qebly, Benban Bahary and El Raqaba. Benban village is inhabited by tribes which migrated from the Arabian Peninsula to the South of Egypt. The tribes are believed to be descendants of El Husein (Grandson of Prophet Muhammad). The largest tribes in these areas are El Ansar and El Ababda. Some Nubians are also present in the village. Nubians are believed to be descendants of an ancient African civilization which ruled the south of Egypt in Pharaonic times. There are three Nubian households in this village. Almost all Benban inhabitants are Muslim. About 3.0% are Christian (Copt). Benban has a small church administered by a resident priest. In general, Benban residents value traditions and norms and have formed local a dispute settlement committee (Shoura Council)[2].

The total population in Benban village is estimated at 26,220 people: 36.0% in Benban Bahary, 34.9% in El Raqaba and 29.0% in Benban Qebly. The total number of households is estimated at 5,797. The average household size varies between 4.4 in El Raqaba and 4.6 in Benban Bahary.

New Benban village is a new development consisting of 50 residential buildings (all sold, around 15 inhabited). The number of people living in New Benban is around 75 persons[3]. The Local Governmental unit plans to construct an additional 50 residential units.

[1] The governorate is divided into regions which are named Markaz
[2] Based on a meeting with the Mayor of Benban Bahary
[3] Data based on interviews with the community people and officials.

Figure 15: New Benban Schematic

Table 2: Population distribution in Benban

Sub-village	Male	Female	Total	Households	Household size
Benban Bahary	4645	4797	9442	2054	4.6
Benban Qebly	3746	3868	7614	1720	4.4
El Raqaba	4337	4827	9164	2023	4.5
Total	12746	13492	26220	5797	4.5

In Aswan Governorate, around 30% of the population is under 15 years and 50% between 15 and 45 years. In Benban, population between 15 and 45 years is 50.34% while 29.9% are under 15 years.

As for Fares village, population is estimated at 13,122 (Information Center in the LGU, 2015). Approximately 5 km from Fares, New Fares was constructed in 2006 and remains uninhabited to date.

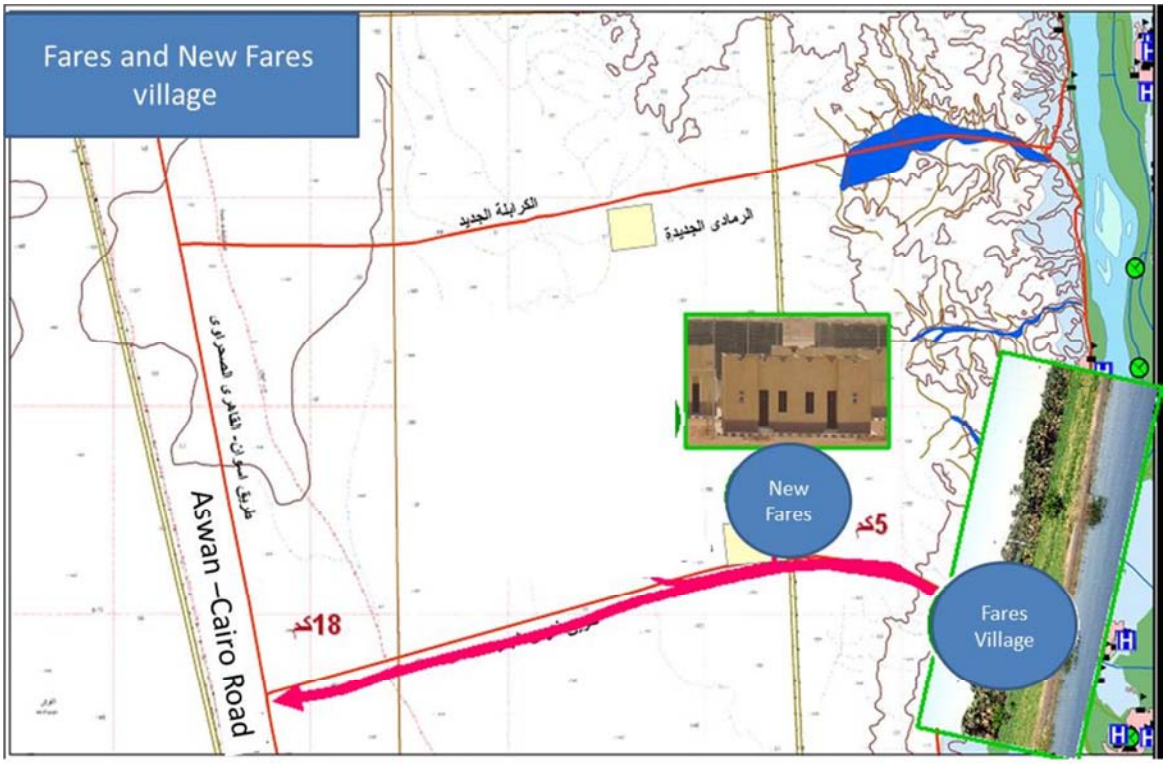

Figure 16: Fares and New Fares Villages

Infrastructure and Services

Water Supply and Sewage Connection: The Benban village water supply is drawn from an intake on the Nile which is treated to potable water standards. The potential water abstraction point for the solar project is in the same area of the Benban intake (i.e. approximately 16 km away from the Benban PV site). Fares village has access to water from Fares Water Treatment Station. Fares average daily consumption of water is 835.5 cubic meters. Water consumption varies seasonally as consumption is higher during summer.

Connectivity of households to the sewage treatment network is 27% in Daraw and Kom Ombo with two sewage treatment plants located in Daraw and one in Kom Ombo. Septic tanks are used In Fares, Benban, New Fares, and New Benban for houses and businesses not connected to the sewerage network.

Electricity Supply: Access to electricity in Upper Egypt governorates is 99.0% (Egyptian Human Development Report 2010). The census showed that the majority of households use electricity as the main source of lighting. However, the electricity supply is not stable and frequently uninterrupted, particularly in rural areas. In Benban, interruptions (blackouts) occurred in 2013-2014 but the system improved in 2015.

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.

Education:

The Egyptian Human Development Report (2010) states that adult literacy rate (15+) was 77.0% in 2007/2008 in Aswan Governorate (97.1% of Aswan residents completed basic and secondary education). Aswan Governorate has 1,190 schools. It is estimated that 60% of schools are for basic education. Vocational and commercial schools represent about 5.0%.

Benban has 10 primary schools with total number of 69 classes and 2,704 students; 48.5% of the students are female. The class size is about 38 per class. There is a total of 142 teachers, 52 of whom are female. Benban has 5 preparatory schools with 36 classes and 1,153 pupils; almost half of them are female. The class size varies between 27 in Benban Qebly and 33 in Benban Bahary. Secondary schools are limited to only one with 11 classes and 287 students. Females account for 168, males for 119. The class size is 26 students. There is one agriculture vocational school and one vocational school for girls. The total number of students is 742 in the agricultural school and 160 females in the vocational school for girls

Table 3: Schools in Aswan Governorate , Kom Ombo, Daraw, Benban and Fares

Educational level	Aswan Governorate	Kom Ombo	Daraw	Benban	Fares
Pre schooling (kindergarten)	268	66	24		
One class schools	60	13	10		
Primary	456	104	36	10	6
Preparatory	272	64	19	5	2
Public Secondary	39	6	3	1	
Vocational 3-5 years	39	8	3	1	
Commercial and hotels schools	16	1	1		
Agriculture schools	5	1	1	1	
Special needs	35	7	1		
Total	1190	270	98	18	

Source: Information center www.aswan.gov. 2012

Employment:

In 2010 the Aswan labour force represented 29.4% of the total population; 21.9% of them were female. Agricultural labourers represent 30.3% of the total labour force while those who work in services activities represented 43.0%. The smallest economic sector was industry (26.7% of the total labour force). Aswan Governorate has a relatively low unemployment rate of 12.9% of which 34.5% are female (higher in rural areas).

There was no official employment data available for Benban and Fares. A rapid assessment was conducted in Benban during September 2015. Estimates based on input from participants: 40% unemployed due to limited government jobs and limited investments in this area. The Arab tribes see their employment opportunities mainly in administration and operational activities.

Economic Activities in Benban and Fares: Economic activity in Benban village relies mainly on agriculture and associated processing and trading. Some villagers work in small local industries: a brick kiln and one factory for drying tomatoes (seasonal work during winter). Few residents of Benban hold government jobs. Some households rely on money transferred from family members working abroad.

In Fares village, the labor force is estimated at 39.2% of the population, with those in the agriculture sector representing 75% of the total labor force. Almost all residents with jobs are male (only 11 females with jobs). The total unemployment ratio among males is 16% while Female unemployment ratio is at 99.5%. The majority of females are unemployed due to the traditions and norms of the community. Yet, the majority of females do certain types of work i.e. raising poultry and livestock inside the house and some farming.

Health Services: Benban village has a health unit operated by one recently graduated general practitioner. The closest ambulance point to Benban village was damaged in 2014. The community now relies upon another ambulance station at the northern edge of the village at k62, on the local road to Fares. In Fares village 2 health units are in operation and an ambulance unit is located in the entrance of the village.

Social Services and Recreational Facilities: Table below summarizes facilities available in the Markazs and in Aswan Governorate.

Table 4: Social Services and Recreational Facilities

Services	Daraw	Bin Ban	Kom Ombo	Fares	Aswan Gov.
Social units	7	1	15	1	23
"Productive families" project	2,559	531	5,010	771	8,100
NGOs	64	7	132	2	203
Event Halls	40	4	55	1	99
Nursery	34	2	54	3	90
Workshops for females	4	1	14	0	19
Vocational training centers	0	0	0	0	3
Holy Quran Reciting center	35	3	45	1	83
Womens club	1	0	1	0	2
Childrens club	2	0	2	0	4
Special needs care Facilities	1	0	2	0	3

Source: Information center **www.aswan.gov**. 2012

1.7 Potential Impacts

1.7.1 Environmental Impacts

Although the construction of the 1800 MW Benban Solar Park will significantly change the appearance of the current Benban site, from a purely environmental point of view the land-take for each of the 41 sub-project and the entire 37.2 km^2 Benban site does not have a significant impact on any valuable natural habitat and its flora and fauna, given the Benban site characteristics (desert without vegetation; only very few and common flora and fauna species). There is also no negative impact on archaeology and cultural heritage from individual projects or the whole site.

The 41 Benban Projects are, individually and collectively, a large and temporary construction project which requires transport of large volumes of equipment and employs a large number of workers. It uses local resources and has an impact on the local environment and the local socio-economic conditions. The following two tables summarize the likely environmental impacts and provide a rating for their significance. This is followed by likely socio-economic impacts and a summary of major aggregate impacts

Table 5: Potential Environmental Impacts during Construction Phase

Context	Likely Impact					
		Positive/ Negative	**Location**	**Duration**	**Mitigation available**	**Significance after mitigation**
Landscape and visual impact	Large construction site with large number of vehicle movements on and off site. Highly visible from the Aswan – Luxor Highway.	Negative	Local	Short-term	Yes	Minor
Land use, soil and groundwater	Risk of soil and groundwater contamination from municipal and hazardous wastes is low (groundwater is at a depth of approximately 240 metres)	Negative	Local	Short-term	Yes	Minor
Biodiversity	Construction works can destroy habitats and their flora and fauna. However, this is desert land without biodiversity value. Only few and common flora and fauna species were found.	Negative	Local	Long-term	No	Minor
Archaeological and cultural heritage	There is no evidence of archaeological structures on the Benban PV site, and no indication that the site has any cultural heritage value. However, chance finds are possible.	Negative	Local	Long term	Yes	Minor
Noise and Air Quality	There can be considerable local noise from transport vehicles and machinery used for panel array construction and, to a lesser extent, from excavation work for foundations and cable ducts. The large number of vehicles entering the site for deliveries during peak construction time will lead to a deterioration of ambient air quality due to vehicle exhaust gases; similarly, if generators are used, local air pollution will occur. There may also be significant impact due to dust. The large area under construction will generate high levels of dust that has the potential to have a significant impact particularly on site workers and to a lesser extent on local communities and road users under certain weather conditions. Furthermore, high dust levels can also have significant impact on projects when commissioning and testing, since some will commission whilst others are still constructing, and it is important for performance tests that the panels are not covered in dust. Therefore dust mitigation is key.	Negative	Local	Short term	Yes	Medium

Context	Likely Impact					
		Positive/ Negative	**Location**	**Duration**	**Mitigation available**	**Significance after mitigation**
Traffic	Delivery of components for the PV panel arrays and transport of a large number of workers will cause a high number of vehicle movements during construction time. This is a cause of air pollution; a risk to workers on site; and a risk to other road users on the highway at the connections to the Benban PV site.	Negative	Local and regional	Short-term	Yes	Major
Infrastructure and Services	Electricity supply – There is currently no electricity supply to the Benban site, and none is planned at the moment. In the absence of a central electricity supply to the Benban PV site developers will have to use generators which will produce exhaust gases and can be noisy.	Negative	Local	Short term	Yes	Minor
	Water - Significant volumes of water are required for sanitary services (estimated 50 litres per worker per day).	Negative	Local	Short term	Yes	Minor
	Sanitary Installations and waste water – Sanitary installations have to be provided temporarily for the large number of workers during peak construction time.	Negative	Local	Short term	Yes	Minor
	Waste – Construction phase wastes are likely to consist of building waste; excavation spoil; paper, packaging, wood, and plastics: hazardous wastes from cleaners, solvents, paints; and municipal waste mainly from food production. Developer estimates indicate that organic food waste, packaging (including wood) and plastics are expected to be dominant waste groups.	Negative	Local	Short term	Yes	Minor
Occupational health and safety	There are generic risks associated with construction sites. These 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). The risk for such impacts is temporary (6-12 months) but an effective occupational health and safety management system has to be implemented on each plot and for the Benban PV site as a whole. The largely unskilled construction workforce will have to be instructed and supervised	Negative	Local	Short term	Yes	Minor

Table 6: Potential Impacts during Operation Phase

Context	Likely Impact	Assessment of Impact				
		Positive/ Negative	Location	Duration	Mitigation available	Significance after mitigation
Landscape and visual impact	Panel arrays will become the dominant feature in this flat landscape.	Negative	Local	Long term	Yes	Minor
Land use, soil and groundwater	Limited risk of soil contamination from municipal and hazardous wastes including fuels and lubricants. Groundwater is at a depth of approximately –240 metres, so risk of contamination is very low)	Negative	Local	Long term	Yes	Minor
Biodiversity	Project site is desert land with limited terrestrial biodiversity. Only few and common flora and fauna species were found. Water from panel cleaning during operation may support biodiversity. There is potentially an impact on birds which use the Nile valley as a migratory path (disorientation due to the large area of panels). This may be related to the altered aerial appearance of the desert which may attract the soaring birds and should be investigated as a precautionary measure.	Negative	Local	Long term	Yes	Minor
Archaeological and cultural heritage	There is no evidence of archaeological structures on the Benban PV site, and no indication that the site has any cultural heritage value. However, chance finds of buried artifacts is a highly unlikely possibility.	Negative	Local	Long term	Yes	Negligible
Noise and air quality	During normal operations there should be no significant noise or air pollution sources.	Negative	Local	Long term	Yes	Negligible

Context	Likely Impact	Assessment of Impact				
		Positive/ Negative	**Location**	**Duration**	**Mitigation available**	**Significance after mitigation**
	Solar generated electricity will displace a significant volume of gaseous pollutants such as particulate matter, SO_2, NO_X and CO_2, compared with thermal generation.	Positive	Regional/Global	Long term	N/A	Major
Transport	Vehicle traffic will be low.	Negative	Local	Long term	Yes	Minor
Infrastructure and utilities	Electricity supply – it is assumed that no generators will be required	No impacts			N/A	NA
	Water – river water supply. Solar panels will have to be cleaned to avoid reduced efficiency due to dust built-up. Wet cleaning is a commonly used option and requires large volumes of clean water. Dry (brush) cleaning is an alternative. River Nile water abstraction will have a minor impact..	Negative	Local	Long term	Yes (supply of river water from the Nile)	Minor
	Water – groundwater abstraction Groundwater extraction has been considered as an option but was recently (Autumn 2015) ruled out by the Ministry of Irrigation and Water Resources.	No impacts	Local	Long-term	NOT assessed for groundwater extraction	NA
	Sanitary installations and waste water – Only a small number of temporary workers will be on site during daytime; volumes of sanitary water and subsequently waste water to be disposed of will be small and easily manageable (septic tanks/treatment off site).	Negative	Local	Long term	Yes	Minor
	Waste- Waste will mainly consist of municipal waste; volumes will be low and can be easily managed.	Negative	Local	Long term	Yes	Minor
Occupational health and safety	Occupational health and safety risks will be associated with repair and maintenance of panels and their electrical connections. These can be managed with a H&S system.	Negative	Local	Long term	Yes	Minor

1.7.2 Social and socio-Economic Impacts

Project affected People and Project Stakeholders

Consultation with project stakeholders has been carried out. This includes consultation meetings with local people, individually, in groups, and at formal consultation meetings. In general local communities welcome the project and anticipate its benefits to the local economy.

The project is expected to result in the creation of job opportunities, both directly and indirectly. Daily average number of workers during the peak time will be about 500 workers per plot. In case of a simultaneous start of all the construction activities this would require 18,000 workers. The local community of Benban and Fares could theoretically provide a proportion of this temporary labour force dependent on skills needed and the strategies of the individual developers in sourcing their workforce. To maximize employment opportunities in the local communities it is anticipated that training will be required for currently unskilled workers. On-the-job training will also supplement opportunities for the local workforce for both temporary construction roles and for long-term operations phase positions, where these are available.

During normal operations only a very limited number of workers will be required. Developers generally stated that they need 6-10 permanent staff on site during daytime, plus additional workers for panel cleaning. Most permanent staff are likely to live locally and should be sourced on the basis of non-discrimination and in line with internationally accepted employment conditions.

Supply chain: Construction and Operation

In addition to direct and indirect employment, services and resources provided to the Project will include the following:

- Implementation of works and provision of supplies related to construction, operation and closure of the site and ancillary facilities;
- Provision of transportation, freight and storage services to the Project;
- Provision of food supplies, catering, and cleaning services;
- Provision of building and auxiliary materials and accessories, engineering, installation and maintenance;
- Provision of white goods, electronic appliances, communications and measurement equipment;
- Security personnel;
- Accommodation, laundry and clothing;
- Retail services; and
- Provision of fuel

Meeting Energy Demands

For Aswan Governorate and the country as a whole the project will bring benefit by participating in enhancing the electricity supply. A more reliable supply will be positive for residents as well as for trade and commerce, including tourism.

There will also be environmental benefits in the form of reduced emissions and reduced water demand from thermal power stations, whose generation will be displaced by renewable energy.

Land Acquisition

The project site consists of 37.2 km ^{2} of 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 site 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. Similarly to other cases of allocation of state-owned land across Egypt, the National Center for Land Use planning, Ministry of Civil Aviation, New Settlements Authority, and the Armed Forces provided their consent/clearance on using the land for solar Energy Development.

Following the 25th of January 2011 revolution some individuals felt that there were greater opportunities to encroach on unoccupied land. Therefore NREA asserted its ownership of the site and implemented security measures to prevent this. In cooperation with local authorities NREA announced a deadline for trespassers to leave the project site – following this security measures were implemented to prevent any encroachment.

The projects are not expected to require additional land other than for a water abstraction point (if river water abstraction is chosen as the water supply option). A right of way over unused and unoccupied desert land will also be required for the associated high voltage transmission line.

Community Health, Safety and Security

Increased traffic on the Aswan – Luxor Highway and the small roads serving Benban and adjacent villages during construction will be a major impact and a traffic management plan will be necessary to minimize risks and inconveniences to the local population.

Potential impacts on the cultural fabric of the villages might occur when hundreds of non-local workers are present temporarily, which may have an impact on the norms and traditions of the community people. In order to avoid or mitigate any disturbances it is recommended to maximize the use of local labour and to maximize benefits to the local communities to win their trust and support.

Workforce

The Benban Projects are expected to require an intensive yet short-term construction program. If all 41 Benban projects were to be carried out at the same time, and all were to require 500 workers per plot at peak construction time (2-3 months) then the site would temporarily receive up to 18,000 workers. Even if the individual projects were staggered over a year, this could lead to the need for 4,500 temporary workers (i.e. equal peak manpower requirement spread over the whole year). These calculations are based on 36x50MW facilities, to equalize for different plot sizes.

It is expected that a proportion of these jobs will be filled by the local people, temporarily alleviating the high rate of local unemployment. Discussions held with local authorities and community leaders in Benban village indicated that the local communities in Benban are expected to provide around 2,000 workers, while Fares village may contribute an additional 1,000.The termination of work for most of the workers employed during the peak construction phase (who will be informed that these jobs are temporary but may still hope they turn into permanent) will have to be handled carefully. It has to be absolutely clear that this is short-term work and that the prospects for long-term employment on the Benban Projects is quite limited. The end of temporary work and income can be a social problem as it impacts on the individual and the entire community. This can lead to resentment and opposition to the Benban Projects. A participatory community support programme could help alleviate such impacts.

Additional benefits will be the creation of a number of permanent jobs for during the operation phase (probably 6-10 per facility, plus some temporary employment).

Table 7: Potential Social Impacts during Construction Phase

Component	Impact	Positive/ Negative	Location	Duration	Mitigation available	Significance (after mitigation)
Socioeconomic impacts	**Job creation:** Creation of direct and indirect temporary jobs	Positive	Local/regional	Temporary	Yes	Major
	Worker influx: The risks and impacts of influx of skilled and unskilled workers, opportunists and others requires robust mitigation and monitoring	Negative	Local / regional	Temporary	Yes	Minor
Community health and safety	Influx of workers and vehicles may have adverse impacts on community health and road safety	Negative	Local	Temporary	Yes	Minor
Land use, acquisition and involuntary resettlement	**Land needed for the project:** The project will need 37.2 km square of lands to be obtained from state owned lands allocated to NREA for establishing the solar units. The land is owned by the governorate of Aswan. The land was reserved for future investments i.e. solar projects	No impacts	NA	NA	NA	NA
	The overhead transmission lines: That will connect the substations with the national grid. The OHTL trespasses bare desert lands	No impacts	NA	NA	NA	NA

Component	Impact	Positive/ Negative	Location	Duration	Mitigation available	Significance (after mitigation)
	the potential water intake land: It is anticipated that the water intake will extract water from the Nile from a vacant land owned by the Local Governmental unit	No impacts	NA	NA	NA	NA
	Land needed for any other associated facilities (e.g. workers accommodation, storage of equipment ..etc) The project might require additional plots of lands in order to accommodate workers and construct any other facilities. Such activities should meet the requirement of PR/PS 5 pertaining to Land Acquisition, Involuntary Resettlement and Economic Displacement	Negative	Local	Temporary	Yes	Minor
Infrastructure related impacts	**Transport – vehicle traffic will be low. That will affect the income of small vehicles drivers**	**Negative**	**Local**	**Temporary**	**Yes**	**Minor**
	Electricity supply – it is assumed that generators will be utilized. Therefore, load on electricity grid is not applicable	No impacts	NA	NA	NA	NA
	Water – river water supply. Solar panels cleaning and domestic usage by workers	Negative	Local	Temporary	Yes	Minor

	Water – groundwater abstraction Groundwater extraction would have to be evaluated and it is assumed for these purposes that this option will not be adopted	No impacts	NA	NA	NA	NA
	Sanitary installations and waste water – Sanitary water to be evacuated by private vehicles. That will generate income to the owners and workers of vehicles	Positive	Local	Temporary	Yes	Minor
	Waste- Waste will mainly consist of municipal waste; volumes will be low and can be easily managed. A private contractor will benefit from waste collection services	Positive	Local	Temporary	Yes	Minor
Cultural resources	Cultural impacts on community traditions	Negative	Local	Temporary	Yes	Minor
Over consumption of community resources	Influx of hundreds of workers to the project site will result in affecting community resources	Negative	Local	Temporary	Yes	Minor

Table 8: Potential Social Impacts during Operation Phase

Component	Impact	Positive/ Negative	Location	Duration	Mitigation available	Significance (after mitigation)
Socioeconomic	Creation of direct and indirect permanent jobs.	Positive	Local	Permanent	NA	Major
Community health and safety	Influx of workers and vehicles may have adverse impacts on community health and road safety	Negative	Local	Temporary	Yes	Minor
Infrastructure related impacts	Transport – vehicle traffic will be low. That will affect the income of small vehicles drivers	Negative	Local	Permanent	Yes	Minor
	Electricity supply – the Benban park will generate electricity to the national grid	Positive	Regional	Permanent	NA	Medium
	Water – river water supply. Solar panels cleaning and domestic usage by workers	Negative	Local	Permanent	Yes	Minor
	Sanitary installations and waste water May generate income to the owners and workers of septic tank evacuation vehicles	Positive	Local	Permanent	Yes	Minor
	Waste- Mainly small amounts of municipal waste. Waste handlers and contractors may benefit from providing waste services	Positive	Local	Permanent	Yes	Minor
Cultural resources	Cultural impacts on community traditions	Negative	Local	Permanent	Yes	Minor
Community Resource Overconsumption	Limited or no pressure on local resources expected during operation	Negative	Local	Permanent	Yes	Minor
Security arrangements	Arrangements will be required to ensure that adequate measures are in place to manage security teams and their community interactions	Negative	Local	Permanent	Yes	Minor
Land use, acquisition and involuntary resettlement	No additional land needs expected during operation	No Impacts	NA	NA	NA	NA

1.7.3 Aggregate Impact of all 41 Benban Projects

Individual Benban Projects may differ in site layout and technology, but their construction and operation will have similar impacts because they:

- Require a large number of temporary workers for construction (who require accommodation; food and transport);
- Receive a large number of containers with components, within a short period of time (probably 3-6 months);
- Use resources (notably water for sanitary facilities during construction and for panel cleaning during the operations phase);
- Generate liquid and solid waste (mainly during construction).

Whilst these pressures of a large workforce; the large number of vehicle movements to and from the site; the volume of solid waste; and the water requirements on the local environment and community are low-to-medium for a single project, they become more significant when combined for all 41 projects. This becomes obvious when comparing data for a representative single plot with aggregate data for all plots. This is presented in Table below using data from Benban developers. These data may not be absolutely precise, but they are a good indicator for local environmental and social pressures.

Table 9: Key aggregate requirements of the Benban PV site

	Single Plot (50MW)	**All 41 Plots with a total installed capacity of 1,800 MW (i.e. equal to 36x50MW)**
Daily number of workers at peak construction time (90 days)	500	18,000
Daily number of workers at normal construction time (5 months)	200-300	7,200 – 10,800
Daily number of workers at the operations phase (25 years)	10 (plus temporary staff for panel cleaning)	360
Daily number of buses required to transport workers on/off site at peak construction time	10	360
Daily number of buses required to transport workers on/off site at normal construction time (not peak time)	4 - 6	144 - 216
Total number of containers delivered	600	21,600
Daily number of containers delivered during 90 days peak construction time	10	360
Daily number of other vehicles at peak construction time	15	540
Daily total number of vehicles at peak construction time	30	1044
Daily total number of vehicles at normal construction time (not peak time)	10	360
Daily total number of vehicles leaving and entering the highway at normal construction time (not peak time)	20	720
Daily total number of vehicle movements (i.e. vehicles leaving and entering the highway) at peak construction time	60	2088
No of panels	200,000	7,200,000
Water usage for panel cleaning – 2 litres per panel (one cycle)	400 m^3	14,400 m^3
Water usage for panel cleaning – 4 litres per panel (one cycle)	800 m^3	28,800 m^3
Worst case scenario monthly water usage: 100% of plots use wet cleaning; 4 litres/panel; 2 cycles/month	53 m^3/day	1,920 m^3/day

1.8 Management of Impacts

Based on the outcome of several consultations workshop held at the NREA premises in Cairo, a table of common issues raised by developers and stakeholders and recommended actions to address such issues.

Table 10: Common issues for Benban developers

Issue	Description	Priority	Response
Throughout project life			
Stakeholder engagement	Each developer must communicate with project stakeholders, in particular the local communities, as well as operate a grievance mechanism. Separate communications by 20+ developers in relation to 41 projects will be confusing and overwhelming for stakeholders. Similarly it will be difficult for stakeholders to identify whom to direct a grievance, complaint or question at, especially if their concern relates to the site as a whole.	Necessary	The Benban SESA will propose a common stakeholder engagement plan based on (1) a joint stakeholder relations team, (2) a single grievance mechanism, and (3) a master Non-Technical Summary, to be supplemented by project-specific NTSs. **However** this will still require a mechanism for developers to collectively pay for and commit to this programme.
Corporate social responsibility	In order to maximise stakeholder benefits and maintain good relationships each developer is likely to want to operate a corporate social responsibility programme to benefit the local communities. An uncoordinated bilateral approach by each developer may confuse or even alienate stakeholders.	Necessary	As with the stakeholder engagement plan the Benban SESA will propose a common CSR programme but an implementation mechanism will still be required.
Road safety	Shared site roads necessitates common rules for road safety, such as speed limits, signage, access etc.	Necessary	Road safety rules should be developed, together with a mechanism for adoption and enforcement.

Issue	Description	Priority	Response
Emergency procedures	Contiguous sites mean that each developer may be affected by an emergency on another site. Common procedures for evacuation routes, rally points, emergency signals etc. would avoid problems. Common provision of emergency response facilities such as firefighting or first aid equipment would be more efficient.	Necessary	Common procedures should be developed. Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.
Waste handling	Each plant will produce a certain amount of solid and liquid waste. Common standards for handling this will prevent sites being impacted by others with lower standards. Common provision of waste disposal facilities would be more efficient and convenient.	Desirable	Common procedures should be developed. Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.
Health and safety policies	Common rules on health and safety would ensure that projects are not affected by being associated with projects with lower standards and help cultivate best practices across the entire site.	Desirable	Common procedures should be developed, together with a mechanism for adoption and enforcement.
Site access, fencing and security	Many projects will share a common access point to the overall site and be dependent for their security on the security put in place by their neighbours. Each project's security would be considerably enhanced by a common security policy and the common provision of perimeter security and site access controls.	Desirable	Common procedures should be developed. Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.
Telecommunications	Each project site will need both telephone and high speed internet access. Common provision of this interconnectivity will be much more efficient than individual.	Desirable	Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.

Issue	Description	Priority	Response
During construction			
Traffic management	There will be multiple traffic movements in a short period of time, all using the single carriageway Luxor-Aswan highway, and there do not appear to be areas allowing lorries to park pending access to the site. Coordination of traffic movements will be necessary to avoid serious congestion accessing the site and significant risk of accidents as vehicles enter and leave the site, especially at peak periods.	Necessary	Common procedures should be developed, together with a mechanism for adoption and enforcement. This should include (1) detailed procedures to manage exit from, and entry to, the public highway, (2) precautionary measures on that highway such as warning signs and (3) general logistical coordination to spread the peak demands on roadspace.
Labour policies	Stakeholders will not easily distinguish between individual projects and accordingly different labour standards will cause confusion and potentially labour difficulties. Common standards for recruitment and treatment of all workers would avoid this problem.	Necessary	The Benban SESA will propose common workers' rights guidelines but an implementation mechanism will still be required, together with a mechanism for adoption and enforcement.
Worker recruitment	A coordinated approach to communicating labour opportunities, receiving expressions of interest and managing recruitment, especially of unskilled local labour, will maximise the benefits for local stakeholders and avoid confusion or labour unrest.	Desirable	A centralised portal for the dissemination of labour opportunities would be beneficial.
Worker accommodation, transport, catering and sanitary facilities	At the peak of construction there may be up to 18,000 workers on the Benban site. Common standards for their accommodation, transport, catering and sanitary needs will avoid projects being impacted by others with lower standards. Common provision will be more efficient and convenient.	Desirable	Common standards should be developed, although the Benban SESA will propose specific accommodation standards. Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.

Issue	Description	Priority	Response
Electricity provision	Each site will need auxiliary power during construction. Common provision would be more efficient than bilateral provision.	Desirable	Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.
Water provision	Each site will need water during construction for drinking, sanitary use. Common provision would be more efficient than bilateral provision.	Desirable	Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.
Drainage	Each project's drainage solution will affect all projects downstream or downhill of it. Accordingly a coordinated drainage plan will avoid unforeseen impacts.	Necessary	A coordinated plan should be prepared either by the developers collectively or by a third party engineer on their behalf.
Laydown areas	Each project will need secure areas to store materials and equipment prior to their use or installation. The project sites may not be sufficiently large to allow this to happen on site, necessitating laydown areas nearby. Common provision of this facility would be more efficient and avoid competition for space.	Desirable	Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.
During operation			
Water provision	The site will have significant water needs during operation, which are likely to be met by a pipeline from the Nile, for which coordination is inevitable.	Necessary	Common facilities would require a third party provider, together with a mechanism for developers to collectively procure and pay for these facilities.

These impacts and resource requirements provide a challenge to NREA and the developers. There is a clear need to identify, at this stage in project development, all facilities that need to be in place for construction and operation. All developers contacted stated that they aim to start construction at the earliest possible date (i.e. when all permits are obtained and finance is in place), and complete construction within 6-12 months. This is a complex construction project with considerable environmental, social and health and safety implications. It requires effective management by an experienced entity (e.g. a facility management company). This has to be agreed and set up by the developers as a matter of urgency. Discussions between developers are currently ongoing to establish an association to represent them and streamline shared actions.

To ensure smooth construction work and to minimize delays and risks, this site management entity should carry out the following actions by the proposed developers association:

- All utilities and services necessary for construction work are in place at start of construction (e.g. electricity supply; water supply; parking and container storage; site security; worker accommodation and sanitary installations; food production; emergency services; waste management on site and disposal arrangements)
- Traffic management and logistics during construction and materials delivery schedules have been agreed between the developers;
- Environmental management is in place (development of an overall, ISO based site management system to manage and reduce impacts);
- Stakeholder engagement and public information and consultation is functioning and operates at a site-level rather than separately for each individual project;
- A high –level occupational health and community safety management plan is in place (to support individual developers);
- Establish minimum labour conditions that have been agreed in compliance with national law, ILO Standards, and requirements of IFIs (contracts; housing etc.);
- Training and supervision of workers who will be recruited from Benban, Fares, Daraw and Kom Ombo (largely unskilled workers during the construction period) has been agreed and a schedule is in place;
- A common approach between the developers for community/CSR initiatives and projects.
- A procedure for archaeological chance-finds is in place.

2 Environmental and Social Action Plan

An Environmental and Social Action Plan is part of the SESA that should be adhered to by the EETC, NREA and the developers; it provides a list of recommended high-level actions to avoid, minimize or mitigate impacts on the site, the workforce and the local communities. These are recommendations for the site management entity which will then have to agree the implementation with all individual developers.

Table 11: Environmental and Social Action Plan

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
E&S Capacity, consistency and management Many of the mitigation measures identified in the SESA to address aggregated impacts require a consistent approach by all developers. The Developers Association, supported by the individual developers, will need to appoint a suitably qualified team, with adequate budget, to develop the various strategies and plans identified in the SESA prior to commencement of any construction related activities. The Developers Association E&S team, site management arrangements, the local communities and the regulatory authorities will need to be consulted to form a fully integrated working group.	Ensure a single, coordinated and complimentary approach to E&S issues by the Benban developers. Reduction in project related risks such as logistics, workforce and resources. Reduction in costs for any one developer to E&S management. Full integration of E&S matters with logistics, project management, community interaction and other stakeholders will increase the project benefits and mitigate the risks and negative impacts.	NREA requirements IFI requirements Best practice	Developers Association / All Developers	Prior to any construction related activities	Fully staffed advisory team developing all relevant plans prior to construction.

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
Development and Completion of relevant plans and strategies The SESA for Benban has identified a number of plans and strategies required to be developed prior to construction works, these include: • Environmental & Social Management Systems; • Contractor management plan including minimum EPC requirements; • Labour and Working Conditions strategy and employment plan; including worker accommodation requirements during construction • Security management plan; • Emergency response plan • Community H&S study and population influx plan; • Community development strategy and CSR programme • Traffic management, logistics and road safety plan; • Resource use plan, including provision of adequate water needs and associated studies; • Stakeholder engagement plan. Each of these items is covered in detail in the following sections of this ESAP.	Additional studies have been identified by way of this SESA to fully assess and mitigate detailed E&S issues in aggregate. The completion of these studies identified in the SESA will facilitate adequate management of E&S issues prior to the commencement of project activities. It is essential that these works are completed prior to construction.	NREA requirement IFI requirements Best Practice	Developers Association and their Advisory team	Prior to construction	Delivery of each strategy and plan for approval by NREA and EEAA.

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
Environmental & Social Management Systems An E&S management system is required for the Benban Development to establish a framework, with detailed management plans, for all pertinent common E&S issues which will cover common areas / facilities used by all developers. A management system will be required for 1, construction and 2, operation phases of the project and will be aligned (for construction) and certified (for operation) with national requirements and international good practice.	A management system with associated construction and operation management plans will provide a common framework for E&S management of all shared and common facilities.	Included above	Included above	Included above	Included above

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
Labour and Working Conditions strategy and employment plan To avoid the potential negative impacts association with substandard labour practices a detailed strategy is to be developed setting common standards for labour and working conditions, and code of conduct. In addition, a detailed assessment of the local labour market is needed with a view to developing a local employment and training plan. This could include the development of a centralised database for available workers. Where external workforce is required, a worker influx strategy is to be developed which will include an accommodation plan and procedures to manage issues associated with host communities and worker interactions with local populations. The plan should be shared with all developers, the Ministry of Labour and ILO representatives in Egypt for consultation and approval. Project developers will set out their staffing needs during the production of the plan and a common employment sourcing arrangement will be established. The strategy will include a detailed monitoring plan during labour sourcing.	Minimise risks associated with poor labour practices and opportunist labour agencies exploiting the local labour market. Reduce the risks of inter-community tensions and between communities and influx workers. Maximise the benefits of employment opportunities to project affected people. Provide safe and sustainable employment opportunities, set realistic employment expectations - including contract termination planning and communication. Minimise the potential for project delays as a result of 1, labour shortages and 2, local communities protesting at employment practices.	Included above	Included above	Included above	Included above

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
Security management plan Where common security arrangements are required the Developers Association will establish a common security management plan which will be benchmarked against the UN Guiding Principles of Security and Human Rights. The plan will include all appropriate employment, training, registration and community interaction procedures. The use of private security will be agreed with local police and other local authorities, will include measures to address opportunists occupying any areas of the site, and include a community grievance mechanism. A coordinated approach to security management will avoid multiple security arrangements between developers.	A properly trained and managed security team will both ensure adequate site security and also minimise risks association with security personnel and their interactions with the community.	Included above	Included above	Included above	Included above
Community H&S and security study, and population influx plan; A community health, safety and security plan is required to address issues related to population influx resulting from the Benban development, including establishing baseline health conditions of local population, establishing population influx management plans and procedures to mitigate risks to community associated with construction and operational phases of the project.	The risks associated with population influx and other project hazards will be better understood and managed with an adequate community H&SS plan and the project benefits to project affected people will be maximised.	Included above	Included above	Included above	Included above

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
Traffic, logistics and road safety management plan; The traffic management and road safety plan will be developed in close coordination with the community H&SS plan. The traffic management plan will be provided to the local law enforcement and parties responsible for road safety and will include training and capacity building where necessary. The plan will also consider general delivery logistics for equipment and material, including the provision for a centralised material and equipment storage area.	Road safety risks have the potential to represent significant risks and a comprehensive road safety plan will provide opportunities for community employment and mitigation of negative impacts. Applying a co-ordinated approach to delivery of material and equipment can reduce the risk of delays in construction.	Included above	Included above	Included above	Included above
Community development strategy and CSR programme A detailed community development strategy is required in order to maximise community benefits from the Benban project; this will then be used to develop the CSR needs assessment and strategy.	Project developers coordinating their respective CSR activities will have a positive impact on local communities, avoid duplication or conflicting efforts, and deliver sustainable benefits based on the communities identified needs.	Included above	Included above	Included above	Included above

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
Resource and utility plan, including provision of adequate water needs and associated studies Project developers will have common needs of resources and utilities and where these cannot be established at the specific land plots a resource needs plan will be developed, particularly regarding water sourcing, needs and efficiencies. The plan will identify the needs for additional studies required, e.g. Nile connection EIAs etc. This plan would also cover wastewater, drainage, waste management, electricity, and communication needs and apply a common approach where appropriate.	Reduce the risks of competing resourcing needs, minimise the impacts to local infrastructure / supplies and other stakeholders using the resources locally. Satisfy local permitting requirements. Maximise the efficiency in use of local resources.	Included above	Included above	Included above	Included above
Construction Environmental Management Plan (CEMP) A generic CEMP to establish minimum environmental management, mitigation and monitoring requirements for individual developers to use as a basis for on-site management. This will consider the benefits of a co-ordinated waste management strategy, including the provision of a centralised waste storage facility. The CEMP will also cover any additional survey that may be required, such avifauna.	Establish a common approach to environmental management, and save time and costs by minimising duplication of work by developers	Included above	Included above	Prior to construction	Included above

Issue and Mitigation Action	Benefits	Requirement (Legal; IFI; BP)	Responsibility and Resources	Schedule	Target/Evaluation Criteria
Implementation of the master stakeholder engagement activities and Establishing a community liaison office A common agreement will be reached regarding stakeholder engagement and information dissemination. This SESA has provided a proposed format for a common SEP which will be used by the Developers Association, amended where necessary, as the basis for implementing a Benban wide SEP. This will include the establishment of a community liaison office, a mechanism for information dissemination, and a grievance redress mechanism. The SEP will be closely linked to the CSR programme.	Avoidance of consultation fatigue, competing interests and community confusion over project risks and benefits. Common approach to stakeholder engagement and grievance management will avoid duplication and conflicting information.	NREA requirements IFI requirements Best practice	Developers	Prior to first project impacts.	Mechanism in place to disseminate information and engage with local stakeholders.