

# Strategic Environmental and Social Assessment of Solar Energy Projects in the East Nile Region (Arab Republic of Egypt)

## Final SESA Solar Report



September 2018



New and Renewable Energy Authority (NREA)  
Ministry of Electricity and Renewable Energy

# Strategic Environmental and Social Assessment of Solar Energy Projects in the East Nile Region (Arab Republic of Egypt)

## Final SESA Solar Report

### Prepared for:

New and Renewable Energy Authority (NREA), Egypt

Attn: Eng. Nefesa Hassan

Copy: Eng. Hala, Eng. Asmaa

J. Lea-Cox (EBRD), Y. Deghedi (EBRD)

### Prepared by:

JV Lahmeyer International GmbH & ecoda Environmental Consultants

c/o Lahmeyer International GmbH

Friedberger Str. 173

61118 Bad Vilbel

Germany

Report Status: Approved

### Revision History:

Revision	Date	Author	Checked by	Approved by	Description
01	08.11.2017	Dr. Frank Bergen Dr. Ernst Niemann Tony Moens de Hase Dr. Omneya Nour Eddin Matthias Drosch	Matthias Drosch Nicolas Veneranda Dr. Frank Bergen	Dr. Frank Bergen Matthias Drosch	Draft SESA Solar Report
02	25.01.2018	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Second Draft SESA Solar Report – considering comments from NREA and EBRD
03	25.05.2018	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Final Draft SESA Solar Report – considering comments from NREA and EBRD
04	25.09.2018	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Final SESA Solar Report

## Table of Contents

1	General .....	1
1.1	Introduction .....	1
1.2	The Project Area.....	1
1.3	SESA Process and Objectives .....	4
1.4	SESA Solar Report – Objectives and Approach .....	6
1.5	Consideration of Alternatives and Justification of the Project .....	7
2	Legal and Administrative Framework.....	9
2.1	Policy Context .....	9
2.2	Legal and Regulatory Framework in Egypt .....	9
2.3	EBRD Performance Requirements .....	10
2.4	Equator Principles .....	12
3	Description of a typical Solar Power Project.....	14
3.1	Objective and Scope .....	14
3.2	Typical Features and Scope of Works of Large Scale Solar Farms .....	14
3.2.1	Typical layout and large scale solar farm components .....	14
3.2.2	Construction works .....	18
3.2.3	Operation and maintenance works.....	24
3.2.4	Decommissioning .....	26
4	Methodology / Approach .....	27
4.1	Scoping .....	27
4.2	Stakeholder Engagement.....	29
4.3	Baseline Studies on Existing Physical, Biological and Social Environment .....	30
4.3.1	Physical environment .....	30
4.3.2	Biological environment.....	32
4.3.3	Social and economic environment.....	38
4.4	Technical and Land-Use Criteria for Classification of Area as preclusive or less favourable.....	39
4.5	Basic Approach for the Impact Assessment .....	40
4.5.1	Environmental Impact Significance Assessment.....	40
4.5.2	Socio-economic Impact Assessment .....	44
4.6	Mitigation of Impacts .....	44
4.7	Disclosure and Public Hearing.....	45
5	The Existing Physical, Biological and Social Environment.....	46
5.1	Physical environment .....	46
5.1.1	Project Area .....	46
5.1.2	East Solar-1 .....	51
5.1.3	East Solar-2 .....	56

5.1.4	East Solar-3 .....	59
5.2	Biological environment.....	62
5.2.1	Project Area .....	62
5.2.2	East Solar-1 .....	79
5.2.3	East Solar-2 .....	83
5.2.4	East Solar-3 .....	84
5.3	Social and economic environment.....	88
5.3.1	Project Area .....	88
5.3.2	East-Solar 1 .....	99
5.3.3	East-Solar-2 .....	106
5.3.4	East-Solar-3 .....	106
5.4	Conclusion.....	106
6	Prediction and Evaluation of Impacts on the Physical, Biological and Social- Economic Environment identified during Scoping .....	109
6.1	Physical Environment .....	109
6.1.1	General .....	109
6.1.2	Land-use/Land-take.....	110
6.1.3	Landscape character and visual impact.....	111
6.1.4	Water resources and wastewater .....	111
6.1.5	Domestic and hazardous waste .....	113
6.1.6	Air Quality .....	114
6.1.7	Noise and Reflection .....	115
6.1.8	Archaeological, historical and cultural heritage .....	116
6.1.9	Impact on traffic, utility services.....	117
6.1.10	Run-off / flash flood risk.....	118
6.1.11	Seismicity Risks .....	119
6.2	Biological environment.....	119
6.2.1	East Solar-1 .....	119
6.2.2	East Solar-2 .....	128
6.2.3	East Solar-3 .....	135
6.3	Social and economic environment.....	142
6.3.1	Positive impacts during construction .....	142
6.3.2	Positive impacts during operation .....	143
6.3.3	Negative impacts during construction .....	144
6.3.4	Negative impacts during operation.....	146
7	Mitigation of Environmental and Social Impacts .....	148
7.1	General - Best Practice / Mitigation Strategy .....	148
7.2	Mitigation Measures Applying for the Solar Subareas.....	149
7.2.1	Physical environment.....	149

7.2.2	Biological environment.....	151
7.2.3	Social and economic environment.....	152
7.3	Special Mitigation Features in the individual East Solar Subareas.....	154
7.3.1	East Solar-1 subarea .....	154
7.3.2	East Solar-2 subarea .....	154
7.3.3	East Solar-3 subarea .....	154
8	Environmental and Social Management and Monitoring Plan.....	158
8.1	Environmental and Social Management .....	158
8.2	Monitoring Arrangements and Actions .....	161
9	Bibliography and References .....	164
10	Annex.....	167
10.1	Annex A: Scoping Phase	
10.1.1	Annex A1: Scoping Report	
10.1.2	Annex A2: Report on the Scoping Meeting	
10.2	Annex B: Project Information Flyer	
10.3	Annex C: Interviews	
10.3.1	Annex C1: Overview of Interviews	
10.3.2	Annex C2: Outcomes of Interview Forms	
10.4	Annex D: Official Communication between NREA and Regional Governorates	
10.4.1	Annex D1: List of communication between NREA and the Governorates	
10.4.2	Annex D2: Letters	
10.5	Annex E: Public Hearing Report	
10.6	Annex F: Manual for identification of coordinates of preclusive and unfavourable zones	
10.7	Annex G: Non-Technical Summary	
10.8	Annex G: Non-Technical Summary – Arabic Version	

## List of Figures

Figure 1-1:	Overview of the SESA stages and reports.....	5
Figure 3-1:	Setup of a solar PV plant.....	15
Figure 3-2:	Typical ‘Mounting Structure’ erected on site (source: Lahmeyer, Shams PV plant in Jordan).....	16
Figure 3-3:	Example of inverter and transformer arrangement (Source: SMA).....	16
Figure 3-4:	Example of a solar PV plant (Source: Lahmeyer, Cerami PV plant Sicily, Italy) .....	17
Figure 3-5:	Typical solar PV plant layout (Source: Lahmeyer, PV plant layout in South Africa) ..	17
Figure 3-6:	Mounting structure concrete foundation (Al- Ward Al Joury PV Plant –Jordan).....	18
Figure 3-7:	Depth mounting structure foundation construction (source: Lahmeyer, Mussomeli PV plant in Sicily).....	19
Figure 3-8:	Inverter foundation example (Source: Lahmeyer, Falcon PV plant in Jordan) .....	19
Figure 3-9:	Drainage system (source: Lahmeyer, Falcon PV plant in Jordan) .....	20
Figure 3-10:	Trench cable leading cables to/from inverter (Source: Lahmeyer, Shams PV Plant in Jordan) .....	20
Figure 3-11:	Fixed mounting structures assembly (source: Lahmeyer, Cammarata PV Plant in Sicily).....	21
Figure 3-12:	Single Axis Tilted (left), Single Axis Horizontal (middle) and Dual Axis (right).....	22
Figure 3-13:	Single axis tracker mounting structure (source: Lahmeyer, Shams PV plant in Jordan).....	22
Figure 3-14:	2 x 1,010 kW PV switchgear in Jordan.....	23
Figure 5-1:	Overview of Areas and Asphalt Road System inside and next to the Project Area ..	47
Figure 5-2:	Excerpts of the Geological Map of Egypt.....	49
Figure 5-3:	Limestone Stratification at WP 60_4 in the north of the East Solar-2 subarea (left) and pocketed weathered Limestone at WP 42_3 (East Solar-3) .....	49
Figure 5-4:	GSHAP Seismic Hazard Map for the Egypt Region .....	50
Figure 5-5:	Zones preclusive or less favourable for solar power development in East Solar-1 according to Technical and Land-Use Criteria .....	52
Figure 5-6:	View to the north at waypoint 29_2 .....	53
Figure 5-7:	View to the east at waypoint 29_2 .....	53
Figure 5-8:	View to the north at waypoint 26_2 in the area centre.....	53
Figure 5-9:	View to the south at WP 26_2 in the area centre.....	53
Figure 5-10:	Example of the more complex landscape in the northwest at WP 66_4 (View towards south).....	53
Figure 5-11:	Provisional gravel road at WP 6_2 (upper layer of 30 cm removed) .....	54
Figure 5-12:	Farmland development at WP 29_2 .....	54
Figure 5-13:	Quartzite mining at WP 3_2a.....	54
Figure 5-14:	Marble mining at WP 8_2.....	54
Figure 5-15:	Gravel screening plant at WP 16_2.....	55

Figure 5-16:	Gravel screening plant at WP 20_2 .....	55
Figure 5-17:	Dispersed gravel collected from upper surface (WP 10_2) .....	55
Figure 5-18:	Zones preclusive or less favourable for solar power development in East Solar-2 according to Technical and Land-Use Criteria .....	57
Figure 5-19:	New Highway El Minya to Ras Ghareb at WP 51_4 .....	58
Figure 5-20:	View over new Highway to north at WP 53_4 – Limestone Excavation Material ....	58
Figure 5-21:	Typical landscape, car trail and prospection marks at WP 55_4 .....	58
Figure 5-22:	Typical landscape and prospection marks at WP 58_4 .....	58
Figure 5-23:	Zones preclusive or less favourable for solar power development in East Solar-3 according to Technical and Land-Use Criteria .....	60
Figure 5-24:	Surface Conditions at WP 35_3 on top of the Cliff .....	61
Figure 5-25:	Unstable conditions at the Cliff at WP 35_3 .....	61
Figure 5-26:	Tributary Wadi to Wadi ash-Shaykh at WP 39_3 .....	61
Figure 5-27:	Vegetated spot inside Wadi ash-Shaykh at WP 42_3 .....	61
Figure 5-28:	A huge scarp forms (fault line) of nearly 100 m runs adjacent to the northern border of the East Solar-3 subarea (left); view from the top of the cliff to south (right) .....	63
Figure 5-29:	The vast majority of the Project Area is completely without vegetation (top: East Solar-1; middle: East Solar-2; bottom: East Solar-3) .....	65
Figure 5-30:	Images of Wadi Mushaqqaq .....	67
Figure 5-31:	Canyon-like part of Wadi al-Mashj without vegetation (top left), single shrubs and herbs in a wide part of the Wadi (top right) and (former) cultivated land at the western border of the Project Area (bottom) .....	67
Figure 5-32:	Caves offering shelter for mammals, birds and other animals .....	68
Figure 5-33:	<i>Ochradius baccatus</i> (top left), <i>Zygophyllum coccineum</i> (top right) found in the Project Area and stands of <i>A. tortilis spp. raddiana</i> found in the East Solar-1 subarea .....	70
Figure 5-34:	<i>Anastacia hierochuntica</i> (to left), <i>Panicum turgidum</i> (top right), <i>Launaea nudicaulis</i> (bottom left) and <i>Farsetia aegyptia</i> (bottom right) .....	71
Figure 5-35:	Domestic camels near houses in the East Solar-1 subarea .....	73
Figure 5-36:	Lesser Whitethroat roosting in Wadi al-‘Imrani complex (top left), Trumpeter Finch ( <i>Bucanetes githagineus</i> ) at the Eastern Desert Road (top left), two Spotted Sandgrouse in Wadi Mushaqqaq (bottom left) and Desert Warbler ( <i>Sylvia nana/deserti</i> ) in Wadi Ibadah (bottom right) .....	74
Figure 5-37:	Reptiles found in the Project Area: Sinai Agame, Saharan Fan-Toed Gecko (top right), Sahara Sand Snake (bottom left) and Bosc's Fringe-Toed Lizard (bottom right) .....	78
Figure 5-38:	Exemplary tracks of animals found in the Project Area .....	79
Figure 5-39:	Migratory Locust (left) and Camel Spider (right) .....	79
Figure 5-40:	Single bushes in the centre and some herbs near the origin of a small Wadi in the north-western part of the East Solar-2 subarea .....	83

Figure 5-41:	Wadi ash-Shaykh complex holds several stands of Acacia trees and has, in its north-eastern part, a canyon-like character.....	85
Figure 5-42:	Administrative Division of Beni Suef Governorate.....	89
Figure 5-43:	Administrative Division of El Minya Governorate.....	92
Figure 5-44:	White bricks used for construction .....	94
Figure 5-45:	Mining areas .....	94
Figure 5-46:	Extension of Mining Areas.....	95
Figure 5-47:	Archeological sites.....	96
Figure 5-48:	Beni Hassan Tombs .....	97
Figure 5-49:	Access to the Beni Hassan tombs.....	97
Figure 5-50:	El Minya – Assiut National Road in the East Solar-1 subarea .....	98
Figure 5-51:	Google Map showing the farming activities in East Solar-1 subarea .....	99
Figure 5-52:	Grape farm at one of the newly reclaimed areas inside East Solar 1 .....	100
Figure 5-53:	Water well and pump used for irrigation .....	100
Figure 5-54:	Irrigation system inside East Solar 1.....	101
Figure 5-55:	Farm along Menia - Assuit Desert Road in East Solar 1.....	101
Figure 5-56:	Farm along Menia - Assuit Desert Road in East Solar 1.....	101
Figure 5-57:	Interviews with farmers inside the East Solar-1 subarea .....	102
Figure 5-58:	Farm sign "Ba'gar family" .....	102
Figure 5-59:	Interview with Mr. Sayed Ba'gar .....	102
Figure 5-60:	A general view of Sekem Farm.....	103
Figure 5-61:	Google Map of Sekem Farm (inside East Solar-1 subarea).....	104
Figure 5-62:	Sekem organic farming activities .....	104
Figure 5-63:	Sekem Farm – House for workers .....	105
Figure 7-1:	Mitigation Hierarchy .....	148

## List of Tables

Table 3-1:	Key components of a PV Plant .....	15
Table 4-1:	Criteria for judgement of physical criteria.....	39
Table 4-2:	Event Magnitude Ranking.....	42
Table 4-3:	Determination of Receptor Sensitivity .....	42
Table 4-4:	Receptor Sensitivity Rankings .....	44
Table 4-5:	Impact Significance.....	44
Table 5-1	Climate El Minya (40 m a.s.l.).....	48
Table 5-2:	Climate Assiut Airport (230 m a.s.l.).....	48
Table 5-3:	Attribution of habitats found in the Project Area during site visits and field surveys according to the classification of Harhash et al. (2015) .....	63
Table 5-4:	Assessment of the importance of the main Wadis located in the East Solar subareas as a habitat for plants and animals .....	68
Table 5-5:	List of plant species recorded in the Project Area .....	70
Table 5-6:	List of mammal species recorded in the Project Area.....	72
Table 5-7:	List of birds recorded during transect walks in the Project Area.....	74
Table 5-8:	List of reptiles recorded in the Project Area .....	77
Table 5-9:	Population Distribution at Beni Suef Governorate .....	88
Table 5-10:	Population Distribution by Education Status at Beni Suef Governorate .....	89
Table 5-11:	Population Distribution at El Minya Governorate.....	91
Table 5-12:	Population Distribution by Education status at El Minya Governorate .....	91
Table 6-1:	Event Magnitude land-use/land-take.....	110
Table 6-2:	Event magnitude of visual impact.....	111
Table 6-3:	Event magnitude for cumulative impact on water resources .....	112
Table 6-4:	Event magnitude for domestic and hazardous waste .....	114
Table 6-5:	Event magnitude for impact on air quality .....	115
Table 6-6:	Event magnitude for noise and reflection .....	116
Table 6-7:	Estimated traffic impact .....	117
Table 6-8:	Event magnitude for traffic impact .....	118
Table 8-1:	Environmental and Social Management Plan.....	158
Table 8-2:	Generic monitoring program .....	162

## List of Maps

Map 1-1:	Overview on the location and the extent of the Project Area and of different subareas based upon already prescribed height restrictions for RE developments...2
Map 4-1:	Tracks and plots in the East Solar-1 subarea taken as a sample for the special survey on habitats, flora and fauna (incl. local and roosting birds) .....34
Map 4-2:	Tracks and plots in the East Solar-2 subarea taken as a sample for the special survey on habitats, flora and fauna (incl. local and roosting birds) .....35
Map 4-3:	Tracks and plots in the East Solar-3 subarea taken as a sample for the special survey on habitats, flora and fauna (incl. local and roosting birds) .....36
Map 5-1:	Schematic presentation of the location and the run of main wadis / wadi systems and of stands of Acacia trees .....66
Map 5-2:	Assessment of the importance of main Wadis in the East Solar-1 subarea as a habitat for plants and animals .....82
Map 5-3:	Assessment of the importance of main Wadis in the East Solar-3 subarea as a habitat for plants and animals .....87
Map 5-4:	Zones preclusive or less favourable for solar power development in the East Solar-1 subarea .....107
Map 5-5:	Zones preclusive or less favourable for solar power development in the East Solar-3 subarea .....108
Map 7-1:	Zones preclusive or less favourable for solar power development in the East Solar-1 subarea as a result of the impact assessment (mitigation measures) .....155
Map 7-2:	Zones preclusive or less favourable for solar PV power development in the East Solar-2 subarea as a result of the impact assessment (mitigation measures) .....156
Map 7-3:	Zones preclusive or less favourable for solar PV power development in the East Solar-3 subarea as a result of the impact assessment (mitigation measures) .....157

## 1 General

### 1.1 Introduction

A Strategic Environmental and Social Impact Assessment (SESA) for the development of renewable energy (RE) projects in a 1,725 km<sup>2</sup> area (2,200 km<sup>2</sup> during the proposal stage and before modification of the area boundaries by the Government of Egypt – GoE, see section 1.2) located to the east of the Nile River in Egypt across three Governorates Beni Suef, El Minya and Assuit has been carried out by the Joint Venture of Lahmeyer International and ecoda Environmental Consultants on behalf of the National Renewable Energy Authority (NREA) in Egypt.

Following the issuance of the Renewable Energy (RE) Feed-in Tariff (FiT) presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (EBRD), has been engaged in partnership with the Government of Egypt (GoE) to identify a portfolio of RE projects (from wind and solar sources) to be financed by prequalified Foreign Direct Investors (FDIs). It is expected that each project will be 50 MW in capacity.

The GoE has identified three large areas suitable for development of RE mega farms for both wind and solar projects under the newly issued FiT law including a 1,725 km<sup>2</sup> area located to the east of the Nile River (the "Project Area"). This area has been identified based on existing data on solar and wind potential and existing land-use. To ensure a strategic level assessment of the potential environmental and social issues associated with the development of RE projects in this area, and to inform the decision-making process for project development, the GoE, together with the NREA, is undertaking a Strategic Environmental and Social Assessment (SESA) Study for the Project Area. A SESA is a systematic decision-support process that helps to ensure that environmental, social and other sustainability aspects are considered effectively in policy, plan and programme making. The SESA is supported by the EBRD.

This report focus on the development of solar energy projects, whereas a separate report considers the development of wind projects within the Project Area.

### 1.2 The Project Area

The East Nile Area of 2,200 km<sup>2</sup> with a useable area of 1,725 km<sup>2</sup> (East Solar-1, East Solar 2 and East Solar-3 subareas as well as East Wind-1 and East Wind-2 subareas) was allocated by Presidential Decree No. 456 of 2014, which was modified by the Decree No. 116 of 2016 for the development of solar PV and wind power projects. Most of the area is located in the El Minya Governorate. Smaller portions are extending to the Assiut Governorate in the south and to the Beni Suef Governorate in the north. With the modification in 2016 three subareas with a total of 425 km<sup>2</sup> were excluded from further RE developments due to military height limitations ("zero height", see Map 1-1). Thus, East Nile RE power development is limited to wind power (maximum building height of 150 m) in the subareas East Wind-1 and East Wind-2 and solar power (photovoltaic) in the subareas East Solar-1, East Solar-2 and East Solar-3. This report deals with the assessment of potential solar power development in the East Solar-1, East Solar-2 and East Solar-3 subareas.

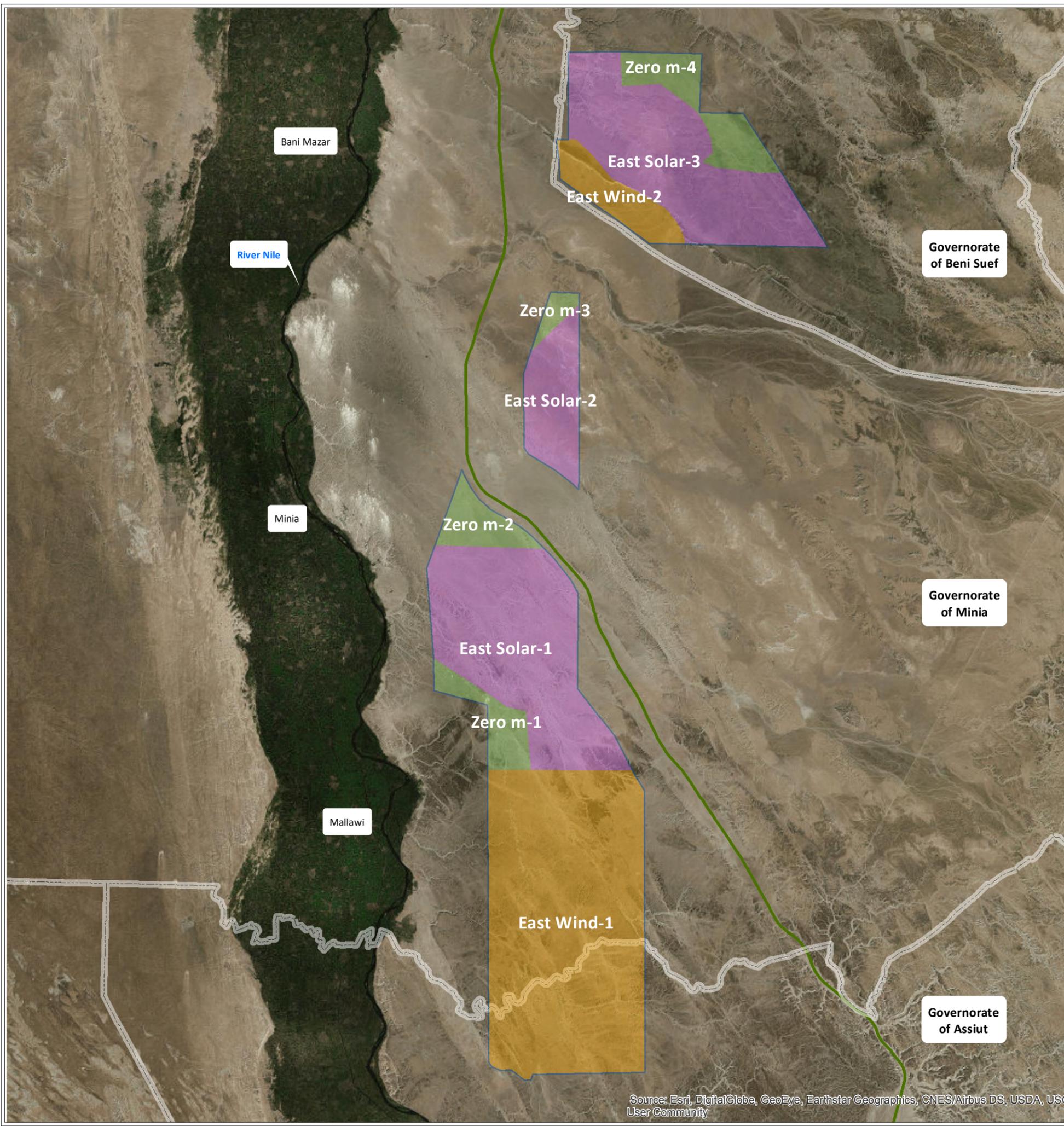
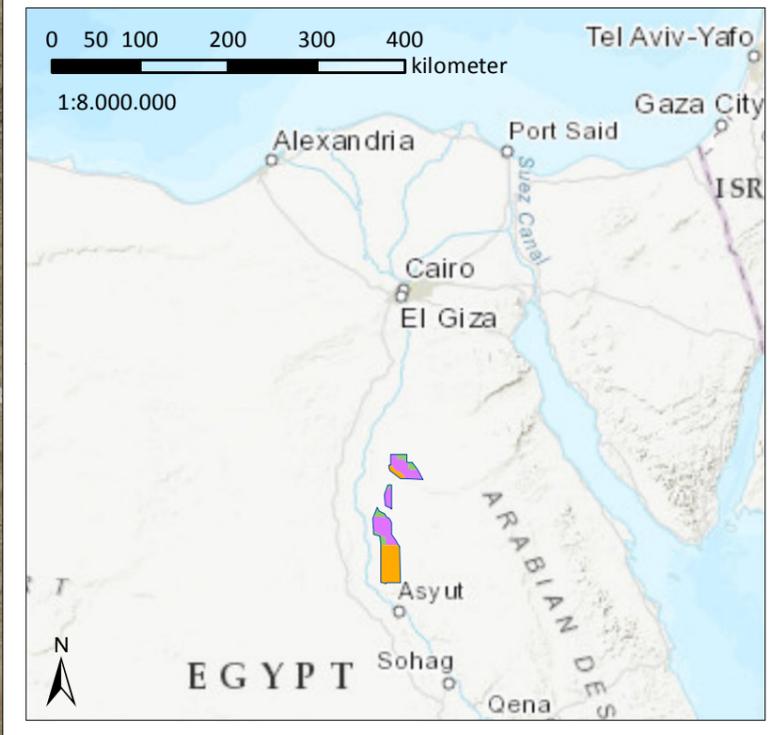
**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 1.1:**  
 Overview on the location and the extent of the Project Area and of different subareas based upon already prescribed height restrictions for RE developments

**Bordering of project area and subareas**

-  project area
-  subarea not useable for RE developments (due to height restrictions "Zero")
-  subarea usable for PV solar power projects (due to height restrictions "5 m")
-  subarea usable for wind power projects (due to height restrictions "150 m")
-  borders between governorates
-  Cairo – Asswan Highway



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, SDA, CNES/Airbus DS, User Community

The Project Area is located in the Eastern Desert (also called Arabian Desert; Al-Saḥrā' Al-Sharqiyyah). Originating just southeast of the Nile River delta, the Eastern Desert extends south-eastward into north-eastern Sudan and from the Nile River valley eastward to the Gulf of Suez and the Red Sea. It covers an area of about 221,940 km<sup>2</sup>. The Eastern Desert consists of a rolling sandy highland that rises abruptly from the Nile Valley and merges some 80 to 170 km east of the Nile into the Red Sea Mountains, a series of rugged volcanic, north-south-trending mountain chains that reach a maximum height of 2,187 m at Mount Shā'ib al-Banāt. The desert receives occasional rainfall and is extensively dissected by Wadis (dry beds with occasional streams).

The Project Area includes three solar PV subareas:

#### **East Solar-1**

The East Solar-1 subarea stretches over nearly 30 km from the north to the south at a minimum distance of 5.5 km east of the River Nile (see Map 1-1). The maximum width of this subarea is about 18 km (total area of about 415 km<sup>2</sup>) and the area is solely located in the Governorate El Minya. The Cairo - Aswan Eastern Desert Road runs in a north-south direction through this subarea (see Map 1-1).

#### **East Solar-2**

The East Solar-2 subarea is the central area of the three subareas and is also located in the El Minya Governorate. It is located about 10 km north of the East Solar-1 subarea and 15 km south of the East Solar-3 subarea respectively. The maximum north-south extension is 22 km and 7 km for the extension in east-west direction, resulting in a total area of 118 km<sup>2</sup>. The minimum distance to the Nile River in the west is about 30 km. The area can be accessed by the El Minya-Ras Ghareb Highway which is currently under construction but the portion leading to the East Solar-2 subarea is already completed.

#### **East Solar-3**

The East Solar-3 subarea is located at a minimum distance of about 25 km east of the Nile Valley in the area of the Governorate Beni Suef.

At distances of about 8.5 km the Assiut - Cairo Desert Road runs from south to north. The maximum extent of this subarea is about 40 km from the northwest to the southeast and about 20 km from the south to the north (total area of about 363 km<sup>2</sup>).

The main characteristics of these subareas are described in section 5.

In this report, the definitions as defined in the following are used:

- Project Area: whole area useable for RE developments (1,725 km<sup>2</sup>)
- subareas: East Solar-1, East Solar-2 or East Solar-3 subarea
- zones: favourable, less favourable and preclusive zones as per definition under section 5 and 6.

### 1.3 SESA Process and Objectives

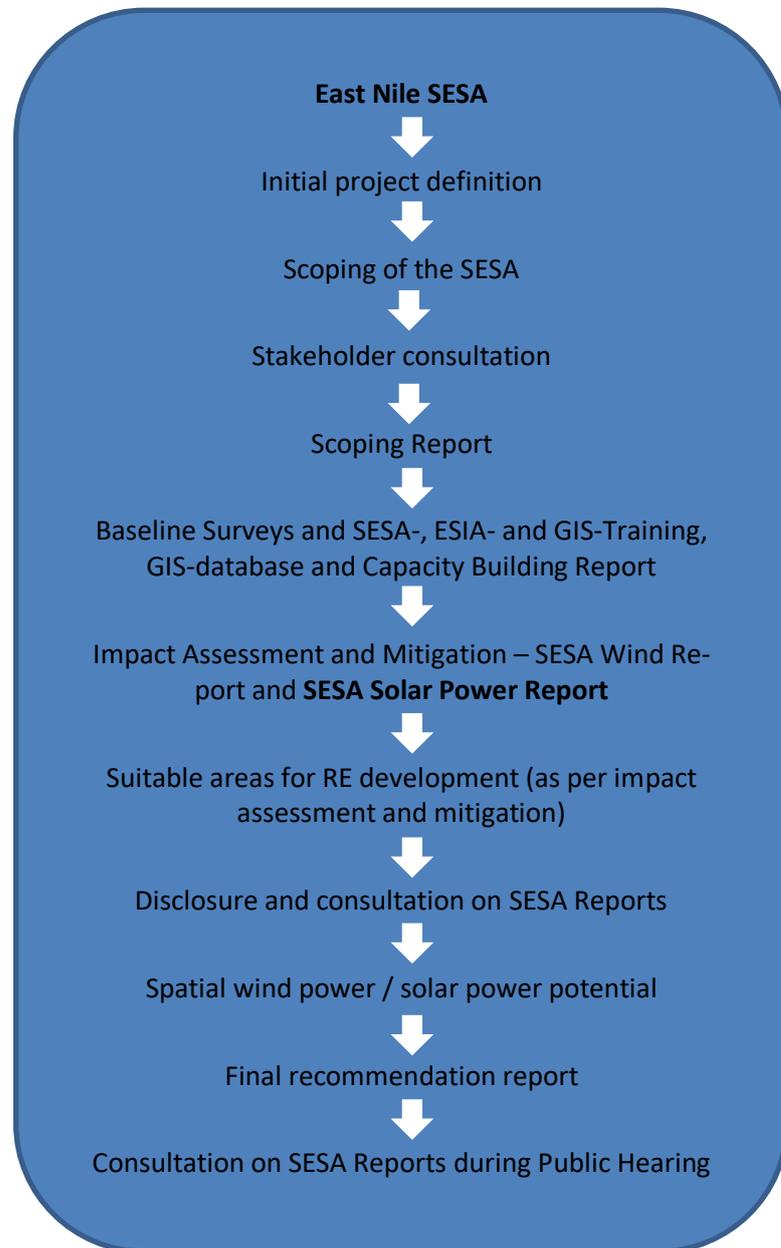
The SESA process for the Project Area has the following objectives:

- To provide a reliable source of environmental and social data for the Project Area to inform RE development plans, environmental permitting and project financing.
- To identify eventually existing zones of technical or social constraints for RE development within the Project Area
- To identify and assess potential environmental and social impacts associated with RE project development and operation in the Project Area and define mitigation and management measures to address these potential impacts, including recommendations on arrangement of plots for individual wind or solar power projects.
- To engage with stakeholders, including members of the public on the planned development of RE projects in the Project Area.
- To identify areas in the Project Area, which are suitable for RE development based on the outcome of Social and Environmental Impact Assessment.
- To develop a Geographic Information System ("GIS") database, which will be used to inform future RE projects.
- To determine the spatial distribution of the wind and solar power potential
- To identify and outline the best possible areas for wind power and solar power development considering technical, social, environmental and RE power potential aspects
- To identify eventually existing further requirements (data procurement/measurements, studies, administrative) for RE development on the identified areas.

The SESA has adopted a typical SESA (to a large extent similar to an ESIA) process to inform project development over a large area.

In addition, during the course of the SESA, the Consultant provided training to the staff of the New and Renewable Energy Authority (NREA) on SESA, Environmental and Social Impact Assessment (ESIA) and GIS.

It includes the following key stages and reports:



**Figure 1-1: Overview of the SESA stages and reports**

The SESA Wind and SESA Solar Reports are analogous to a regional ESIA study over the East Nile wind power and solar power areas evaluating the suitability of areas according to technical or social constraints and the significance of social and environmental impacts after consideration of mitigation options. The SESA process goes beyond that. In addition, the spatial wind and solar power distribution is determined to identify the best possible areas for RE power development and to inform future projects and investment decisions, and project financing for the development of individual investment projects of 50 MW each within these areas. This is compiled in a separate report: The Final Recommendation Report.

#### 1.4 SESA Solar Report – Objectives and Approach

This subject report, the SESA Solar Report, focuses on the social and environmental assessment to define the suitability for solar PV power development within the greater East Solar-1, East Solar-2 and East Solar-3 subareas considering technical, social or environmental constraints. The major elements of this report are:

- Legislative Framework and International Environmental and Social Standards
- Generic description of PV plant technology and implementation
- Baseline Assessment on Existing Physical, Biological and Social Environment
- Identification of physical (technical and land-use) constraints – areas to be precluded from solar PV power development according to hard criteria and areas being less favourable for technical reasons
- Prediction and assessment of potential social and environmental impacts identified during scoping, considering typical features of a solar PV plant project
- Mitigation and social and environmental management
- Classification of areas to technical and land-use constraints and to residual social and environmental impacts
- Stakeholder engagement – public consultation

Considering the environmental, social and technical attributes and the significance of predicted impacts the study identifies

- zones that are favourable for solar PV power development,
- zones that are less favourable, but can be developed with restrictions, and
- zones in which solar PV power development is precluded.

The results, which are also entered into a GIS database, are mapped by overlaying the hard criteria and predicted impacts. Thus, within the SESA –Solar Power Report areas are classified from the point of view of social and environmental criteria as well as of the physical-technical constraints. A further differentiation within the subareas of equal technical, environmental and social suitability (favourable or less favourable) took place according to the spatial solar power distribution, which, however, is not part of this report and is dealt with in the separate Final Recommendation Report.

This SESA Solar Power report is analogous to a regional ESIA study for the East Solar-1, East Solar-2 and East Solar-3 subareas. It shall facilitate the later environmental permitting for the intended 50 MW solar power plots of private investors.

## 1.5 Consideration of Alternatives and Justification of the Project

Egypt is characterised by fast growing energy demand. In order to meet the estimated demand, an increase of about 37 % of primary energy needs to be met by 2022. As a general strategy to meet this demand, the Government of Egypt is focusing as much as possible on locally available natural resources including expanding utilisation of renewable energy sources, expansion of electricity and gas integration with neighbouring countries. Therefore, the Egyptian Government has adopted a renewable energy strategy with the target to cover 20 % of its electric power demand from renewable energy by 2022. Considering that the hydropower potential has almost been fully exploited, the utilisation of renewable energy is the best option to assure that Egypt will meet his target achieving 20% of the electricity generation from renewable energy by 2020.

The use of renewable energies is considered to be an environmentally compatible form of electricity supply. It saves CO<sub>2</sub> emissions and contributes to resource conservation such as the indigenous oil and gas reserves. Hence, in areas of good solar power potential like Upper Egypt, utilisation of solar energy is one of the best alternatives to satisfy the growing energy demand of Egypt.

The Project Area has been proposed by the National Centre for Land-use Planning and approved by the Council of Ministers. Comments of competent authorities such as air force and aviation authority have been already received by NREA. Thus, it can be stated that there has already been an internal consultation between competent authorities prior to the selection of the East Solar-1, East Solar-2 and East Solar-3 subareas. The driving criteria for selecting of the subareas have been:

- the areas have been identified to be located in a region with likely promising solar power potential,
- the areas mostly consist of vast desert grounds with only sparse vegetation are considered to be of limited ecological relevance,
- the areas are believed to be mostly free from competing uses, and
- the geomorphology of the subareas is mostly favourable for solar power development requiring limited construction and landscape modification measures, and

Solar power plant development is needed, because it will

- provide a valuable source of renewable energy for use within Egypt to support infrastructure developments,
- strengthen Egypt's energy sector by helping to diversify its energy sources,
- reduce the country's reliance on fossil fuel,
- help Egypt to achieve its targets in terms of development of renewable energy,
- mark Egypt as a developing state with a commitment to reduce its Greenhouse Gas emissions, and
- provide local jobs and improvements, specifically during the construction phase.

The so-called “zero-alternative”, i.e. the no-action alternative, would result in an increased deficit between electricity demand and actual power generation that cannot be balanced by electricity-saving measures. Even at present, power supply problems still occurred in Egypt. Without additional wind power projects in selected areas, the additional electricity demand would have to be satisfied by conventional power stations. Thus, CO<sub>2</sub> free renewable electricity generation would have to be mainly compensated by heavy fuel oil fired power plant generation with significant CO<sub>2</sub> emissions, counteracting emission control goals. In addition, heavy fuel oil would have to be imported at high economic cost.

Furthermore, the expected significant capacity factor of the solar power potential would deliver some firm generation capacity, which can be considered to substitute investments into conventional power generation capacity to meet future demands. Thus, the zero-alternative would imply adverse effects on CO<sub>2</sub> emissions, on the economy and would counteract the political targets mentioned above.

## 2 Legal and Administrative Framework

### 2.1 Policy Context

The East Nile Project Area was allocated by Presidential Decree No. 456 of 2014, modified by the Decree No. 116 of 2016 defining the Project Area for the development of wind and solar energy projects. The presidential decree is a result of preceding central Egyptian power development planning with involvement of different, relevant Ministries and Authorities. Wind and solar potential, site suitability as well as potential environmental and social impacts were considered during the identification of the RE development areas on desktop level. Sola PV power development is limited to the East Solar-1, East Solar-2 and East Solar-3 subareas. This SESA Solar Report focuses on these three subareas.

The intended private investments into solar PV power development are likely to require financing by international lenders requiring meeting international standards. Accordingly, the SESA has considered the Egyptian legal and regulatory framework, EBRD Performance Requirements and the Equator Principles. While compliance with Egyptian legal and regulatory requirements is obligatory, the SESA has adopted the strictest requirements, Egyptian or international – whichever is stricter. Thus, the conditions for later international project financing shall be fulfilled.

### 2.2 Legal and Regulatory Framework in Egypt

A legal and regulatory framework for a Strategic Environmental and Social Assessment, e.g. an E&S Assessment for a regional development, plan or programme, does not exist in Egypt. Relevant for the SESA, however, is the legal and regulatory framework for Environmental Impact Assessment (EIA), which, though not explicitly stated in the designation, comprises the social assessment as well. The legal basis for EIA was established by Law No. 4 of 1994, the Law on Protection of the Environment and its Executive Regulations 1995 (Prime Ministers Decree 338). According to these Regulations, the Egyptian Environmental Affairs Agency (EEAA) has the authority to approve bases and procedures for the assessment of environmental impacts of projects.

The law was amended by Law 9/2009 to update environmental legislation. Major amendments include:

- An EIA shall be prepared for both new establishments and the expansion of existing establishments.
- The EEAA can penalise an investor with fines, if conditions imposed by the EIA process would not be implemented.
- The public consultation has been made mandatory for Form C projects, i.e. projects requiring full EIA, in addition to a public disclosure with an Arabic executive summary.

Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2nd edition (2009) steer the EIA and environmental approval process. According to these guide-

lines, “Generation of electricity using wind or solar energy, including power lines” is a category C project type and has to undergo a full EIA.

The involvement of the public and relevant entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process on the social and environmental aspects with relevant parties to minimise potential negative environmental and social impacts, strengthen social acceptance of the project, informing the relevant parties that the environmental impacts will be minimised to levels that are low as reasonably practical and achieve the balance between legitimate requirements for development and environmental protection.

Consultation is undertaken at least twice during the EIA process: the first in the phase of identifying the scope of the SESA and the second after the preparation of the draft SESA report. Scoping is prepared by establishment of a stakeholder engagement plan, listing the parties relevant that will be consulted and the methods of consultation. A meeting was held with EEAA to discuss the plan and the meeting resulted in an increase of relevant parties.

The Egyptian Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2nd edition (2009) contain a provision with regards to projects in a development, for which an integrated EIA has been prepared (e.g. for a cluster of foundries or tourist centres; in analogy for a cluster of wind or solar PV power projects). In this case, the individual projects of a similar nature will be required to abide by the requirements of the category that is less strict than its original category. Accordingly, once an integrated EIA (also designated as regional or strategic EIA) was prepared and approved for a cluster development of wind or solar PV power according to category C requirements, for later individual investment projects out of the cluster the EIA will have to follow the requirements of category B, making use of the assessment results of the integrated EIA and applying any measures, restrictions, etc. defined in the E&S action or management and monitoring plan. The SESA facilitates and informs the later EIA and environmental approval process for individual RE projects. The SESA considers the requirements of these guidelines for EIA in Egypt.

### **2.3 EBRD Performance Requirements**

The European Bank for Reconstruction and Development (EBRD) supports the development of the SESA and is further active in providing finance for development projects in Egypt including potential RE projects in the Project Area and elsewhere. The EBRD, as a signatory to the European Principles for the Environment, is committed to promoting the adoption of EU environmental principles, practices and substantive standards. Moreover, EBRD recognises the ratification of international environmental and social agreements, treaties and conventions by its countries of operations. The EBRD seeks to ensure that projects satisfy and fulfil the following conditions:

- A project/or operational activities are socially and environmentally sustainable,
- A project/or operational activities are respectful to the rights of affected workers and communities, and

- A project/or operational activities is designed and operated in compliance with applicable regulatory requirements and good international practice.

As the SESA is supported by the EBRD, it is necessary for the SESA to apply the EBRD's environmental and social requirements, which are defined in the EBRD's Environmental and Social Policy of May 2014, together with its associated Performance Requirements. All projects financed by the EBRD shall be structured to meet the requirements of this Policy. According to its E&S Policy, large solar PV plants are typically regarded as category B projects. As the three East Solar subareas mainly cover desert land that is not assumed to hold particular sensitive environment this categorisation is valid for solar PV developments in the three subareas, too. For category B projects, an E&S impact assessment that is proportionate to the project's nature, size and location, as well as the characteristics of the potential impacts and risks is required. For the power lines, a separate ESIA will be required once national power grid expansion studies is carried out and the power evacuation concept and transmission line corridors have been defined.

As part of its E&S Policy, the EBRD has adopted a comprehensive set of specific Performance Requirements (PRs) that the projects are expected to meet:

*PR 1: Assessment and Management of Environmental and Social Impacts and Issues*

*PR 2: Labour and Working Conditions*

*PR 3: Resource Efficiency and Pollution Prevention and Control*

*PR 4: Health and Safety*

*PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement*

*PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources*

*PR 7: Indigenous Peoples*

*PR 8: Cultural Heritage*

*PR 9: Financial Intermediaries*

*PR 10: Information Disclosure and Stakeholder Engagement*

The Performance Requirements, with the exception of PR 7 and PR9, are applied to the SESA to fulfil the conditions for the future financing of RE projects by the EBRD. Reason for not considering PR7 is the absence of Indigenous Peoples as per definition in this PR in this region and Financial Intermediaries (PR 9) are not involved in this project stage.

Of special relevance for the SESA is PR 1, with the key requirements to

- Identify and evaluate environmental and social impacts and issues of the project,
- Adopt a mitigation hierarchy approach to address adverse environmental or social impacts and issues to workers, affected communities, and the environment from project activities,
- Promote improved environmental and social performance of clients through the effective use of management systems; and
- Develop an ESMS tailored to the nature of the project, for assessing and managing environmental and social issues and impacts in a manner consistent with relevant PRs.

This corresponds to the approach of this subject strategic environmental and social assessment studies. As the SESA covers the development of various RE projects over a large area, it corresponds to a Category A project (equivalent to Class C as per Egyptian regulations), i.e. projects that could result in potentially significant adverse future environmental and/or social impacts which cannot readily be identified or assessed and will require the client to carry out a comprehensive Environmental and Social Impact Assessment (ESIA). The ESIA process includes a scoping stage to identify the potential future environmental and social impacts associated with the project. This SESA considers the EBRD's requirement for ESIA and Category A projects. The SESA can be used by the EBRD and other financial institutions to inform financing decisions on individual RE projects.

For information disclosure and stakeholder engagement, PR 10 is of high importance. Accordingly, stakeholder engagement shall take place by providing local communities that are directly affected by the project and other relevant stakeholders with access to timely, relevant, understandable and accessible information, in a culturally appropriate manner, and free of manipulation, interference, coercion and intimidation. Stakeholder engagement involves the following elements: stakeholder identification and analysis, stakeholder engagement planning, disclosure of information, consultation and participation, grievance mechanism, and ongoing reporting to relevant stakeholders. Considering that Egyptian regulatory requirements are less demanding, PR10 is applied for stakeholder engagement.

As a signatory to the European Principles for the Environment, the EBRD is committed to promoting the adoption of EU environmental principles, practices and substantive standards. In this respect the SESA has taken into consideration the principles of the EU Directive 2001/42/EC of 27 June 2001 on the assessment of effects of certain plans and programmes on the environment (the EU Strategic Environmental Impact Assessment Directive) as well as other standards, directives and good international practice relevant to SESA and RE development.

## 2.4 Equator Principles

RE projects in the Project Area are likely to be developed by prequalified Foreign Direct Investors ("FDIs"). These FDIs are likely to require financing from financing institutions. Many financing institutions have adopted the Equator Principles (EP), which are applied to projects subject to finance and are similar the EBRD Performance Requirements. Currently 84 Equator Principles Financial Institutions (EPFIs) in 35 countries have officially adopted the EPs, covering over 70 percent of international Project Finance debt in emerging markets. EPFIs commit to implementing the EP in their internal environmental and social policies, procedures and standards for financing projects.

Accordingly, to meet the international financing requirements of private investors, the SESA applies, in addition the EBRD Performance Requirements, the requirements of the Equator Principles (The Equator Principles [EP] III are effective from 4 June 2013).

The Equator Principles Financial Institutions (EPFIs) will only provide Project Finance and Project-Related Corporate Loans to projects that meet the requirements of Principles 1-10:

- Principle 1: Review and Categorisation
- Principle 2: Environmental and Social Assessment
- Principle 3: Applicable Environmental and Social Standards
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan
- Principle 5: Stakeholder Engagement
- Principle 6: Grievance Mechanism
- Principle 7: Independent Review
- Principle 8: Covenants
- Principle 9: Independent Monitoring and Reporting
- Principle 10: Reporting and Transparency

As defined in Principle 3, for projects located in Non-Designated Countries like Egypt, the assessment process evaluates compliance with the applicable IFC Performance Standards of 2012 on Environmental and Social Sustainability (Performance Standards) and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) (Exhibit III).

IFC Performance Standards:

- 1 Assessment and Management of Environmental and Social Risks and Impacts
- 2 Labour and Working Conditions
- 3 Resource Efficiency and Pollution Prevention
- 4 Community Health, Safety and Security
- 5 Land Acquisition and Involuntary Resettlement
- 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources
- 7 Indigenous Peoples
- 8 Cultural Heritage

The Performance Standards are similar to the EBRD Performance Requirements although there are some limited differences. The SESA ensures that both sets of requirements are met.

World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) are split into General Guidelines and Industry Sector specific guidelines. The general guidelines cover environmental, occupational health and safety and community health and safety aspects that could be applied to any project. Of special relevance are the sector guidelines: Project Developer's Guide for the Utility Scale Solar Photovoltaic Power Plants.

### **3 Description of a typical Solar Power Project**

#### **3.1 Objective and Scope**

This report assesses the potential and expected environmental and social impacts of solar power development intended to be realised in 50 MW plots. Such assessment is carried out as a second step, after having identified all those areas that are preclusive or less favourable based on criteria regarding physical requirements and competing land-use.

Ground mounted PV plants are built in areas and have specific characteristics. Beside high solar resource and sufficient land availability, ideally flat terrain or slightly sloped (north-facing slope for terrain located in southern hemisphere, south facing in case of south hemisphere), limited environmental constraints (i.e. massive presence of trees, rivers crossing the land) and not rocky sites, represents the base conditions to allow a ground mounted PV plant development. PV modules are placed on mounting structures distributed on rows (according to the planned layout) all over the suitable land. Mutual row to row distance depends on the module technology and site characteristics. Depending on the soil features, mounting structures are generally fixed into the ground through steel poles.

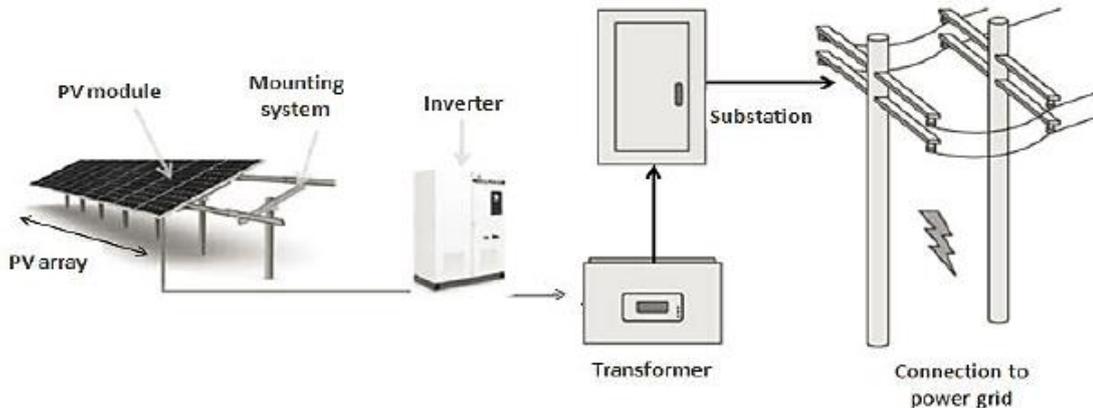
Accordingly, such typical PV plant layout with its typical potential impacts the PV plant does anticipate the later environmental and social impacts of the intended 50 MW solar farm plots quite precisely already at this early study stage.

For this purpose, the different project components of a photovoltaic plant as well as the major works during the lifecycle of the project are described in the following subsection.

#### **3.2 Typical Features and Scope of Works of Large Scale Solar Farms**

##### **3.2.1 Typical layout and large scale solar farm components**

A Photovoltaic (PV) plant generates electricity from solar radiation through use of a PV Module, which is made up of several solar cells. Solar cells produce Direct Current (DC), which is converted to Alternating Current (AC) in inverters before the plant is connected to the grid. A simplified set-up of a PV plant is shown in Figure 3-1.



**Figure 3-1: Setup of a solar PV plant**

In general, a solar PV power plant of size 50 MW is generally divided into smaller units (often called blocks) consisting of a number of solar arrays connected to a single inverter. Onsite infrastructure consists of:

- PV Panels are grouped into “solar arrays”. A 50 MW PV project may have PV panels of capacity ranging from 250 W to 300 W. A typical dimension of a solar PV Panel could be 1,950 mm x 990 mm x 40mm and weighs around 18 - 25 kg. Materials used for PV modules, independent of technology, in general, are recyclable and non-hazardous.
- Mounting Structure (Supporting Structure) is used for mounting of the PV modules that generate electricity. The mounting structure can either be fixed or tracking (following the sun).
- DC-AC Inverters for conversion of the DC electricity from the PV arrays (through LV cables) to AC electricity are located in each block. AC is further fed to the transformer before being evacuated through the utility grid. A typical inverter and transformer arrangement which is used in large scale solar power plants is shown below.

Typically, the solar PV plant will also have offsite infrastructure, which generally consists of the transmission lines from the PV plant to the nearest sub-station. These lines can either be underground or overhead.

Table 3-1 provides an overview of key components of a 50 MW solar PV plant. A general large scale PV power plant as built and a typical PV plant layout are shown in Figure 3-5.

**Table 3-1: Key components of a PV Plant**

<b>Component</b>	<b>Basic Description</b>
Project Capacity	50MW (AC)
Project Area	100 ha to 200 ha depending on the technology (fixed or sun tracking) and orographic conditions
Other infrastructure	Underground low voltage (LV) and medium voltage (MV) cables, inverter room and transformer units, warehouse, office, substation



**Figure 3-2:** Typical 'Mounting Structure' erected on site (source: Lahmeyer, Shams PV plant in Jordan)



**Figure 3-3:** Example of inverter and transformer arrangement (Source: SMA)



**Figure 3-4:** Example of a solar PV plant (Source: Lahmeyer, Cerami PV plant Sicily, Italy)



**Figure 3-5:** Typical solar PV plant layout (Source: Lahmeyer, PV plant layout in South Africa)

### 3.2.2 Construction works

The construction works for a typical photovoltaic plant consist of civil, mechanical and electrical works.

The **civil works** relating to the construction of a solar PV plant are relatively straightforward.

Prior to any activity, the site survey represents one of the most important steps for PV plant construction. Adequate ground investigation reports, which provide sufficient detailed ground information, will lead to appropriate project design avoiding extra costs in case the foundations or other elements are not adequately designed for the site.

Once soil investigation results are provided, the site must be levelled to facilitate the construction works. In case the site is built on agricultural land, the levelling works must be kept to a minimum in order to easily allow the site to be restored to agricultural use after decommissioning. Following the layout, will start the marking of mounting structures and fence phase. Once all mounting structures, fences and other structures are marked, drilling for mounting structures foundation and excavation works will start.

Depending on the ground characteristics, mounting structures can be simply screwed, hammered directly into the ground, or drilled and fixed by concrete foundation. In some cases, where the site conditions (or local regulation) do not allow any drilling activity, mounting structures are fixed by using ballasted foundation.



Figure 3-6: Mounting structure concrete foundation (Al- Ward Al Joury PV Plant –Jordan)

Foundation works of mounting structures, service buildings, control room and substation represent one of the main and most sensitivity phase of civil works.

Figure 3-6 shows the posing of mounting structure poles prior to concrete jet. In this case, due to sandy terrain which did not assure sufficient strength, a concrete foundation with depth in a range of 1-2 m was chosen as the most appropriate solution.

Foundation depth varies according to the soil characteristics. In some cases, foundation depths up to 5-7 metres are required. The following figures show the construction phase of a concrete foundation for a single axis tracking system-mounting structures. Reached depth was in a range of 7-9 metres. In this case, the soil was clay-rich and water saturated. Hence, massive concrete foundations were required for all tracking system of that PV plant.

Construction of foundations for inverters, service buildings, control room and substation are also an important task of the civil work.



**Figure 3-7: Depth mounting structure foundation construction (source: Lahmeyer, Mussomeli PV plant in Sicily)**



**Figure 3-8: Inverter foundation example (Source: Lahmeyer, Falcon PV plant in Jordan)**

The picture on the right shows a foundation of inverter cabinet with a total height of around 1 metre – 30 cm is above ground to protect from water flooding.

Due to the nature of the excavation works digging or pile driving for foundations, it is important to be aware of hazardous obstacles or substances below ground level. Typical hazards may include ground gases and leachate from former landfill operations, contaminated land due to historical industrial works or processes and unexploded ordnance from previous wartime activities, such as on or near active/retired military bases or other sites that may have been mined or bombed. However, such risks are not expected in the East Nile project area.

Of particular importance is also the drainage system works. Depending on the site conditions, i.e. slope, soil type, proximity to aquatic bodies, drainage systems must be considered and properly designed to ensure that water run-off is controlled to minimise erosion. The pictures below show a shallow drainage system of a PV plant in Jordan.



**Figure 3-9: Drainage system (source: Lahmeyer, Falcon PV plant in Jordan)**



**Figure 3-10: Trench cable leading cables to/from inverter (Source: Lahmeyer, Shams PV Plant in Jordan)**

In case of sloping sites, construction of underground drainage systems can be also required to avoid excessive erosion and consequent damages to the structures.

Further civil works are the excavation and backfilling of cable trenches (depth of about 1 m and a width of 1 to 2 m), which are built after or in parallel of mounting structures, inverter cabinets and service buildings are completed. Cable trenches lead cables from PV modules to inverters and from inverters to connector service building and then to substation.

For maximum annual energy production, the optimum inclination with respect to horizontal plane and the module plane is generally determined in accordance with the respective latitude of the site. For a PV plant to be located in Egypt, an optimal inclination angle or tilt should be between 20° and 30° depending on the location. With regards to orientation, it will be generally south-facing (northern hemisphere).

These structures are considered very robust and a mostly maintenance-free solution. Usually the use of these systems allows the plant layout to be easily adapted to the shape of the available terrain. Since these solutions do not track the sun path the energy production per installed kWp capacity is lower compare to the same capacity installed on tracking systems.

The assembly of fixed mounting structures with mono-crystalline PV modules (305 Wp each) from the manufacturer SunPower is presented below.

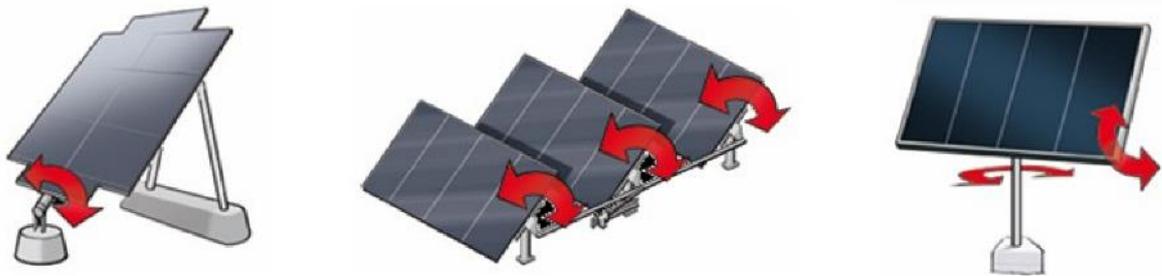


**Figure 3-11:** Fixed mounting structures assembly (source: Lahmeyer, Cammarata PV Plant in Sicily)

Distance between module rows depends on several factors. Terrain slopes, number of PV modules placed and if the PV modules are placed in portrait or landscape position. In this case, a single row of PV modules is fixed in portrait position and terrain is sloped to the south, which reduces mutual shading and then row to row distance.

A tracking system is another common type of mounting structure. A tracking system enables motion of the PV arrays to follow the elliptical path of the sun over the course of a day. The tracking functionality minimises the angle of incidence between incident irradiation and the PV panel. Consequently, the photovoltaic array receives direct components of the global solar irradiation, increasing the amount of energy produced compared to a fixed installed PV array.

Commercially available trackers for PV applications are classified, according to their axis of rotation, into three types: single axis tilted, single axis horizontal and 2-axis (dual axis) trackers. A single axis tracker rotates along one axis following the position of sun over the day. A 2-axis tracker follows the changing position of sun in both directions, the change from East to west over the day and north to south over the year (see Figure 3-12).



**Figure 3-12:** Single Axis Tilted (left), Single Axis Horizontal (middle) and Dual Axis (right)

The most commonly used tracking in current days are single axis horizontal tracking. The high specific yield (kWh/kWp) is the major advantage of tracking system over fixed mounted solution. The tracking system requires higher Capital Expenditure (CAPEX) and higher attention to maintenance than PV system with fixed mounted systems.

Figure 3-13 shows a single axis horizontal tracker structure mounting four rows of thin film modules from First Solar manufacturer in Jordan.



**Figure 3-13:** Single axis tracker mounting structure (source: Lahmeyer, Shams PV plant in Jordan)

The **electrical works** of a PV plant consists in installation of PV modules, inverters, transformers and cabling. PV modules are connected in series to make a string and then are combined in parallel in DC string combiner boxes through fuses, which protects the modules in case of over current or reverse flow. The String combiner boxes are equipped with DC disconnection switches and surge arrestors. For desert environment like Egypt, to avoid dust, water infiltration and condensation issues, DC combiner box must be IP54 class. From DC combine boxes, strings are then connected to the inverters. Depending on the PV modules features, a different number of strings are connected to the inverters. Inverter for desert environment also must be minimum class IP54 and can be string or central inverter. The decision of choosing central or string inverter depends on the spare parts and inverter manufacturer availability to provide assistance in the country of the project. In case of lack of inverter assistance availability (i.e. the inverter manufacturer does not have a local office in the country of the project), choosing string inverters is preferred and they must be available on site as spare parts. In such a case, it will be more efficient to replace the damaged inverter/s instead of waiting for maintenance assistance. However, for economic reasons the majority of the medium-large scale free field PV plants are equipped with central inverters.

Common PV plant configuration is to divide the PV field in several independent subfields. Every subfield will have inverters, MV transformers and MV switchgear. The Figure below shows a 2,020 kW MV turnkey power station of a PV Plant in Jordan, which is equipped with 2 x 1,010 kW AC power inverters, 20 kV step-up transformer and medium voltage switchgear.



**Figure 3-14:** 2 x 1,010 kW PV switchgear in Jordan

Due to the easy installation, this is one of the most common solutions for medium-large scale ground mounted PV plants.

Cabling represents the biggest activity of electrical works during PV plant construction. Cables should be installed according to inverter manufacturer's recommendations. Installation should be carried out with care paid towards damage that can occur when pulling the cable into position. The correct pulling tension and bending radii should be adhered to by the installation contractor

to prevent damages to the cable. Even though cables are UV protected, they must not be permanently exposed to the sun.

Underground cables should be buried at a suitable depth, generally between 500mm and 1,000mm. Cables may either be buried directly or in ducts. If cables are buried directly, they should be enveloped in a layer of sand or sifted soil in order to avoid damage by backfill material.

While the typical photovoltaic plant layout can be anticipated, the interconnection with the Egyptian Power grid will require a thorough power grid expansion planning, including the construction of new transmission lines up to the load centres. As a result of such expansion planning, the Egyptian Transmission Company will have to define the locations and mode of PV power interconnection (e.g. voltage level). It is expected that collector substations shall serve for more than one photovoltaic power plants of 50 MW and will be located in the load centre of the photovoltaic plants to be interconnected.

Collector substations on desert ground are usually walled for sand protection with indoor Medium Voltage switchgear and open-air High Voltage switchgear. The walled area for a 500 MVA substation (suitable for 9 x 50 MW plots) may occupy an area of 400 x 400 m. However, construction works such as for switchyard and auxiliary buildings, power transformer bays, and open-air HV switchyard extend only over a smaller portion of the walled area.

The construction of free filed PV plants does not require any special transport. However, transportation of PV modules requires particular attention. The largest risk while transporting photovoltaic modules are mechanical loads that can cause micro-cracks unnoticeable to the naked eye. The customer who receives panels with defects has difficulties to prove it was caused by transport. It is estimated that 5% of all panel damages are those resulting from transport. To reduce micro-crack risks, vertical transportation is preferred to horizontal. Hence, a suitable road, which allows lorries transporting PV modules reducing the mechanical loads, is a mandatory condition. Especially transportation of PV modules and MV power station requires suitable and good quality roads.

### **3.2.3 Operation and maintenance works**

Operation and maintenance activities comprise the regular control/operation of the photovoltaic plant as well as troubleshooting, repair and scheduled maintenance. Considering that photovoltaic power plant operation can be done by remote control, relevant activities for a 50 MW PV plant are usually limited and do not require permanent presence of personnel at the site. Nevertheless, O&M personnel should be available within 24 hours for troubleshooting (e.g. change of fuses, replacement of sensors, restarting of inverters, opened protection) to avoid loss of generation.

Compared to other power generating technologies, solar PV power plants have low maintenance and servicing requirements. However, proper maintenance of a PV plant is essential to maximise both energy yield and the plant's lifetime. Optimal operations must find a balance between maximising production and minimising cost.

Scheduling and frequency of efficient and appropriate preventative maintenance, depends on a numbers of factors. Technology selected, environmental conditions of the site, warranty terms and seasonal variances are key factors that influence PV plant maintenance activities. Scheduled maintenance must be carried out at intervals planned in accordance with the manufacturer's recommendations, and as required by equipment warranties. Where the shutdown of the plant is required, maintenance should be carried out where possible during nonpeak production periods, such as early morning or evening.

Even though scheduled maintenance maximises production and extends plant lifetime, it does represent a cost to the project in terms of additional expenses and lost revenue due to reduced power generation. Hence, the purpose is to find the right balance between the cost of scheduled maintenance and increased yield over the life of the system.

One of the most important activities of maintenance is module cleaning. It is a simple but important task, which can produce significant and immediate benefits in terms of production. Module cleaning frequency depends on local site conditions and the time of year. The duration between two consecutive cleans varies significantly according to the site. The more dusty and arid the site, the higher the cleaning frequency is.

Depending on the PV modules technology, plant layout and site condition, different methods of PV modules cleaning can be used. In case of large tracking installation, water is seen being sprayed on the module surface. Other methods of cleaning include the use of a brush trolley and use of a dust broom. Pressure washing uses about 0.3-0.8 l/m<sup>2</sup> of water depending on the nozzle, and wet-contact cleaning (brush and squeegee) can use as little as 0.05-0.3 l/m<sup>2</sup>, depending on the solution. Also important is water quality. Total Dissolved Solids (TDS) is less important than what contributes to the TDS, particularly the concentration of hard ions (usually Ca). The problem is that any hard ions left behind in residual water on the panels builds up as scale and is difficult to remove. Soft ions (typically Na) would just go away naturally. So, a high TDS  $\sim <1,500$ ppm is acceptable, provided that there is not too much hard ions ( $\sim <50$ ppm).

To avoid losses of connection that will affect the entire PV plant performance, all junction boxes or string combiner boxes should be checked periodically. Any accumulation of water, dirt or dust could cause corrosion or short circuit within the junction box.

In areas with a large variation in temperature between night and day (like desert areas), PV plant elements are subjected to contacts to loosen. Potential faults across the PV plant can often be detected through thermography, which helps to identify weak and loose connections in junction boxes and inverter connections. Thermography may also detect hot spots within inverter components and on modules that are not performing as expected.

Inverter faults are the most common cause of PV plant shut down. The maintenance of inverters changes according to size, type, environment, condition etc. The scheduled maintenance must be agreed with inverter manufacturer. Vegetation control and grass cut is another important task. Vegetation has the potential to place a shadow over the PV modules and reduce the performance. Cut grass depends on the site, so the maintenance is scheduled according to requirements.

For the O&M, a standard set of spare parts is stored inside the PV plant to shorten repair times and to prevent delay and loss of generation. Accordingly, a storage building needs to be maintained not too far away from the site.

### **3.2.4 Decommissioning**

The design lifetime of PV plant is generally 25 years. However, this time can be extended up to 40 years depending on the PV plant status.

The design lifetime of the other infrastructure (substation, buildings) is even longer. Decommissioning is the process for removing an abandoned solar panel system with their foundation and the electrical infrastructure and restoring the land to its original state.

While decommissioning means a large potential for recycling and recovery of valuable components and metals and thus corresponds to commercial interest, there is the risk that residual parts will not be treated as required. The focus is on proper backfilling of pits and trenches, the removal and disposal/treatment of residual waste, and the restoration of a proper landscape.

## 4 Methodology / Approach

### 4.1 Scoping

The scope of the SESA is defined at an early stage in the SESA process through a scoping study for wind and solar PV technology, the results were documented in a separate report, submitted in October 2016. This scoping stage in the process had the following objectives:

- Establish the already known environmental and social baseline conditions in the Project Area.
- Identify potential environmental and social impacts associated with the development of RE projects in the Project Area and present an initial assessment of their potential significance.
- Identify any studies or surveys that inform the assessment of impacts and determine suitable RE development areas.
- Engage with stakeholders to inform them about the SESAs (wind and solar) and allow them to inform the scoping stage and SESA.

The scoping stage of the SESA has been implemented as follows:

- Initial review of the Project Area, proposed development plans and typical RE project concepts and designs.
- Impact identification exercise to identify potential impacts, their potential significance, the necessary baseline information required, level of assessment and assessment methodology,
- Documentation of the scoping review in a draft Scoping Report for provision of preliminary information to key stakeholders (draft Scoping Report was disclosed via website of NREA and EBRD),
- Undertaking initial stakeholder engagement through a scoping meeting with identified key stakeholders,
- Revision and updating of the draft Scoping Report according to the findings of the scoping meeting and overall scoping process to determine the final scope of the SESA studies, and
- Disclosure of the Scoping Report to key stakeholders and to the public (via websites of NREA and the EBRD) and submission to the three Governorates.

The scoping determines which impacts are likely to be significant and will become main focus of the SESAs. Scoping also identifies data availability and data gaps. The scoping process determines the appropriate spatial and temporal scopes for the assessment and suggests suitable survey methodologies. The full Scoping Report is attached under Annex A1 10.1.1.

The Scoping Report was presented to the key stakeholders on 12 July 2016. Invitations were either sent by Fax or personally handed over by personnel of the Consultant's team. The invitation of key stakeholders from the Governorates El Minya, Assiut and Beni Suef extended to taking over of travel cost and of allowances for the visits to Cairo. The majority of local key stakeholders invited were from El Minya, reflecting that the more complex organisation of the El Minya Governorate administration than for the other two governorates and that most of the Project Area is located in this province and near to El Minya.

The meeting was composed of the following:

1. Presentation on the SESA Wind and SESA Solar and the purpose of the scoping meeting:
  - a) tasks, objectives and expected results of the SESAs,
  - b) purpose of the scoping meeting,
  - c) description of typical features and layout of wind power and solar power projects in desert areas with predominant wind direction / alignment of solar PV,
  - d) preliminary overview of the baseline environmental and social conditions in the Project area, and
  - e) data gaps in baseline information.
2. Scoping the SESAs: Discussion and review of likely RE project and potential environmental and social impacts, potential impact significance, level of assessment required and assessment methodology,
  - a) wind power development,
  - b) solar PV power development, and
  - c) establishment of list of potentially significant impacts and assessment methodology.
3. Review of stakeholder list and consideration of stakeholder input.
4. Inquiry of specific information from stakeholders.

Beside the participation of numerous counterparts of NREA major players, present at the scoping meeting were the two delegates from the Egyptian Environmental Affairs Agency (EEAA), one delegate from the Governorate Assiut and the delegate from the Transmission Company (EETC). The Attendance sheets are enclosed under Annex A2.

Though stakeholder participation in the scoping meeting suffered from some last minute cancellation of the El Minya delegates, EEAA considered the scoping meeting and its results to be satisfactory.

All the main findings, concerns and recommendations provided by the various stakeholders during the scoping meetings were taken into consideration in the assessment. Accordingly, the assessment shall in particular focus on the following issues:

Social-economic impacts:

- Additionally assess number of people working on isolated business in the area
- Assessment of opportunities of local manufacturing of components
- Judgement of effects of improved knowledge of modern wind energy generation / solar PV power technologies (e.g. by dissemination of information material and by on the job training during construction) to boost future development in the region

#### Water resources & wastewater:

- Identify appropriate source(s) of water supply and effects to the resources
- Assess the potential need of buffer tanks to avoid overstressing resources by fast fill of tankers
- Wastewater treatment to be differentiated into domestic and hazardous wastewater

#### Domestic and hazardous waste management:

- Assessment of appropriate options for on-site treatment of domestic waste
- Assessment of recycling options for hazardous waste and of the need for regular disposal of hazardous waste (e.g. used batteries, broken panels)

#### Air pollution

- Dust development at the construction site may not be a general environmental problem affecting the population but should be considered under occupational health aspects

#### Occupational Health

- Application of internationally accepted health and safety standards
- Special consideration to dust protection at construction site

#### Further aspects to be considered

- Surface runoff with special emphasis to identify Wadis that are likely for flash flood risks
- Assessment of existence of fault lines and reference to consideration of local earthquake design standards

As an outcome of the scoping meeting, a list of potential and anticipated impacts, their potential significance and the extent of assessment and the assessment methodologies to be applied were defined. The Scoping Report was then updated and serves to define the scope of the SESAs. The final version was submitted to NREA and EBRD in October 2016 and disclosed to the three Governorates in August 2017 in addition. This final version of the Scoping Report was also published on NREA's and EBRD's homepages.

## **4.2 Stakeholder Engagement**

The SESA approach to stakeholder engagement and disclosure is established in the Stakeholder Engagement Plan (SEP), which is attached to the Scoping Report. The SEP is seen as a living document which will be implemented, and was updated during SESA development, SESA disclosure and during RE project development in the Project Area, if necessary.

As the first step in stakeholder engagement and information disclosure, the draft Scoping Report was issued, following submission to NREA on 27 June 2016, and circulated to various key stake-

holders, including those in the three Governorates together with an invitation for the scoping meeting, held on 12 July 2016 at NREA offices in Cairo, as mentioned in the previous section. In parallel, the report was disclosed on NREA's and EBRD's homepages. On the basis of the feedback received during the scoping meeting, the SEP has been updated accordingly.

During the various site reconnaissance missions of the Consultant's experts, people who have been accidentally encountered in the Project Area have been addressed and project information flyers in Arabic have been distributed. The results of all interviews were documented on interview forms (see Annex D 10.3). The outcome of the interviews is described under section 5 and under section 5.3.1.7 in particular.

Furthermore, key stakeholders such as the regional Governorate of El Minya were visited on 4 October 2016 and 31 October 2016.

The draft SESA Report was disclosed on the websites of NREA and EBRD<sup>1</sup> on 01 June 2018. Furthermore, Arabic and English version of the Non-Technical Summary of the SESA Report and the Summary of the Recommendation Report have been made available at NREA's office in Cairo for inspection plus direct notification to registered stakeholders. The results and main conclusions of the SESA were presented to the stakeholders in a Public Hearing on 28 June 2018 at Horus Resort Hotel at El Minya, Egypt. Comments, concerns, remarks and suggestions raised by stakeholders during the Public Hearing have been considered and reflected in this final version of the SESA report, which will be disclosed to the public as well (on websites of NREA and EBRD).

### **4.3 Baseline Studies on Existing Physical, Biological and Social Environment**

#### **4.3.1 Physical environment**

The physical environment of the Project Area was investigated by

- Desktop studies to collect data and information on the Project Area such as from literature, internet sources or satellite images
- Approach of the administration of the Governorates for inquiry of data and information
- Field investigations inside and next to the Project Area.

The focus of such an investigation was on the climate, geomorphology, hydrological conditions, existing infrastructure such as paved access roads and power grid, current land-use and sociological conditions.

#### **Desktop studies**

Initially topographical maps of the national topographical service were procured well covering the Project Area and the surroundings. The largest scale of maps available is 1:50,000. The most re-

---

<sup>1</sup> <http://www.nrea.gov.eg/>  
<http://www.ebrd.com/work-with-us/projects/tcpsd/egypt-strategic-environmental-and-social-assessment-of-renewable-energy-projects-in-the-east-nile-area.html>

cent maps were based on a topographical survey carried out during the years 1988-1990. As the maps do not reflect the actual situation, especially regarding settlements and roads, they were mainly used for identification of the relief of the area and of mayor Wadis. In addition, the availability of geological maps was investigated identifying the Geologic Map of Egypt 1981. This official Map was prepared by the Egyptian Geological Survey, compiling information from various sources.

Data on the climate of the Project Area obtained from literature and internet are scarce and available only for El Minya (30 years climate norms) and Assiut Airport in the Nile Valley. As to the character of the hyper-arid area with rainfall being very rare and with only exceptional water flow in major Wadis, no precise information on hydrology is available. Accordingly, only generalised information from literature on the water regime could be applied. For the road system, a digital map from the GADM<sup>2</sup> database of the worldwide asphalt roads was identified and applied.

To complete and update geographic information, the most recent satellite images were analysed. Special focus of the analysis was on the actual asphalt road system, on settlements and economic activities inside and near to the Project Area. Moreover, the alignment of new power lines in the north of the Project Area was identified.

The satellite images were furthermore used to plan the field surveys, identifying routes in the desert area that are likely to be suitable for all terrain cars while covering the whole Project Area in a representative way.

#### **Approach of the administration of the Governorates for data and information**

Special emphasis was laid to approach El Minya Governorate on data and information regarding

- any planning inside or near the Project Area that need to be considered,
- more detailed maps on the area especially on Geology, and
- information on usufructs or property rights with relevance to the Project Area.

Thus, the Consultant has visited the Governorates on 31 October 2016 (El Minya information centre) as indicated in Annex C1.

#### **Field Investigation**

A field investigation was carried out from 3 October to 10 October 2016 by two experts to assess the physical condition with a special focus on restraints for solar PV power development. The field investigation was carefully prepared based on desktop information. A major focus was on the screening of recent satellite images with regards to economic activities such as gravel tracks or roads, buildings, earth movements/mining pits or agriculture/plantations. Based on this information, GPS tracks were planned with the objective of

- designing representative tracks to get an overview of the whole East Solar subareas and
- including all the pre-identified activities for verification of details on the ground.

---

<sup>2</sup> Global Administrative Areas (<http://www.gadm.org/>)

During field investigations

- for representative points, georeferenced photos of the landscape (north, west, south, east) were taken,
- economic activities were documented by georeferenced photos,
- whenever people were encountered during field investigation inside the areas (three cases only), they were interviewed with regards to their activities, perspectives and special site conditions.

Data obtained during field investigation were going to be entered into the GIS database. Moreover, they were summarised in an internal Site Reconnaissance Report.

#### **4.3.2 Biological environment**

##### 4.3.2.1 Legally protected sites / areas and internationally recognised areas of biodiversity value

Baseline data on areas that are officially designated as protected sites / areas or internationally recognised areas of biodiversity value have been gathered by review of existing literature, by an investigation on data officially provided by the Egyptian Environmental Affairs Agency (EEAA) and on existing data available on the World Wide Web and, finally, by interviews with people who are engaged in nature conservation activities in Egypt and with local people.

##### 4.3.2.2 Habitats and flora

As the Project Area is located in a desert environment, vegetation is quite sparse and limited to certain spots, mainly Wadis. A review of existing literature on the typical vegetation of the Eastern Desert (Abd El-Ghani et al. 2014) revealed initial baseline information with regards to the flora of the Project Area. Based on this background, site visits were scheduled to gather information on existing plants and to identify spots of vegetation. Preliminarily, an investigation of aerial images (e.g. Google Earth) of the Project Area was conducted whereby the location of larger spots of vegetation, existing tracks and Wadis, i.e. locations that needs to be visited, has already been identified. Based on this information, routes for the site visits were planned and maps for the fieldwork were prepared by ArcGis 10.2. The site visits were undertaken in different periods of the year by different experts of the Consultant (in March, April, July, October and November 2016 and in March 2017). During the site visits, the expert slowly drove with a 4x4 Land Cruiser on certain tracks through the Project Area in search of existing plants. Whenever plants were encountered, the spots were prospected in detail. Data on species and numbers were gathered. Important spots with characteristic species or other important features were registered by GPS. Photos of plants were taken for further species identification using identification guides and internet sites. Habitat features were thoroughly described and documented, with photos and GPS-coordinates taken. Due to the huge extent of the Project Area, not every single location could be investigated in detail during fieldwork. However, the used route (see Map 4-1 to Map 4-3) aimed to cover the whole subareas and ensured that the most important spots of flora could be extensively surveyed. Hence, the obtained results present a representative sample of the existing vegetation of the subareas. Obtained data (incl. GPS-coordinates) on existing flora and habitats were entered in an Excel Spreadsheet and transferred to the GIS-database later on.

Habitats can be assessed according to their importance for plants and animals, which in turn depends on the number and diversity of existing elements and the physical and climatic conditions (e.g. soil, water). The importance of habitats found in the subareas is assessed in five categories: very low, low, important, high and very high.

Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt) SESA Solar Report

client: New and Renewable Energy Authority (NREA), Ministry of Electricity and Renewable Energy

Map 4.1: Tracks in the East Solar-1 subarea taken as a sample for the special survey on habitats, flora and fauna



Bordering of East Solar-1 subarea

East Solar-1 subarea

Roads road

Tracks and plots  
tracks used for survey on habitats, flora and fauna  
tracks used for survey on local and roosting birds

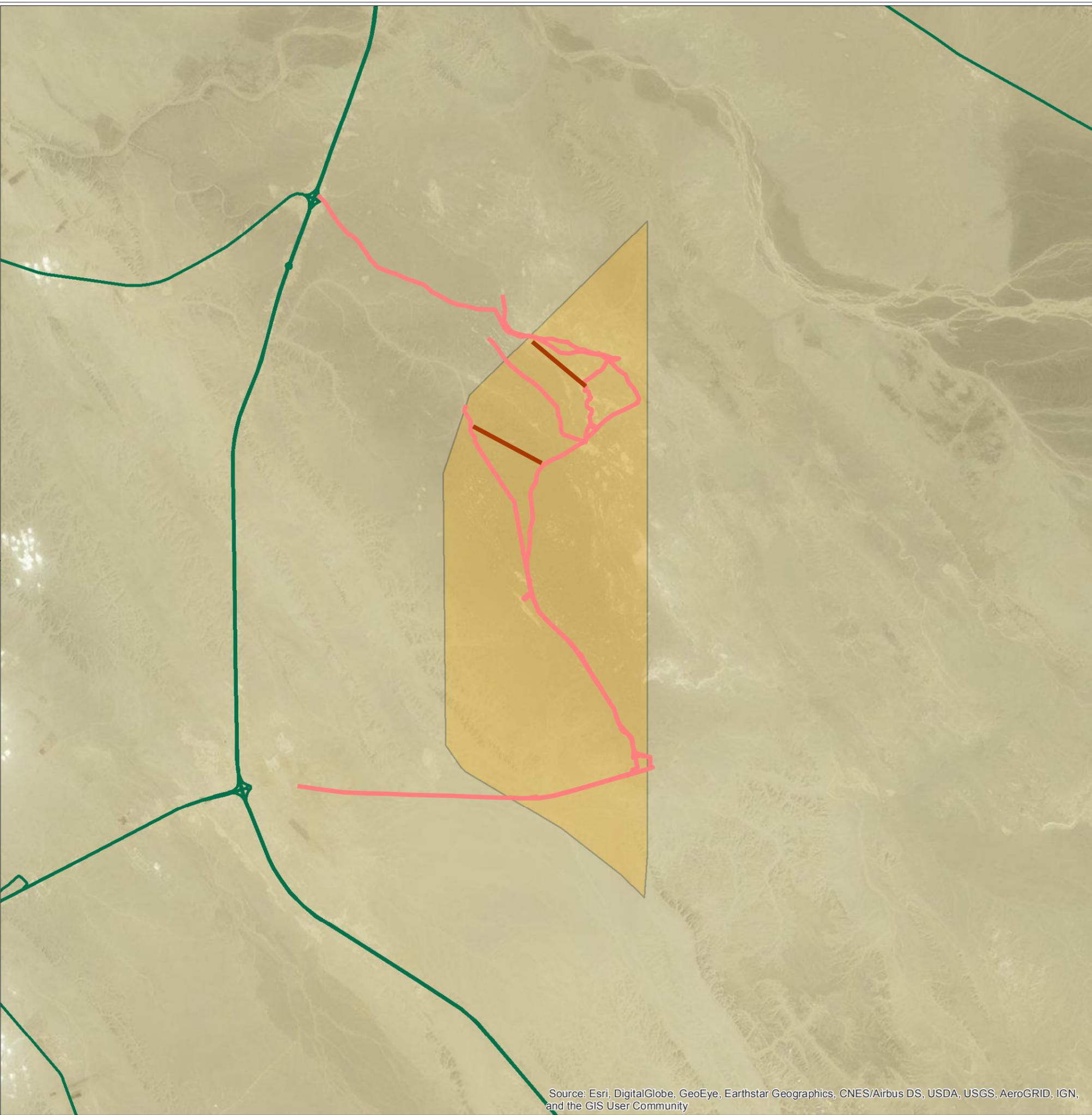


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 4.2:**  
 Tracks in the East Solar-2 subarea taken as a sample for the special survey on habitats, flora and fauna



**Bordering of East Solar-2 subarea**

 East Solar-2 subarea

**Roads**  
 road

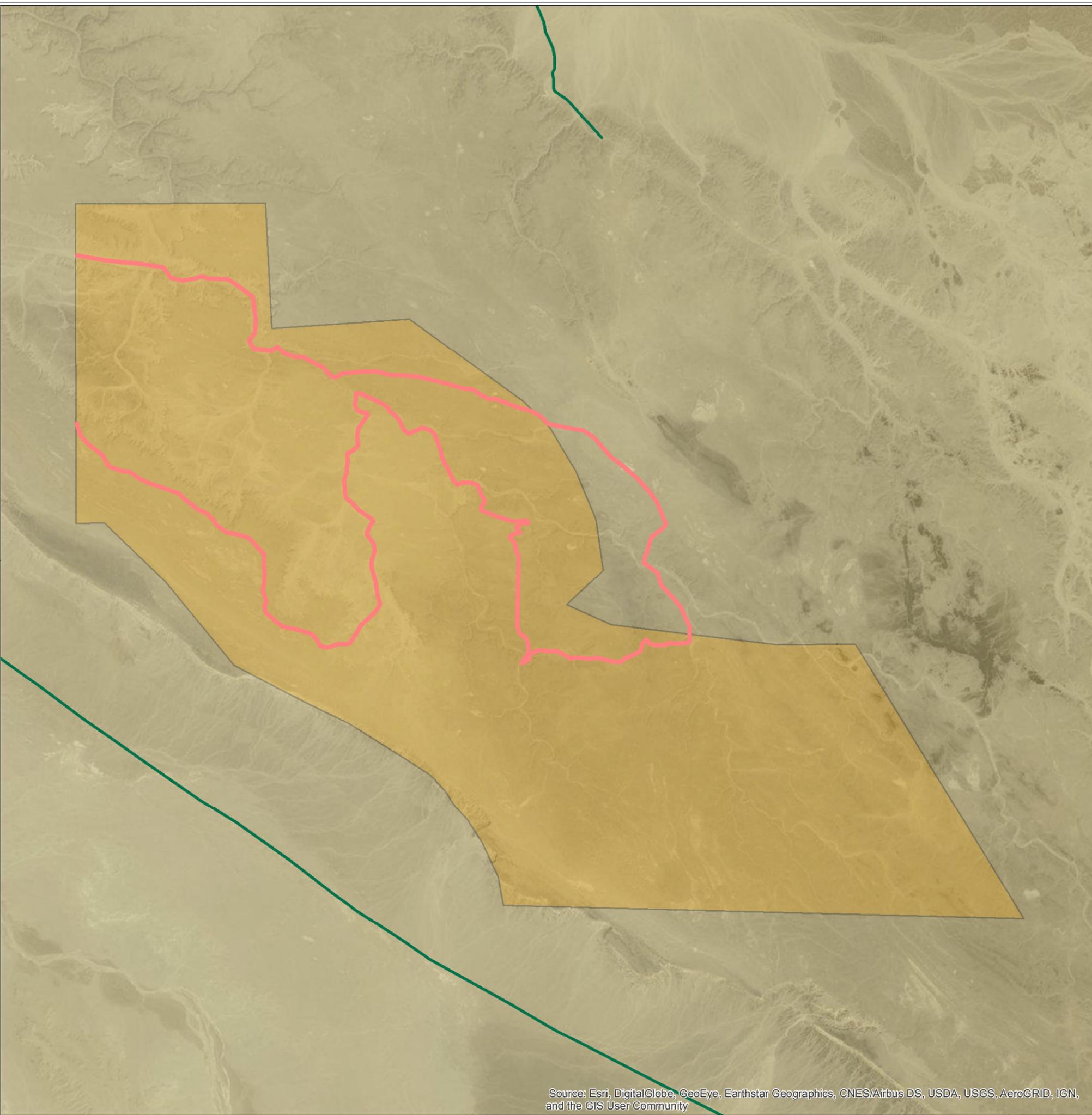
**Tracks and plots**  
 tracks used for survey on habitats, flora and fauna  
 tracks used for survey on local and roosting birds



**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
New and Renewable Energy Authority (NREA),  
Ministry of Electricity and Renewable Energy

**Map 4.3:**  
Tracks in the East Solar-3 subarea  
taken as a sample for the special survey  
on habitats, flora and fauna



**Bordering of East Solar-3 subarea**

 East Solar-3 subarea

**Roads**  
 road

**Tracks and plots**  
 tracks used for survey on habitats, flora and fauna



#### 4.3.2.3 Fauna

Due to the arid climatic conditions, the habitat potential for animals in the Project Area was believed to be rather low. Within in the so-called “West of Nile” area, only few numbers of insect, reptile, bird and mammal species were recorded occasionally (Al Amar 2011).

A review of existing literature on the typical fauna of Egypt and existing data on the Eastern Desert revealed initial baseline information (e.g. Baha El Din 2006; Hoath 2009, Saleh 1997 & 1993, Osborn & Helmy 1980). Based on this background, extensive site visits were scheduled to gather information on existing habitats and on the occurrence of animals in the Project Area. The site visits were conducted simultaneously to the site visits for flora and habitats (see section 4.3.2.2) by different experts of the Consultant (in March, April, July, October and November 2016 and in March 2017). Due to the extent of the Project Area, it was not possible to survey the entire area in detail. Hence, based on an investigation of aerial images, appropriate routes were planned (see Map 4-1 to Map 4-3). During site visits, a combined transect and point-counting method was used with mainly direct observations, i.e. the expert slowly drove along the planned route in search of present animals and suitable habitats for animals (caves, burrows). Whenever animals were encountered, the GPS-coordinates and data on species and numbers were recorded. Photos of animals were taken for further species identification using identification guides and internet sites. In addition, at certain locations (more or less equally distributed over the routes) the surrounding was “scanned” using binoculars (8x or 10x magnified) for animals and studied in order to find burrows or scats, which might indicate the presence of animal species. In doing so, it was possible to obtain a representative sample of the existing fauna of the subareas.

In addition, a special survey was conducted to collect more detailed baseline data on local and roosting birds. The approach was designed according to the characteristics and the extent of the Project Area and to abundance and distribution of birds that could be expected in such a desert habitat. Line transect counts can be regarded as the most appropriate method, providing a uniform technique of counting birds within a huge study area. Transect selection was done due to the characteristics landscape of the Project Area focusing on Wadis, because it is very difficult and sometimes even impossible to enter and to walk across the elevated areas outside the Wadi beds. In addition, higher bird numbers can be expected in the Wadis that represent the only areas in the desert that include spots of vegetation. The selected transects were chosen using Google Earth and were transferred to a handheld GPS. A total of 36 line transects, each of a length of 2 km, were finally selected as sampling plots for the Project Area, thereof 13 and 2 line transects in East Solar-1 and East Solar-2 subarea, respectively (see Map 4-2 and Map 4-3). No line transects counts were undertaken in the East Solar-3 subarea due to its restricted accessibility. The bird expert walked each transect at least three times using a binocular (8x magnified), GPS and site maps. One site visit was conducted in September 2016, November 2016 and February 2017 respectively. Selected transects were even walked four or five times. During transect counts, every individual bird was recorded (number of individuals, species, sex, behaviour). *Collins Bird Guide* was used for strengthening species identification.

Finally, a review of existing literature, an investigation on existing data available on the World Wide Web and interviews with people who are involved in nature conservation activities in Egypt and with local people were undertaken in order to collect baseline data on bats in the Project Area. Furthermore, when assessing the importance of the three East Solar subareas as a habitat for bats, data on the occurrence on bats obtained by a standardised monitoring of bat activity at

selected sites in the Project Area in spring, late summer and autumn 2016 (see SESA Wind Report) was also taken into account.

All obtained data (incl. GPS-coordinates) on recorded animals were entered in an Excel Spreadsheet and transferred to the GIS-database later on.

According to Harrison et al. (2017), little scientific evidence exists that demonstrates a direct impact of solar PV plants on birds. This is particularly valid for migrating birds, i.e. birds in active flight that simply cross an area (for an assessment of the so-called “lake effect” see side note in section 0). Thus, a special monitoring on bird migration in the East Solar subareas was not required (as far as necessary the results of the monitoring of migrating birds conducted in the adjacent East Wind subareas (see SESA Wind Report) have been used for further assessment).

#### **4.3.3 Social and economic environment**

The scope of the social study is limited to the three subareas East Solar-1, East-Solar-2 and East Solar-3 subareas where the solar plant planning shall be considered. Secondary data (statistics are compiled from the Egypt Statistical yearbook 2015 – (CAPMAS) to understand the background of the socio-economic condition in the Project Area.

In addition, the socio-economic team performed a site reconnaissance in October 2016 to collect additional social and economic on-site baseline data. During this mission, sample interviews were held with people who have been encountered in the Project Areas during the site reconnaissance as already mentioned under section 4.2 to disclose information on the project, a the basic information on the project were summarised in a flyer which was distributed to the interviewed people (see Annex D, section 10.3). The flyer was available in English and Arabic language. Additional interviews were performed by the bird monitoring team with people accidentally encountered in the field during the spring bird monitoring in 2017. The outcomes of the interviews were documented on interview forms, which are attached under Annex D1 (section 10.3.1).

Further to the sample interviews, consultation meetings were held with the Governorate of El Minya (4 October and 31 October) to obtain additional data from the information centre and inform the Governorates on the project. To assure that the Governorates were sufficiently informed about the planning activities, the final Scoping Report was sent to the three Governorates in August 2016 (please refer to Annex A1; section 10.1.1), requesting them to provide their comments before the scoping meeting.

#### 4.4 Technical and Land-Use Criteria for Classification of Area as preclusive or less favourable

Prior to the assessment of potential social and environmental impacts, the East Solar-1, East Solar-2 and East Solar-3 subareas were screened with regards to constraints due to competing land-use and technical constraints which impede solar power development or make it more difficult. This leads to areas defined to be preclusive or less favourable for reasons of land-use and technical constraints.

An essential physical/technical criterion for the suitability of areas for solar power development is the accessibility of the areas, taking into consideration that slopes should not be greater than 20 % for the transport of the equipment, to avoid unreasonable high costs for transportation. The criteria reflect the distance to existing asphalt roads, the need to build access roads over external land and the difficulty of road construction as a function of the complexity of the terrain (e.g. steep slopes, division in deep Wadis, underground conditions). The accessibility from existing asphalt roads on stretches with dams or cuts is considered a difficulty. This applies for the highway, which also is a toll road without any exit possibility except at the points of toll collection.

The geomorphology can be adverse to solar PV power development. The criteria are the complexity of the terrain, requiring larger efforts for preparing the hard stands for the PV panel racks, the exposition of areas with respect to the sun, bearing capacities of soils or existence of migrating dunes.

No plans or register on current or planned land-use in the project desert areas well away from the populated Nile Valley could be made available by the Governorate. Accordingly, all information on competing land-use was to be obtained from the screening of recent satellite images and/or site investigations. Current land-use that is considered to be relevant in the context of this study is

- existing economic activities with fixed installed equipment such as agriculture, mining or gravel screening plant and
- schemes that are currently obviously already under development.

Areas that are under prospection only, or which are used for dispersed collection of minerals (e.g. gravel collection from the upper surface layer over large areas) are not considered to be a competing land-use that hinders solar PV power development as it can be expected that gravel depots will be exhausted at the time of investment into solar PV power development.

The criteria are summarised in Table 4-1.

**Table 4-1: Criteria for judgement of physical criteria**

Parameter	Preclusive	Less Favourable	Favourable
Accessibility / Remote-ness	Barriers of migrating dune or Steep unstable escarpments	Access from protected toll road only without regular exit and access roads to be built outside the allocated area, length of external	All the residual areas such as:  Existing asphalt roads (other than protected toll roads without a regular exit) are near to or crossing the area

Parameter	Preclusive	Less Favourable	Favourable
		access roads of more than 5 km or Complex terrain with deep Wadis	or Flat or slightly undulated terrain allows easy construction of gravel roads
Geomorphology	Steep slopes of >20%, or Unstable escarpments and foundation conditions or Migrating dunes	Complex terrain with deep Wadis and limited plateau areas, or Soft soils	All the residual areas such as:  Solid underground and homogeneous, predominantly low sloping areas
Competing Land-use	Land already used as farmland or obviously already under development or Existing service areas (e.g. road houses) or Industrial areas (e.g. asphalt plant, gravel plants, marble or quartzite mining)	<i>N/A areas either usable or not</i>	All residual areas including those of dispersed temporary superficial gravel mining or with marks of earlier prospection

## 4.5 Basic Approach for the Impact Assessment

### 4.5.1 Environmental Impact Significance Assessment

Potential significant impacts likely to be caused by solar plant development were identified during the scoping phase. In this subject, SESA solar study anticipated impacts are assessed more in detail based on the findings of the baseline studies. The significance is determined as much as possible quantitatively. The methodology is described hereafter.

An impact is defined where project activity–receptor interactions occur. According to ISO14001:2004, an impact is defined as: “Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s environmental aspects (activities, products or services)”.

Once the impacts, either adverse or beneficial, are fully understood, it is necessary to judge the significance of each impact, to determine whether it is acceptable, requires mitigation or is unacceptable. Within the assessment process, impacts are ranked according to their “significance” which is a function of “event magnitude” and “receptor sensitivity”. Determining event magnitude requires the identification and quantification (as far as practical) of the sources of potential environmental and social effects from routine and non-routine project activities. Determining receptor environmental sensitivity requires an understanding of the biophysical environment. Criteria for assessment are, for instance:

- Area of influence.
- The magnitude of an effect is often directly related to the size of the area affected (e.g. the acres of land disturbed).
- Percentage of resource affected.
- The greater the percentage of a resource affected, the higher the magnitude of an effect.
- Persistence of effects.
- Permanent or long-term changes are usually more relevant than temporary ones (the ability of a resource to recover after activities are complete is related to this effect).
- Sensitivity of resources.
- Stimuli to sensitive resources are usually more relevant than those to resources that are resilient.
- Status of resources.
- Effects to rare or limited resources are usually considered more significant than effects to common or abundant resources.
- Regulatory status.
- Effects to resources that are protected (e.g. endangered species, wetlands, air quality, cultural resources, water quality) typically are considered to be more significant than effects to those without regulatory status (many resources with regulatory status are rare or limited).
- Societal value.
- Some resources have societal value, such as sacred sites, traditional subsistence resources and recreational areas (some of these resources might also have regulatory status).

Determining receptor environmental sensitivity is to be based, where existing, on accepted standards (e.g. ambient pollution limits), internationally treaties on preservation of nature and understanding of the biophysical environment.

Impact Assessment has to

- be receptor or subject-specific,
- distinguish between different project phases (construction, operation, decommission), and
- distinguish between different “impact paths”.

### **Determination of Event Magnitude**

As a general guideline, event magnitudes are classified according to the extent, frequency, duration and the intensity of an event, each attribute valued as low (1), medium (2) or high (3). The high variety of kind of events does not allow defining a universal measuring scale. Accordingly, the attributes are valued individually for each event or a cluster of events.

The total event magnitude is assessed by adding together individual scores. An event Magnitude is determined by adding together rankings. When determining the event magnitude, the baseline

conditions are already considered (e.g. limitation of resources, already existing pollution, current utilisation).

Table 4-2.

When determining the event magnitude, the baseline conditions are already considered (e.g. limitation of resources, already existing pollution, current utilisation).

**Table 4-2: Event Magnitude Ranking**

Magnitude	Score
Low	4
Medium	5-8
High	9-12

### **Determination of Receptor Sensitivity**

Receptors are differentiated into:

- Human Receptor (people)
- Ecological Receptors (habitats, flora and fauna)
- Soil, Ground Water and Surface Water
- Physical Features (monuments, archaeological sites, protected areas)

The receptor sensitivity depends on the presence and the resilience to the identified stressor. It is determined as listed in Table 4-3 and Table 4-4.

**Table 4-3: Determination of Receptor Sensitivity**

Receptor	Criteria	Score	Attribute
<b>Human Receptor</b>	Presence	1	People very seldom present in the area of anticipated impact (sporadic activities or passing)
		2	People being present for some of the time only (commercial or industrial properties)
		3	People permanently present in the area of anticipated impact (e.g. residential properties, dwellings)
	Resilience to identified stressors	1	Ambient conditions (air quality, noise, shadowing) are well below applicable prescriptive limits (standards) – least vulnerable
		2	Ambient conditions (air quality, noise, shadowing) are below applicable standards - vulnerable
		3	Ambient conditions (air quality, noise, shadowing) are at or above applicable standards – most vulnerable
<b>Ecological Receptor</b>	Presence	1	Common habitats / plant or animal species that can be frequently found in Egypt and are not confined to the Pro-

Receptor	Criteria	Score	Attribute
			ject Area, not threatened or protected and not rare
		2	Habitats / plant or animal species that are regionally rare or mainly confined to the Project Area
		3	Observed or reliably predictable presence of a unique, rare, threatened or protected habitat and plant or animal species
	Resilience	1	Habitats / species or communities unaffected or marginally affected
		2	Habitats / species undergoing moderate but sustainable change expected to stabilise under continuous presence of impact source, if ecological functionality is maintained
		3	Substantial loss of ecological functionality (e.g. loss of habitats / species, substantial population decrease)
<b>Physical Receptor</b>	Presence	1	Feature which is common (none of below)
		2	Feature with local or regional value being sensitive to disturbance
		3	Presence of feature which has international or national value (e.g. monument, archaeological site, protected areas, nature reserve)
	Resilience	1	Feature/Receptor is unaffected or marginally affected
		2	Feature undergoes moderate but sustainable change with physical integrity maintained
		3	Potential for substantial damage or loss of physical integrity
<b>Soil, subsurface/surface water</b>	Presence	1	Receptor has limited or no value
		2	Receptor has moderate value (e.g. only occasionally used or not intensively used)
		3	Receptor is of high value (e.g. public water supply, irrigation, cultivation farming)
	Resilience	1	Receptor is not affected or marginally affected (e.g. contamination well below standards or water abstraction marginal compared to resources)
		2	Moderate level of disturbance (e.g. contamination still meetings standards or water abstraction with limited, reversible effects to the water resources)
		3	High level of disturbance (e.g. contamination beyond standards or potential for substantial pollution of water or soil resources)

The overall receptor sensitivity is the result of adding up the presence and resilience valuation scores.

**Table 4-4: Receptor Sensitivity Rankings**

Receptor Sensitivity	Score
Low	2
Medium	3-4
High	5-6

**Determination of overall Environmental Impact Significance**

Impact significance is obtained by superimposition of event magnitude and receptor sensitivity with an overall classification in four attributes: negligible, minor, moderate or major. The classification matrix is given in Table 4-5.

**Table 4-5: Impact Significance**

		Receptor Sensitivity		
		Low	Medium	High
Event Magnitude	Low	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	High	Moderate	Major	Major

**4.5.2 Socio-economic Impact Assessment**

The socio-economic impact assessment applied a semi-qualitative assessment approach to describe and evaluate impacts. Factors taken into account to establish impact significance will include probability, spatial extent, duration and magnitude of the impacts in addition to the sensitivity of receptors (e.g. the groups of people or populations most likely to be affected and, in particular, whether impacts are likely to be disproportionately experienced by vulnerable groups).

Indirect socio-economic impacts (i.e. induced effects) will also be assessed using the same approach.

**4.6 Mitigation of Impacts**

The environmental impact assessment methodology described before is applied to the identified potential and anticipated impacts under consideration that PV solar power development will not take place on zones identified to be preclusive.

For given impacts that have been evaluated to be moderate or major, the next step is to identify and define appropriate mitigation measures by applying the mitigation hierarchy, with the objective of mitigation to a level as low as reasonably possible. Accordingly, the significance level of residual impacts is targeted to become negligible or minor, or well below defined standards, whenever standards are applicable. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures, which shall become subject to the environmental management and monitoring.

#### **4.7 Disclosure and Public Hearing**

Public participation and disclosure of the SESA Report was carried out according to the local procedures and the EBRD environmental and social policy as well as EBRD's public information policy, including the Public Hearing event which was organised with the main aim of discussing the key findings from the SESA Study. Consequently, the draft SESA Report, the draft Recommendation Report as well as the English and Arabic version of the Non-Technical Summary were disclosed at the websites of EBRD and NREA<sup>3</sup> on 01 June 2018 (plus direct notification to registered stakeholders including public notification of report availability). For private sector projects, EBRD's environmental policy requires a minimum of disclosure period of 60 days, and 120 days for public sector projects. Given the fact that the SESA is the first assessment for subsequent privately financed projects, it has been accepted by EBRD to apply the minimum disclosure period of 60 days.

The Public Hearing was held on 28 June 2018 at Horus Resort Hotel at El Minya. It was ensured that the SESA Report was disclosed for an appropriate period of time prior to the meeting. The Public Hearing had been announced by advertisement in Al-Akhbar newspaper 24 days in advance.

The results of the Public Hearing were documented in a separate Public Hearing Report, submitted in September 2018 (see Annex E). During the Public Hearing, no additional concerns or arguments on environmental or social issues were raised that had not already been addressed in the draft SESA Report. Thus, there was no need of weighing of arguments and adjustments or additions. The Public Hearing was mainly dealing with clarifications and creation of a better understanding of limits defined in the SESA Report, especially regarding number of job opportunities and the involvement of government, utility and investors (see Annex E). One question was raised regarding the risk of floods in the project areas. Unlike the project sites at the Red Sea Coast, the East Nile area is less prone to flood due to different topographical situation.

After the Public Hearing, the stakeholders were afforded a month to provide written comments. Similar as during the Public Hearing, no relevant additional concerns or arguments have been received. Likewise the Draft SESA Report, the Final SESA Report and the Final Recommendations Report will be disclosed again on the websites of NREA and EBRD, following the same guideline.

---

<sup>3</sup> <http://www.nrea.gov.eg/>  
<http://www.ebrd.com/work-with-us/projects/tcpsd/egypt-strategic-environmental-and-social-assessment-of-renewable-energy-projects-in-the-east-nile-area.html>

## 5 The Existing Physical, Biological and Social Environment

### 5.1 Physical environment

#### 5.1.1 Project Area

The project area relevant for this SESA Solar Report is composed of the East Solar-1, East Soar-2 and the East Solar-3 subareas (see Figure 5-1 below), i.e. those areas with a building height limit of 5 m. The areas extend on desert ground well away from any village or other settlements. They allocate a few economic activities only. The northern border of the most northern East Solar-3 subarea of 363 km<sup>2</sup> is located to the south of Cairo at about 160 km in linear distance and at 60 km in linear distance to Beni Suef. The East Solar-2 subarea amounts to 179 km<sup>2</sup> and starts about 15 km to the south of the East Solar-3 subarea. The East Solar-1 subarea is the largest (416 km<sup>2</sup>) and the most southern of the three areas. It starts about 10 km in the south of East Solar-3 and is directly connected to the East Wind-1 subarea further to the south. The western borders of both areas are well away from populated Nile Valley. In the case of the East Solar-2 subarea, the distance is more than 20 km and more than 6 km in case of the southern East Solar-1 subarea.

The areas can be reached via the highway from Cairo, which is a toll road with exit possibilities to the surrounding desert at toll collection points only. Though the areas are located remotely, there are still some asphalt roads from the Nile Valley or the interconnection road between Minya and Assiut near or even inside the East Solar subareas. All asphalt roads are well dimensioned.

Climate data could be obtained from the El Minya and Assiut met stations (see Table 5-1 and Table 5-2). The climate can be classified as a hyperarid desert climate with high temperature differences between night and day of more than 15 °C (at Assiut airport in a desert environment). The average maxima vary between 19 °C (winter) and 37 °C (summer). Temperature variations are less pronounced in El Minya in the Nile Valley. The monthly means vary between 12 °C and 29 °C at both met stations. Precipitation was measured sporadically (1 or 2 mm) during the winter months only. However, that does not mean that uncommonly convective heavy rains of high intensities may occurred at rare intervals such as in February 2017.

Infrastructure in the areas besides the roads is limited to one medium voltage line along the Minya-Assiut Road, which is used for street illumination. No public utility services are extending to the area. Human activities in the area are limited to some farming, road service houses, two gravel-mining plants and one asphalt plant.

Power grid lines (500 kV from Aswan to Cairo and 220 kV) are available along the western bank of the Nile Valley with a major 500 kV substation at Samalut. However, from earlier JICA West Nile studies, it is known that the lines are already utilised to their capacities. For the Gulf of Suez (Ras Ghareb) large scale wind power development, a new 500 kV line to Samalut is under construction, passing about 9 km south of the East Solar-3 subarea. Another 500 kV line to Cairo along the Highway in the west of East-Solar-3 is under construction to evacuate the Gulf of Suez wind power to the Egyptian Load Centres. Extensive load flow and system expansion studies would have to be carried out to develop additional power grid capacities and network design for the evacuation of large scale East Nile wind and solar power.

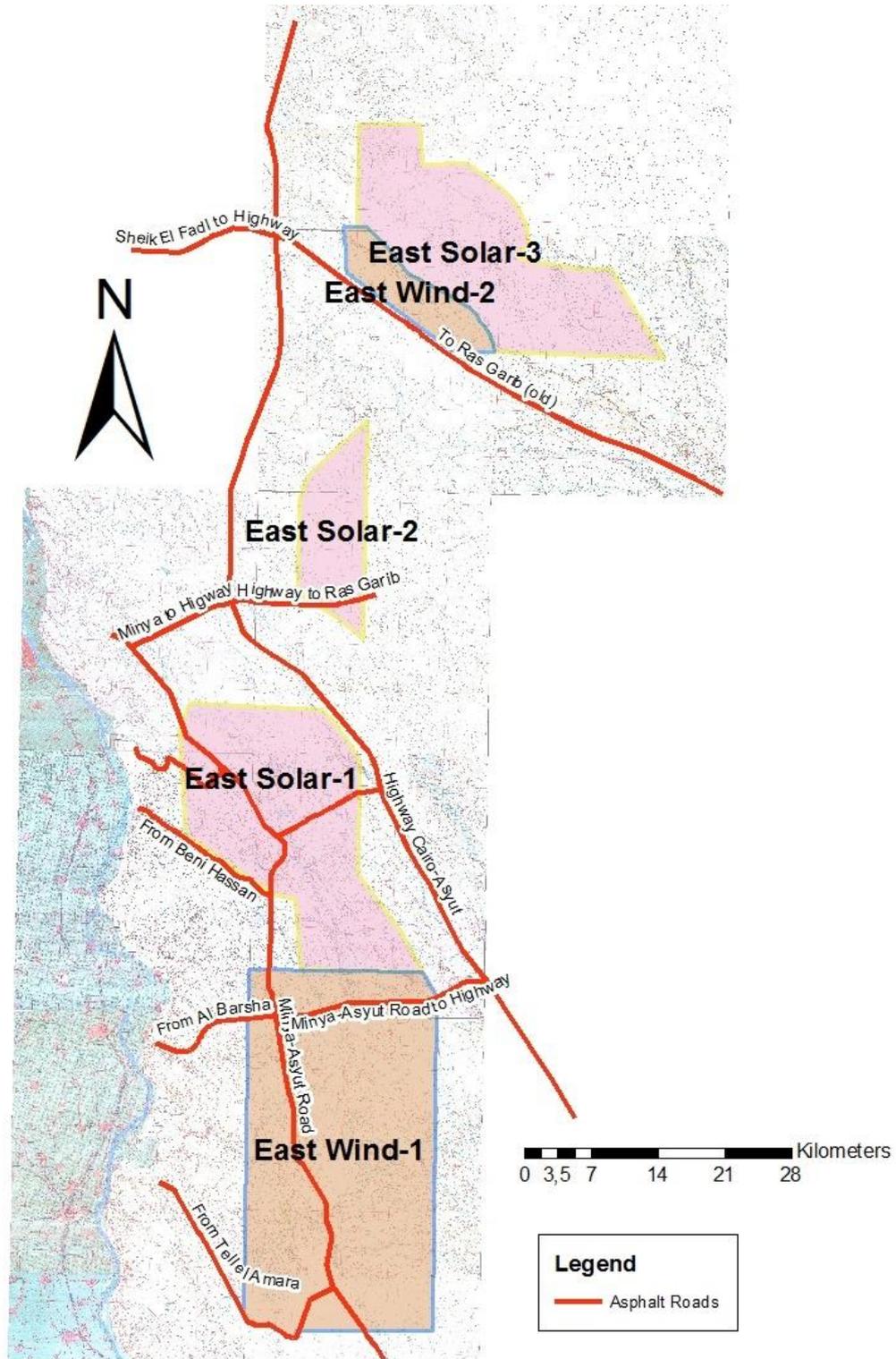


Figure 5-1: Overview of Areas and Asphalt Road System inside and next to the Project Area

**Table 5-1 Climate El Minya (40 m a.s.l.)**

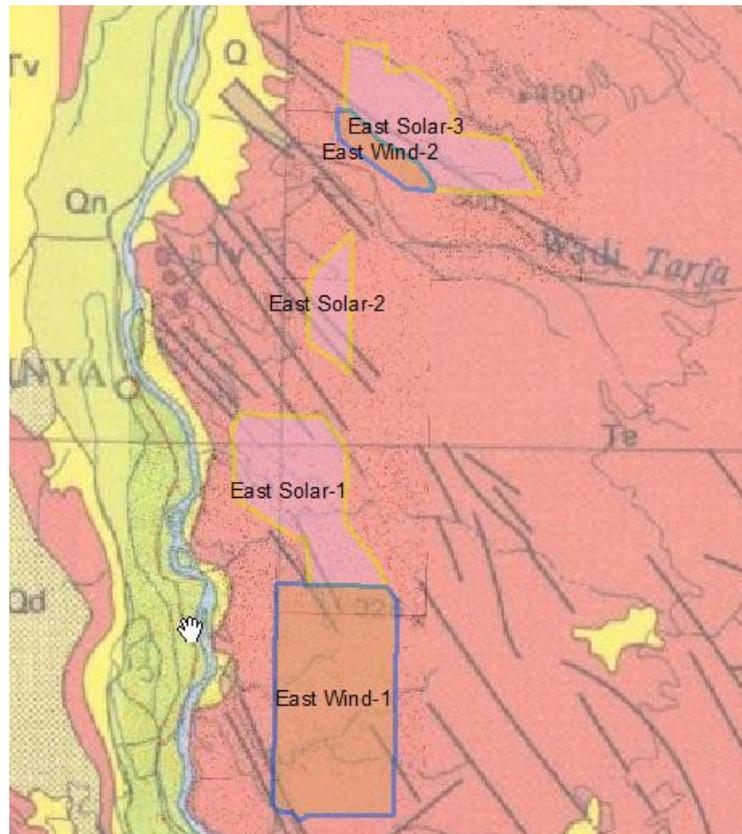
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Temperature (°C)	11.8	13.7	17.1	21.3	25.7	27.3	28.3	28.3	26	22.9	18.7	13.5
Mean Min. Temperature (°C)	4.3	5.9	8.8	12.1	17	18.8	20	20.5	18.2	15.4	11.5	6
Mean Max. Temperature (°C)	19.4	21.6	25.5	30.5	34.4	35.9	36.6	36.1	33.8	30.5	26	21
Precipitation / Rainfall (mm)	0	1	0	0	0	0	0	0	0	2	1	1

**Table 5-2: Climate Assiut Airport (230 m a.s.l.)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Temperature (°C)	13.1	14.6	18.2	23	27.2	29.2	29.6	29.7	27.4	24.6	19.8	14.8
Mean Min. Temperature (°C)	5.9	6.9	9.8	14.2	18.7	21.3	22	22.5	20.7	18.2	12.7	7.8
Mean Max. Temperature (°C)	20.4	22.4	26.7	31.8	35.8	37.2	37.2	36.9	34.1	31	27	21.9
Precipitation / Rainfall (mm)	0	0	0	0	0	0	0	0	0	0	1	1

The general geological conditions in the Project Area are obtained from the Geologic Map of Egypt issued by the “The Egyptian Geological Survey and Mining Authority” in 1981. A wider zone of the map around the Project Area was georeferenced and entered into the GIS database (see Figure 5-2). Due to the scale and the geographic coordinate system of the map, the georeferencing is not 100 % precise. Nevertheless, it gives a good overview of the quite homogeneous geological conditions in the Project Area.

The underground is formed in the Eocene. It consists of thick Marine Limestone with chert and minor clay beds. It is overlain by layers of gravel and sand of limited depth in general varying from few centimetres to 1 or 2 metres at Wadi beds and hangs.



**Figure 5-2: Excerpts of the Geological Map of Egypt**



**Figure 5-3: Limestone Stratification at WP 60\_4 in the north of the East Solar-2 subarea (left) and pocketed weathered Limestone at WP 42\_3 (East Solar-3)**

The geological map shows one major fault line forming an escarpment of more than 100 m in height difference, being partly inside the East Wind-2 subarea, but at a short distance to the southern border of East Solar-3. Most of the East Solar-3 subarea has a complex relief with deep falls into Wadis. This is different in the East Solar-1 and East Solar-2 subareas, which are quite uniform, consisting mostly of slightly undulated land except for some cuts by major Wadis at some spots of the East Solar-1 subarea. The landscape does not contain any special features. All Wadis have a moderate slope and sandy underground. The Wadi beds were free from erosion



## 5.1.2 East Solar-1

### 5.1.2.1 Special Physical Environment Features of the East Solar-1 subarea

The East Solar-1 subarea has an extension of 28 km from north to south and lateral lengths (west to east) of about 18 km in the north and 11 km in the south. The area is located within the El Minya Governorate. The most western part is located more than 5 km away from the Nile Valley. Though located in the desert, it has good accessibility by well dimensioned asphalt roads next or even crossing the area from El Minya (north), the Nile Valley (west) and Assiut (south). The shape and the asphalt roads are shown in Figure 5-5. This figure shows also waypoints, which mark special features or representative locations, where landscape photos were taken (usually one in each direction (north, east, south and west)). The photos are contained in the GIS database and examples are presented in the following sections.

As described under chapter 5.1.1, the Geology at East Solar-1 is quite homogeneous and, in general, offers stable underground conditions. Solar PV panels will be erected at sites exposed to the sun for reason of high energy yield, i.e. not in valleys with possible accumulation of gravel in the surface layer, and in general, near-surface rocky limestone underground conditions are expected. As for the character of limestone, near-surface caverns may exist at individual locations. Groundwater irrigation from deep wells at farms in the northwest of the area shows that at least at some spots, deep groundwater aquifers of good yield exist.

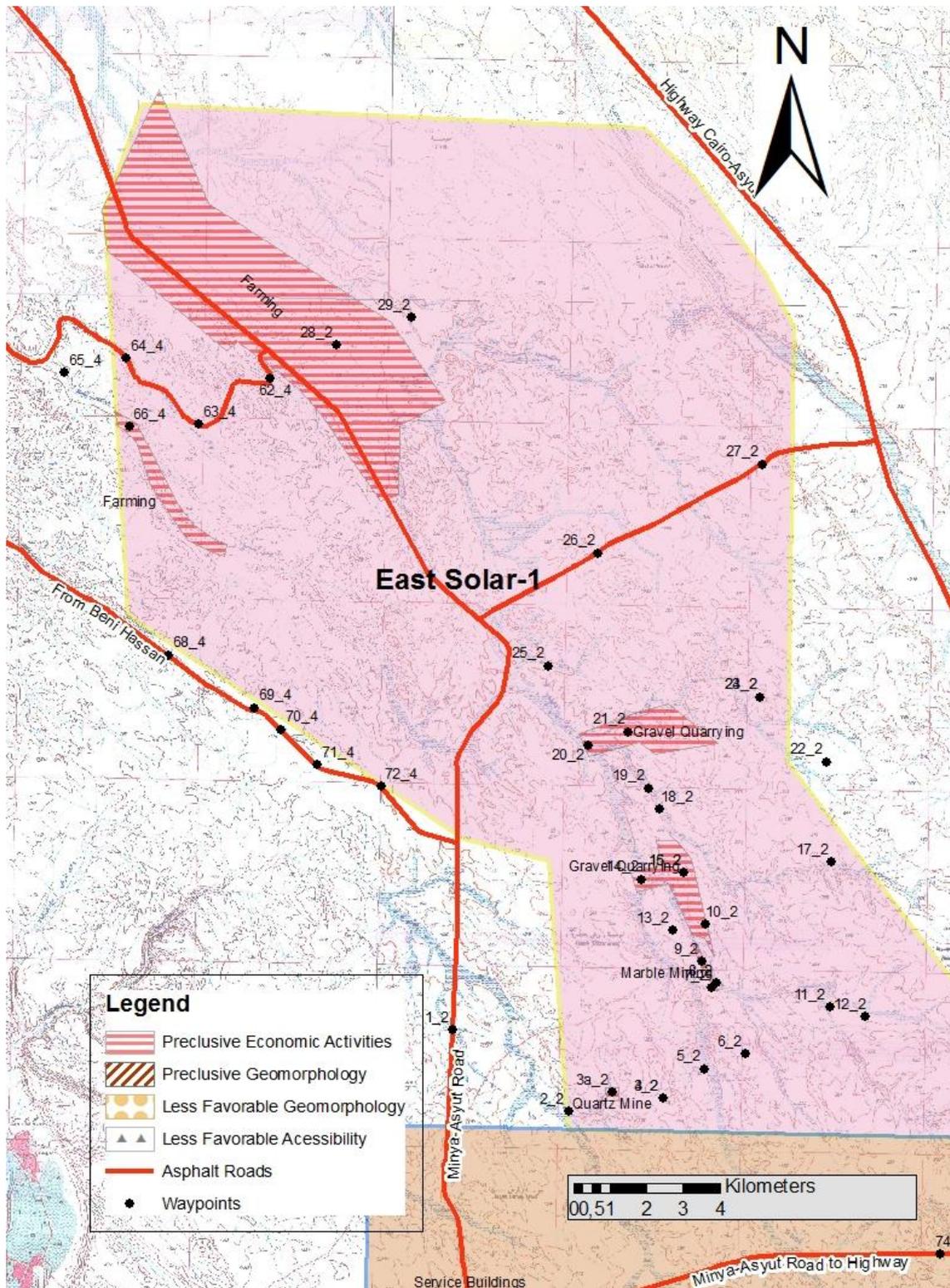
In general, the area is common non-vegetated desert ground. The surface layer mostly consists of slightly cemented pebble with a thickness in the order of 10 cm to 50 cm. This is followed by solid underground consisting of rocky limestone, which is strongly weathered in some parts. In general, the terrain is quite smooth, interrupted by some Wadis only. The landscape is mostly uniform, slightly undulated land without any special features. Typical landscape views are shown in Figure 5-6 to Figure 5-10.

The southern half of the East Solar-1 subarea contains some subareas of more complex terrain. It is crossed by one major Wadi system "Wadi Al Imrani" with 20 to 40 m high Wadi banks in the East of the El Minya - Assiut Road (see Figure 5-5). This Wadi becomes more deeply indented in the west of the El-Minya – Assiut Road, where, together with its tributaries, it forms a zone of small steep valleys. To the southeast of the East Solar-1 subarea, the terrain falls steeply towards Wadi Assiut (see Figure 5-5).

Some subareas of more complex terrain can also be found in the north-western part of the East Solar-1 subarea. It is crossed by one major Wadi system "Wadi Ibadah" with 20 to 30 m high Wadi banks in the west of the El Minya - Assiut Road (see Figure 5-10).

The inner part of the East Solar-1 subarea shows many prospection marks, ongoing development or current economic activities. This includes many provisional gravel roads.

Examples for a provisional road and land development are shown in Figure 5-11 and Figure 5-12.



**Figure 5-5: Zones preclusive or less favourable for solar power development in East Solar-1 according to Technical and Land-Use Criteria**



**Figure 5-6: View to the north at waypoint 29\_2**



**Figure 5-7: View to the east at waypoint 29\_2**



**Figure 5-8: View to the north at waypoint 26\_2 in the area centre**



**Figure 5-9: View to the south at WP 26\_2 in the area centre**



**Figure 5-10: Example of the more complex landscape in the northwest at WP 66\_4 (View towards south)**



**Figure 5-11: Provisional gravel road at WP 6\_2 (upper layer of 30 cm removed)**



**Figure 5-12: Farmland development at WP 29\_2**

Besides signs of prospection and land-take at many spots of the East Solar-1 subarea, its inhabitants have fixed installations and ongoing economic activities. This current land-use needs consideration for solar power development. The land-use identified during October 2016 is shown in Figure 5-5. It comprises:

- Public asphalt roads with safety corridors of 200 m to each side,
- Existing farming and farmland under development in the northwest of the East Solar-1 subarea (see Figure 5-10 and Figure 5-12),
- Quartzite mining (WP 3\_2a - see Figure 5-13),
- Marble mining (WP 8\_2 - see Figure 5-14), and
- Gravel screening plants (see Figure 5-15 and Figure 5-16).



**Figure 5-13: Quartzite mining at WP 3\_2a**



**Figure 5-14: Marble mining at WP 8\_2**



**Figure 5-15: Gravel screening plant at WP 16\_2**



**Figure 5-16: Gravel screening plant at WP 20\_2**



**Figure 5-17: Dispersed gravel collected from upper surface (WP 10\_2)**

#### 5.1.2.2 Zones preclusive or less favourable for solar power development according to Technical and Land-Use Criteria

An evaluation of the physical environment under technical and land-use aspects are accessibility, geomorphology and competing land-use. According to the criteria defined in section 0, this resulted in the identification of subareas that are preclusive or others that are less favourable for solar PV power development. The subareas are shown in Figure 5-5 before.

##### **Accessibility:**

No preclusive or less favourable areas were identified. The accessibility of the whole area is favourable. The East Solar-1 subarea is crossed by open asphalt roads. Any necessary internal access road to the different portions of the East Solar-1 subarea can be built on land allocated by Presidential Decree.

##### **Geomorphology:**

No areas were identified to be preclusive or less favourable regarding geomorphological conditions.

### **Competing land-use:**

Existing land-use was identified in the northwest along the El Minya - Assiut Road, inside the north western part of the area (farming areas) and in the southeast (Gravel mining and screening plants). The respective areas are considered to be preclusive for solar power development.

### **5.1.3 East Solar-2**

#### 5.1.3.1 Special Physical Environment Features of the East Solar-2 subarea

The East Solar-2 subarea amounts to 179 km<sup>2</sup> and is located in the East of El Minya. It is crossed in the south by the New Highway from El Minya to Ras Ghareb (see Figure 5-18), consisting of two separate carriageways of three lanes in each direction at a distance of about 100 m to each other (see Figure 5-19 and Figure 5-20). At the time of area reconnaissance in October 2016, it was not yet put into service. It may become part of the toll road system. However, this is different to the Highway Cairo-Assiut, where roadsides are not closed, allowing easy exit to the surrounding desert.

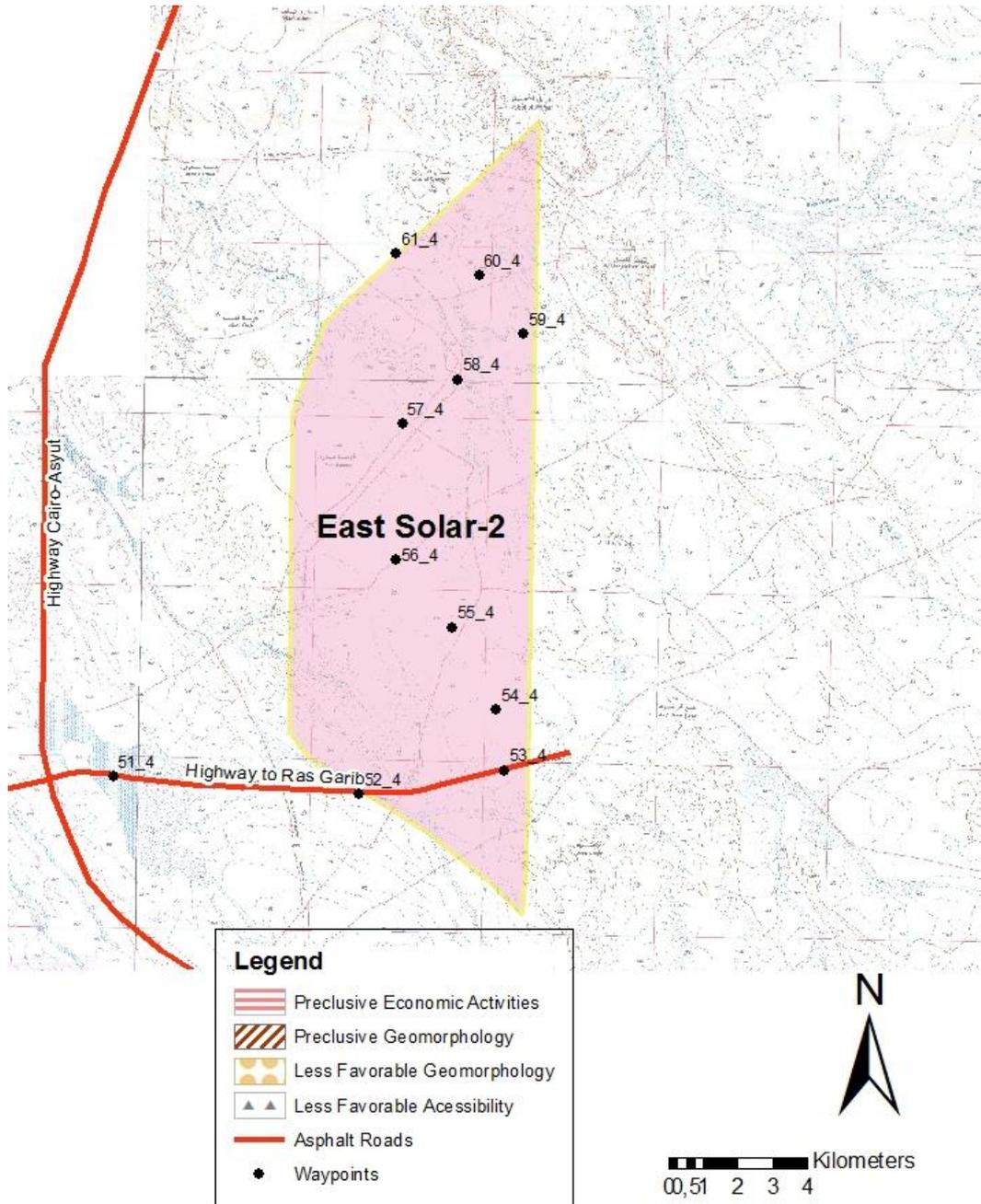
The shape of the area and the asphalt road are shown in Figure 5-19 and Figure 5-20, as well as way-points, which mark special features or representative locations where landscape photos were taken (usually one in each direction (north, east, south and west). The photos are contained in the GIS data bank.

The access to the East Solar-2 subarea would be from direction of El Minya and the Highway Cairo – Assiut crossroad. While exit construction to the south of the Highway can be easily done by simple earth works and gravel road construction, the access to the northern part of the East Solar-2 subarea requires more complex measures, however, there are still limited efforts. For the exit to the north, a U-turn needs to be constructed to allow reaching the road body of the opposite direction, Ras Ghareb – El Minya. For traffic safety, some widening of the road bodies for slowdown and acceleration lanes will be required. Accordingly, solar power development for the East Solar-2 subarea will require coordination with the Highway Company.

The access to the East Solar-2 subarea through this new highway is considered to be the most economic option and considered to be easy and at limited efforts. Moreover, the East Solar-2 subarea allows easy construction of internal access roads, as the terrain is mostly flat (except in the far north) and made of firm underground. Accordingly, the accessibility of the East Solar-2 subarea is favourable.

As an alternative, the exit and highway turning arrangements from the existing crossroad with the Cairo - Assiut Highway might be used. In this case, a new access road of about 7.5 km length between the crossroad and the East Solar-2 subarea would need to be constructed over external land. In this case, the access to the East Solar-2 subarea would have to be accessed as less favourable. In both cases, the planning and construction of the access to the East Solar-2 subarea need to be coordinated with the Highway Company.

An access from the north from the old Ras Ghareb Road would require extraordinary efforts. In this case, an access road over a distance of 15 km through difficult terrain (crossing of Wadi Al Tafar, complex terrain) would have to be constructed. This option is unrealistic.



**Figure 5-18:** Zones preclusive or less favourable for solar power development in East Solar-2 according to Technical and Land-Use Criteria



**Figure 5-19: New Highway El Minya to Ras Ghareb at WP 51\_4**



**Figure 5-20: View over new Highway to north at WP 53\_4 – Limestone Excavation Material**



**Figure 5-21: Typical landscape, car trail and prospection marks at WP 55\_4**



**Figure 5-22: Typical landscape and prospection marks at WP 58\_4**

Almost all of the East Solar-2 subarea is flat land consisting of an upper layer of cemented gravel followed by limestone layers. Typical surface conditions are shown in Figure 5-21 and Figure 5-22. The terrain in the northern end is more complex but still suitable for PV plant construction. In general, the surface consists of gravel or sandy gravel with layer depth of 20 to 40 cm. Only in lowland spots in the north, the upper layer is thicker (e.g. on the upwind side of the northern cliff at WP 60\_4; see Figure 5-3). Limestone layers follow this. An underground profile is shown in Figure 5-3. Thus, the area benefits from solid underground and flat terrain. The surface of the terrain is favourable for solar PV power development.

The East Solar-2 subarea and the surrounding area is a vast desert, free from any constructions or installations. It contains only one compacted temporary car trail, most likely constructed for prospection, a few marks of cross-country car movement and some signs of prospection (see Figure 5-21 and Figure 5-22). The purpose of the prospection of the upper surface layers is mostly likely targeting soil and subsurface qualities. The marks shown in Figure 5-22 are to check suitability of the soils for farming, as it is done by Bedouins.

#### 5.1.3.2 Zones preclusive or less favourable for solar power development according to Technical and Land-Use Criteria

An evaluation of the physical environment under technical and land-use, according to the criteria defined in section 4.3.1, did not identify any restrictions regarding accessibility, geomorphology and competing land-use. This is under the assumption that the new El Minya - Ras Ghareb Highway crossing the East Solar-2 subarea can be opened for access to the site. Otherwise, accessibility must be judged as being less favourable.

### 5.1.4 East Solar-3

#### 5.1.4.1 Special Physical Environment Features of the East Solar-3 subarea

The East Solar-3 subarea (see Figure 5-23) is located to the northeast of the Cliff (see Figure 5-24), with the south-eastern part directly located at the Cliff. As the cliff extends to about 70 km to the east in parallel to the old Ras Ghareb Road, the East Solar-3 portion cannot be reached from this road. The only possibility would be access from the Cairo - Assiut Highway in the west (see Figure 5-1), on top of the plateau over a distance of more than 11 km over external land, to reach the border of the East Solar-3 subarea. However, there is no exit from this Highway, which is a toll road protected by lateral barriers to avoid unpaid use. Any development in the upper East Solar-3 subarea would require the construction of an exit to be negotiated with the Highway Company. Thus, access to the upper East Solar-3 subarea is judged to be difficult.

Within the East Solar-3 subarea, only the southern part (except the Cliff area) would allow easy construction of internal roads. Most of the other area consists of complex terrain with deep valleys and Wadis. Accordingly, the internal access is also judged to be difficult for most of the area. Accordingly, accessibility to the whole East Solar 3 subarea is judged to be less favourable.

The southern part of East Solar-3 subarea (except the cliff portion in the southeast, which is unstable and prone to hang-gliding – see Figure 5-25) and some peripheral portions are flat land consisting of an upper layer of about 10 cm of cemented gravel followed by limestone layers like in all other project areas. Typical surface conditions for that southern portion are shown in Figure 5-24.

The majority of the area consists of complex terrain with deep Valleys and Wadis (see Figure 5-27). The area is crossed by the major Wadi ash-Shayk, which shows scarce vegetation and is likely to carry water from time to time (see Figure 5-27).

The East Solar-3 subarea does not show any compacted earth road or car trails like in the other areas. Only very few marks of cars which have entered into the area were found during the site reconnaissance. Along Wadi ash-Shaykh area a camel trail exists which seems still to be used. Otherwise the area is free from any activities.

The whole East Solar-3 subarea is free from competing land-use. This is under consideration that, like in other desert areas in Egypt, Bedouins may have a claim on the land and that in case of any project implementation, an agreement has to be sought by individual investors.

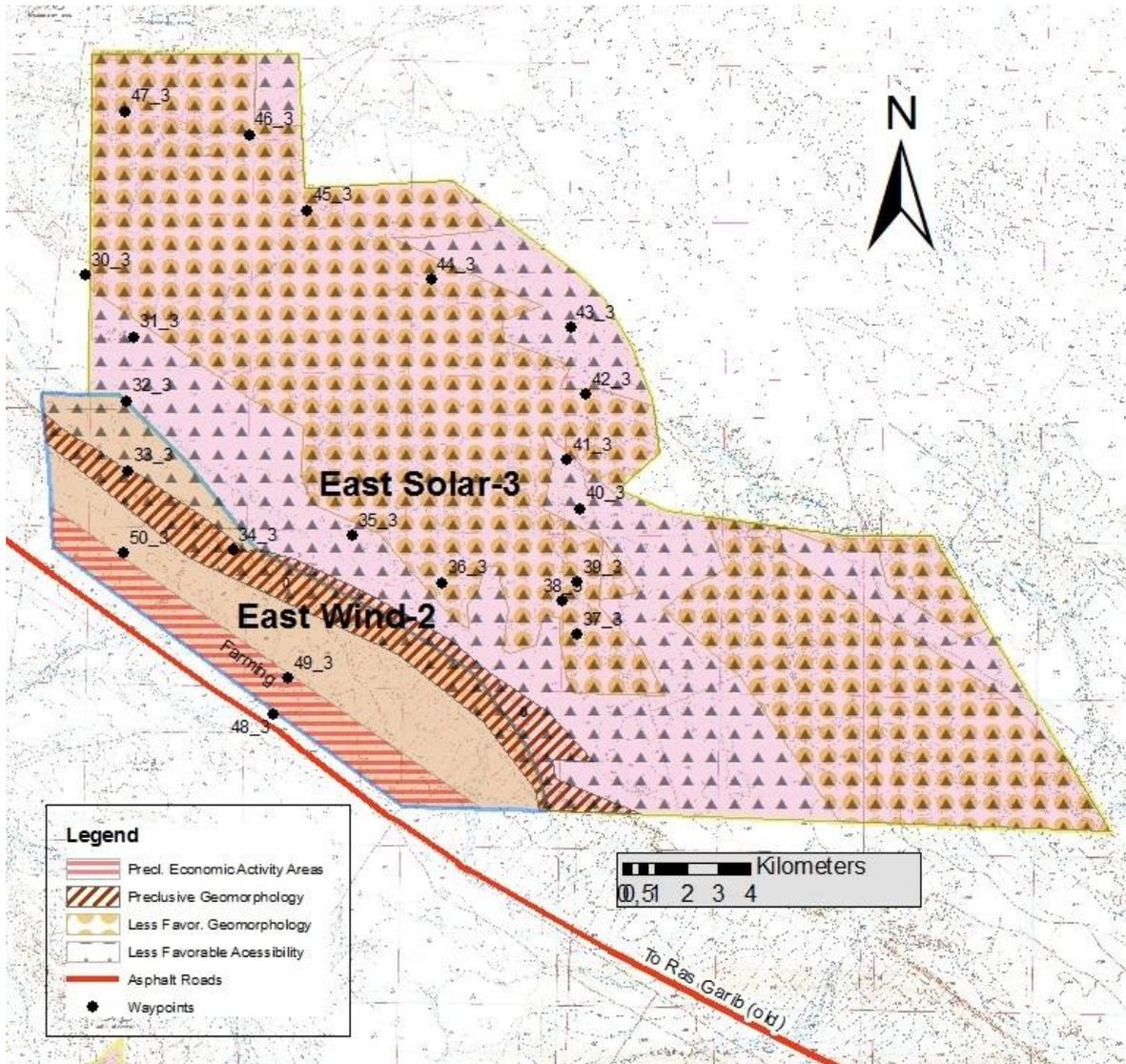


Figure 5-23: Zones preclusive or less favourable for solar power development in East Solar-3 according to Technical and Land-Use Criteria



**Figure 5-24: Surface Conditions at WP 35\_3 on top of the Cliff**



**Figure 5-25: Unstable conditions at the Cliff at WP 35\_3**



**Figure 5-26: Tributary Wadi to Wadi ash-Shaykh at WP 39\_3**



**Figure 5-27: Vegetated spot inside Wadi ash-Shaykh at WP 42\_3**

#### 5.1.4.2 Zones preclusive or less favourable for solar power development according to Technical and Land-Use Criteria

An evaluation of the physical environment under technical and land-use aspects, according to the criteria defined in section 0, resulted in the identification of subareas that are preclusive or others that are less favourable for solar power development. The subareas are shown in Figure 5-23.

##### **Accessibility:**

The accessibility of the whole area is classified to be less favourable due to long distances to the existing highway over external land outside the area allocated by Presidential Decree, the need to construct exits from this toll road highway and the complex terrain with steep valleys.

**Geomorphology:**

The portion on the cliff to the southeast of East Solar-3 is judged to be preclusive due to unstable foundation conditions.

**Competing land-use:**

No competing land-use was identified in the East Solar-3 subarea.

**5.2 Biological environment****5.2.1 Project Area**

The Project Area, and thus, subareas East Solar-1, East Solar-2 and East Solar-3, are located in the northern part of the Eastern Desert which extends between the Nile Valley and the Red Sea. The Eastern Desert is traversed by numerous canyon-like depressions (Wadis) running to the Red Sea or to the Nile Valley. The Wadis crossing the project are dewatering directly to the west, to the Nile Valley, or to the southeast, to Wadi Habbib and Wadi El Assiuti, which finally lead into the Nile as well. The Wadis have the potential to host some vegetation, with a sporadic growth of plants in case of rare rainfall. However, the Project Area is characterised by the exceeding aridity of the desert climate and a relief essentially consisting of gravely and pebbly plains. Accordingly, its potential to serve as a habitat for plants and animals is rather low.

**5.2.1.1 Legally protected sites / areas and internationally recognised areas of biodiversity value**

The investigation reveals that no legally protected site / area exists, nor any national park nor important bird area and no internationally recognised area of biodiversity value in the Project Area (e.g. Fouda 2016, Baha El Din 1999).

Another protected site, though located at minimum distances of about 8 km northeast of the Project Area (East Solar-3 subarea, see Map 5-3), is “Wadi Sannur Cave”. Wadi Sannur Cave covers an area of 12.04 km<sup>2</sup> and was designated in 1992 by Minister Decree no. 709. It safeguards a cave, a rare geologic feature in Egypt, which is of interest for paleo-climatological records (EEAA 2015).

**5.2.1.2 Habitats**

Harhash et al. (2015) aimed to develop a suitable habitat model for large scale planning to support the decision-making process towards natural resources in Egypt. The obtained habitat classification includes a total of five main habitat systems, 12 habitat sub-systems and 36 habitat classes.

Applying the classification elaborated on by Harhash et al. (2015) to the different habitats found in the Project Area during site visits and field surveys, the whole Project Area must be attributed to the main habitat system “Desert”, with its four Sub-Systems “High Land”, “Plain Land”, “Low

Land” and “Caves” (see Table 5-3). Scarps and high areas with an elevation between 200 and 500 m a.s.l. can only be found at single places in the northern section (East Solar-3 subareas) and in the southern section of the Project Area. In fact, a huge scarp forms (cliff) run along the southern border of the East Solar-3 subarea (see Figure 5-28). However, the vast majority of the Project Area can be classified as “Hamada Desert” (Sub-System: “Plain Land”) that is crossed by “Valleys and Canyons” (i.e. Wadis) which belong to the Sub-System “Low Land”. Finally, special habitats of minor extent, “Caves and Karsts”, are known to occur in the Project Area, too.

**Table 5-3: Attribution of habitats found in the Project Area during site visits and field surveys according to the classification of Harhash et al. (2015)**

Habitat System	Sub-System	Habitat Class	Definition according to Harhash et al. (2015)
Desert	High Land	Mountains	<i>not found in the Project Area</i>
		Hills and Plateaus	<i>not found in the Project Area</i>
		Scarps and High Areas	Elevation from 200 to 500 m a.s.l.
	Plain Land	Desert Sand Dunes, Sand Sheets and Sand Mounds	<i>not found in the Project Area</i>
		Hamada Desert	Hamada Desert is a type of desert landscape consisting of high, largely barren, hard, rocky plateaus, with very little sand because this has been removed by deflation.
		Coastal Sand Dunes	<i>not found in the Project Area</i>
	Low Land	Valleys and Canyons	A valley is a hollow or surface depression of the earth bounded by hills or mountains, a natural trough in the earth's surface that slopes down to a stream, lake or the ocean, formed by water and/or ice erosion. Systems of valleys extend through plains, hills, and mountains.
		Depression	<i>not found in the Project Area</i>
		Sabkhat	<i>not found in the Project Area</i>
	Caves	Caves and Karsts	Underground spaces produced naturally by the weathering of rock. Can extend deep underground, or can be much smaller rock.



**Figure 5-28: A huge scarp forms (fault line) of nearly 100 m runs adjacent to the northern border of the East Solar-3 subarea (left); view from the top of the cliff to south (right)**

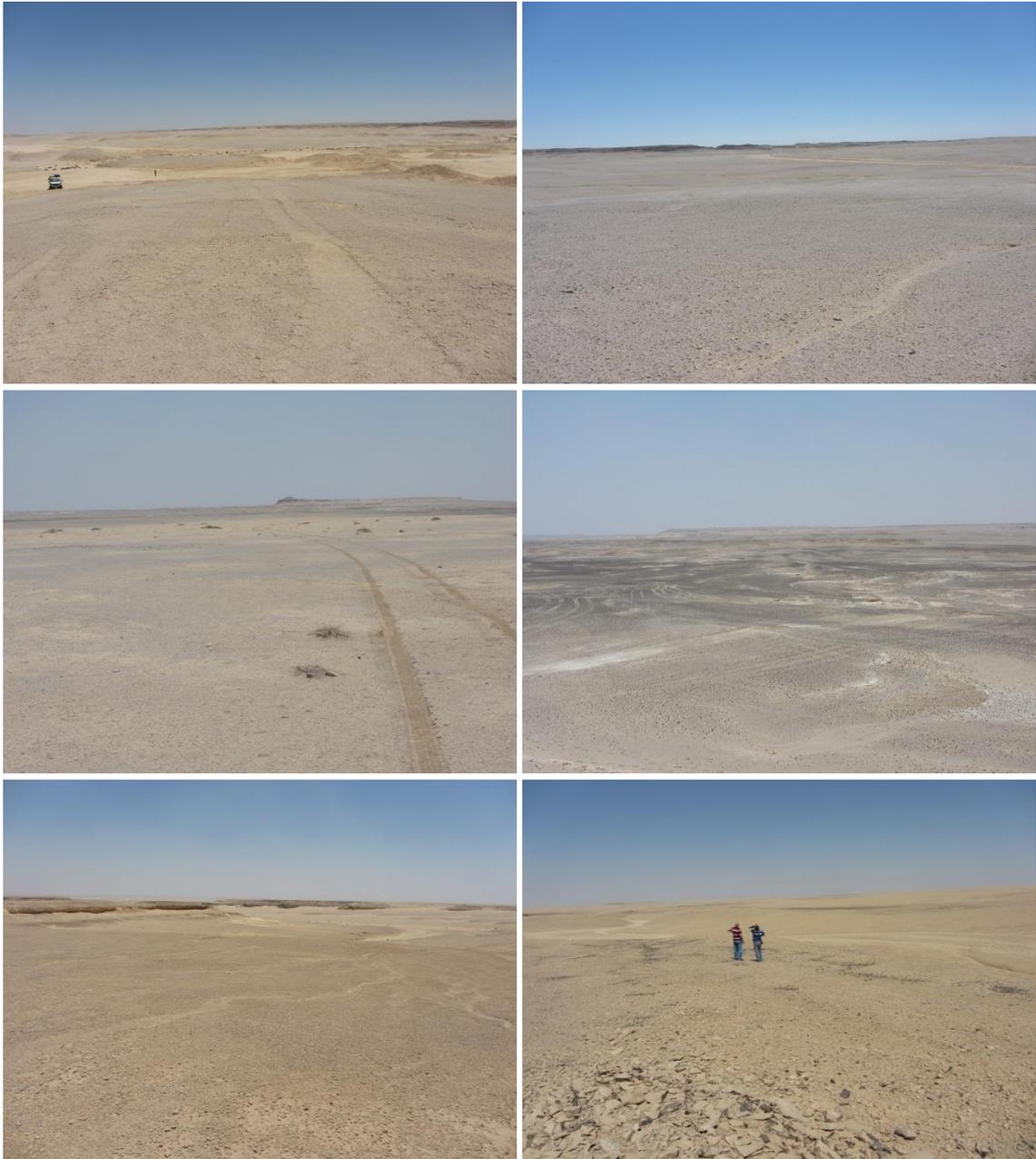
Due to the extreme aridity of the Eastern Desert, the gravely and pebbly plains, the elevated areas and small hills do not serve as a suitable habitat for plants. These areas have very low to no importance as a habitat for plants. Hence, the vast majority of the Project Area is completely without vegetation (Figure 5-29).

Plant and animal life is generally restricted to the Wadis. Water coming from the mountains in the east after rainfall drains into the Wadi systems. In lower reaches of Wadis, where they spread out and are less steep, floods have lost their power and remaining water can sink into the ground sufficiently to support vegetation in the main Wadi channels for years to come. Consequently, the importance of Wadis as a habitat for plants and animals can differ.

The Project Area is trenched by about 14 Wadis or Wadi complexes. Thereof, six Wadi complexes are located in the East Solar subareas (from north to south, see also Map 5-1):

1. Wadi ash-Shaykh (together with Wadi Abu Ritaymah and Wadi umm Awashiz) can be found in the northern section of the Project Area. It runs through the East Solar-3 subarea in a north-western direction to the Nile Valley. Several plant species and a number of stands of *Acacia tortilis ssp. raddiana* populate this Wadi (see Figure 5-41). At some places, the Wadi is accompanied by steep slopes leading to a canyon-like character. Parts of this Wadi complex offer habitat elements suitable for plant and animal species that are adapted to the harsh climatic conditions in the desert. Hence, the Wadi forms an important habitat for plants and animals in the desert.
2. Wadi al Bustan and Wadi ad Dahsah are located between the middle and the southern section, mainly outside the Project Area. The Cairo-Assiut Highway follows the Wadi for about 100 km from the north to the southeast. It is a rather flat and broad Wadi with an extremely low vegetation cover. The Wadi has only a very low importance as a habitat for plants and animals.
3. Wadi Mushaqqaq undulates through the East Solar-1 subarea to the Nile Valley in the west. It is a wide Wadi with only few vegetated spots (mainly shrubs and herbs; see Map 5-2 and Figure 5-30). Its importance to serve as a habitat for animals and plants is assessed to be low.
4. Wadi al Tahaawi starts in the northern part of East Solar-1 subarea and stretches in parallel to the Eastern Nile Road in a north-western direction. It is a wide Wadi, as its surrounding area is flat, with only little vegetation. The Wadi has a very low importance as a habitat for plants and animals (see Map 5-2).
5. Wadi al-Mashj is a branch or a northern extension of Wadi Ibadah. It starts west of the Eastern Nile road and stretches further to the northeast to the Nile Valley. It is accompanied by elevated areas and hills partly building a canyon-like Wadi. Only low numbers of plants populated the Wadi, and vegetation cover is very sparse. Its importance to serve as a habitat for animals and plants is assessed to be low. Near the western border of the Project Area (former), farmland can be found in the Wadi (see Map 5-2 and Figure 5-31).

6. Wadi Ibadah and Wadi al-Birshawi originate south of the East Solar-1 subarea and run more than 20 km to the northwest (see Map 5-1 and Map 5-2). Vegetation cover, shrubs and herbs, is comparably high in these Wadis, and thus, the Wadis seem to be important as a habitat for plants and animals.

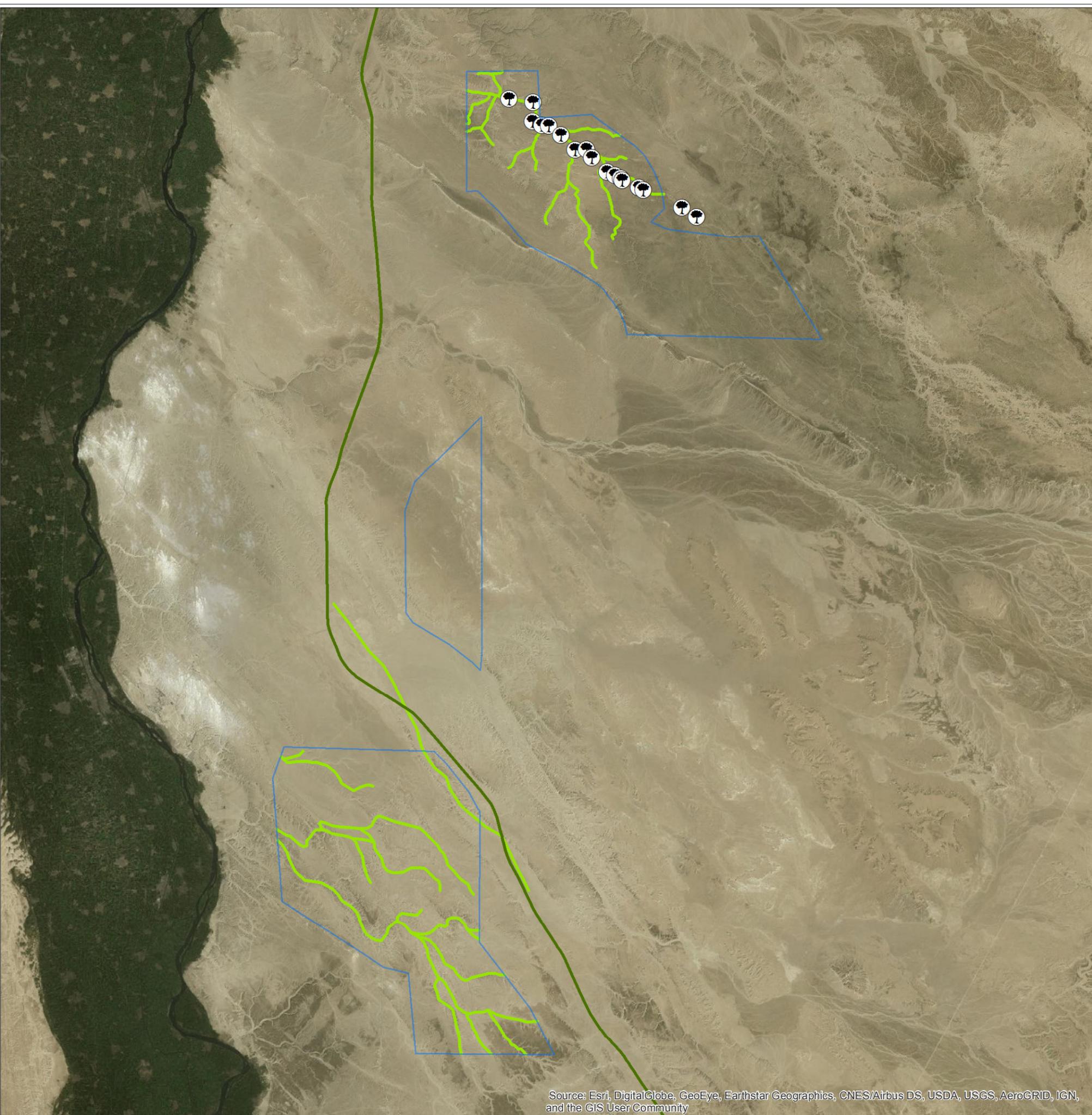


**Figure 5-29:** The vast majority of the Project Area is completely without vegetation (top: East Solar-1; middle: East Solar-2; bottom: East Solar-3)

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 5.1:**  
 Schematic presentation of the location and the run of main wadis / wadi systems and of stands of Acacia trees



**Bordering of three East Solar subareas**

 East Solar subarea

**Wadis and Acacia trees**

 main wadis

 stand of Acacia tree

 Assiut - Cairo Desert Road (motorway)





**Figure 5-30: Images of Wadi Mushaqqaq**



**Figure 5-31: Canyon-like part of Wadi al-Mashj without vegetation (top left), single shrubs and herbs in a wide part of the Wadi (top right) and (former) cultivated land at the western border of the Project Area (bottom)**

Caves, mainly dissolution caves, form particular structures in the desert that offer important habitats for animals (e.g. as shelter). Those structures were particularly found in canyon-like Wadis and at slopes where elevated areas decline into the Wadi. Wherever such slopes occur, similar caves can be expected, i.e. in the East Solar-1 and East Solar-3 subarea (see Figure 5-32). Those

areas are important as habitats for plants and animals. As the East Solar-2 subarea is very flat and homogenous, occurrence of caves in this area is unlikely.



**Figure 5-32: Caves offering shelter for mammals, birds and other animals**

**Table 5-4: Assessment of the importance of the main Wadis located in the East Solar subareas as a habitat for plants and animals**

No.	Name of Wadi	Location / subarea	Habitat value / importance
1	Wadi ash-Shaykh	East Solar-3	important
2	Wadi al Bustan and Wadi ad Dahsah	between middle and southern section	very low
3	Wadi Mushaqqaq	East Solar-1	low
4	Wadi al Tahaawi	East Solar-1	very low
5	Wadi al-Mashj	East Solar-1	low
6	Wadi Ibadah and Wadi al-Birshawi	East Wind-1 and East Solar-1	important

No priority biodiversity features, threatened habitats or ecological structure and functions needed to maintain the viability of priority biodiversity features as defined in EBRD's Performance Requirements 6 (see section 2.3) exist in the Project Area.

No critical habitat, mainly comprising highly threatened or unique ecosystems, habitats of significant importance to endangered or critically endangered species, habitats of significant importance to endemic or geographically restricted species, habitats supporting globally significant migratory or congregatory species, areas associated with key evolutionary processes or ecological functions that are vital to maintaining the viability of biodiversity (as defined in EBRD's Performance Requirements 6, see section 2.3), exist in the Project Area.

### 5.2.1.3 Flora

The vegetation of the Eastern Desert is neither rich in species, nor dense in populations and sometimes referred to as pseudo-savannah with single trees, shrubs and herbs. Grass cover may appear, but mainly after heavy rainfall. Based on the latitudinal variation and floristic composition Abd El-Ghani et al. (2014) suggested subdividing the Eastern Desert into two sub-territories: Galala and Arabian sub-territory. The Project Area is located in the Galala sub-territory, which comprised the northern part of the Eastern Desert. The Galala sub-territory is comparably rich in plant species and the occurrence of numerous plant families. The Wadis tend to support most vegetation due to generally higher soil moisture levels. According to Zahran & Willis (2009) major plant communities known to occur in the desert plains are:

- Woody form (*Ochradinus baccatus*) community

These woody communities are widely distributed and can be found throughout the Arabian Desert, the coastal desert plains of the Red Sea and the Sinai Peninsula.

*Ochradinus baccatus* is a desert shrub with spinescent branches and terminal raceme inflorescence (see Figure 5-33). Growth of *O. baccatus* helps fixation of soil texture forming sandy hillocks underneath the plant. In the Project Area, *O. baccatus* was found mostly in loose groups of bushes in Wadis, mainly in the larger Wadis that are assessed which are important as a habitat for plants and animals (see Table 5-4).

- Succulent half shrub (*Zygophyllum coccineum*) community

*Zygophyllum coccineum* is a leaf and stem succulent xerophyte that remain green all through the year (see Figure 5-33). It belongs to the succulent half shrub community and is widespread in the arid zones of Egypt. This community also includes *Acacia tortilis* subsp. *raddiana* (Figure 5-33) along with *Tamarix nilotica* and several other species.

*Z. coccineum* grows in diverse habitats and different types of soil. It is very common in limestone Wadis and plains of the Eastern Desert and tolerant of saline soils. As this plant is unpalatable, it is not grazed by animals. Loose stands of this succulent xerophyte were found at different places scattered over the entire Project Area.

*A. tortilis* spp. *raddiana* (see Figure 5-33) belongs to the Mimosaceae and is a keystone species growing across arid ecosystems in Africa and the Middle East, from moist savannas to hyper-arid deserts. It is of importance for people and their domesticated animals, improves soil fertility and increases biodiversity (Munzbergova & Ward 2002). In Egypt *A. tortilis* spp. *raddiana* grows in desert Wadis and sandy plains, usually in water catchments areas at the Red Sea coast, the Eastern Desert, Gebel Elba and Sinai (Boulos 1999). In the whole Project Area, more than 50 stands of *Acacia* can be found (see Map 5-1), mainly in Wadi ash-Shaykh (together with Wadi Abu Ritaymah and Wadi umm Awashiz) north of East Solar-3 subarea and in Wadi al-'Imrani complex. A complete list of all plant species found in the Project Area is given in Table 5-5.

All mentioned species are considered to be of "Least Concern" in the IUCN Red List of Threatened Species. There is no information about any endangered or relevant plant species to be found in the Project Area.

At certain sites, active or currently disused farmland can be found in the Project Area (see section 5.1). Trees and bushes have been planted in and around farmland, possibly as a shelter against the wind.

**Table 5-5: List of plant species recorded in the Project Area**

Family	Species
Acacieae	<i>Acacia tortilis ssp. raddiana</i>
Brassicaceae	<i>Anastatica hierochuntica</i> , <i>Diplotaxis acris</i> , <i>Farsetia aegyptia</i> , <i>Zilla spinosa</i>
Fabaceae	<i>Trigonella stellata</i>
Zygophyllaceae	<i>Fagonia arabica</i> <i>Zygophyllum coccineum</i>
Boraginaceae	<i>Trichodesma africanum</i>
Asteraceae	<i>Echinops spinose</i> , <i>Launaea nudicaulis</i> , <i>Pulicaria incisa</i> , <i>Senecio glaucus</i>
Amaranthaceae	<i>Salsola aegyptiaca</i>
Poaceae	<i>Panicum turgidum</i>
Resedaceae	<i>Ochradenus baccatus</i>
Neuradaceae	<i>Neurada procumbens</i>
Geraniaceae	<i>Erodium sp.</i>
Leguminosae	<i>Astragalus caprinus</i>



**Figure 5-33: *Ochradenus baccatus* (top left), *Zygophyllum coccineum* (top right) found in the Project Area and stands of *A. tortilis ssp. raddiana* found in the East Solar-1 subarea**



**Figure 5-34:** *Anastacia hierochuntica* (to left), *Panicum turgidum* (top right), *Launaea nudicaulis* (bottom left) and *Farsetia aegyptia* (bottom right)

#### 5.2.1.4 Fauna

##### Mammals

Few mammals have been documented in the Project Area during the fieldwork (see Table 5-6), indicating that diversity and density is very low due to the harsh living conditions in the desert. However, most animals are active at night, possibly another reason for the limited numbers of records. Moreover, aestivation is an adaption to very hot summer periods in several rodent species.

Desert Red Fox (*Vulpes vulpes pusilla*) and Rüppell's Sand Fox (*Vulpes ruepelli*) searching for carrion and other food sources were rarely observed near the Eastern Desert Road, in larger Wadis, e.g. Wadi Mushaqqaq and Wadi al-'Imrani complex. Tracks and excrements of foxes have been found in the East Wind-1 subarea in spring 2017. Individuals active during night were recorded by an automatic camera installed near an Acacia tree in Wadi al-'Imrani complex and can be expected to occur in other larger Wadis such as Wadi ash-Shaykh in the East Solar-3 subarea. In addition, caves and other structures found in the larger Wadis are generally suitable as a fox den.

A domestic cat (*Felis silvestris catus*) was recorded once in Wadi al-Birshawi.

The occurrence of different rodents (Rodentia) in the Project Area was verified by direct observations or by signs (e.g. droppings, tracks or burrows) left by these animals. Records of the Lesser Egyptian Jerboa (*Jaculus jaculus*) and the Lesser Egyptian Gerbil (*Gerbillus gerbillus*) were obtained in the East Solar-1 and the East Wind-1 subarea at four and three different places, respectively. Both species are believed to settle the Project Area in numbers. The existence of Sundevall's jird (*Meriones crassus*) was proven at one place in Wadi al-Birshawi. Droppings were found that might refer to the Rock Hrax (*Procapra capensis*), a species commonly found in arid land habitat including deserts and savannas. Based on the literature it is also suspected that wolf-like Egyptian Jackal (*Canis anthus lupaster*) cross through the Project Area.

According to Hoath (2009) the occurrence of most bat species in Egypt is restricted to vegetated areas, namely the Nile Valley. Desert areas with no or only very limited vegetation are usually not populated by bats. Based on the results obtained in the course of a bat survey in the East Wind-1 subarea, one can conclude that activity of bats within the Project Area is very low. Hence, the Project Area does not serve as a significant habitat for bats. The Project Area offers only few structures (e.g. buildings, crevices) which are suitable as bat roosts. Many bats prefer heterogeneous landscapes with high biodiversity (i.e. high prey density) as a hunting site. Due to the sparse vegetation, the lack of open bodies of water and due to the expected low level of prey density the Project Area is not an attractive hunting site for local bats. Its importance as a habitat for bats can be assessed as negligible.

At single sites in the East Solar-1 subarea, domestic camels were recorded occasionally (see Figure 5-35).

Adding together, the Project Area, mainly the Wadis, serves as a habitat for single mammal species (mainly night active rodents). However, the number of mammal species that can be found in the area is low. Moreover, abundance of mammals is very low. Hence, the Project Area does not form an important habitat for mammals.

**Table 5-6: List of mammal species recorded in the Project Area**

No.	Species		Family	Location
1	Domestic Camels	<i>Camelus dromedarius</i>	Camelidae	Wadi Ibadah and Wadi al-Mashj
2	Desert Red Fox / Rüppell's Sand Fox	<i>Vulpes vulpes pusilla</i> / <i>Vulpes ruepelli</i>	Canidae	Wadi Mushaqqaq, Wadi Ibadah, Wadi al-Birshawi, Wadi al-'Imrani complex
3	Wildcat / Domestic Cat	<i>Felis silvestris catus</i>	Felidae	Wadi al-Birshawi
4	Lesser Egyptian Jerboa	<i>Jaculus jaculus</i>	Dipodidae	Wadi Mushaqqaq, Wadi Ibadah and Wadi Mashj
5	Lesser Egyptian Gerbil	<i>Gerbillus gerbillus</i>	Muridae	Wadi al-Mashj, Wadi al-Birshawi, Wadi Abu Hasah al-Bahari
	Gerbillus spec.		Muridae	Wadi Mushaqqaq, Wadi al-Mashj
6	Sundevall's jird	<i>Meriones crassus</i>	Muridae	Wadi al-Birshawi



**Figure 5-35: Domestic camels near houses in the East Solar-1 subarea**

### Birds

A total of 45 species have been recorded in the Project Area during standardised fieldwork (i.e. during transect walks, see Figure 5-36). In autumn 2016, the number of species (42) was higher than in spring (16) (see

Table 5-7). This might be partly related to a higher effort undertaken and partly to a stronger passage of migration/roosting birds in autumn 2016.

14 recorded species have been classified as local birds (see

Table 5-7). The most abundant species that could be found in nearly every larger Wadi was Spotted Sandgrouse (290 birds, note that double counts are possible). Rock Doves appeared regularly near the East Desert road in the vicinity of a cafeteria. Desert Lark, Desert Warbler, Desert Wheatear and, to a lower degree, Isabilline Wheatear, were regularly recorded in the Project Area, but only in very low numbers. All other species were rarely observed. In addition, Cream-coloured Courser (*Cursorius cursor*), another local species, was encountered during site visits for flora and fauna. All mentioned species are listed as of “Least Concern” in the IUCN Red List of Threatened Species (IUCN 2017).

Local species were supposed to breed in the Project Area or its surrounding area because they were observed regularly, showed territorial-behaviour or reared chicks (but in very low number).

To conclude, the Wadis that comprise patches of vegetation (herbs, shrubs and occasionally even trees) form a suitable habitat for single species that are adapted to the harsh climatic conditions of the Eastern Desert. However, the obtained results clearly show that the local bird community is very poor in species and bird density is very low. The species recorded in the Project Area are quite widespread and can be found in several desert habitats in Egypt. According to the IUCN Red

List of Threatened Species, no species is assessed as endangered or threatened. Consequently, the Project Area is not an important habitat for local birds.



**Figure 5-36:** Lesser Whitethroat roosting in Wadi al-'Imrani complex (top left), Trumpeter Finch (*Bucanetes githagineus*) at the Eastern Desert Road (top right), two Spotted Sandgrouse in Wadi Mushaqqaq (bottom left) and Desert Warbler (*Sylvia nana/deserti*) in Wadi Ibadah (bottom right)

**Table 5-7:** List of birds recorded during transect walks in the Project Area

(the total number of recorded birds of a species (as a measure for abundance) is given, as is the number of transects at which a species was detected (as a criterion for spatial distribution/continuity).

N°	Species	Status	number of birds / transects		
			2016	2017	
1	Barbary Falcon	<i>Falco pelegrinoides</i>	local	1/1	-
2	European Bee-eater	<i>Merops apiaster</i>	migrating	10/1	-
3	Black Kite	<i>Milvus migrans</i>	migrating	1/1	-

N°	Species		Status	number of birds / transects	
				2016	2017
4	Bluethroat	<i>Luscinia svecica</i>	roosting	2/2	
5	Booted Eagle	<i>Hieraaetus pennatus</i>	migrating	1/1	-
6	Brown-necked Raven	<i>Corvus ruficollis</i>	local	55/13	3/2
7	Chiffchaff	<i>Phylloscopus collybeta</i>	roosting	161/20	4/3
8	Common Snipe	<i>Gallinago gallinago</i>	roosting	10/1	-
9	Common Whitethroat	<i>Sylvia communis</i>	roosting	7/7	-
10	Desert Lark	<i>Ammomanes deserti</i>	local	48/13	9/5
11	Desert Warbler	<i>Sylvia nana/deserti</i>	local	-	16/13
12	Desert Wheatear	<i>Oenanthe deserti</i>	local	9/5	7/4
13	Great Grey Shrike	<i>Lanius excubitor</i>	roosting	-	1/1
14	Golden Oriole	<i>Oriolus oriolus</i>	roosting	1/1	-
15	Greater hoopoe Lark	<i>Alaemon alaudipes</i>	local	13/9	6/2
16	Honey Buzzard	<i>Pernis apivorus</i>	migrating	5/3	-
17	Hooded Wheatear	<i>Oenanthe monacha</i>	local	2/1	1/1
18	Isabelline Shrike	<i>Lanius isabellinus</i>	roosting	1/1	-
19	Isabelline Wheatear	<i>Oenanthe isabellina</i>	local	3/2	6/5
20	Lesser Whitethroat	<i>Sylvia curruca</i>	roosting	25/9	29/9
21	Levant Sparrowhawk	<i>Accipiter brevipes</i>	migrating	-	1/1
22	Masked Shrike	<i>Lanius nubicus</i>	roosting	7/5	-
23	Meadow Pipit	<i>Anthus pratensis</i>	roosting	3/2	-
24	Montagus Harrier	<i>Circus pygargus</i>	migrating	1/1	-
	Harrier spec.	<i>Circus spec.</i>	migrating	1/1	-
25	Mourning Wheatear	<i>Oenanthe lugens</i>	local	8/6	-
26	Northern Lapwing	<i>Vanellus vanellus</i>	migrating	11/1	-
27	Northern Wheatear	<i>Oenanthe oenanthe</i>	local	2/2	-
28	Red-breasted Flycatcher	<i>Ficedula parva</i>	roosting	1/1	-
29	Reed Warbler	<i>Acrocephalus scirpaceus</i>	roosting	9/3	-
30	Rock Dove	<i>Columba livia</i>	local	17/3	-
31	Rock Pipit	<i>Anthus petrosus</i>	local	2/2	-
32	Ruppell's Warbler	<i>Sylvia ruppeli</i>	roosting	1/1	10/5
33	Sardinian Warbler	<i>Sylvia melanocephala</i>	roosting	14/4	4/2
34	Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	roosting	2/1	-
35	Short-toed Eagle	<i>Circaetus gallicus</i>	migrating	1/1	-
36	Spotted Sandgrouse	<i>Pterocles senegallus</i>	local	290/13	58/4
37	Steppe Buzzard	<i>Buteo vulpinus</i>	migrating	1/1	-
38	Steppe Eagle	<i>Aquila nipalensis</i>	migrating	3/2	-
39	Tawny Pipit	<i>Anthus campestris</i>	roosting	1/1	1/1
40	Tree Pipit	<i>Anthus trivialis</i>	roosting	4/2	-

N°	Species	Status	number of birds / transects		
			2016	2017	
41	Trumpeter Finch	<i>Bucanetes githagineus</i>	local	1/1	-
42	Whinchat	<i>Saxicola rubetra</i>	roosting	1/1	-
43	White Wagtail	<i>Motacilla alba</i>	roosting	7/2	-
44	Willow Warbler	<i>Phylloscopus trochilus</i>	roosting	41/13	-
45	Woodchat Shrike	<i>Lanius senator</i>	roosting	-	1/1

A total of 21 species used the area as a roosting site, thereof 20 passerine species. Passerines mainly migrate at night and spend the day roosting in the vegetation or on the ground. Usually they stay only a single day at a site and continue migration the following night. The most abundant species were Chaffinch, Willow Warbler, Lesser Whitethroat (see Figure 5-36) and Sardinian Warbler (see

Table 5-7). These species are quite common in their breeding areas in Europe and are listed as of “Least Concern” in the IUCN Red List of Threatened Species. In addition, some roosting birds were recorded in the Project Area during standardised observations of bird migration in East Wind sub-areas in spring 2016, in autumn 2016 and in spring 2017 (see SESA Wind Report). Finally, Blackstart (*Cercomela melanura*), another roosting passerine, was encountered during site visits for flora and fauna. To conclude, the Project Area comprises larger Wadis with patches of vegetation (herbs, shrubs and occasionally trees) which form a stopover habitat (mainly for a single day) for passerines during migration. However, according to the low numbers of roosting birds, the Project Area has no significant importance as a roosting habitat.

Two extensive periods of monitoring on migrating birds have been conducted in the wider region of El Minya, to the west and east (in the two East Wind subareas, see SESA Wind Report) of the Nile Valley. The main conclusion of both investigations was that the desert located at minimum distances of 10 km west and east to the Nile Valley has no particular importance for bird migration – neither in spring nor in autumn. As this conclusion can be regarded as well founded and finally verified, sufficient baseline data is available for future impact assessments and no further monitoring in the wider region of El Minya is required.

### Reptiles

During site visits, at least ten species of reptiles were detected within the Project Area (see Table 5-8).

Two of the ten species were snakes: single Sahara Sand Snakes occurred regularly in Wadi al-‘Imrani complex, in Wadi Mushaqqaq and Wadi Mashj (both East Solar-1 subarea). The Horned Viper was rarely found in Wadi al-‘Imrani complex and in Wadi Ibadah and Wadi al-Birshawhi (East Solar-1 subarea). Both species are known to be very common in areas of sandy and rocky desert and sub-desert.

The Saharan Fan-toed Gecko was recorded in Wadi al-'Imrani complex. An individual of the genus *Tarentola* was recorded once. However, other members of the family Gekkonidae can be expected to occur in the Project Area, too.

Bosc's fringe-toed lizard and *Nidua* fringe-fingered lizard appeared quite common at different locations in the East Wind-1 and in the East Solar-1 subarea. Single specimens of Red Spotted Lizard were observed in Wadi Mushaqqaq (East Solar-1), Wadi Umm Timmam (the southern branch) and Wadi al-Mijalid. Moreover, other members of the family Lacertidae might also inhabit the Project Area.

In the East Wind-1 subarea, a Sinai Agama appeared two times. This species inhabits the Eastern Desert and can be found on vertical rocky surface, boulders, under ledges and in caves. In addition, a single Agama of the Genus *Trapelus* was recorded.

**Table 5-8: List of reptiles recorded in the Project Area**

Species		Family	Abundance
Horned Viper	<i>Cerastes cerastes</i>	Viperidae	rare
Sahara Sand Snake	<i>Psammophis aegyptius</i>	Colubridae	rare
Saharan Fan-toed Gecko	<i>Ptyodactylus siphonorhina</i>	Gekkonidae	rare
indeterminate	<i>Tarentola spec.</i>	Gekkonidae	rare
indeterminate	<i>Trapelus spec.</i>	<u>Agamidae</u>	rare
Sinai agama	<i>Pseudotrapelus sinaitus</i>	<u>Agamidae</u>	rare
Bosc's fringe-toed lizard	<i>Acanthodactylus boskianus</i>	<u>Lacertidae</u>	common
<i>Nidua</i> fringe-fingered lizard	<i>Acanthodactylus scutellatus</i>	<u>Lacertidae</u>	common
Red-spotted Lizard	<i>Mesalina rubropunctata</i>	<u>Lacertidae</u>	rare
indeterminate		<u>Lacertidae</u>	rare

As site visits were carried out during daytime but most species of the herpetofauna are night active, the number of individuals and species might be underestimated.

The larger Wadis form suitable habitats for single species that are adapted to the harsh climatic conditions of the Eastern Desert. However, the obtained results clearly show that the herpetofauna is poor in species and density is low. The species recorded in the Project Area are quite widespread and can be found in several desert habitats in Egypt. None of the recorded species is known to be endangered or threatened. Consequently, the Project Area is not an important habitat for reptiles.

### Insects

The site visits revealed that insects could temporarily appear in quite high numbers in the Project Area. During some bird observation periods, bird watching was difficult due to hundreds of flies (mainly from the families Muscidae, Syrphidae) surrounding the observers.

A local insect rarely seen was the Desert Pebble Mantis (*Eremiaphila zetterstedti*). Occasional recordings were made of the Heart and Dart (*Agrotis exclamationis*), a moth of the family Noctu-

idae. Some other specimens from the families Carabidae and Vespidae belong to local insect life too.

Migration was obvious in butterflies, like the African Monarch (*Danaus chrysippus*) and the Painted Lady Butterfly (*Vanessa cardui*), which was regularly recorded in autumn 2016. On single days, up to 10 specimens of the Painted Lady Butterfly were found foraging at flowers of an Acacia tree. Migrating Dragonflies, like Vagrant Emperor Dragonfly (*Anax ephippiger*) and the Lesser Emperor (*Anax parthenope*) and the Red-veined Darter (*Sympetrum fonscolombi*) appeared in the entire Project Area in spring and particularly in autumn. Single grasshoppers, Desert Locust (*Schistocerca gregaria*) and Migratory Locust (*Locusta migratoria*) (see Figure 5-39), were encountered in the Project Area, too.

Local insect life is poor in species and mainly aggregated to the larger Wadis where spots of vegetation can be found. Resting specimen of migratory insects can be found in the whole Project Area. The species recorded in the Project Area are quite widespread and can be found in several desert habitats in Egypt. None of the recorded species is known to be endangered or threatened. Consequently, the Project Area is not an important habitat for insects.



**Figure 5-37:** Reptiles found in the Project Area: Sinai Agama, Saharan Fan-Toed Gecko (top right), Sahara Sand Snake (bottom left) and Bosc's Fringe-Toed Lizard (bottom right)



**Figure 5-38: Exemplary tracks of animals found in the Project Area**

### Spiders

Camel Spiders (*Galeodes arabs*; see Figure 5-39) occurred regularly in the East Wind subareas and can probably be found in the entire Project Area, i.e. also in the East Solar subareas. Moreover, single specimens of the family Salticidae might inhabit the Project Area, too.

The results do not indicate that the Project Area comprises an important habitat for spiders.



**Figure 5-39: Migratory Locust (left) and Camel Spider (right)**

## **5.2.2 East Solar-1**

### 5.2.2.1 Legally protected sites / areas and internationally recognised areas of biodiversity value

There exists no legally protected site / area, no national park nor important bird area and no internationally recognised area of biodiversity value in the East Solar-1 subarea or its surrounding area (e.g. Fouda 2016, Baha El Din 1999).

#### 5.2.2.2 Habitats

Due to the extreme aridity of the Eastern Desert, the gravely and pebbly plains and the elevated areas and small hills within the East Solar-1 subarea do not serve as a suitable habitat for plants. Hence, large parts of the subarea have a very low to no importance as a habitat for plants and animals.

No Wadi within the East Solar-1 subarea was assessed to have a very high or high importance as a habitat for plants and animals. Wadi Ibadah and Wadi al-Birshawi provide appropriate living conditions for single plant and animal species, and thus, differ remarkably from the vast desert habitats dominating the East Solar-1 subarea. The aforementioned Wadi is important for plants and animals (see Table 5-4 and Map 5-2). The importance of all other Wadis as a habitat for plants and animals was assessed to be low or very low (see Table 5-4 and Map 5-2).

As caves form particular structures in the desert offering important habitats for animals, caves in the East Solar-1 subarea, which can be particularly found at slopes, are important as a habitat for plants and animals.

#### 5.2.2.3 Flora

Large parts of the East Solar-1 subarea are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. All species recorded in the Wadis of the East Solar-1 subarea are considered to be of “Least Concern” in the IUCN Red List of Threatened Species. Hence, besides Wadi Ibadah and Wadi al-Birshawi, the East Solar-1 subarea is not important for plants.

#### 5.2.2.4 Fauna

Wadi Ibadah and Wadi al-Birshawi form suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders). However, the obtained results of the investigation clearly show that the local fauna is poor in species and density is low. The species recorded in the East Solar-1 subarea are quite widespread and can be found in several desert habitats in Egypt. None of the recorded species is known to be endangered or threatened. Consequently, the East Solar-1 subarea is not an important habitat for animals.

As Wadi Ibadah and Wadi al-Birshawi comprise patches of vegetation that form a stopover habitat (mainly for a single day) for passerines during migration, it might occasionally be used by a low number of birds as a roosting site. All other parts of the East Solar-1 subarea are of no significant importance as a roosting habitat for birds.

One can clearly derive from the results revealed in the two East Wind subareas that the East Solar-1, which is located between the East Wind-1 and the East Wind-2 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.

#### 5.2.2.5 Zones preclusive or less favourable for solar power development according to the biological environment

Regarding the biological environment, the East Solar-1 subarea does not appear to be particularly sensitive to the development of solar PV power projects (a detailed assessment of likely impacts considering that the typical effects of solar power projects can be found in section 6.2). Large parts of the subarea have no significant importance with regards to the biological environment. The only part that differs remarkably from the vast desert habitats dominating the subarea is the Wadi Ibadah and Wadi al-Birshawi. This Wadi provides appropriate living conditions for single plant and animal species and is, thus, of general importance. Consequently, this Wadi has to be assessed as a less favourable zone that should be considered accordingly when developing solar PV power projects in the East Solar-1 subarea (see Map 7-1). No zones preclusive for solar PV power developments were identified with regards to the biological environment in the East Solar-1 subarea.

As already mentioned, caves form particular structures in the desert, offering important habitats for animals. These structures can be found in the East Solar-1 subarea, particularly at slopes where elevated areas decline into the Wadi. As these structures are only small in extent, they cannot be considered in the SESA which aims to provide a reliable source of environmental and social data for the whole Project Area on a larger scale. However, the issue as to whether important caves will be affected by a certain project and whether likely impacts can be mitigated, shall be investigated in the scope of future project-specific ESIA's.

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 5.2:**  
 Assessment of the importance of main wadis in the East Solar-1 subarea as a habitat for plants and animals



**Bordering of East Solar-1 subarea**

 East Solar-1 subarea

**Importance of main wadis**  
 (note: no wadi was assessed to have a high or very high importance)

-  wadi of importance
-  wadi of low importance
-  wadi of very low importance



### 5.2.3 East Solar-2

#### 5.2.3.1 Legally protected sites / areas and internationally recognised areas of biodiversity value

There exists no legally protected site / area, no national park or important bird area and no internationally recognised area of biodiversity value in the East Solar-2 subarea or its surrounding area (e.g. Fouda 2016, Baha El Din 1999).

#### 5.2.3.2 Habitats

The East Solar-2 subarea is very flat and homogenous comprising gravely and pebbly plains. No larger Wadi exists in the subarea, and thus, it is nearly completely free of vegetation. As there are no cliffs or slopes, caves are extremely unlikely to occur. To conclude, the East Solar-2 subarea is of very low to no importance as a habitat for plants and animals.

#### 5.2.3.3 Flora

There is no larger Wadi in the subarea, and thus, it is nearly completely free of vegetation. Only two small vegetated spots have been found in the subarea: a group of single bushes exists in the centre of the subarea and some herbs grow near the origin of a small Wadi in the north-western part of the subarea (see Figure 5-40). The recorded species are considered to be of “Least Concern” in the IUCN Red List of Threatened Species. To conclude, the East Solar-2 subarea is not an important habitat for plants.



**Figure 5-40:** Single bushes in the centre and some herbs near the origin of a small Wadi in the north-western part of the East Solar-2 subarea

#### 5.2.3.4 Fauna

No larger Wadi exists in the East Solar-2 subarea, and thus, it is nearly completely free of vegetation. Accordingly, the local fauna was found to be extremely poor in species and density was extremely low, too. A pair of Spotted Sandgrouse (with two fledglings) was recorded in the small Wadi near the north-western border of the subarea. Single migrating dragonflies (*Sympetrum fonscolombii*) occurred at a group of bushes in the centre of the subarea. None of the recorded species is known to be endangered or threatened. To conclude, the East Solar-2 subarea is not an important habitat for animals.

#### 5.2.3.5 Zones preclusive or less favourable for solar power development according to the biological environment

Regarding the biological environment, the East Solar-2 subarea does not appear to be particularly sensitive to the development of solar PV power projects (a detailed assessment of likely impacts considering the typical effects of solar PV power projects can be found in section 6.2). The subarea has no significant importance with regards to the biological environment. No Wadi or other particular feature exists that differs remarkably from the vast desert habitats dominating the subarea. Hence, in the East Solar-2 subarea, no zones preclusive for solar PV power development with regards to the biological environment were identified (see Map 7-2).

### 5.2.4 East Solar-3

#### 5.2.4.1 Legally protected sites / areas and internationally recognised areas of biodiversity value

There exists no legally protected site / area, no national park or important bird area and no internationally recognised area of biodiversity value within the East Solar-3 subarea (e.g. Fouda 2016, Baha El Din 1999).

“Wadi Sannur Cave”, a rare geologic feature in Egypt, which is of interest for paleo-climatological records (EEAA 2015), is located at minimum distances of about 8 km northeast to the East Solar-3 subarea (see Map 5-3).

#### 5.2.4.2 Habitats

Due to the extreme aridity of the Eastern Desert the gravely and pebbly plains, the elevated areas and small hills within the East Solar-3 subarea do not serve as a suitable habitat for plants. Hence, large parts of the subarea have a very low to no importance as a habitat for plants and animals.

No Wadi within the East Solar-3 subarea was assessed to have a very high or high importance as a habitat for plants and animals. Wadi ash-Shaykh complex provide appropriate living conditions for single plant and animal species (see Figure 5-41), and thus, differ remarkably from the vast desert habitats dominating the East Solar-3 subarea. The aforementioned Wadi complex is important for plants and animals (see Table 5-4 and Map 5-3). The importance of all other parts of the subarea as a habitat for plants and animals was assessed to be low or very low.

As caves form particular structures in the desert offering important habitats for animals, caves in the East Solar-3 subarea, which can be particularly found in the canyon-like Wadi ash-Shaykh in the northwest of the subarea and at slopes, are important as a habitat for plants and animals.

#### 5.2.4.3 Flora

Large parts of the East Solar-3 subarea are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. All species recorded in the Wadis of the East Solar-3 subarea are considered to be of “Least Concern” in the IUCN Red List of Threatened Species. Hence, besides Wadi ash-Shaykh complex, the East Solar-3 subarea is not important for plants.

#### 5.2.4.4 Fauna

The Wadi ash-Shaykh complex offers suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders). However, the obtained results of the investigation clearly show that the local fauna is poor in species and density is low. The species recorded in the East Solar-3 subarea are quite widespread and can be found in several desert habitats in Egypt. None of the recorded species is known to be endangered or threatened. Consequently, the East Solar-3 subarea is not an important habitat for animals.

As the Wadi ash-Shaykh complex comprises patches of vegetation, which form a stopover habitat (mainly for a single day) for passerines during migration, it might occasionally be used by a low number of birds as a roosting site. All other parts of the East Solar-3 subarea have no significant importance as a roosting habitat for birds.

One can clearly derive from the results revealed in the East Wind subareas that the East Solar-3, which is located north of the East Wind-2 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.



**Figure 5-41:** Wadi ash-Shaykh complex holds several stands of Acacia trees and has, in its north-eastern part, a canyon-like character.

#### 5.2.4.5 Zones preclusive or less favourable for solar power development according to the biological environment

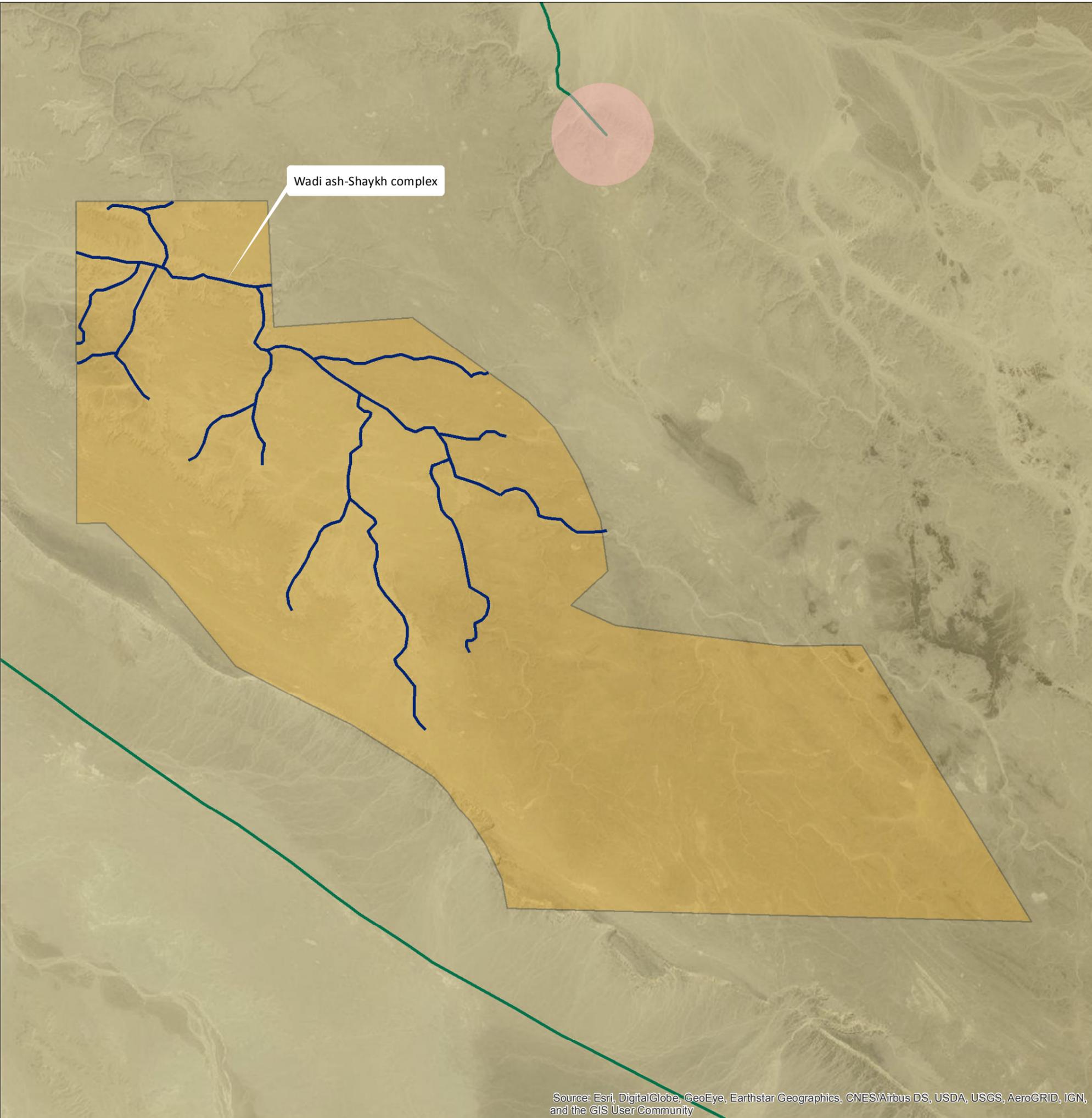
Regarding the biological environment, the East Solar-3 subarea does not appear to be particularly sensitive to the development of solar PV power projects (a detailed assessment of likely impacts considering the typical effects of solar power projects can be found in section 6.2). Large parts of the subarea have no significant importance with regards to the biological environment. The only part that differs remarkably from the vast desert habitats dominating the subarea is the Wadi ash-Shaykh complex. This Wadi complex provides appropriate living conditions for single plant and animal species and is, thus, of general importance. Consequently, this Wadi complex has to be assessed as a less favourable zone that should be considered accordingly when developing solar PV power projects in the East Solar-3 subarea (see Map 7-3). No zones preclusive for solar PV power developments were identified with regards to the biological environment in the East Solar-3 subarea.

As already mentioned, caves form particular structures in the desert, offering important habitats for animals. These structures can be found in the East Solar-3 subarea, particularly in the canyon-like Wadi ash-Shaykh in the northwest of the subarea and at slopes, where elevated areas decline into the Wadi. As these structures are only small in extent, they cannot be considered in the SESA, which aims to provide a reliable source of environmental and social data for the whole Project Area on a larger scale. However, the issue as to whether important caves will be affected by a certain project and whether likely impacts can be mitigated, shall be investigated in the scope of future project-specific ESIA's.

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

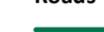
client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 5.3:**  
 Assessment of the importance of main wadis in the East Solar-3 subarea as a habitat for plants and animals



**Bordering of East Solar-3 subarea**

 East Solar-3 subarea

**Roads**  
 road

**Importance of main wadis**  
 (note: no wadi was assessed to have a high or very high importance)  
 wadi of importance

**Protected Area**  
 Wadi Sannur Cave



### 5.3 Social and economic environment

#### 5.3.1 Project Area

##### 5.3.1.1 General and administrative consideration

The three East-Solar subareas are located easterly of the Nile Valley in a desert area adjacent to three Governorates of Beni Suef and El Minya.

The subareas East Solar-1 and East Solar-2 are located in the governorate of El Minya while the subarea East Solar-3) is located in the governorate of Beni Suef, as shown in Map 1-1.

The following sections describe the administrative division and the main social characteristics of the three Governorates.

##### 5.3.1.2 Beni Suef Governorate

Beni Suef is one of the Governorates in the northern Upper Egypt Region, located in the centre of the country. It borders in the north to Giza Governorate, in the east to Cairo Governorate and Red Sea Governorate, in the south to El Minya Governorate, and in the west to Fayoum Governorate. Beni Suef city is the capital of the Governorate, located about 120 km south of Cairo on the west bank of the Nile River. The total area of Beni Suef is about 10,954 km<sup>2</sup> and the populated area is about 1,369.41 km<sup>2</sup>, according to CAPMAS 2017<sup>4</sup>.

#### Population

Beni Suef Governorate population reached 2,953,149 inhabitants who reside in 544,271 households, according to Beni Suef electronic gate<sup>5</sup>. The natural growth rate in Beni Suef Governorate is 25.60 births per 1,000 persons. The birth rate in the Governorate overall is about 31.40 births per 1000 persons and the mortality rate is 5.8 per 1000 persons, according to Beni Suef description by information 2010.

The following table illustrates the population distribution according to sex, rural and urban areas within the Governorate, according to Beni Suef electronic gate.

**Table 5-9: Population Distribution at Beni Suef Governorate**

No. of males	No. of females	Urban inhabitants	Rural inhabitants
1,504,095	1,449,054	720,325	2,232,824

Source: Beni Suef electronic gate (<http://www.benisuef.gov.eg/Default.aspx>)

<sup>4</sup> <http://www.capmas.gov.eg/>

<sup>5</sup> <http://www.benisuef.gov.eg/Default.aspx>

### Education

The following table shows the distribution of Beni Suf population (10 years and over), by educational status according to final results of 2006 census by CAPMAS 2017

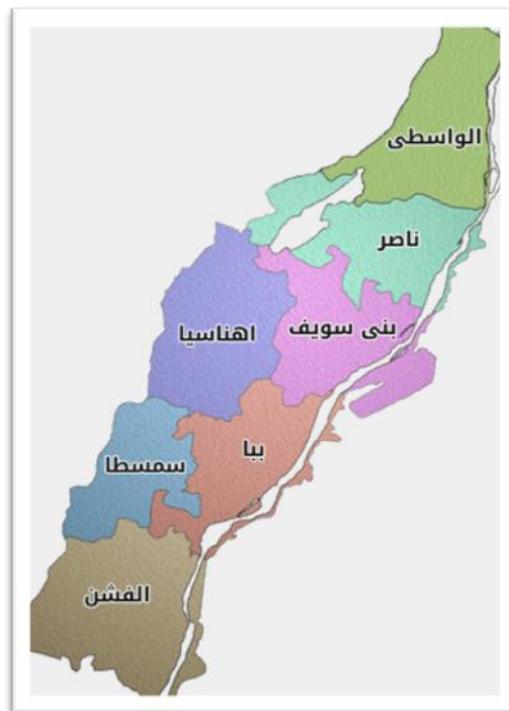
**Table 5-10: Population Distribution by Education Status at Beni Suf Governorate**

Illiteracy rate	Read & write rate	Illiteracy Erasure rate	Below Intermediate	Intermediate rate	Above Intermediate	University	Post graduate
40.5 %	14.6 %	1.1 %	16.9 %	20.5 %	1.5 %	4.8 %	0.1 %

Source: CAPMAS 2017

### Administrative Division

Beni Suf Governorate is composed of seven Markazes (regional counties) which are Beni Suf, Wasta, Nasser, Fashn, Ahnasia, Bpa, and Semsta), The Governorate also encompasses seven cities, 39 local units, and 222 affiliated villages and 860 hamlets according to Beni Suf electronic gate.



**Figure 5-42: Administrative Division of Beni Suf Governorate**

## Socioeconomic activities

### I. Agriculture

According to Beni Suef description by information 2010, Beni Suef is an agricultural Governorate, the total area of cultivated land is about 289.90 thousand feddans. The total cropped area is 569.41 thousand feddans. The most important crops produced in the Governorate include: wheat, cotton, sugar cane, in addition to medical and aromatic plants.

### II. Industry

According to the environmental profile of Beni Suef, Beni Suef Governorate has diversified industrial activities (small-scale industries, medium industries and heavy industries). The industrial sector includes 77 large and medium industrial facilities and about 1,160 small industrial facilities and workshops. 7 % of the total labour force in the Governorate work within the industrial sector. There are eight industrial zones in Beni Suef Governorate – two of them belong to the urban Communities, while the rest are affiliated to the Governorate

The industrial zones are:

- Kom Abu Radi
- Baiad Al Arab
- The industrial zone 1/31
- The industrial zone 2/31
- The industrial zone 3/31
- The industrial zone 4/31
- Heavy industrial zone Gabal Ghareb
- (New urban community industrial zone) New Beni Suef

The most important industries in the Governorate include: vegetables processing and medical and aromatic plants processing, chemicals, garments, slaughterhouses, dairy products, cotton ginning, paper, clay bricks, ceramics, marble, granite and cement.

#### 5.3.1.3 El Minya Governorate

El Minya Governorate lies on both sides of the River Nile. It borders in the north to Beni Suef, in the south to Assiut, in the east to the Red Sea, and in the west to western Desert Governorate.

The city of El Minya is the capital of the Governorate, which is located 245 kilometres to the south of Cairo, 640 kilometres to the north of Aswan, 420 kilometres to the north of Luxor, and about 500 kilometres to the south of the city of Alexandria.

El Minya's total area is about 32,279.00 km<sup>2</sup>, while the populated area is about 2,411.65 km<sup>2</sup>, which represents 7.5 % of the Governorate total area, according to CAPMAS 2017.

### Population

According to CAPMAS (2017) figures, El Minya Governorate population is 5,460,399 inhabitants. The following table shows the population distribution of Minya Governorate including both rural and urban areas. The natural growth rate in El Minya Governorate is 25.10 births per 1,000 persons. The birth rate in the Governorate overall is about 30.80 births per 1,000 persons and the mortality rate is 5.70 per 1,000 persons, according to El Minya description by information 2010, developed by the Information and Decision Support Centre.

**Table 5-11: Population Distribution at El Minya Governorate**

No of Males	No of Females	No of Urban population	No of Rural population	Total population
2,783,472	2,676,927	1,023,540	4,436,859	5,460,399

Source: CAPMAS 2017

### Education

The following table shows the distribution of El Minya population (10 years and over), by educational status according to statistical yearbook 2016:

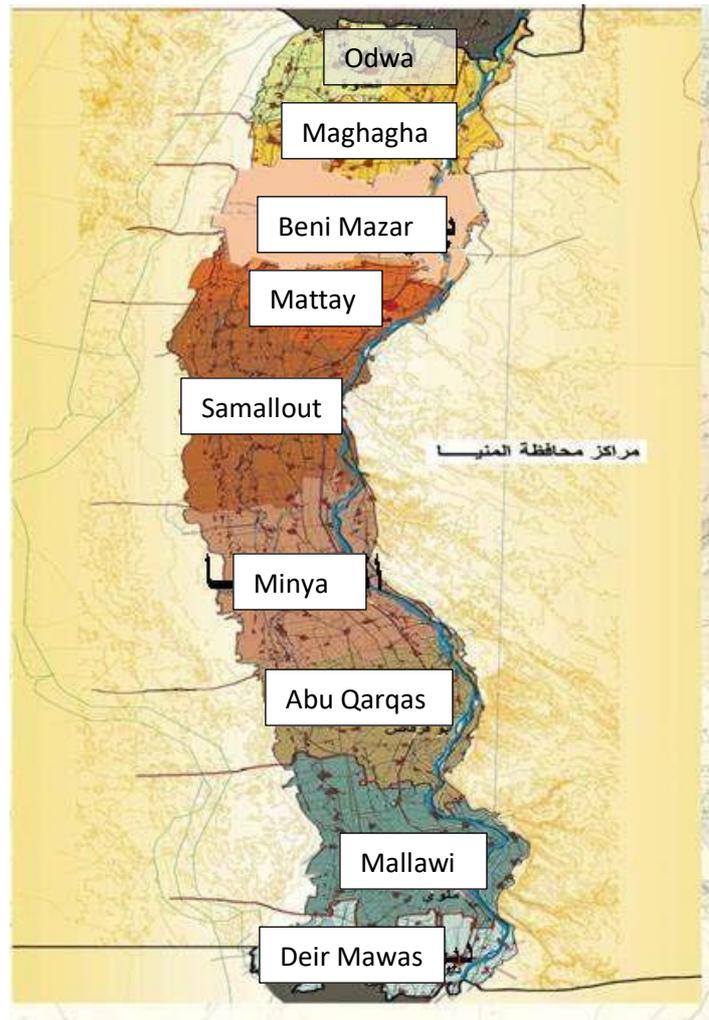
**Table 5-12: Population Distribution by Education status at El Minya Governorate**

Illiteracy rate	Read & write rate	Illiteracy Erasure rate	Below Intermediate	Intermediate rate	Above Intermediate	University	Post graduate
41.3 %	13.3 %	1.6 %	16.8 %	21.0 %	1.3 %	4.6 %	0.1 %

Source: CAPMAS 2017

### Administrative Division

El Minya Governorate is composed of nine Markazes, which are (Minya, Mallawy, Maghagha, Abu Qarqas, Odwa, Beni Mazar, Deir Mowas, Samallout, Mattay), nine cities, 61 rural local units and 299 affiliated villages and 1741 hamlets, according to El Minya description by information 2010.



**Figure 5-43: Administrative Division of El Minya Governorate**

### Socio-economic activities

#### I. Agriculture

According to the environmental profile, El Minya Governorate is one of the leading Governorates in agriculture, producing about 11 % of the total agricultural production all over the country. Field crops represent about 7.6 %, vegetables and fruits represent 3.6 % of the country's production. El Minya comes in first place for producing bee honey and waxes.

The Governorate produces more than ½ million tons of wheat, 1.7 million tons of sugar cane that is used for producing sugar, molasses and about 154,000 tons of sugar beet that is used in producing sugar. The Governorate also produces large amounts of vegetables and fruits for exporting. The Governorate produces 27.1 % of the medical and aromatic plants all over the country.

The area of land applicable to reclamation reached about 200 thousand feddans. That the area is supposed to be reclaimed until 2022, according to the strategy of horizontal expansion (18

thousand feddans west of Beni Mazar, 6 thousand feddans west of Samallout, Maghagha and Odwa and 2550 feddans East of Abo Karkas).

This area represents 0.8 % of the total area that is supposed to be reclaimed by 2022 nationwide, which is estimated to be about 3.3 million feddans. The area of the land already reclaimed in the western desert and belongs to Upper Egypt agricultural company is about 3,300 feddans to be irrigated by three elevation stations at Tarfa, Qamadeer and Saqola.

However, the actual cultivated zemam is about 70 thousand feddans (3,300 in addition to the excluded). Accordingly, there is a problem of encroach upon the water share in the region.

## II. Industrial activities

El Minya Governorate has many industrial activities such as Food Industries, Wood and Furniture, Textile and Ready Made Garments, Printing and Publishing Papers, Medical Products, Engineering Industries, Building Materials, Refractories and Metal, Chemical and leather Industries. In addition, El Minya has sub-centres for small-scale industries and service centres, where the number of existed establishments registered by Industrial Development Authority reached 348, with estimated investment costs of LE 1463 million, employing about 8,984 workers, distributed across all industrial activities.

There are thirteen major industrial centres, which include: Minya City, Minya Centre, New Minya City, Abu Korkas Centre, Eladwa Centre, Bane Mazar, Der Moas Centre, Samalot Centre, Matawy Centre, Maghagha Centre, Mallawy City, Mallawy Centre and Industrial Zone in Matahra.

According to the environmental profile of El Minya, the Governorate has established an industrial zone east of the Nile near Matahra, 12 km south east of the bridge on the Nile. Its area is 1516 feddans and lies 6 km away from New Minya city, adjoined from the west by the agricultural road parallel to the Nile. The structural layout of the region was designed to accomplish optimum use of the land. It was divided according to the expected degree of pollution, in the form of industrial cells, with each cell specialised in a specific industry, and each cell is independent. In addition, there is a central services centre and a compound for small industries on an area of 43 feddans contains about 390 units, the area of each unit is 190 m<sup>3</sup> (142 m<sup>2</sup> of which is covered and 48 m<sup>2</sup> is opened). The cells were also divided in pieces suitable for the type of industry and the expected size of demand, provided that the region can take on 600 projects with 55,000 workers. The cells were divided according to the degree of pollution produced, taking into consideration the prevailing wind in the region. The following are the sub areas of the industrial zone:

- Food industries
- Furniture industries
- Textile and readymade garments industry
- Paper and printing industry
- Medical products industry
- Engineering industry
- Construction materials industry
- Metal industry

#### 5.3.1.4 Land-use

##### 5.3.1.4.1 Mining

The region also consists of a vibrant mining industry. Many mines exist at desert areas. The white bricks extracted from the mines are used for construction. Mining is a very labour intensive industry and hosts a substantial number of workers in the areas. It's less likely that there will be an impact on mining activities, since most mines are not permanent and nearly no mines are located inside the project area. From discussion with mine owners, the potential to find a good source of extracting materials into the areas selected for the project is very low.

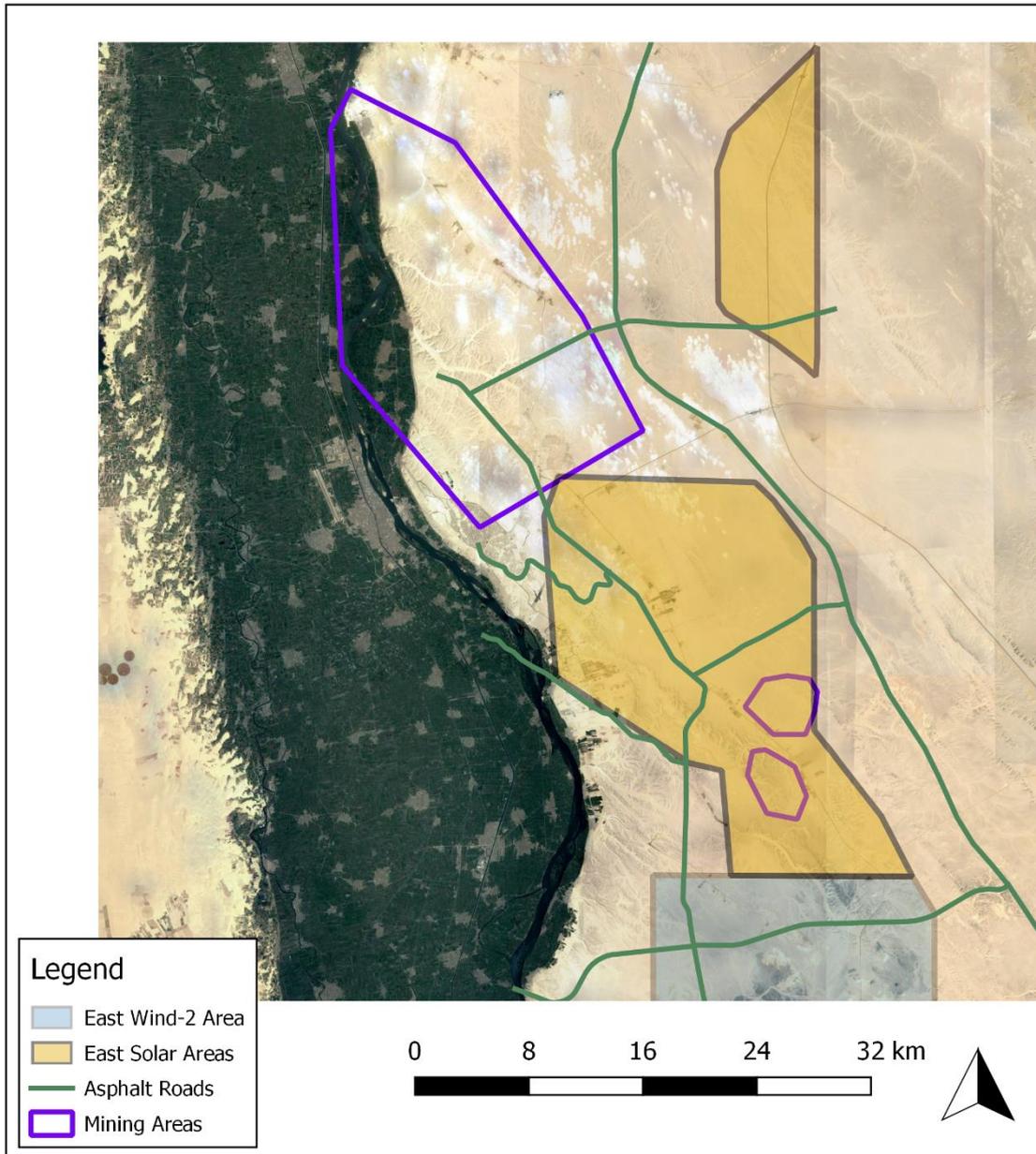
During an interview with the head of the mining department at El Minya Governorate, Dr. Alaa El Din Mohamed Hassan, he indicated that there are plans to move the mining activities away to the east of the new Military road. He mentioned that the total numbers of mines are about 600 mines and that each mine employs about 50 workers. He mentioned that there are estimates that the number of mine workers can be up to 25,000, but this seems exaggerated.



**Figure 5-44: White bricks used for construction**



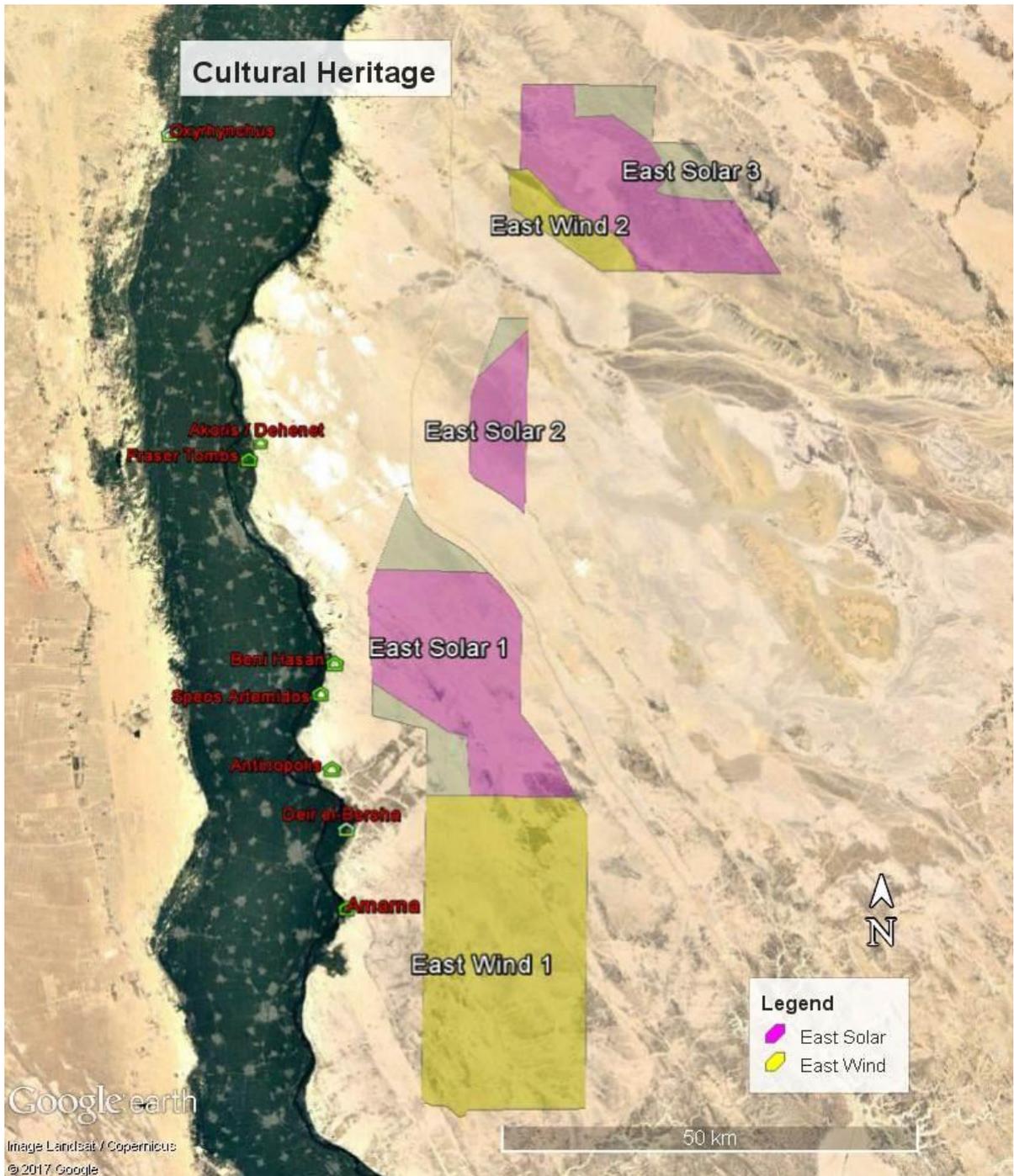
**Figure 5-45: Mining areas**



**Figure 5-46: Extension of Mining Areas**

5.3.1.4.2 Cultural heritage and antiquities

Many archaeological sites are present on the banks of the River Nile, mainly on the east bank (see Figure 5-47). The most famous areas in the region are the sites of Beni Hassan and Tal el Amarna.



**Figure 5-47: Archeological sites**

Beni Hasan is a small village, south of El Minya, where an important group of rock-cut tombs, dating mostly to Dynasties XI and XII, are carved into the high limestone cliffs on the east bank of the Nile. The site is reached via a long steep flight of stone steps up the hillside. From the hillside, there is a nice view up and down the river valley and as the project is in the opposite direction, there is no risk of a visual impact.

The other site Tal El Amarna (9.3 km from East Wind-1) hosts the ruins of the city established in the middle of the 14th century BC by the king Akhenaten to become his new capital. This old city on the east bank of the Nile, that once had a surface area of 15 square kilometres, has many temples, palaces, and fortified walls. Today, few structures remain and only a few items can be viewed to this day. Tal El Amarna also includes two groups of cliff tombs located at the entrance from its southern and northern parts.

All these cultural heritages are well away from the East Solar subareas, and thus, no protection measures are required.



**Figure 5-48: Beni Hassan Tombs**



**Figure 5-49: Access to the Beni Hassan tombs**

#### 5.3.1.5 Roads and Traffic

The Project Area is crossed by the El Minya – Assiut National Road. Moreover, highways Cairo – Aswan and El Minya – Ras Ghareb – Safaga are passing near to the Project Area, facilitating the transport of equipment from Alexandria or the Red Sea ports.

All the roads are in good condition and the traffic seems not too intensive on the main roads.



**Figure 5-50:** El Minya – Assiut National Road in the East Solar-1 subarea

#### 5.3.1.6 Bedouin community near the Project Area

Although no Bedouin camp was identified during the site reconnaissance in the Project Area, the Consultant learned from discussions with the authorities and local Bedouin that many Bedouin are already affected and influenced by other projects. Those impacts have modified their original structure and the consequence of that is that they have constructed settlements at Nile Valley villages, meaning they are not nomads and they are not performing activities such as roaming for resources within the area anymore.

#### 5.3.1.7 Results of Stakeholder Interviews

In order to learn about general views and attitudes of local authorities and population towards the proposed project, meetings and discussion were conducted with the regional Governorates as already described under section 0, and interviews were held with people encountered near the Project Area. The overall knowledge about the project and its impacts was generally very limited in detail.

The following beneficial impacts of the proposed solar farm project were mentioned by the local authorities / population:

##### **Job opportunity for local people**

One of the advantages of big projects like the proposed East Solar subareas is potential job opportunities for semi-skilled and unskilled workers. The proposed project will increase job opportunities for the local people, especially during the construction phase. On top of that, local people get an opportunity to acquire new knowledge and skills that will benefit them.

### Land-use

The planning shall not interfere with any cultural heritages and shall also consider illegal claimed houses. Regarding the mining activities, many statements obtained from the interviewed people concluded that there is no reservation as the mining areas will move to other sites in case solar PV power is installed on “their land”. Many mining areas were claimed to be illegal, as it is preferred by the mine owners not to apply for formal permit since they would have to pay very high fees for the government.

### Cooperation with local Governorates

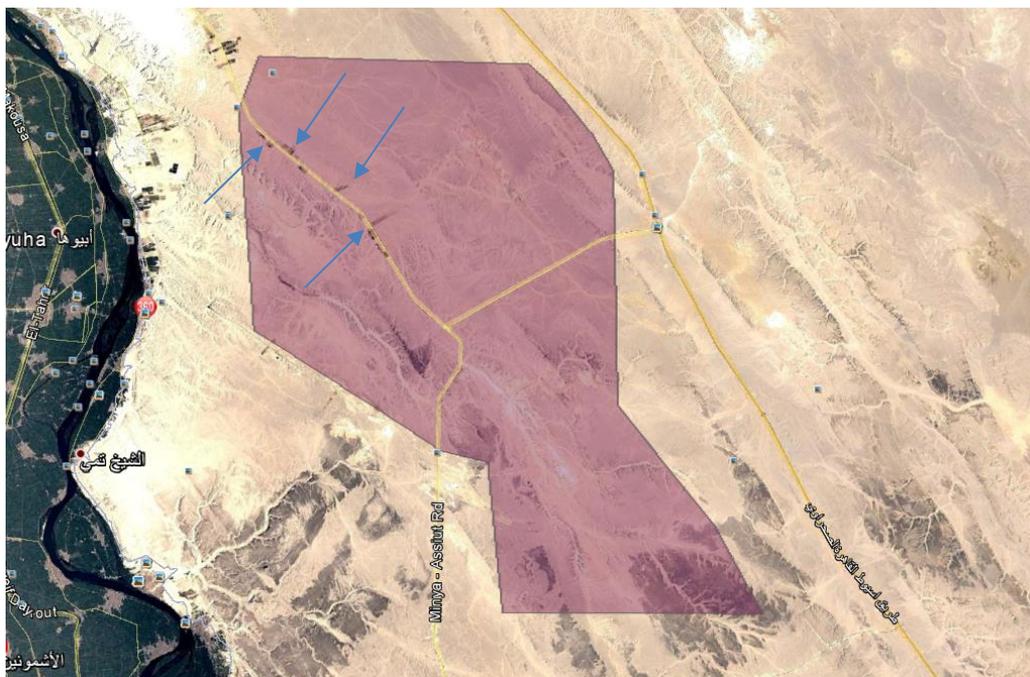
Officials on the Governorate level feel excluded, since they were not included in the selection of the area. They are of the opinion that the presidential decree means they have no potential for future urban expansion in Eastern Desert, although the Project Area is at least 8 km away from current urban areas.

## 5.3.2 East-Solar 1

### 5.3.2.1 Land-use in the East Solar-1

In addition to the land-use aspects as already discussed under section 5.1.1, it was noted during the site reconnaissance in October 2016 that on the El Minya - Assuit Desert Road, land development activities in the East Solar-1 subarea are ongoing.

The social experts discussed with the farmers about those activities. It was indicated that water is available and it is possible to dig a well to extract water easily. Then they start planting the plot from the well water, which is quite adequate for irrigation.



**Figure 5-51: Google Map showing the farming activities in East Solar-1 subarea**

For each farm, four to five farmers are employed. Only men arrive first for working on the farms without their families, since it is still labour intensive to farm and it is not possible to host families there. They have electricity from the nearby electricity company.

The following figures are from farms in East Solar-1 subarea, most along the Menia - Assuit Desert Road and visited by the social experts.



**Figure 5-52: Grape farm at one of the newly reclaimed areas inside East Solar 1**



**Figure 5-53: Water well and pump used for irrigation**



**Figure 5-54:** Irrigation system inside East Solar 1



**Figure 5-55:** Farm along Menia - Assuit Desert Road in East Solar 1



**Figure 5-56:** Farm along Menia - Assuit Desert Road in East Solar 1



**Figure 5-57: Interviews with farmers inside the East Solar-1 subarea**

During the interviews with the farmers, they indicated that the land development activities in the Project Area are coordinated by one family called the “Ba’gar Family”. They are the ones responsible for dividing the plots and supporting the encroachment process until the person becomes officially the land owner.

The team visited the farm owned by the Ba’gar Family, located at the El Minya - Assiut National Road in the north of the East Solar-1 subarea, and we discussed with the head of the family Sayed Ba’gar the farm land development activities in the area.



**Figure 5-58: Farm sign "Ba'gar family"**



**Figure 5-59: Interview with Mr. Sayed Ba'gar**

Mr. Ba'gar explained the process of land encroachment and that many areas along the El Minya - Assiut National Road (mostly in the East-Solar-1 subarea) are already planned to be used for farming by many people. He mentioned that there are even some projects that are planned in the area including an electricity project and other farming investments.

He mentioned that the price of the feddan is about 7,000-8,000 Egyptian pounds if not planted and about 15,000 Egyptian pounds if already planted.

He suggested that the normal practice for development projects is to have an agreement with the local "Arabs" or original people of the area. They provide security services in the area in addition to any job opportunities for unskilled labour. Usually such arrangements are agreed upon with the local community before starting any developmental projects.

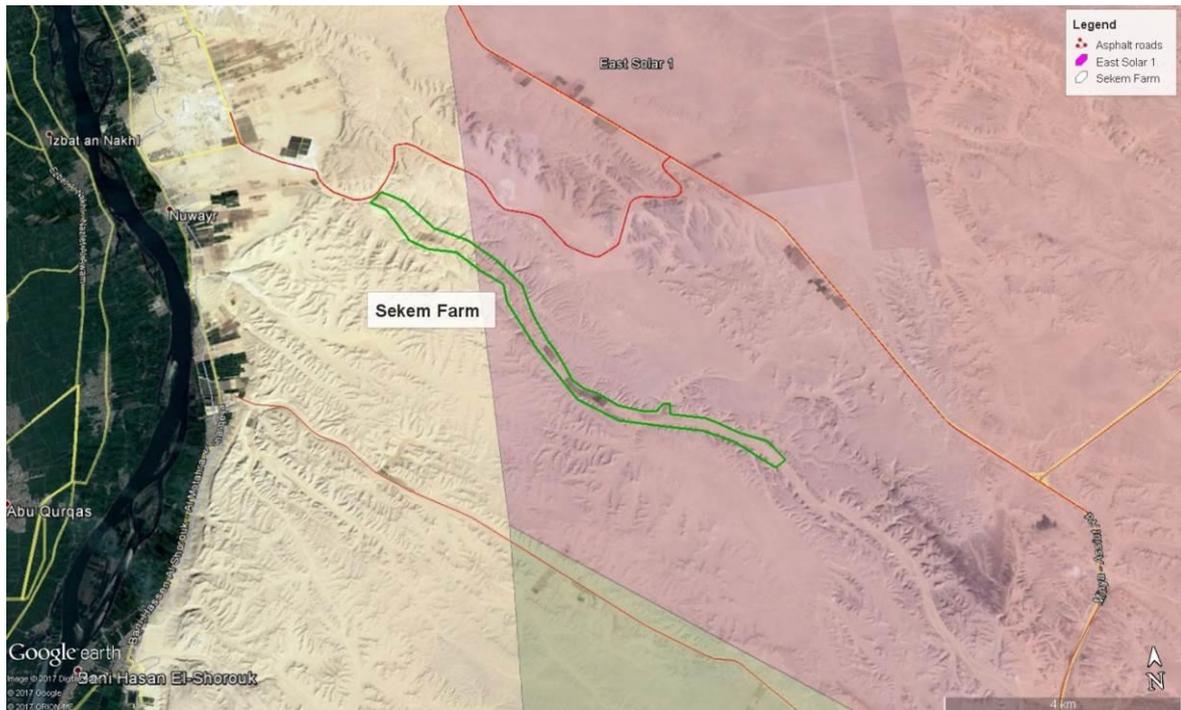
Besides some farming, the East Solar-1 subarea accommodates two areas for gravel quarrying in the centre, a marble mine as well as a quartz mine in the south of the area.

#### Sekem Farm

The Sekem Farm extends for about 14 km with a total area of about 420 ha. The farm is established at an old storm water drain (Wadi al-Mashj) and is mainly located in the East Solar 1 subarea (see Figure 5-61). Only 70 ha are currently cultivated but the remaining area is reclaimed gradually. Sekem Farm is owned by Sekem Company, which conducts organic farming for producing medical herbs. The company also exports its products so they apply high standards in farming, ensuring that no pesticides are used. Currently about 19 permanent workers are employed in addition to 30 temporary workers. The farm is irrigated using wells and has a guest house which was not used during the site visit.



**Figure 5-60:** A general view of Sekem Farm



**Figure 5-61: Google Map of Sekem Farm (inside East Solar-1 subarea)**



**Figure 5-62: Sekem organic farming activities**

The farm represents one of the sensitive receptors to be considered during developmental activities in East Solar-1 subarea. The meeting with two of the management staff of Sekem Farm who were available during the visit indicated that they need a buffer zone from any developmental activities of about 100 metres. This is to protect the plants from any pollutants and allow them to keep their quality of products. They also expect that no chemicals will be used to clean the solar panels, if they are close to the farm.



**Figure 5-63: Sekem Farm – House for workers**

#### 5.3.2.2 Roads and Traffic

Main access to the East Solar-1 subarea is via the Cairo-Assiut Road, which passes the site from northwest to south. In addition, there is a paved road connection in an east-west direction, which connects the El Minya-Assiut Road and the Military Highway, located in the central section of the East Solar-1 subarea.

#### 5.3.2.3 Zones preclusive or less favourable for solar power development according to socio-economic criteria

An evaluation of the socio-economic environment for land-use accessibility and competing land-use that are identified as a preclusive area or other criteria that are less favourable for solar power development.

##### **Accessibility:**

No preclusive or less favourable areas were identified. The accessibility of the whole area is classified to be favourable. The East Solar-1 subarea is crossed by open asphalt roads. Any necessary internal access roads to the different portions of the East Solar-1 subarea can be built on land allocated by Presidential Decree. However, to minimise costs for road construction and transport, it is recommended to implement the first solar plants near the road infrastructure.

##### **Land-use:**

Several farming activities and land reclamation activities were identified in the East-Solar-1 subarea as described under section 5.3.2.1 and must be considered preclusive areas.

### **5.3.3 East-Solar-2**

#### 5.3.3.1 Land-use in the East Solar-2 subarea

In the East-Solar-2 subarea, no land development activities or any other settlements, constructions or installations were observed.

#### 5.3.3.2 Roads and Traffic

The access to the East Solar-2 subarea would be from the direction of El Minya via the Cairo - Assiut National Road and via the new El Minya - Ras Ghareb Highway (see also section 5.1.3) which crosses the southern part of the East Solar-2 subarea.

#### 5.3.3.3 Zones preclusive or less favourable for solar power development according to socio-economic criteria

An evaluation of the socio-economic environment regarding land-use and access concluded that there are no restrictions for solar power development.

### **5.3.4 East-Solar-3**

#### 5.3.4.1 Land-use in the East Solar-3 subarea

Similar to the East-Solar-2 subarea, no land reclamation or any other settlements, construction or installation activities were observed in the East Solar-3 subarea.

#### 5.3.4.2 Roads and Traffic

No direct access via paved roads is available for the East Solar-3 subarea, which requires the construction of new roads from the existing Cairo - Aswan Highway over a long distance and on complex terrain with steep valleys.

#### 5.3.4.3 Zones preclusive or less favourable for solar power development according to socio-economic criteria

An evaluation of the socio-economic environment regarding land-use and access concluded that there are no preclusive areas due to land-use. However, the whole East Solar-3 subarea is considered less favourable due to the difficult respectively intensive costs site for access as mentioned under section 5.3.4.2

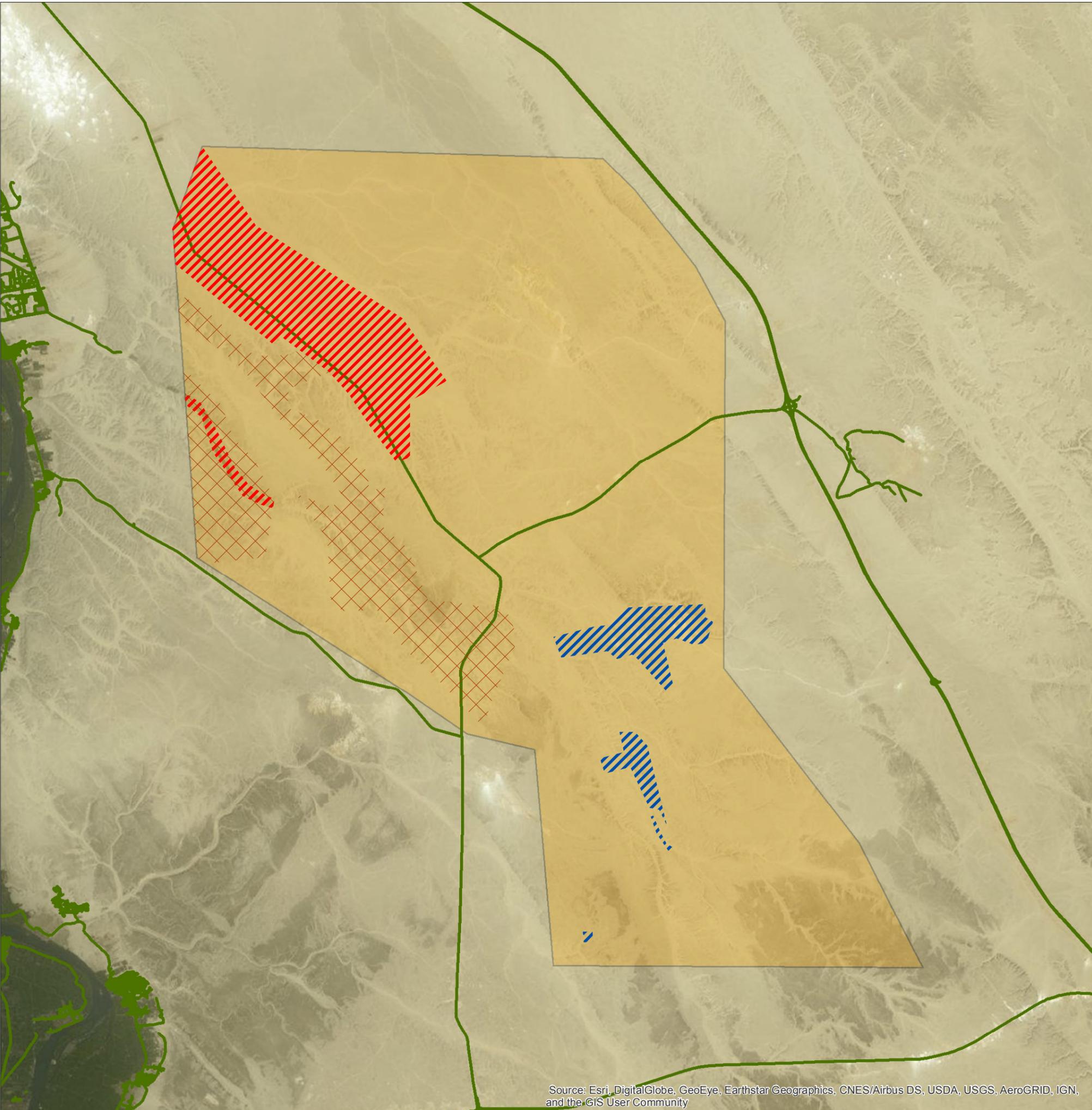
## **5.4 Conclusion**

Maps 5-4 (East Solar-1 subarea) and Map 5-5 (East Solar-3 subarea) indicate the identified preclusive and less favourable zones in the previous sections (no preclusive and less favourable zones in the East Solar-2 subarea).

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 5.4:**  
 Zones preclusive or less favourable for PV solar power development in the East Solar-1 subarea



**Bordering of East Solar-1 subarea**

 East Solar-1 subarea

**Roads**  
 roads

**Zones preclusive for PV solar power development**

-  due to economic activities (farming)
-  due to economic activities (mining)

**Zones unfavourable for PV solar power development**

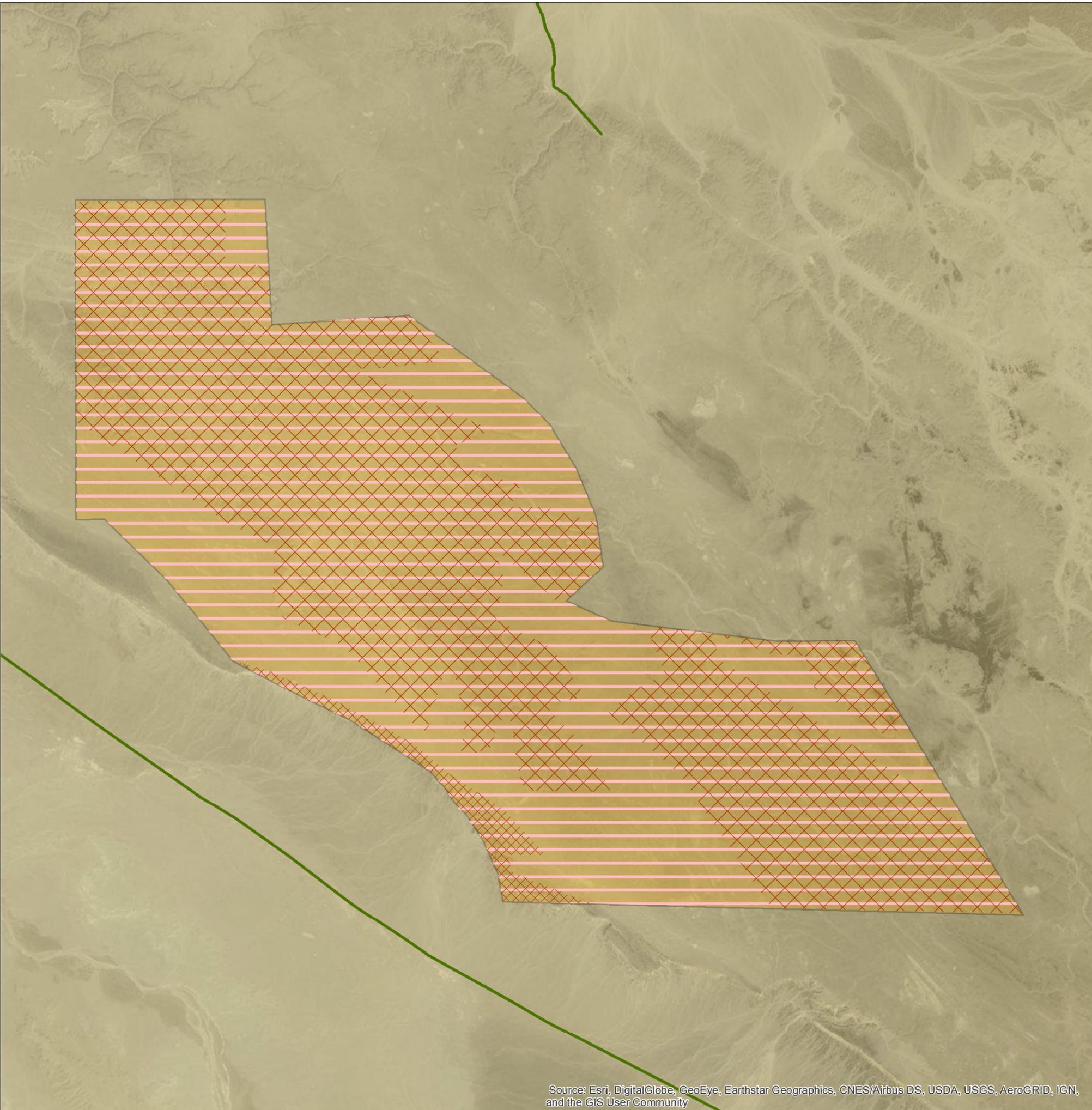
 due to geomorphology



**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 5.5:**  
 Zones preclusive or less favourable for PV solar power development in the East Solar-3 subarea



**Bordering of East Solar-3 subarea**

 East Solar-3 subarea

**Roads**  
 road

**Zones preclusive for PV solar power development**  
 due to geomorphology

**Zones unfavourable for PV solar power development**  
 due to geomorphology  
 due to accessibility



## **6 Prediction and Evaluation of Impacts on the Physical, Biological and Social-Economic Environment identified during Scoping**

In the absence of detailed planning at this stage, the prediction and evaluation of impacts is carried out for typical wind power projects. Impacts are predicted considering that zones already identified to be preclusive for solar PV power development are excluded (see sections 5.1.2 and 5.1.3). Impacts that depend on the size of a project (e.g. use of water resources, waste and wastewater generation, traffic load, social impacts) are predicted and evaluated under the following safe assumptions:

Construction Phase:

- A maximum of three 50 MW solar PV projects will be constructed in parallel in the East Solar-1 and East Solar-2 subareas, and
- The construction period for an individual 50 MW solar PV plant is about 6 to 8 months.

Operation Phase:

- As a safe scenario, it is supposed that the East Solar subareas, except areas that are defined to be preclusive, will be used by solar PV plants, installed according to rules of thumb, keeping sufficient distances for maintenance roads and infrastructure and avoiding important Wadis or other difficult areas. It is estimated that up to 100 solar PV plants with a total installed capacity of 5.0 GW will be operated in parallel in the East Solar-1 and East Solar-2 subareas.

When determining the event magnitude, the baseline conditions are taken into consideration (e.g. limitation of existing resources, already existing pollution and current use). Thus, the evaluation already considers the cumulative impacts. For the methodology of the impact significance assessment, please refer to section 4.5. In the subsequent sections, no tables for event magnitude have been provided if not appropriate or if impacts are obviously negligible.

### **6.1 Physical Environment**

#### **6.1.1 General**

Potential impacts on the physical environment resulting from solar PV power development in the East Solar-1, East Solar-2 and East Solar-3 subareas were identified in the initial phase of the project and further discussed and amended during the scoping meeting on 12 July 2016. Potential impacts were summarised and assessed regarding their likely significance in the Scoping Report of October 2016. Based on further data collection, especially through field investigations, the earlier identified potential impacts are subsequently predicted and evaluated, always considering that subareas identified to be preclusive (see section 5.1) for PV power development are excluded. Impact significance is carried out for both the construction phase and the operation phase. For decommissioning, the same impact significance applies as for the construction phase.

### 6.1.2 Land-use/Land-take

Solar PV Plant development shall take place in areas only that are free of any existing land-use. Accordingly, the impacts of planned solar PV Plant development represent the cumulative impact. The net area coverage rate of land-use/land-take for solar PV power development (roads, platforms, foundations, auxiliary installations) is about 70% to 90 % during the construction and operation phase. These percentages will be lower in subareas containing Wadis, considering that the solar power construction will not extend into Wadis (because of more complex terrain structure and limited space, the risk of occasional Wadi runoff, and stability of the Wadi bed and Wadi Banks/Hangs) except for a few road or medium voltage line crossings. The land-use/land-take impact is evaluated against the nature of the ground.

**Table 6-1: Event Magnitude land-use/land-take**

Attribute	Value (construction period)	Remark (Construction Period)	Value (operation period)	Remark (Operation Period)
Extent	High	Area coverage rate 70 to 90 %	High	Area coverage rate 70 to 90 %
Frequency	Low	One time	Low	one time
Duration	Medium	Construction period about 6 months for a plot	High	Permanent
Intensity	Low	Almost all construction measures limited to upper surface (shallow foundations) only	Low	No effects on soils except shading

Accordingly, the event magnitude is judged to be medium for all phases.

As the receptor is of low value (non-vegetated desert sand or rocks) with a high resilience (a little affected by construction measures only) the receptor sensitivity is evaluated to be low for all phases.

Because of a medium event magnitude and the low receptor sensitivity, the cumulative impact significance of land-use/land-take is evaluated to be minor for both the construction and the operation phase.

### 6.1.3 Landscape character and visual impact

Solar PV power development is the only planned measure for the East Solar subareas. Impacts on the landscape discussed hereafter are cumulative impacts. A potential deterioration of landscape due to the solar power installations has an impact of about 3 km, in case of unhindered view. The visual impact is evaluated against a human receptor.

**Table 6-2: Event magnitude of visual impact**

Attribute	Value (con- struction period)	Remark (Construction Period)	Value (op- eration period)	Remark (Operation Period)
Extent	Low	Building height limit of 5 m only	Low	Building height limit of 5 m only
Frequency	High	Continuously	High	Continuously
Duration	Medium	Installation period 3 to 6 months for a plot	High	Permanent
Intensity	Low	Low impact intensity due to vast desert character of landscape	Low	Low impact intensity due to vast desert character of landscape

Accordingly, the event magnitude is judged to be medium for all phases.

Depending on the locations, receptors (people) are either not present or very seldom at or near to the site (e.g. passing on roads or a very minor number of people working at gravel plants or farms). Considering that places of current human activities are already excluded from potential PV power development (preclusive areas), for the remaining subareas, human receptors are only affected marginally during all phases. Therefore, the receptor sensitivity is assessed to be low for all phases.

With a medium event magnitude and a low receptor sensitivity, the cumulative impact significance of land-use/land-take is evaluated to be minor for both the construction and the operation phase.

### 6.1.4 Water resources and wastewater

Water will have to be transported from the sources inside and next to the River Nile Valley. These water sources are fed by the River Nile, with an average discharge of about 2,000 m<sup>3</sup>/s (averaged between Aswan and Cairo gauge). Water supply will be mainly required for the construction phase, i.e. for concrete making, for anti-dust spraying and for sanitary purposes.

Considering a typical 50 MW project consisting of about 180 PV strings, each mounted on racks with two foundations of 1 m<sup>3</sup> volume, the overall concrete volume for foundations will be about 350 m<sup>3</sup> only. The concrete making water demand for the foundations of each rack is about 0.35

m<sup>3</sup> and the total water demand for all the panels of about 60 m<sup>3</sup>. Additional water will be required for smaller foundations of auxiliary equipment (e.g. Inverter and MV Transformer blocks) and the civil works of the attributable portion of a common HV Substation (e.g. one substation for 5 solar PV plots), all considered by 20 % surcharge. Further safe assumptions are that not more than 100 foundations per week can realistically be constructed in a 50 MW plot and that no more than three plots will do foundation construction in parallel. Accordingly, water demand for construction works in should not be in excess of 55 m<sup>3</sup> per week.

In addition, sanitary water consumption of 10 -15 l/d per worker for up to 40 workers per plot and water spraying for dust protection of 5 m<sup>3</sup> per day are considered. Accordingly, the cumulative average total daily water consumption during peak construction periods in the solar power development areas is about 18 m<sup>3</sup>/working day is equivalent to about 0.2 l/s. During the operation phase, from time to time, very little amount of water will be required for cleaning. For instance, pressure washing requires about 0.3-0.8 l/m<sup>2</sup> of water depending on the nozzle, and wet-contact cleaning (brush and squeegee) can use as little as 0.05-0.3 l/m<sup>2</sup>, depending on the solution.

Wastewater is limited to biodegradable water from sanitary facilities of about of 2 m<sup>3</sup>/d on solar power development areas.

**Table 6-3: Event magnitude for cumulative impact on water resources**

Attribute	Value (construction period)	Remark (Construction Period)	Value (operation period)	Remark (Operation Period)
Extent	Low	Abstraction at individual sources with good yield.  Wastewater generation at few sites (site offices/construction yard)	Low	Not measurable. Depending on number of PV plots
Frequency	Low	Temporary	Low	Occasionally during service visits only or after sandstorms
Duration	Low	Coherent periods of estimated 4 months	Low	Short (1-2 days for 50 MW)
Intensity	Low for water consumption  Medium for wastewater	0.2 l/s water consumption compared to 2,800,000 l/s resources  Estimated 2 m <sup>3</sup> /day of well degradable domestic wastewater in the overall solar power development area	Low	0.3-0.8 l/m <sup>2</sup> depending on the cleaning solution

**Water Consumption:** Considering the large water resources in the Nile Valley, the abstraction of water during the construction phase is marginal. During the other phases, even no measurable water consumption will take place. Accordingly, the event magnitude is evaluated to be low for all phases. The receptors (groundwater aquifers) are not intensely used. However, the resilience of the water wells is limited to their individual capacities and sensitive to overutilisation during the construction phase. Accordingly, the receptor sensitivity is evaluated to be medium for the construction phase and low during the other phases (no measurable water demand). With a low event magnitude and a medium receptor sensitivity, the cumulative water consumption impact significance is assessed to be minor for the construction phase. During the other phases, the impact significance is negligible.

**Wastewater:** The estimated amount of 2 m<sup>3</sup>/d of wastewater requires treatment for hygiene reason. This event magnitude is assessed to be medium for the construction phase and low for the operation phase. The receptor (desert ground) has limited or no value and will be marginally affected only. Accordingly, the receptor sensitivity is evaluated to be low for all phases. With a medium event magnitude and a low receptor sensitivity, the cumulative impact significance is assessed to be minor during the construction phase. During the operation phase, the impact significance is negligible.

### 6.1.5 Domestic and hazardous waste

#### Construction phase

Considerable amounts of solid waste will be generated by solar PV power construction projects. The waste essentially consists of packing material (paper, plastics, wood) for transportation of the PV panels and auxiliary equipment components. The waste will occur mostly at the individual erection sites and in the construction yard. With favourable wind conditions, the waste can easily spread over the desert and be transported over large distances. Domestic waste quantities generated by construction workers are marginal.

The only possible source for hazardous waste caused during construction is spilt oil and grease originating from construction equipment (e.g. lorries, excavators, craned) and from handling of deliveries (e.g. transformer oil). Both the littering of waste and the spillage of hazards can easily be avoided by proper workmanship and strong supervision.

#### Operating phase

Marginal non-hazardous waste amounts might be caused during eventual repair measures and exchange of components. No permanent personnel is expected to stay at the site except a few guards, which do not cause measurable waste quantities.

**Table 6-4: Event magnitude for domestic and hazardous waste**

Attribute	Value (con- struction period)	Remark (Construction Period)	Value (op- eration period)	Remark (Operation Period)
Extent	Medium	Waste generation at individual construction sites and construction yard only.	Low	Marginal
Frequency	Low	Temporary at different spots	Low	Only occasionally
Duration	Low	Coherent periods of estimated about 6 months	Low	n/a
Intensity	Low	On average, still small over the area	Low	Marginal

Accordingly, the event magnitude is evaluated to be low to medium during the construction phase and low during the operation phase.

Considering that the soil and subsurface are of little value and that soils/subsurface are only marginally affected, the receptor sensitivity is evaluated to be low during all phases. Accordingly, the significance of cumulative impacts resulting from waste is evaluated to be minor during the construction phase and negligible during the operation phase.

### 6.1.6 Air Quality

During the construction phase, some emissions of exhaust gases of machinery and dust at individual construction places (road construction and excavation sites) may occur. During the operation phase, only occasional service visits will take place.

The event magnitude of emissions is evaluated as follows:

Depending on the locations, receptors (external people) are either not present or very seldom at or near to the site (e.g. passing on roads or a very minor number of people working at gravel plants or farms). Considering that places of current human activities are already excluded from potential solar power development (preclusive areas), for the remaining subareas, human receptors are affected marginally – well below standards during all phases. Therefore, the receptor sensitivity is assessed to be low for all phases.

Low to medium event magnitude and low receptor sensitivity signify a minor significance of impacts on the ambient air quality during the Construction Phase, which is rather a matter of occupational health and safety. During the operation phase, event magnitude and receptor sensitivity are low. Accordingly, the impact significance is negligible.

The event magnitude of emissions is evaluated as follows:

**Table 6-5: Event magnitude for impact on air quality**

Attribute	Value (con- struction period)	Remark (Construction Period)	Value (op- eration period)	Remark (Operation Period)
Extent	Low	At working sites and along gravel roads only	Low	Marginal
Frequency	Low	Temporary	Low	Occasionally, during service visits only
Duration	Low	During working hours of machinery and transports only	Low	Very short
Intensity	Low to medium	Dust generation mainly depending on wind speeds	Low	Very low emissions

Accordingly, the event magnitude is evaluated to be low to medium during the construction phase and low during the operation phase.

Depending on the locations, receptors (external people) are either not present or very seldom at or near to the site (e.g. passing on roads or a very minor number of people working at gravel plants or farms), what corresponds to a presence score of '1' for all phases. Considering that places of current human activities are already excluded from potential PV power development (pre-clusive areas), for the remaining subareas, human receptors are affected marginally – well below standards during all phases. Therefore, the receptor sensitivity is assessed to be low for all phases.

Low to medium event magnitude and low receptor sensitivity signify a minor significance of impacts on the ambient air quality during the Construction Phase, which is rather a matter of occupational health and safety. During the operation phase, both, event magnitude and receptor sensitivity, are low. Accordingly, the cumulative impact significance is negligible.

### 6.1.7 Noise and Reflection

As potential human receptors, working personnel on the farms or mining areas in the East Solar-1 and East Solar-3 subareas were identified. For these receptors, standards for commercial or industrial properties apply. Relevant applicable ambient noise level standards are 70/70 dB (day/night time) according to IFC EHS Guidelines and 65/ 55 dB according to the Egyptian Law 4/1994, executive regulations, Annex 7. The more stringent Egyptian standards are considered.

The event magnitude of noise is classified as per the table below:

**Table 6-6: Event magnitude for noise and reflection**

Attribute	Value (con- struction period)	Remark (Construction Period)	Value (op- eration period)	Remark (Operation Period)
Extent	Low	Noise only from working sites	Low	No noise emissions
Frequency	Low	Occasional noise emissions from construction works,	Low	No noise emissions
Duration	Low	Noise emissions only occasional, during working hours, not during night times	Low	No noise emissions
Intensity	Low	Limited intensity of noise emissions away from other economic activities (e.g. by jack hammering in the case of excavating foundation pits in rocky underground)	Low	No noise emissions

Accordingly, the event magnitude is evaluated to be **low** during all phases.

Human receptors in the neighbourhood of solar PV development plots, such as workers or farmers i.e. personnel in a few dispersed commercial or industrial properties, are not permanently living at the working place. Moreover, their working places are at least 300 m in distance from the PV plant plots (300 m distance buffer from borders considered for preclusive areas), therefore the noise levels at receptors' place will be much lower than the limit of 65 dB during daytime during the construction phase. Accordingly, the cumulative receptor sensitivity is evaluated to be low during the construction phase. This applies also for the other phases, when no noise emission will take place. For the workers employed with noise intensive works at the construction sites, it is assumed that generally accepted occupational H&S standards will apply.

Low event magnitude and low receptor sensitivity signify a negligible noise impact significance during all phases.

### 6.1.8 Archaeological, historical and cultural heritage

The site investigation revealed that all the three East Solar subareas are free from archaeological, historical and cultural heritages. Moreover, this applies also for the surroundings, i.e. for distances from the border of more than 5 km. Accordingly, it is obvious that impact significance is negligible and not subject to detailed evaluation. However, there might be the chance that throughout construction activities, archaeological remains buried in the ground are discovered. The procedures for handling such remains if identified shall be defined in a Chance Find Procedure to be devel-

oped by the project developers and integrated in the Contractors environmental management plan, taking into consideration local laws as well as in accordance with EBRD PR 8 and IFC PS 8.

### 6.1.9 Impact on traffic, utility services

The solar power development will be independent from existing utility services, as will water supply, wastewater treatment and electricity supply. Water will be provided by tankers from high yield sources in the Nile Valley (see section 6.1.4).

The 50 MW PV plants will be connected to the national power grid, which requires expansion before commissioning the PV plants. This requires in-depth load flow analysis, power grid expansion planning and implementation studies.

The traffic load caused by solar power development can be estimated for the construction phase, considering the safe assumption of parallel work on three solar farms as well as parallel delivery of PV and auxiliary equipment over a period of 3 months. Except for the power transformers of substations (e.g. one 125 MVA Transformer for two 50 MW PV plants), no heavy haulage transport is required.

**Table 6-7: Estimated traffic impact**

<b>Estimate of Traffic Caused by solar power development</b>	<b>No. per working day</b>
600 transports of solar panels	10
Auxiliary equipment such as racks and cables + foundation reinforcement, inverters, transformers	10
Water supply tankers for water supply, each 30 m <sup>3</sup> for concrete (incl. 45 % surplus)	5
Aggregates, lorries of 20 m <sup>3</sup> each	12
Construction and installation materials for substation, 3 x 2 lorries	6
Transport of personnel, utility services, supplies, 3 x 8 minibuses or small lorries	24

Accordingly, the average expected additional traffic load per working day caused by solar farm development during the construction phase is about 45 large lorry transports and 25 transports by smaller vehicles including minibuses, pick-ups or small lorries. Distributed over a working day (10 hours), this corresponds to an additional traffic load of 4.5 lorries per hour and 2.0 smaller vehicles per hour.

For the East Solar-1 subarea, this may be compared to the current traffic load on the El Minya and Assiut Road (see Figure 5-1), which is the most frequented road in the area. A rapid assessment revealed a number of 45 small vehicles (personal cars, minibuses, pick-ups) and 40 lorries per hour in one direction on this road. Assuming that all additional peak traffic load will apply for the same road stretch, the current traffic load will be increased by about 10 %, resulting to a total traffic load of about 50 small vehicles and 45 lorries per hour and per direction. With such a traffic load during the construction phase, the El Minya – Assiut Road, like other asphalt roads in the area, all being well-dimensioned, has not reached its capacity by far. During the operation phase, the additional traffic load is very small and not quantifiable.

In case of East Solar-2, the estimated traffic caused by PV plant development may be compared to the very low traffic utilisation of the new El Minya – Ras Ghareb Highway.

Accordingly, the event magnitude is evaluated to be low during all phases.

Even when considering the extra traffic load during the construction phase, the overall traffic on the asphalt roads in the area is still low. Moreover, the roads are well dimensioned and have not reached their capacity by far. During the operation phase, the additional traffic load is not quantifiable.

Low event magnitude and low receptor sensitivity signify a negligible cumulative impact significance of traffic caused during all phases.

**Table 6-8: Event magnitude for traffic impact**

Attribute	Value (construction period)	Remark (Construction Period)	Value (operation period)	Remark (Operation Period)
Extent	Low	Moving on individual places only	Low	Only occasionally service cars
Frequency	Low	In average per hour 4.5 lorries and 2 smaller vehicles for the overall solar power development areas	Low	Very seldom
Duration	Low	Only passing	Low	Only passing
Intensity	Low	Heavy haulage only in exceptional cases	Low	No noise emissions

#### 6.1.10 Run-off / flash flood risk

The region is hyper-arid with very minor precipitation during winter times. However, occasionally rains of high intensity can occur. Such rains are typically of a convective nature and accordingly of limited spatial extension and duration. There is no statistical evidence on the occurrence interval

of such rains. E.g. during the west Nile Measuring Programme 2012-2013 at about 100 km distance to the west, such events were observed twice at different measurement locations, causing damages to sensors (lightning strike) and a sudden large temperature drop.

If such torrential rains fall on areas with mountainous character (i.e. larger hangs with of good gradients, narrow Wadis with high slopes) the resulting runoff can accumulate and develop to become dangerous flash floods. Other special features for such Wadis are larger rocks to be found in the Wadi bed. Such flash floods are flattened once they reach less steep and more ample Wadi beds.

Desktop studies and field inspection to the East Solar-1, East Solar-2 and East Solar-3 subareas revealed that Wadis existing on these areas are not prone to such floods. Cross sections are wide, slopes are shallow and hill heights above Wadi beds only ascend up to 50 m. Moreover, Wadis existing on these areas do not show large stones or rocks at the low areas of the Wadi bed.

However, occasionally, runoff caused by precipitation may occur inside the Wadis, but not being of dangerous in nature like flash floods are. Flash floods may occur outside the project area near to the eastern banks of the River Nile Valley, where the landscape and the Wadis are deeply sloping towards the Nile with Wadi Gradients in the order of 2 %.

Accordingly, no special risk from flash floods in the Wadis is expected in the East Solar-1, East Solar-2 and East Solar-3 subareas. In addition, as solar PV plants typically require flat surface for installation of the panels. Installation in Wadi beds is not considered feasible from a technical point of view, thus minimising this risk in addition.

#### **6.1.11 Seismicity Risks**

Possible elevated earthquake risks due to geological fault lines were presumed during scoping. The strength of earthquakes at an exceedance probability of 10 % in 50 years is discussed in section 5.1. The strength for the areas is low to moderate, corresponding to a peak ground acceleration of 0.8 to 1.0 m/s<sup>2</sup>. Risks can be well-controlled by applying adequate earthquake codes as part of construction norms.

## **6.2 Biological environment**

### **6.2.1 East Solar-1**

#### **6.2.1.1 Legally protected sites / areas and internationally recognised areas of biodiversity value**

In the absence of any legally protected site or internationally recognised areas of biodiversity value within or near to the East Solar-1 subarea installation / construction, operation of multiple solar PV plants in this subarea will not affect any designated site.

### 6.2.1.2 Habitats and flora

#### Construction Phase

Construction of multiple solar PV power projects in the East Solar-1 subarea might lead to:

- Loss of habitats and direct damage of plants

During construction of multiple solar PV plants, the removal and partial destruction of the top soil surface and some deeper soil layers will occur. Consequently, installation of foundations of PV panels and auxiliaries, permanent access roads, trails for power lines, storage positions for heavy machines or other technical installations that might directly affect (destroy) habitats and (damage) plants. Due to the extent of the affected area of a solar PV project (usually about 90 % of the total project area), event magnitude is assessed as high.

Receptor sensitivity can be regarded as low, because large parts of the East Solar-1 subarea are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. Hence, besides Wadi Ibadah and Wadi al-Birshawi, the East Solar-1 subarea does not serve as an important habitat for plants.

To conclude, the effects caused by loss of habitat or direct damage of plants will lead to moderate impacts.

Siting of solar PV panels shall avoid vegetated areas and particular structures like caves or crevices. No panel shall be installed next to or inside Wadi Ibadah and Wadi al-Birshawi. Construction measures in this Wadi shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. In doing so, effects caused by construction of multiple solar PV plants can be reduced and the residual impacts are assessed as minor.

The important Wadi has to be assessed as less favourable for solar PV developments (see Map 5-2 and Map 7-1).

- Compaction of soil due to land-use

Compaction of soil might lead to a damage of local seed banks and a reduction of the suitability for plant growth. However, the subarea comprises no threatened species or plant communities of conservational concern. Moreover, the potential for plant growth in this hyper-arid area is very limited, and thus, impacts due to the construction of multiple solar PV plants in the subarea are assessed as moderate (high event magnitude and low receptor sensitivity).

If construction works avoid vegetated areas (in particular the important Wadi) and particular structures like caves or crevices, residual impacts can even be assessed as minor.

- Dust emissions

Dust emissions will be limited to a very small area and limited to rather brief periods. Only negligible impacts on habitats or flora are expected due to dust emissions (medium event magnitude and low receptor sensitivity).

- Waste

Waste resulting from constructional work will cause no significant impact on habitats or flora. However, it might pollute larger areas when drifted away by strong winds. Thus, waste should

be removed immediately from the site and should be stored at or near the site in appropriate ways.

In conclusion, construction of multiple solar PV projects within the subarea will cause minor residual impacts on habitats, vegetation or plant communities.

#### Operation and Maintenance Phase

Operation and maintenance of multiple solar PV power projects within the East Solar-1 subarea might lead to:

- Modification of habitat suitability / quality

Solar PV panels are known to change abiotic habitat factors, which might indirectly affect the suitability / quality of an area as a habitat for plants. The shadowing effect of solar PV panels leads to a reduction of solar radiation and probably to lower temperatures on the ground underneath it. In addition, wind speed might be slightly reduced under solar PV panels. Some species might benefit from the newly formed habitat conditions, whereas other species might be adversely affected. Hence, from an environmental point of view event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because large parts of the East Solar-1 subarea are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. Hence, besides Wadi Ibadah and Wadi al-Birshawi, the East Solar-1 subarea does not serve as an important habitat for plants.

To summarise, the residual effects caused by changed abiotic habitat factors will lead to negligible impacts.

Furthermore, it is assumed that an appropriate cleaning procedure will be applied and that the required amount of water will be minimised when cleaning solar PV panels.

Operation and maintenance of multiple solar PV plants within the subarea will cause only negligible residual impacts on habitats, vegetation or plant communities. There are also no other activities in the subarea that might contribute to increased impacts to significant levels. During periods of maintenance of solar PV projects, human activities will be restricted to the already existing roads and storage positions.

### 6.2.1.3 Fauna

#### Construction Phase

Construction of multiple solar PV power projects in the East Solar-1 subarea might lead to:

- Direct loss or modification of habitats for animals

During construction of multiple solar PV plants (including associated infrastructure, like cables or powerlines) the removal and partial destruction of the top soil surface and some deeper soil layers will occur. Consequently, installation of foundations of PV panels and auxiliaries, permanent access roads, trails for power lines, storage positions for heavy machines or other technical installations might directly destroy or modify habitats for animal species. Due to the extent of the affected area of a solar PV project (usually about 90 % of the total project area), event magnitude is assessed as high.

Animal species recorded in the East Solar-1 subarea are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened. Consequently, the East Solar-1 subarea is not an important habitat for animals.

Furthermore, one can clearly derive from the results revealed in the East Wind subareas that the East Solar-1, which is located between the East Wind-1 and the East Wind-2 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.

Suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders) can be found in Wadi Ibadah and Wadi al-Birshawi. As this Wadi comprises patches of vegetation that form stopover habitats (mainly for a single day) for passerines during migration, it might be occasionally used by a low number of birds as a roosting site. All other parts of the East Solar-1 subarea have no significant importance as a roosting habitat for birds.

To sum up, receptor sensitivity is assessed to be low, and thus, effects caused by loss or modification of habitats for animal species will lead to moderate impacts.

Siting of solar PV panels shall avoid vegetated areas and particular structures like caves or crevices. No panel shall be installed next to or inside Wadi Ibadah and Wadi al-Birshawi. Construction measures in this Wadi shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. In doing so, effects caused by construction of multiple solar PV plants can be reduced and the residual impacts are assessed as minor.

The important Wadi has to be assessed as less favourable for solar PV developments (see Map 5-2 and Map 7-1).

- Disturbance by human activities with heavy machines, traffic, noise and dust emission

Animals might be affected by disturbance during the construction phase. However, disturbance effects are restricted to a rather small area. Thus, animals can find alternative habitats for the time of constructional works. Moreover, constructional work is limited to a rather short period of time. Animals can reoccupy all areas after the construction phase.

Animal species recorded in the East Solar-1 subarea are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low.

To conclude, the impact on animals caused by disturbance during construction of multiple solar PV plants is assessed to be negligible (low event magnitude and low receptor sensitivity).

- Waste  
Waste resulting from constructional work will cause no significant impact on fauna. It will probably attract certain animals, however, especially feral species (dogs, cats, rodents, etc.). This might affect indigenous species. Thus, waste should be removed immediately from the site and should be stored at the site in appropriate ways.
- New species of urban and rural environments  
New species of urban and rural environments can be imported into the area together with construction materials and containers. This should be avoided as much as possible, because new species often affect indigenous species.

To conclude, the residual impacts on animals caused by the construction of multiple solar PV projects within the East Solar-1 subarea are assessed as negligible to minor.

#### Operation and Maintenance Phase

##### Side note on potential impacts caused by operation of solar PV power projects on birds

Birdlife International (2017) suggests five potential negative impacts that solar PV arrays may have on birds: habitat loss / fragmentation, collision risk, disturbance, barrier effect and change of habitat function.

According to Harrison et al. (2017), little scientific evidence exists that demonstrates a direct impact of solar PV on birds. Several general statements were made regarding the potential effect of solar panels on birds in the scientific literature that are not supported with evidence (Harrison et al. 2017). Pearce-Higgins & Green (2014; cit. in Harrison et al. 2017) refer to the potential of Concentrated Solar Power (CSP) to have a detrimental effect on birds, whereas any negative impact of solar PV on birds is likely to be relatively low. However, the latter is presented with the caveat that there is little evidence available, and that further research is required.

According to RSPB (2011), there is no scientific evidence of fatality risks to birds associated with operational solar PV arrays. Similarly, DeVault et al (2014) observed no obvious evidence for bird casualty caused by solar PV panels, despite conducting 515 bird surveys at solar PV sites. Waltson et al. (2016) presented a first assessment of avian mortality at utility-scale solar energy (USSE) facilities in the United States through a synthesis of available avian monitoring and mortality information at existing USSE facilities. RSPB (2011) pointed out that structurally collision risk at solar PV arrays is probably similar to many other man-made features, but might be higher for waterfowl, which may be attracted to PV panels by the so-called "lake effect". The "lake effect" theory posits that waterfowl might crash into solar panels after confusing them with lakes. However, this effect cannot be regarded as a proven phenomenon yet, but is still a theory based on incidental observations.

According to Wybo (2013; cit. in Harrison et al. 2017) the main attractant for birds is the potential for solar PV arrays to be used as nesting grounds.

To sum up, no or very little evidence is available for a relevant collision risk or a barrier effect of solar PV power projects. Hence, the main impact on birds is related to disturbance (mainly during construction) and to habitat loss / fragmentation and change of habitat function which is highly site-specific. Accordingly, RSPB (2017) summarised that “the wildlife impact of a solar array scheme will be largely determined by location”. Where a PV power projects is not within or close to protected areas and functionally linked land, significant impacts on birds are unlikely to occur.

In general (i.e. disregarding the existence/absence of sensitive receptors), operation and maintenance of multiple solar PV power projects within the East Solar-1 subarea might lead to:

- Modification of habitat suitability / quality

Solar PV panels are known to change abiotic habitat factors, which might indirectly affect the suitability / quality of an area as a habitat for animals. The shadowing effect of solar PV panels leads to a reduction of solar radiation and probably to lower temperatures on the ground underneath it. In addition, wind speed might be slightly reduced under solar PV panels. In general, some species might benefit from the newly formed habitat conditions, whereas other species might be adversely affected. Considering the harsh climatic conditions and the high solar radiation in the desert, solar PV panels in the East Solar-1 subarea will likely offer shelter against the sun, and thus, increase habitat suitability for local and roosting animals. Hence, event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because the East Solar-1 subarea is not an important habitat for animals. Animal species recorded in the East Solar-1 subarea are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened.

To conclude, the effects caused by changed abiotic habitat factors will lead to negligible impacts on animals.

Nevertheless, siting of solar PV panels shall avoid vegetated areas and particular structures like caves or crevices. No panel shall be installed next to or inside Wadi Ibadah and Wadi al-Birshawi. Construction measures in this Wadi shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. Hence, the important Wadi has to be assessed as less favourable for solar PV developments (see Map 5-2 and Map 7-1).

It is assumed that an appropriate cleaning procedure will be applied and that the required amount of water will be minimised when cleaning solar PV panels. In doing so, any significant impact on animals can be avoided.

- Disturbance of animals or indirect loss of habitat by visual effects (silhouette effects, dazzling effects)

Animals, mainly larger birds or larger mammals, might be affected by disturbance during the operational phase of multiple solar PV projects. An indirect loss of habitat might happen, if animals show avoidance behaviour against solar PV panels. However, as the visual stimulus of a solar PV panel is more or less constant over time and as a solar PV project does not comprise

moving parts (in contrast to wind power projects), such avoidance behaviour is unlikely to occur. Moreover, due to the limited height of solar PV panels, any disturbance effects are probably restricted to a small distance of few metres and cover only a small area in the surroundings of a panel. In addition, there is no indication that solar PV panels might lead to dazzling effects, having the potential to disturb animal wildlife. In fact, no animal species is known to actively avoid the vicinity of solar PV panels yet. If there is any temporary effect, animals, particularly local species, are believed to habituate to the stimuli of solar PV panels. Hence, event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because the East Solar-1 subarea is not an important habitat for animals (as already given above).

To conclude, any visual impact on animals possibly leading to disturbance or indirect loss of habitat is assessed as negligible.

- Disturbance of animals by light emissions (reflections)  
Sun or moon light reflected by multiple solar PV panels might have different implications:
  - a. Animals might avoid the vicinity of solar PV panels due to disturbing reflections leading to a habitat loss. This cannot be excluded for roosting birds, particularly for those species that roost in larger flocks. By contrast, local animals (birds) shall habituate and become aware of such visual stimulus and are not believed to be affected. As receptor sensitivity can be regarded as low, because the East Solar-1 subarea is not an important habitat for animals (as already given above), only minor residual impacts are expected by light emissions at multiple solar PV panels.
  - b. Animals might be attracted if suitable habitats are reflected by multiple solar PV panels (as it is known from window glass). However, as the solar PV panels will be orientated in a horizontal plane and as no specific habitat feature that might be reflected exists in the East Solar-1 subarea, ground living animals will definitely not be affected by any reflection.

Birds might notice reflections when flying over a solar PV projects. There has been a discussion whether waterfowl might consider a large solar PV project as a water surface, and thus, might be attracted (as occasionally recorded on wet parking areas and roads). However, to date, no observations supporting this hypothesis, the so-called “lake effect”, exist (see side note on potential impacts of solar PV plants on birds given above). Considering the excellent visual capabilities of birds, Herden et al. (2009) assumed that birds shall be able to notice (even at larger distances) that a solar PV project is not a single homogeneous body (of water), but composed of several distinct elements. In addition, the reflected spectrum (range of wavelength, UV-portion of reflected light) might differ from reflections of water surfaces. To summarise, there is no evidence that waterfowl are significantly attracted to solar PV projects. Finally, the subarea is not known to be crossed by waterfowl.

As receptor sensitivity can be regarded as low, because the East Solar-1 subarea is not an important habitat for animals (as already given above), any visual impact possibly leading to an attraction of animals is assessed as negligible.

- c. Reflections at panels might also lead to irritation or disorientation of birds migrating or flying over a large solar PV project during day. However, the frequency and weight of such an effect remain unclear and mainly depends on the site of a project.

As receptor sensitivity can be regarded as low, because the East Solar-1 subarea is neither an important habitat for local or roosting birds nor an important site for migrating birds (see section 5.2.2.4), possible irritation or disorientation caused by reflections is assessed as a negligible impact.

If modern and efficient solar panels with high absorption capacity are applied, the reflection of sunlight or moonlight will be marginal only (see section 6.3.4), and thus, all corresponding impacts are assessed as negligible.

- Attraction, irritation or disorientation of animals by artificial light emissions

Artificial lighting of solar PV projects during night might attract animals (e.g. bats) or might irritate or disorientate migrating birds.

As receptor sensitivity can be regarded as low, because the East Solar-1 subarea is neither an important habitat for bats or other animals nor an important site for migrating birds (see section 5.2.2.4), possible attraction, irritation or disorientation caused by artificial lighting is assessed as a minor impact. Nevertheless, lighting of a solar PV project shall be minimised.

- Disturbance by human activities related with maintenance of large scale solar farms

Animals might be affected by disturbance during the operation and maintenance phase. However, disturbance effects are restricted to a rather small area. Thus, animals can find alternative habitats for the time of maintenance works. Moreover, maintenance work is limited to a rather short period of time. Animals can reoccupy all areas after the construction phase.

As receptor sensitivity can be regarded as low, because the East Solar-1 subarea is not an important habitat for animals (as already given above), the impact on animals caused by disturbance during operation and maintenance is assessed to be negligible.

- Barrier effects / habitat loss

Fencing a solar PV project might lead to barrier effects separating different sub-habitats or intersecting migration corridors of animals with large home ranges. Moreover, a fence might exclude larger animals (mammals) from the project area, leading to an indirect habitat loss. The weight of such a barrier effect is highly site-specific and depends on the location and the habitat characteristics of a site and its surrounding area.

As receptor sensitivity can be regarded as low, because the East Solar-1 subarea is not an important habitat for animals (as already given above), any impact on animals caused by barrier effect (and resulting habitat loss) is assessed to be negligible.

- Collision risk for flying animals (bats, birds, insects)

In general, flying animals face the risk of collision at solar PV panels. However, the risk is as high as at any other natural or artificial obstacle and is not a specific characteristic of solar PV panels (see side note on potential impacts of solar PV plants on birds given above). Moreover, flying animals are usually able to perceive solar PV panels in time enabling them to avoid a collision. Hence, event magnitude can be regarded as low.

Collision risk might be increased for birds

- a. if panels act as a mirror, reflecting the surrounding habitat during daytime. However, as the solar PV panels will be orientated in a horizontal plane (about 30°) and as no specific habitat feature that might be reflected exists in the East Solar-1 subarea, this effect is not believed to cause a relevant collision risk for birds.
- b. at subsidiary infrastructure, like fences (wire fence) or steel cables that might be required at solar PV panels. However, as receptor sensitivity can be regarded as low, because the East Solar-1 subarea is not an important habitat for birds (as already given above), collision risk at such infrastructure is assessed to be low. Nevertheless, the use of wire fences or steel cables shall be minimised. If collisions occur at such infrastructures, fences and cables can be marked to increase their perceptibility and to reduce the risk of collision for birds.

To summarise, collision risk at solar PV panels and subsidiary infrastructure in the East Solar-1 subarea is assessed to be low, and thus, any impact caused by collisions is negligible.

- Impacts of associated overhead powerlines

Side note on potential impacts of overhead powerlines on birds during operation

Overhead powerlines can affect breeding, roosting and migrating birds. According to Haas et al. (2015), the main risks to birds are:

- Risk of electrocution: Birds sitting on power poles and / or conducting cables might be killed when causing short circuits (short circuit between phases, or short-to-ground). In particular, “bad engineering” practised on medium-voltage power pole constructions has resulted in an enormous risk for numerous medium-sized and large birds, which use power poles as perching, roosting and even nesting sites.
- Risk of collision: in flight, birds can collide into the cables of powerlines, because the cables are difficult to perceive as obstacles. In most cases, the impact of collision leads to immediate death or to fatal injuries and mutilations.

As given above, local and roosting birds (of medium-sized and large species) might face the risk of electrocution if overhead powerlines with medium-voltage power pole constructions are used for connecting a solar PV plants with the grid or for connecting different solar PV power projects with each other. However, due to the low abundance and density of local and roosting birds in the East Solar-1 subarea, this effect is assessed as a minor impact (medium event magnitude and low receptor sensitivity). Nevertheless, using underground cables is always the preferable option. If the use of overhead powerlines cannot be avoided, such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015). In doing so, the risk of electrocution for medium-sized and large birds can significantly be reduced and the residual impact is assessed as negligible.

Local, roosting and migrating birds might face the risk of collision at overhead powerlines in the subarea. However, resident birds might be aware of powerlines and might adapt their behaviour accordingly. Moreover, the local bird community in the subarea is poor in species, bird density is low and no threatened species was found. Furthermore, one can clearly derive from the results revealed in the East Wind subareas that the East Solar-1 subarea is not of particular

importance for roosting and migrating birds. Hence, collision risk at overhead powerlines for local, roosting or migrating birds is low and will not lead to significant impacts on populations (minor impact). By using underground cables or by considering available guidelines (e.g. Bird-Life International 2015) when designing overhead powerlines, the residual impact is assessed as negligible.

To conclude, the effects on animals caused by operation and maintenance of multiple solar PV projects and associated powerlines within the East Solar-1 subarea will lead to negligible and minor residual impacts.

## 6.2.2 East Solar-2

### 6.2.2.1 Legally protected sites / areas and internationally recognised areas of biodiversity value

In the absence of any legally protected site or internationally recognised areas of biodiversity value within or near to the East Solar-2 subarea, installation / construction and operation of multiple solar PV plants in this subarea will not affect any designated site.

### 6.2.2.2 Habitats and flora

#### Construction Phase

Construction of multiple solar PV power projects in the East Solar-2 subarea might lead to:

- Loss of habitats and direct damage of plants

During construction of solar PV projects, the removal and partial destruction of the top soil surface and some deeper soil layers will occur. Consequently, installation of foundations of PV panels and auxiliaries, permanent access roads, trails for power lines, storage positions for heavy machines or other technical installations might directly impact (destroy) habitats and (damage) plants. Due to the extent of the affected area of a solar PV project (usually about 90 % of the total project area), event magnitude is assessed as high.

Receptor sensitivity can be regarded as very low, because the vast majority of the East Solar-2 subarea is completely without vegetation. There is no larger Wadi and only two small vegetated spots have been found in the subarea (see Figure 5-40). Hence, the East Solar-2 subarea does not serve as an important habitat for plants.

The effects caused by loss of habitat or direct damage of plants will lead to minor impacts that can even be reduced to minor residual impacts by avoiding any constructional activity in the vegetated spots.

- Compaction of soil due to land-use

Compaction of soil might lead to the damage of local seed banks and a reduction in suitability for plant growth. However, the subarea comprises no threatened species or plant communities

of conservational concern. Moreover, the potential for plant growth in this hyper-arid area is very limited, and thus, impacts due to the construction of multiple solar PV plants in the sub-area are assessed as moderate (high event magnitude and low receptor sensitivity). If construction works will avoid vegetated spots, residual impacts can even be assessed as minor.

- Dust emissions  
Dust emissions will be limited to a very small area and limited to rather brief periods. Only negligible impacts on habitats or flora are expected due to dust emissions (medium event magnitude and low receptor sensitivity).
- Waste  
Waste resulting from constructional work will cause no significant impact on habitats or flora. However, it might pollute larger areas when drifted away by strong winds. Thus, waste should be removed immediately from the site and should be stored at or near the site in appropriate ways.

In conclusion, construction of solar PV projects within the subarea will cause minor residual impacts on habitats, vegetation or plant communities.

#### Operation and Maintenance Phase

Operation and maintenance of multiple solar PV power projects within the East Solar-2 subarea might lead to:

- Modification of habitat suitability / quality  
Solar PV panels are known to change abiotic habitat factors, which might indirectly affect the suitability / quality of an area as a habitat for plants. The shadowing effect of solar PV panels leads to a reduction of solar radiation and probably to lower temperatures on the ground underneath it. In addition, wind speed might be slightly reduced under solar PV panels. Some species might benefit from the newly formed habitat conditions, whereas other species might be adversely affected. Hence, from an environmental point of view, event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because the vast majority of the East Solar-2 subarea is completely without vegetation. There is no larger Wadi and only two small vegetated spots have been found in the subarea (see Figure 5-40). Hence, the East Solar-2 subarea does not serve as an important habitat for plants.

To summarise, the effects caused by changed abiotic habitat factors will lead to negligible impacts.

It is assumed that an appropriate cleaning procedure will be applied and that the required amount of water will be minimised when cleaning solar PV panels. In doing so, any impact on habitats and flora can be avoided.

Operation and maintenance of solar PV projects within the subarea will cause only negligible impacts on habitats, vegetation or plant communities. There are also no other activities in the sub-

area that might contribute to increased impacts to significant levels. During periods of maintenance of solar PV projects, human activities will be restricted to the already existing roads and storage positions.

#### 6.2.2.3 Fauna

##### Construction Phase

Construction of multiple solar PV power projects in the East Solar-2 subarea might lead to:

- Direct loss or modification of habitats for animals  
During construction of solar PV projects (including associated infrastructure, like cables or powerlines) a removal and partial destruction of the top soil surface and some deeper soil layers will occur. Consequently, installation of foundations of PV panels and auxiliaries, permanent access roads, trails for power lines, storage positions for heavy machines or other technical installations might directly destroy or modify habitats for animal species. Due to the extent of the affected area of a solar PV project (usually about 90 % of the total project area), event magnitude is assessed as high.

Receptor sensitivity can be regarded as low, because the local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened. Consequently, the East Solar-2 subarea is not an important habitat for animals. Furthermore, one can clearly derive from the results revealed in the East Wind subareas that the East Solar-2, which is located between the East Wind-1 and the East Wind-2 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.

To sum up, the effects caused by loss or modification of habitats for animal species will lead to moderate impacts that can even be reduced to minor residual impacts by avoiding any constructional activity in the vegetated spots.

- Disturbance by human activities with heavy machines, traffic, noise and dust emission  
Animals might be affected by disturbance during the construction phase. However, disturbance effects are restricted to a rather small area. Thus, animals can find alternative habitats for the time of constructional works. Moreover, constructional work is limited to a rather short period of time. Animals can reoccupy all areas after the construction phase.

The local fauna of the subarea is poor in species and density is low. Consequently, the East Solar-2 subarea is not an important habitat for animals.

To conclude, the impact on animals caused by disturbance during construction is assessed to be negligible (low event magnitude and low receptor sensitivity).

- Waste  
Waste resulting from constructional work will cause no significant impact on fauna. It will probably attract certain animals, however, especially feral species (dogs, cats, rodents, etc.).

This might affect indigenous species. Thus, waste should be removed immediately from the site and should be stored at the site in appropriate ways.

- New species of urban and rural environments  
New species of urban and rural environments can be imported into the area together with construction materials and containers. This should be avoided as much as possible, because new species often affect indigenous species.

To conclude, the residual impacts on animals caused by the construction of multiple solar PV projects within the East Solar-2 subarea are assessed as negligible to minor.

#### Operation and Maintenance Phase

In general (i.e. disregarding the existence/absence of sensitive receptors), operation and maintenance of multiple solar PV power projects within the East Solar-2 subarea might lead to:

- Modification of habitat suitability / quality  
Solar PV panels are known to change abiotic habitat factors that might indirectly affect the suitability / quality of an area as a habitat for animals. The shadowing effect of solar PV panels leads to a reduction of solar radiation and probably to lower temperatures on the ground underneath it. In addition, wind speed might be slightly reduced under solar PV panels. In general, some species might benefit from the newly formed habitat conditions, whereas other species might be adversely affected. Considering the harsh climatic conditions and the high solar radiation in the desert, solar PV panels in the East Solar-2 subarea will likely offer shelter against the sun, and thus, increase habitat suitability for local and roosting animals. Hence, event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because the local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened. Consequently, the East Solar-2 subarea is not an important habitat for animals. Furthermore, one can clearly derive from the results revealed in the East Wind subareas that the East Solar-2, which is located between the East Wind-1 and the East Wind-2 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.

To conclude, the effects caused by changed abiotic habitat factors will lead to negligible impacts on animals.

It is assumed that an appropriate cleaning procedure will be applied and that the required amount of water will be minimised when cleaning solar PV panels. In doing so, any significant impact on animals can be avoided.

- Disturbance of animals or indirect loss of habitat by visual effects (silhouette effects, dazzling effects)  
Animals, mainly larger birds or larger mammals, might be affected by disturbance during the operational phase of a solar PV project. An indirect loss of habitat might happen, if animals show avoidance behaviour against solar PV panels. However, as the visual stimulus of a solar PV panel is more or less constant over time and as a solar PV project does not comprise mov-

ing parts (in contrast to wind power projects), such avoidance behaviour is unlikely to occur. Moreover, due to the limited height of solar PV panels, any disturbance effects are probably restricted to a small distance of a few metres and cover only a small area in the surroundings of a panel. In addition, there is no indication that solar PV panels might lead to dazzling effects having the potential to disturb animal wildlife. In fact, no animal species is known to actively avoid the vicinity of solar PV panels yet. If there is any temporary effect, animals, particularly local species, are believed to habituate to the stimuli of solar PV panels. Hence, event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because the East Solar-2 subarea is not an important habitat for animals (as already given above).

To conclude, any visual impact on animals possibly leading to disturbance or indirect loss of habitat is assessed as negligible.

- Disturbance of animals by light emissions (reflections)  
Sun or moon light reflected by multiple solar PV panels might have different implications:
  - a. Animals might avoid the vicinity of solar PV panels due to disturbing reflections leading to a habitat loss. This cannot be excluded for roosting birds, particularly for those species that roost in larger flocks. By contrast, local animals (birds) shall habituate and become aware of such visual stimuli and are not believed to be affected.

As receptor sensitivity can be regarded as low, because the East Solar-2 subarea is not an important habitat for animals (as already given above), only minor impacts are expected by light emissions at solar PV panels.

- b. Animals might be attracted if suitable habitats are reflected by solar PV panels (as it is known from window glass). However, as the solar PV panels will be orientated in a horizontal plane and as no specific habitat feature, that might be reflected, exists in the East Solar-2 subarea, ground living animals will definitely not be affected by any reflection.

Birds might notice reflections when flying over a solar PV projects. There has been a discussion as to whether waterfowl might consider a large solar PV project as a water surface, and thus, might be attracted (as occasionally recorded on wet parking areas and roads). However, to date, no observations supporting this hypothesis, the so-called “lake effect”, exist (see side note on potential impacts of solar PV plants on birds given in section 6.2.1.3). Considering the excellent visual capabilities of birds, Herden et al. (2009) assumed that birds shall be able to notice (even at larger distances) that a solar PV project is not a single homogeneous body (of water), but composed of several distinct elements. In addition, the reflected spectrum (range of wavelength; UV-portion of reflected light) might differ from reflections of water surfaces. To summarise, there is no evidence that waterfowl are significantly attracted to solar PV projects. Finally, the subarea is not known to be crossed by waterfowl.

As receptor sensitivity can be regarded as low, because the East Solar-2 subarea is not an important habitat for animals (as already given above), any visual impact possibly leading to an attraction of animals is assessed as negligible.

- c. Reflections at panels might also lead to irritation or disorientation of birds migrating or flying over a large solar PV project during day. However, the frequency and weight of such an effect remain unclear and is mainly depending on the site of a project.

As receptor sensitivity can be regarded as low, because the East Solar-2 subarea is neither an important habitat for local or roosting birds nor an important site for migrating birds (see section 5.2.3), possible irritation or disorientation caused by reflections is assessed as a negligible impact.

If modern and efficient solar panels with high absorption capacity are applied, the reflection of sunlight or moonlight will be marginal only (see section 6.3.4), and thus, all corresponding impacts are assessed as negligible.

- Attraction, irritation or disorientation of animals by artificial light emissions  
Artificial lighting of solar PV projects at night might attract animals (e.g. bats) or might irritate or disorientate migrating birds.

As receptor sensitivity can be regarded as low, because the East Solar-2 subarea is neither an important habitat for bats or other animals nor an important site for migrating birds (see section 5.2.3), possible attraction, irritation or disorientation caused by artificial lighting is assessed as a minor impact. Nevertheless, lighting of a solar PV project shall be minimised.

- Disturbance by human activities related to maintenance of large scale solar farms  
Animals might be affected by disturbance during the operation and maintenance phase. However, disturbance effects are restricted to a rather small area. Thus, animals can find alternative habitats for the time of maintenance works. Moreover, maintenance work is limited to a rather short period of time. Animals can reoccupy all areas after the construction phase.

As receptor sensitivity can be regarded as low, because the East Solar-2 subarea is not an important habitat for animals (as already given above), the impact on animals caused by disturbance during operation and maintenance is assessed to be negligible.

- Barrier effects / habitat loss  
Fencing a solar PV project might lead to barrier effects separating different sub-habitats or intersecting migration corridors of animals with large home ranges. Moreover, a fence might exclude larger animals (mammals) from the project area leading to an indirect habitat loss. The weight of such a barrier effect is highly site-specific and depends on the location and the habitat characteristics of a site and its surrounding areas.

As receptor sensitivity can be regarded as low, because the East Solar-2 subarea is not an important habitat for animals (as already given above), any impact on animals caused by barrier effect (and resulting habitat loss) is assessed to be negligible.

- Collision risk for flying animals (bats, birds, insects)

In general, flying animals face the risk of collision at solar PV panels. However, the risk is as high as at any other natural or artificial obstacle and is not a specific characteristic of solar PV panels (see side note on potential impacts of solar PV plants on birds given in section 6.2.1.3). Moreover, flying animals are usually able to perceive solar PV panels in time enabling them to avoid a collision. Hence, event magnitude can be regarded as low.

Collision risk might be increased for birds

- a. if panels act as a mirror reflecting the surrounding habitat during daytime. However, as the solar PV panels are orientated in a horizontal plane (about 30°) and as no specific habitat feature, that might be reflected, exists in the East Solar-2 subarea, this effect is not believed to cause a relevant collision risk for birds.
- b. at subsidiary infrastructure, like fences (wire fence) or steel cables that might be required at solar PV panels. However, as receptor sensitivity can be regarded as low, because the East Solar-2 subarea is not an important habitat for birds (as already given above), collision risk at such infrastructure is assessed to be low. Nevertheless, the use of wire fences or steel cables shall be minimised. If collisions occur at such infrastructures, fences and cables can be marked to increase their perceptibility and to reduce the risk of collision for birds.

To summarise, collision risk at solar PV panels and subsidiary infrastructure in the East Solar-2 subarea is assessed to be low, and thus, any impact caused by collisions is negligible.

- Impacts of associated overhead powerlines

As given in section 6.2.1.3, local and roosting birds (of medium-sized and large species) might face the risk of electrocution if overhead powerlines with medium-voltage power pole constructions are used for connecting a solar PV plants with the grid or for connecting different solar PV power projects with each other. However, due to the low abundance and density of local and roosting birds in the East Solar-2 subarea, this effect is assessed as a minor impact (medium event magnitude and low receptor sensitivity). Nevertheless, using underground cables is always the preferable option. If the use of overhead powerlines cannot be avoided, such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015). In doing so, the risk of electrocution for medium-sized and large birds can significantly be reduced and the residual impact is assessed as negligible.

Local, roosting and migrating birds might face the risk of collision at overhead powerlines in the subarea. However, resident birds might be aware of powerlines and might adapt their behaviour accordingly. Moreover, the local bird community in the subarea is poor in species, bird density is low and no threatened species was found. Furthermore, one can clearly derive from the results revealed in the East Wind subareas that the East Solar-2 subarea is not of particular importance for roosting and migrating birds. Hence, collision risk at overhead powerlines for local, roosting or migrating birds is low and will not lead to significant impacts on populations (minor impact). By using underground cables or by considering available guidelines (e.g. BirdLife International 2015) when designing overhead powerlines, the residual impact is assessed as negligible.

To conclude, the effects on animals caused by operation and maintenance of solar PV projects and associated powerlines within the East Solar-2 subarea will lead to negligible and minor residual impacts.

### 6.2.3 East Solar-3

#### 6.2.3.1 Legally protected sites / areas and internationally recognised areas of biodiversity value

In the absence of any legally protected site or internationally recognised areas of biodiversity value within or near to the East Solar-3 subarea, installation / construction and operation of multiple solar PV plants in this subarea will not affect any designated site.

As “Wadi Sannur Cave” is located at minimum distances of about 8 km (see section 5.2.4 and Map 5-3), solar PV projects in the East Solar-3 subarea will not affect this protected area.

#### 6.2.3.2 Habitats and flora

##### Construction Phase

Construction of multiple solar PV power projects in the East Solar-3 subarea might lead to:

- Loss of habitats and direct damage of plants  
During construction of solar PV power projects, a removal and partial destruction of the top soil surface and some deeper soil layers will occur. Consequently, installation of foundations of PV panels and auxiliaries, permanent access roads, trails for power lines, storage positions for heavy machines or other technical installations might directly impact (destroy) habitats and (damage) plants. Due to the extent of the affected area of a solar PV project (usually about 90 % of the total project area), event magnitude is assessed as high.

Receptor sensitivity can be regarded as low, because large parts of the East Solar-3 subarea are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. Hence, besides the Wadi ash-Shaykh complex (see Map 5–3), the East Solar-3 subarea does not serve as an important habitat for plants.

To conclude, the effects caused by loss of habitat or direct damage of plants will lead to moderate impacts.

Siting of solar PV panels shall avoid vegetated areas and particular structures like caves or crevices. No panel shall be installed next or inside Wadi ash-Shaykh complex. Construction measures in this Wadi shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. In doing so, effects caused by construction of multiple solar PV plants can be reduced and the residual impacts are assessed as minor.

The important Wadi complex has to be assessed as less favourable for solar PV developments (see Map 5-3 and Map 7-3).

- **Compaction of soil due to land-use**  
Compaction of soil might lead to a damage of local seed banks and a reduction of the suitability for plant growth. However, the subarea comprises no threatened species or plant communities of conservational concern. Moreover, the potential for plant growth in this hyper-arid area is very limited, and thus, impacts due to the construction of multiple solar PV plants in the subarea are assessed as moderate (high event magnitude and low receptor sensitivity).  
If construction works avoid vegetated areas (in particular the important Wadi complex) and particular structures like caves or crevices, residual impacts can even be assessed as minor.
- **Dust emissions**  
Dust emissions will be limited to a very small area and limited to rather brief periods. Only negligible impacts on habitats or flora are expected due to dust emissions (medium event magnitude and low receptor sensitivity).
- **Waste**  
Waste resulting from constructional work will cause no significant impact on habitats or flora. However, it might pollute larger areas when drifted away by strong winds. Thus, waste should be removed immediately from the site and should be stored at or near the site in appropriate ways.

In conclusion, construction of multiple solar PV projects within the subarea will cause minor residual impacts on habitats, vegetation or plant communities.

#### Operation and Maintenance Phase

Operation and maintenance of multiple solar PV power projects within the East Solar-3 subarea might lead to:

- **Modification of habitat suitability / quality**  
Solar PV panels are known to change abiotic habitat factors that might indirectly affect the suitability / quality of an area as a habitat for plants. The shadowing effect of solar PV panels leads to a reduction of solar radiation and probably to lower temperatures on the ground underneath it. In addition, wind speed might be slightly reduced under solar PV panels. Some species might benefit from the newly formed habitat conditions, whereas other species might be adversely affected. Hence, from an environmental point of view event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because large parts of the East Solar-3 subarea are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. Hence, besides the Wadi ash-Shaykh complex (Map 5-3) the East Solar-3 subarea does not serve as an important habitat for plants.

To summarise, the effects caused by changed abiotic habitat factors will lead to negligible impacts.

It is assumed that an appropriate cleaning procedure will be applied and that the required amount of water will be minimised, when cleaning solar PV panels. In doing so, any impact on habitats and flora can be avoided.

Operation and maintenance of solar PV projects within the subarea will cause only negligible impacts on habitats, vegetation or plant communities. There are also no other activities in the subarea that might contribute to increased impacts to significant levels. During periods of maintenance of solar PV projects, human activities will be restricted to the already existing roads and storage positions.

### 6.2.3.3 Fauna

#### Construction Phase

Construction of multiple solar PV power projects in the East Solar-3 subarea might lead to:

- Direct loss or modification of habitats for animals  
During construction of solar PV projects (including associated infrastructure, like cables or powerlines) a removal and partial destruction of the top soil surface and some deeper soil layers will occur. Consequently, installation of foundations of PV panels and auxiliaries, permanent access roads, trails for power lines, storage positions for heavy machines or other technical installations might directly destroy or modify habitats for animal species. Due to the extent of the affected area of a solar PV project (usually about 90 % of the total project area), event magnitude is assessed as high.

Animal species recorded in the East Solar-3 subarea are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened. Consequently, the East Solar-3 subarea is not an important habitat for animals.

Furthermore, one can clearly derive from the results revealed in the East Wind subarea that the East Solar-1, which is located north of the East Wind-1 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.

Suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders) can be found in Wadi ash-Shaykh complex. As this Wadi complex comprises patches of vegetation that form stopover habitats (mainly for a single day) for passerines during migration, it might be occasionally used by a low number of birds as a roosting site. All other parts of the East Solar-3 subarea have no significant importance as a roosting habitat for birds.

To sum up, receptor sensitivity is assessed to be low, and thus, the effects caused by loss or modification of habitats for animal species will lead to moderate impacts.

Siting of solar PV panels shall avoid vegetated areas and particular structures like caves or crevices. No panel shall be installed next to or inside the Wadi ash-Shaykh complex. Construc-

tion measures in this Wadi complex shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. In doing so, effects caused by construction of multiple solar PV plants can be reduced and the residual impacts are assessed as minor.

The important Wadi complex has to be assessed as less favourable for solar PV developments (see Map 5-3 and Map 7-3).

- Disturbance by human activities with heavy machines, traffic, noise and dust emission  
Animals might be affected by disturbance during the construction phase. However, disturbance effects are restricted to a rather small area. Thus, animals can find alternative habitats for the time of constructional works. Moreover, constructional work is limited to a rather short period of time. Animals can reoccupy all areas after the construction phase.

Animal species recorded in the East Solar-3 subarea are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low.

To conclude, the impact on animals caused by disturbance during construction is assessed to be negligible (low event magnitude and low receptor sensitivity).

- Waste  
Waste resulting from constructional work will cause no significant impact on fauna. It will probably attract certain animals, however, especially feral species (dogs, cats, rodents, etc.). This might affect indigenous species. Thus, waste should be removed immediately from the site and should be stored at the site in appropriate ways.
- New species of urban and rural environments  
New species of urban and rural environments can be imported into the area together with construction materials and containers. This should be avoided as much as possible, because new species often affect indigenous species.

To conclude, the residual impacts on animals caused by the construction of multiple solar PV projects within the East Solar-3 subarea are assessed as negligible to minor.

#### Operation and Maintenance Phase

In general (i.e. disregarding the existence/absence of sensitive receptors), operation and maintenance of multiple solar PV power projects within the East Solar-3 subarea might lead to:

- Modification of habitat suitability / quality  
Solar PV panels are known to change abiotic habitat factors, which might indirectly affect the suitability / quality of an area as a habitat for animals. The shadowing effect of solar PV panels leads to a reduction of solar radiation and probably to lower temperatures on the ground underneath it. In addition, wind speed might be slightly reduced under solar PV panels. In general, some species might benefit from the newly formed habitat conditions, whereas other species might be adversely affected. Considering the harsh climatic conditions and the high solar radiation in the desert, solar PV panels in the East Solar-3 subarea will likely offer shelter

against the sun, and thus, increase habitat suitability for local and roosting animals. Hence, event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because the East Solar-3 subarea is not an important habitat for animals. Animal species recorded in the East Solar-3 subarea are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened.

To conclude, the effects caused by changed abiotic habitat factors will lead to negligible impacts on animals.

It is assumed that an appropriate cleaning procedure will be applied and that the required amount of water will be minimised, when cleaning solar PV panels. In doing so, any significant impact on animals can be avoided.

- Disturbance of animals or indirect loss of habitat by visual effects (silhouette effects, dazzling effects)

Animals, mainly larger birds or larger mammals, might be affected by disturbance during the operational phase of a solar PV project. An indirect loss of habitat might happen, if animals show avoidance behaviour against solar PV panels. However, as the visual stimulus of a solar PV panel is more or less constant over time and as a solar PV project does not comprise moving parts (in contrast to wind power projects), such avoidance behaviour is unlikely to occur. Moreover, due to the limited height of solar PV panels, any disturbance effects are probably restricted to a small distance of few metres and cover only a small area in the surrounding of a panel. In addition, there is no indication that solar PV panels might lead to dazzling effects having the potential to disturb animal wildlife. In fact, no animal species is known to actively avoid the vicinity of solar PV panels yet. If there is any temporary effect, animals, particularly local species, are believed to habituate to the stimuli of solar PV panels. Hence, event magnitude is assessed as low.

Receptor sensitivity can be regarded as low, because the East Solar-3 subarea is not an important habitat for animals (as already given above).

To conclude, any visual impact on animals possibly leading to disturbance or indirect loss of habitat is assessed as negligible.

- Disturbance of animals by light emissions (reflections)

Sun or moon light reflected by multiple solar PV panels might have different implications:

- a. Animals might avoid the vicinity of solar PV panels due to disturbing reflections, leading to a habitat loss. This cannot be excluded for roosting birds, particularly for those species that roost in larger flocks. By contrast, local animals (birds) shall habituate and become aware of such visual stimulus and are not believed to be affected.

As receptor sensitivity can be regarded as low, because the East Solar-3 subarea is not an important habitat for animals (as already given above), only minor impacts are expected by light emissions at solar PV panels.

- b. Animals might be attracted if suitable habitats are reflected by solar PV panels (as it is known from window glass). However, as the solar PV panels will be orientated in a horizontal plane and as no specific habitat feature, that might be reflected, exists in the East Solar-3 subarea, ground living animals will definitely not be affected by any reflection.

Birds might notice reflections when flying over a solar PV projects. There has been a discussion whether waterfowl might consider a large solar PV project as a water surface, and thus, might be attracted (as occasionally recorded on wet parking areas and roads). However, to date, no observations supporting this hypothesis, the so-called “lake effect”, exist (see side note on potential impacts of solar PV plants on birds given in section 6.2.1.3). Considering the excellent visual capabilities of birds, Herden et al. (2009) assumed that birds shall be able to notice (even at larger distances) that a solar PV project is not a single homogeneous body (of water), but composed of several distinct elements. In addition, the reflected spectrum (range of wavelength, UV-portion of reflected light) might differ from reflections of water surfaces. To summarise, there is no evidence that waterfowl are significantly attracted to solar PV projects. Finally, the subarea is not known to be crossed by waterfowl.

As receptor sensitivity can be regarded as low, because the East Solar-3 subarea is not an important habitat for animals (as already given above), any visual impact possibly leading to an attraction of animals is assessed as negligible.

- c. Reflections at panels might also lead to irritation or disorientation of birds migrating or flying over a large solar PV project during day. However, the frequency and weight of such an effect remains unclear and mainly depends on the site of a project.

As receptor sensitivity can be regarded as low, because the East Solar-3 subarea is neither an important habitat for local or roosting birds nor an important site for migrating birds (see section 5.2.4), possible irritation or disorientation caused by reflections is assessed as a negligible impact.

If modern and efficient solar panels with high absorption capacity are applied, the reflection of sunlight or moonlight will be marginal only (see section 6.3.4), and thus, all corresponding impacts are assessed as negligible.

- Attraction, irritation or disorientation of animals by artificial light emissions  
Artificial lighting of solar PV projects during night might attract animals (e.g. bats) or might irritate or disorientate migrating birds.

As receptor sensitivity can be regarded as low, because the East Solar-3 subarea is neither an important habitat for bats or other animals nor an important site for migrating birds (see section 5.2.4), possible attraction, irritation or disorientation caused by artificial lighting is assessed as a minor impact. Nevertheless, lighting of a solar PV project shall be minimised.

- Disturbance by human activities related with maintenance of large scale solar farms  
Animals might be affected by disturbance during the operation and maintenance phase. However, disturbance effects are restricted to a rather small area. Thus, animals can find alternative habitats for the time of maintenance works. Moreover, maintenance work is limited to a rather short period of time. Animals can reoccupy all areas after the construction phase.

As receptor sensitivity can be regarded as low, because the East Solar-3 subarea is not an important habitat for animals (as already given above), the impact on animals caused by disturbance during operation and maintenance is assessed to be negligible.

- Barrier effects / habitat loss  
Fencing a solar PV project might lead to barrier effects separating different sub-habitats or intersecting migration corridors of animals with large home ranges. Moreover, a fence might exclude larger animals (mammals) from the project area leading to an indirect habitat loss. The weight of such barrier effect is highly site-specific and depends on the location and the habitat characteristics of a site and its surrounding area.

As receptor sensitivity can be regarded as low, because the East Solar-3 subarea is not an important habitat for animals (as already given above), any impact on animals caused by barrier effect (and resulting habitat loss) is assessed to be negligible.

- Collision risk for flying animals (bats, birds, insects)  
In general, flying animals face the risk of collision at solar PV panels. However, the risk is as high as at any other natural or artificial obstacle and is not a specific characteristic of solar PV panels (see side note on potential impacts of solar PV plants on birds given in section 6.2.1.3). Moreover, flying animals are usually able to perceive solar PV panels in time, enabling them to avoid a collision. Hence, event magnitude can be regarded as low.

Collision risk might be increased for birds

- a. if panels act as a mirror reflecting the surrounding habitat during daytime. However, as the solar PV panels will be orientated in a horizontal plane (about 30°) and as no specific habitat feature, that might be reflected, exists in the East Solar-3 subarea, this effect is not believed to cause a relevant collision risk for birds.
- b. at subsidiary infrastructure, like fences (wire fence) or steel cables that might be required at solar PV panels. However, as receptor sensitivity can be regarded as low, because the East Solar-3 subarea is not an important habitat for birds (as already given above), so collision risk at such infrastructure is assessed to be low. Nevertheless, the use of wire fences or steel cables shall be minimised. If collisions occur at such infrastructures, fences and cables can be marked to increase their perceptibility and to reduce the risk of collision for birds.

To summarise, collision risk at solar PV panels and subsidiary infrastructure in the East Solar-3 subarea is assessed to be low, and thus, any impact caused by collisions is negligible.

- Impacts of associated overhead powerlines

As given in section 6.2.1.3, local and roosting birds (of medium-sized and large species) might face the risk of electrocution if overhead powerlines with medium-voltage power pole constructions are used for connecting a solar PV plants with the grid or for connecting different solar PV power projects with each other. However, due to the low abundance and density of local and roosting birds in the East Solar-3 subarea, this effect is assessed as a minor impact (medium event magnitude and low receptor sensitivity). Nevertheless, using underground cables is always the preferable option. If the use of overhead powerlines cannot be avoided, such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015). In doing so, the risk of electrocution for medium-sized and large birds can significantly be reduced and the residual impact is assessed as negligible.

Local, roosting and migrating birds might face the risk of collision at overhead powerlines in the subarea. However, resident birds might be aware of powerlines and might adapt their behaviour accordingly. Moreover, local bird community in the subarea is poor in species, bird density is low and no threatened species was found. Furthermore, one can clearly derive from the results revealed in the East Wind subareas that the East Solar-3 subarea is not of particular importance for roosting and migrating birds. Hence, collision risk at overhead powerlines for local, roosting or migrating birds is low and will not lead to significant impacts on populations (minor impact). By using underground cables or by consider available guidelines (e.g. BirdLife International 2015) when designing overhead powerlines, the residual impact is assessed as negligible.

To conclude, the effects on animals caused by operation and maintenance of multiple solar PV projects and associated powerlines within the East Solar-3 subarea will lead to negligible and minor residual impacts.

## **6.3 Social and economic environment**

### **6.3.1 Positive impacts during construction**

#### **6.3.1.1 Workforce and jobs**

With regards to job creation, the project will result in direct and indirect jobs. Based on the comparison analysis with the previous project related to solar energy, the following is a summary of the potential jobs that could be created:

For each 50 MW project (a possibility of maximum 2 to 3 projects in parallel): 100 unskilled workers plus 20-30 skilled workers for project management (duration 4-6 months), 20-30 semi-skilled workers for module mounting and 20 skilled workers for project management (duration 5-6 months).

If two or three projects start at the same time, this would require approximately 400 workers. The local communities (El Minya and Beni Suef) could theoretically provide a proportion of this temporary labour force dependent on skills needed.

Workers might be adversely impacted if fundamental principles and rights are not respected. Labour and working conditions defined in EBRD PR2 and IFC PS2 shall be maintained. This is also relevant for the lodging in temporary facilities at the site.

#### 6.3.1.2 Supply chain

The project will also result in positive opportunities for local companies that can work in importing/manufacturing of some components due to the need of the supply chain.

Vehicle drivers will benefit from the project through the provision of transportation to those who work in the project. As well, some of them might be contracted to transfer the workers to the project area.

Community members from the region and surrounding villages will benefit from some increase in economic activities in order to serve the needs of the project developers and workers. Hotels, shops and restaurants will also see their turnover increase.

The project might result in the development of the surrounding areas. At least, some of the projects will pave roads and enhance basic infrastructure of some areas inside the selected zone.

Skilled and unskilled workers will get acquainted with modern technologies of solar power, which will create more job opportunities for them in the future as other development will take place in Egypt for RE.

The cumulative socio-economic impacts are considered to be positive and major for the construction phase, provided that a high percentage of workers will be employed from the nearest villages to the Nile Valley.

### 6.3.2 Positive impacts during operation

#### 6.3.2.1 New source of energy

The most important and positive impact is that the project will result in a renewable source of electricity that will enrich the National Electricity Grid. Such source of electricity could be used for:

- contributing to addressing a national energy shortage,
- reducing the use of fossil fuels in electricity generation, and
- displacing carbon-intensive sources of electricity.

#### 6.3.2.2 Job creation and income generation

The project will allow the creation of some jobs (a limited number) and will be a source of income for those who will operate the solar plant and work on a permanent basis. Based on a rough calculation for the direct jobs to be provided during operation, it will involve/engage about 5 to 10

people per solar plant, considering cleaning requirements for the modules as well as security. The permanent staff are likely to live locally.

In addition, provision of transportation and freight, cleaning services, security personnel, accommodation, etc. will be provided to the projects and generate local incomes. In addition, some minor impact on local tourism projects can be expected as some tour operators might propose to visit some of the solar farms.

The project will develop the new (power) industry, e.g. by establishing facilities for manufacturing a mounting structure, and enhance renewables as part of the Egyptian energy mix.

It will build the capacity of the community and for scholars with regards to solar and wind power production and renewable energy management.

#### 6.3.2.3 Enhancement of the community

Some enhancement of the services and utilities in the areas due to the project implementation can be expected and the impact on health will be improved due to the reduction or non-use of fossil fuels.

#### 6.3.2.4 Economic benefits and investments

The project will result in economic benefits through the long-term improvement of power quality.

Typically, the following positive impacts are expected from the development of the solar plant:

- Development of a solar power economy (development of related industries, development of commercial activities and management of such equipment). This will be a new field that will attract investors – consequently, hard currency will be increased
- Provision of a renewable source of energy will result in a reduction of subsidy allocated for the non-renewable fuel. As well, the new source of energy is considered clean energy.
- Additional tax income in case the projects will be implemented as IPP projects.

### 6.3.3 Negative impacts during construction

#### 6.3.3.1 Land-use

##### General

As the Project Area falls within the Eastern desert, it is not considered to be owned by the governorates but rather by the central government. Ownership has been transferred to NREA to use in renewable energy projects in light of the approvals by the central government and the armed forces as well as other relevant entities (e.g. civil aviation, General Authority for Rehabilitation Projects and Agricultural Development). It must be noted during discussion with the El Minya

governorate that authorities were frustrated that the land was allocated by the central government without consultation with them and they considered the project to be blocking the Eastern desert with possible extension of the Governorate.

Since no private ownership rights were observed, this impact will be considered low due to the importance of the issue of land acquisition. A detailed analysis will be needed during the ESIA of each site to confirm that no specific impacts on land-use will occur, as there are with some projects.

However, it must be noted that the land which must be blocked for PV plants is about 100-200 ha for a 50 MW plant and unlike wind power, the land below the modules cannot be used for other purposes.

#### 6.3.3.2 Impact on/from traffic

It is expected that during development, there will be an increased traffic flow on the surrounding roads. Although there are several newly established roads in the Project Area, there may be impacts on the roads leading to the Nile Valley villages, especially in El Minya Governorate, when heavily loaded and slow lorries may use the road. However, such an impact is relatively limited due to the low traffic flow on the road, as indicated by the traffic sample. Especially the El Minya - Assiut National Road, which passes through the East Solar-1 subarea and the connection between the El Minya - Assiut National Road and the eastern Dessert Road have ample additional capacity to absorb the additional traffic load easily. This impact is considered of low severity.

#### 6.3.3.3 Impacts related to occupational health and safety

There are major health and safety risks result from working on electrical systems and working with tools and machinery. Investors will be contractually required to keep the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) as a minimum standard. Besides keeping to the general guidelines regarding environmental, occupational health and safety and community health and safety aspects, of special relevance are the sector guidelines: IFC Environmental Health and Safety Guidelines and the Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution as well the EBRD PR 4.

Moreover, future investors will be required to employ, through their Contractors, an H&S engineer/supervisor, who is fully authorised to sanction any wrongdoing. An H&S management plan will be established at the start of construction activities subject to approval of supervising authority NREA. Important elements are safety training (for workers, machine drivers), emergency measures in case of accidents and a reporting system.

Considering that such measures will be correctly implemented, the residual impacts on occupational Health and Safety are of a minor nature. Egypt is in the top ten countries for the number of fatal road accidents by WHO (World Health Organization). The Central Agency for Public Mobilisation and Statistics (CAPMAS) recorded a total number of 14,548 car accidents on Egypt's roads in 2015 and the number one cause of accidents is human error, accounting for 63.3 % of the total figure, followed by the technical condition of the vehicles with 22.9 %. Safety risk during the

transport of personnel to the site has to be taken into consideration and the impact is considered moderate if strict measures are taken (speed limit, drivers with experience who respect the law, vehicles in good condition).

#### 6.3.3.4 Impacts related to temporary inconvenience

Considering that the selected areas for PV plants are at distance to any community, no measurable inconvenience for local communities will arise.

#### 6.3.3.5 Impacts on Bedouin community

The solar plant development areas are located in the desert, an area traditionally used, and traversed, by Bedouins. During SESA fieldwork, no Bedouins were encountered, but nevertheless the development of solar projects will change the character of the Project area to a degree which may impact upon Bedouins. Furthermore, the influx of labour may also pose an impact to Bedouin communities, if present. Individual projects should seek engagement with Bedouins about project developments, afford project benefits and opportunities to Bedouins and put in place measures to avoid influx related impacts.

To avoid the potential negative impacts associated with labour influx (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 for developers at the East Solar-1, East Solar-2 and East Solar-3 subareas should be developed. This should be coupled with identifying the exact employment needs of the project and the availability of local communities to provide the workforce and specific training needs. As the workers probably live in villages in the Nile Valley, this impact is considered minor due to the fact that the two subareas are far from these villages.

#### 6.3.3.6 Impacts on cultural and historical sites

On basis of the field survey, no cultural or archaeological sites exist in the East Solar subareas of the project or in the vicinity.

### 6.3.4 Negative impacts during operation

The following negative impacts are assumed:

- Land-use: Impacts during the operation phase are likely to be similar to those during construction, although on a smaller scale.
- Socio-economic impacts: the most important potential socio-economic negative impact during the operation is the use of water to clean the solar panels after a dust or sandstorm. Where water is rare, this use is sometime considered a waste of precious resources and may have a very negative impact. The level of the impact will depend on the amount of water needed. In some countries with frequent sand or dust storms, they may need to clean every night, in oth-

ers, one cleaning per week or per month is sufficient. The technology is also important, as wet or dry-cleaning methods can be applied. Wet cleaning may need up to one litre of water per m<sup>2</sup> of panels or 400 m<sup>3</sup> for a 50 MW project. Dry cleaning is better for the environment, but the coating on the panel must be adapted. This aspect needs to be analysed in detail in the scope of a project-specific ESIA.

- Health and Safety impacts: Permanent staff employed for normal operations is likely to be well trained and aware of H&S requirements, H&S company 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. Yet it is also necessary to have a clear documented health and safety policy as well as monitoring the H&S performance. This impact is considered moderate.
- The phenomena of reflection penalise the technical performances of solar installations. The application of an anti-reflective layer on the cells and the use of special front lenses reduce this phenomenon, which is, however, marginal. High quality glasses allow about 90% of the light to pass through. About 2% are diffused and absorbed, and only 8% reflected. Modern anti-reflective coatings can increase solar transmission to more than 95% and reduce reflection to less than 5%. Thus, the impact from reflection by modern PV plant is considered not measurable and thus negligible.

## 7 Mitigation of Environmental and Social Impacts

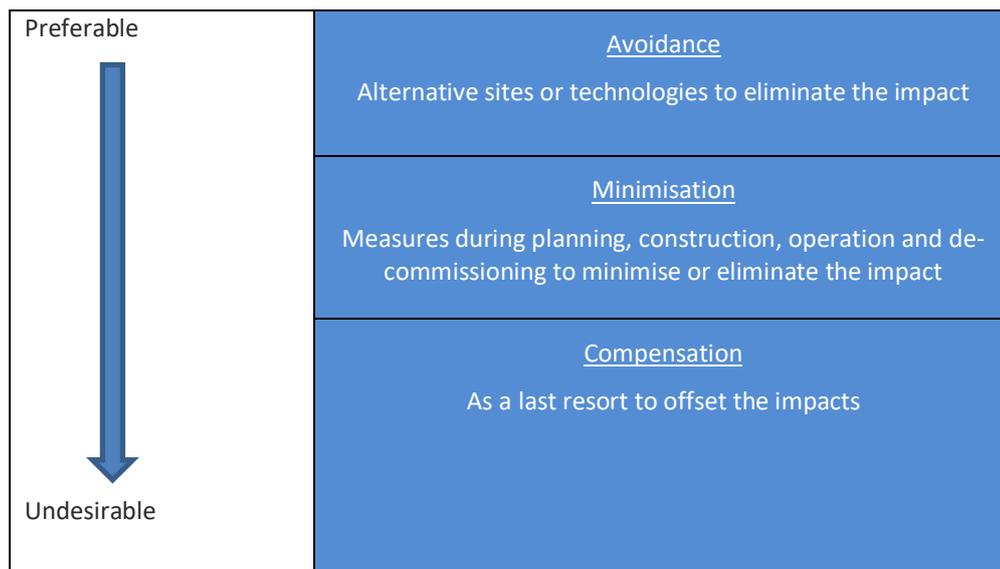
### 7.1 General - Best Practice / Mitigation Strategy

Mitigation aims to prevent adverse impacts from happening and to keep those that do occur within an acceptable level. This applies throughout the project cycle. All cumulative impacts previously identified are subject to mitigation except those that are assessed to be negligible.

The objectives of mitigation are to:

- find better alternatives and ways of doing things,
- enhance the environmental and social benefits of a proposal,
- avoid, minimise or remedy adverse impacts, and
- ensure that residual adverse impacts are kept within acceptable levels.

Following best practice, the mitigation hierarchy was applied.



**Figure 7-1: Mitigation Hierarchy**

Avoidance is the first step in the mitigation hierarchy. It is obviously the most preferred form of mitigation, because it ensures no environmental damage. Typical avoidance measures are keeping sufficient distance to receptors to make impacts negligible (e.g. noise, reflection) or to exclude the use of areas of competing land-use.

For impacts that cannot be completely avoided, steps shall be taken to ensure minimal damage to the environment. Where it is possible, such impacts are to be measured in relation to existing standards (e.g. emission, ambient, HSE standards). In this case, minimisation means to keep impacts well below limits defined in the standards. For other impacts not quantifiable by standards, minimisation means reduction to an acceptable level.

For those impacts only, that objectively cannot be avoided or minimised to acceptable level, compensation may apply to offset the impacts. Environmental or social offset is commonly defined as actions taken outside of the development site to compensate for the impacts in the development site. This last, undesirable measure is of no relevance for the solar power development.

All previously identified, cumulative impacts of PV solar power development in the vast desert area with low receptor sensitivity can be mitigated during project planning and execution by avoidance and minimisation to acceptable level with reasonable efforts. The subsequently listed mitigation measures are tailored to reduce the significance level of residual impacts to become either negligible or very minor, or well below defined standards, whenever standards are applicable. As to the obvious very low level of residual impacts, a repeat of a formal assessment of the impact significance level of residual impacts is not required.

## **7.2 Mitigation Measures Applying for the Solar Subareas**

### **7.2.1 Physical environment**

#### **7.2.1.1 Land-use/land-take**

Areas of current land-use or under development are designated to be preclusive for solar power development. This is to avoid social conflicts. The impact significance of land-take of the remaining portions (solar power plots) on land owned by the Government was assessed to be minor. Compensation or offtake measures are not required.

#### **7.2.1.2 Landscape character and visual impact**

Considering the vast desert character of the landscape, the little presence of human receptors at some spots only inside or near to the area and the large distances of development projects to the next villages or settlements, no specific mitigation measures are required during the planning and permitting process. The minor impacts arising during the construction phase shall be reduced by adequate restoration measures of construction sites upon completion, such as the levelling of excavation heaps or removal of all littered materials from the sites.

#### **7.2.1.3 Water resources and wastewater**

To protect water resources and to keep the withdrawal of water from wells at moderate level during periods of high water demand (casting of foundations during the construction phase), equalisation water tanks shall be installed at all East Solar subareas, at the wells and at the concrete batching plant. The volume of the water tank at the batching plant shall at least correspond with the water demand for the part of the PV plant that requires the larger volume of uninterrupted concrete pouring, which depends on the specific design of the PV plant. The volume of the water tank at the source shall correspond to the volume of the biggest tanker lorry used during the construction phase.

Domestic wastewater treatment from the sanitary installations at the site during construction shall be collected and treated in a simple two stage anaerobic treatment plant with rinsing of treated water into desert gravel for natural post-treatment. Sludge from domestic wastewater treatment shall be disposed regularly to keep the treatment plant well-functioning.

#### 7.2.1.4 Domestic and hazardous waste

The contractor shall be forced to carry out good workmanship and housekeeping during construction by contractual stipulations and by the assignment of supervising engineers in order to assure adequate disposal or recycling of waste. This shall be carried out to the extent that potential packing material waste shall be returned to the delivery vehicles.

To mitigate negative impacts during the construction phase, residual non-hazardous waste shall be collected and safely stored at the site so that drifting by wind is avoided. The recyclable or usable fraction (e.g. metals, reuse of wood) shall be separated and carried to the recovered substance cycle. The residual fraction of biodegradable or burnable waste will be collected in bags and in bins and disposed at designated waste treatment sites and landfills. In case of the absence of such sites, the waste shall be disposed of at an environmentally safe waste disposal site (desert pits). To reduce volume, the waste is burnt. The residual waste will be covered by sand. The waste is inert and in the absence of rain, there is no harm for the subsurface. Considering the small amounts of domestic waste (about 60 m<sup>3</sup> per year and a 50 MW plot of non-compacted waste equivalent to about 2 m<sup>3</sup>/a after incineration), this simple method is considered to be acceptable.

To reduce the volume, the waste is burnt and the residual waste will be covered by sand. The waste is inert and in absence of rain and very deep groundwater levels, there is no harm to the subsurface. Considering the small amounts of domestic waste (about 60 m<sup>3</sup> per year and a 50 MW plot of non-compacted waste equivalent to about 2 m<sup>3</sup>/a after incineration), this simple method is considered acceptable.

Spillage or dispersion of hazardous waste, such as spilt oil and grease, originating from construction equipment or transformers, into the soils at the site shall be avoided by careful handling and collection in containers and subsequent recycling.

#### 7.2.1.5 Air Quality

The impacts on the ambient air quality during the construction phase are caused by dust development at the working sites of machinery during road and foundation excavation works and shall be mitigated under occupational health and safety aspects. Mitigation measures are

- spraying water,
- workers to be assigned at the upwind side (the side of the dune facing the wind direction) from machinery, and
- wearing protective masks.

#### 7.2.1.6 Noise

Mitigation of noise impacts on sites of economic activities within or next to the solar power areas, where workers are employed or even reside for periods of time, shall be through keeping siting

distances of at least 300 m to any existing economic activity in the area. This applies for the construction.

#### 7.2.1.7 Archaeological, historical and cultural heritage

In the absence of archaeological, historical and cultural heritage inside or next to the project areas and having evaluated the impact significance on traffic to be negligible, no mitigation measures are required for these subjects. Moreover, no special risks from seismicity and flash floods that require special attention exist. However, discharge may occur occasionally in Wadis. Therefore, construction measures inside Wadis shall be minimised, e.g. limited to crossing gravel roads with the road surface to be at Wadi bed level or of Medium Voltage cables.

### 7.2.2 Biological environment

#### Construction and decommission phase

No significant impacts caused by construction/decommission activities calling for particular mitigation measures have been identified in the process of the assessment. Nevertheless, applying general measures to avoid or, at least, minimise any impact on habitats, flora and fauna during construction and decommissioning is crucial. This covers:

- The restriction of all activities to the boundaries of the construction areas, storage positions and access roads/tracks. Any use of the surroundings must be strictly avoided.
- Compliance with the regulations defined in Article 28 of the Egyptian Law no. 4/1994 for the Protection of the Environment amended by Law 9/2009, i.e. mainly a ban of
  - o hunting, killing, catching birds and wild animals or marine living organisms,
  - o cutting or damaging protected plant species,
  - o collecting, possessing, transporting, or offering to sell kinds of fauna and flora fossils or changing their features, and
  - o trading in all endangered living organisms of fauna and flora species.
- Larger Wadis, which hold sparse vegetation, form specific elements in the desert and can be used as a habitat for certain animals and temporarily as foraging or hunting sites for local birds. Hence, important Wadis have to be assessed as less favourable for solar power developments (see Map 5-2 and Map 5-3). An appropriate mitigation measure is to avoid construction works in these Wadis as much as possible.
- Avoid installing wire fences and steel cables that might pose a collision risk for birds. If wire fences or steel cables are required, these structures can be marked, if appropriate, to increase their perceptibility and to reduce the risk of collision for birds.
- Avoid lighting of solar PV projects to minimise attraction, irritation or disorientation of animals. If lighting is absolutely required, the minimum number of lights of lowest effective intensity shall be used. LED-lights or other light sources with wavelengths of more than 550 nm are known to have only limited effects on insects, and thus, shall be preferred.

- Build the grid within a solar PV power project and the grid between different PV projects by underground MT cables. If the use of overhead lines cannot be avoided, such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015) in order to avoid the risk of electrocution of large birds.

Except from considering and applying the mentioned measures no further management and mitigation is required with regards to habitats, flora and fauna, because no residual significant adverse impacts are expected by construction/decommission of solar PV projects and associated infrastructure in the Project Area.

#### Operation and maintenance phase

In order to protect habitats, flora and fauna in the three subareas - in particularly species protected by Egyptian legislation (e.g. Rüppell's Sand Fox), the regulations defined in Article 28 of the Egyptian Law no. 4/1994 amended by Law 9/2009 have to be followed and best practice procedures and general mitigation measures during operation and maintenance have to be applied.

When cleaning solar PV panels, as described in section 3.2.3, an appropriate procedure shall be applied and the required amount of water shall be minimised in order to save resources and to minimise the impact on the biological environment.

Beyond that, no additional management and mitigation is required with regards to habitats, flora and fauna, because no residual significant adverse impacts are expected by operation/maintenance of large scale solar farms and associated infrastructure in the Project Area.

#### Need for Post-Construction Monitoring / Risk Management

The gathered baseline data clearly shows that the East Solar subareas do not serve as an important habitat for plants. Animal species recorded in the East Solar subareas are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened. Consequently, the East Solar subareas are not an important habitat for animals.

Hence, there is no need for additional baseline studies on flora and fauna in the three subareas (neither before, during nor after construction of solar PV projects).

### **7.2.3 Social and economic environment**

#### **7.2.3.1 Management of impacts related to Health and Safety**

During the construction phase, potential impacts on workers and community health and safety during construction of a project are those associated with any construction project involving earthmoving, use of large equipment, transportation of overweight and oversized materials and construction and installation of industrial facilities. Additionally, health and safety issues include either working at height or in trenches. That might result in injuries and death.

#### Mitigation measures

- Investors will be contractually required to force contractors to abide by the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) as a minimum standard. Besides

maintaining general guidelines regarding environmental, occupational health and safety and community health and safety aspects, of special relevance are the IFC guidelines such as Health and Safety Guidelines for Electric Power Transmission and Distribution. Moreover, investors shall observe the EBRD Performance Requirement 4 on Health and Safety, whichever document is stricter.

- In accordance with the labour laws related to occupational health and safety No. 12 of the year 2003, workers should be oriented about health and safety procedures.
- The contractor and subcontractors shall assign a health and safety supervisor, who is fully authorised to sanction any non-observance of H&S procedures.
- The contractor shall establish a health and safety plan prior to the start of construction works. He shall make all health and safety facilities (i.e. firefighting equipment, surgery room for first aid treatment, first aid materials, protective tools, etc.) available at the project site and shall have equipment for emergency evacuation to the next hospital on standby at the site.
- All personnel shall undergo initial safety training, specifically tailored to individual work tasks.
- Contracts should be signed with the health facilities close to the construction site.

#### 7.2.3.2 Management of impacts on the Bedouin Community

The interests of Bedouin groups need to be considered when developing and implementing wind power projects:

- Bedouins should be consulted during the planning for the individual projects to ensure that any proposed development plan does not conflict with their reasonable interests. Participatory consultation tools should be employed during project implementation and operation.
- Affording potential benefits such as job opportunities shall be considered.
- Absence of information and statistics is a real challenge. There is a need to start by developing a database that includes information about the Bedouin community. This is essential for monitoring benefits from the project and to ensure that Bedouins are not excluded.

#### 7.2.3.3 Management of labour influx

##### Mitigation measures

- Minimising the number of workers from outside the Governorates close to the Project Area is highly recommended. The contractor should be advised to employ construction labour from the nearest villages in the Nile Valley. The incentives to contractors for such a measure include reducing the need for accommodation and transportation for workers.
- Community leaders could take part in the process of employment in terms of informing their local community about job opportunities. This will fall under the responsibility of the Social Development Officer.
- Fundamental principles and rights of workers need to be respected in line with EBRD PR2 and IFC PS2 and with special reference to national labour and employment laws.

- The temporary accommodation facilities at the site need to be appropriate for its location and be clean, safe and, at minimum, meet the basic needs of workers as per IFC and EBRD Workers' accommodation: processes and standards<sup>6</sup>.
- Involve stakeholders and the public, implement consequential information disclosure, establish a grievance process and redress mechanism by NREA.

#### 7.2.3.4 Management of impacts related to mirror effect

Unlike Concentrated Solar Power (CSP) plants, mirror effects caused by the modules of a PV Plant are negligible. Thus, no special protection measures are required.

### 7.3 Special Mitigation Features in the individual East Solar Subareas

#### 7.3.1 East Solar-1 subarea

Areas in the East Solar-1 subarea currently used or being under development for economic activities have to be considered to be preclusive. In addition, special features were identified that require specific mitigation: The important Wadi Ibadah and Wadi al-Birshawi has to be assessed as less favourable for solar PV power developments, and thus, construction works in this Wadi complex shall be avoided as much as possible (see Map 7-1).

#### 7.3.2 East Solar-2 subarea

Besides the general mitigation measures to be applied to all the solar power development, no special features in the East Solar-2 subareas were identified that require specific mitigation (see Map 7-2).

#### 7.3.3 East Solar-3 subarea

Besides the general mitigation measures to be applied to all solar PV power developments, special features in the East Solar-3 subarea were identified that require specific mitigation: The important Wadi ash-Shaykh complex has to be assessed as less favourable for solar PV power developments, and thus, construction works in this Wadi complex shall be avoided as much as possible (see Map 7-3).

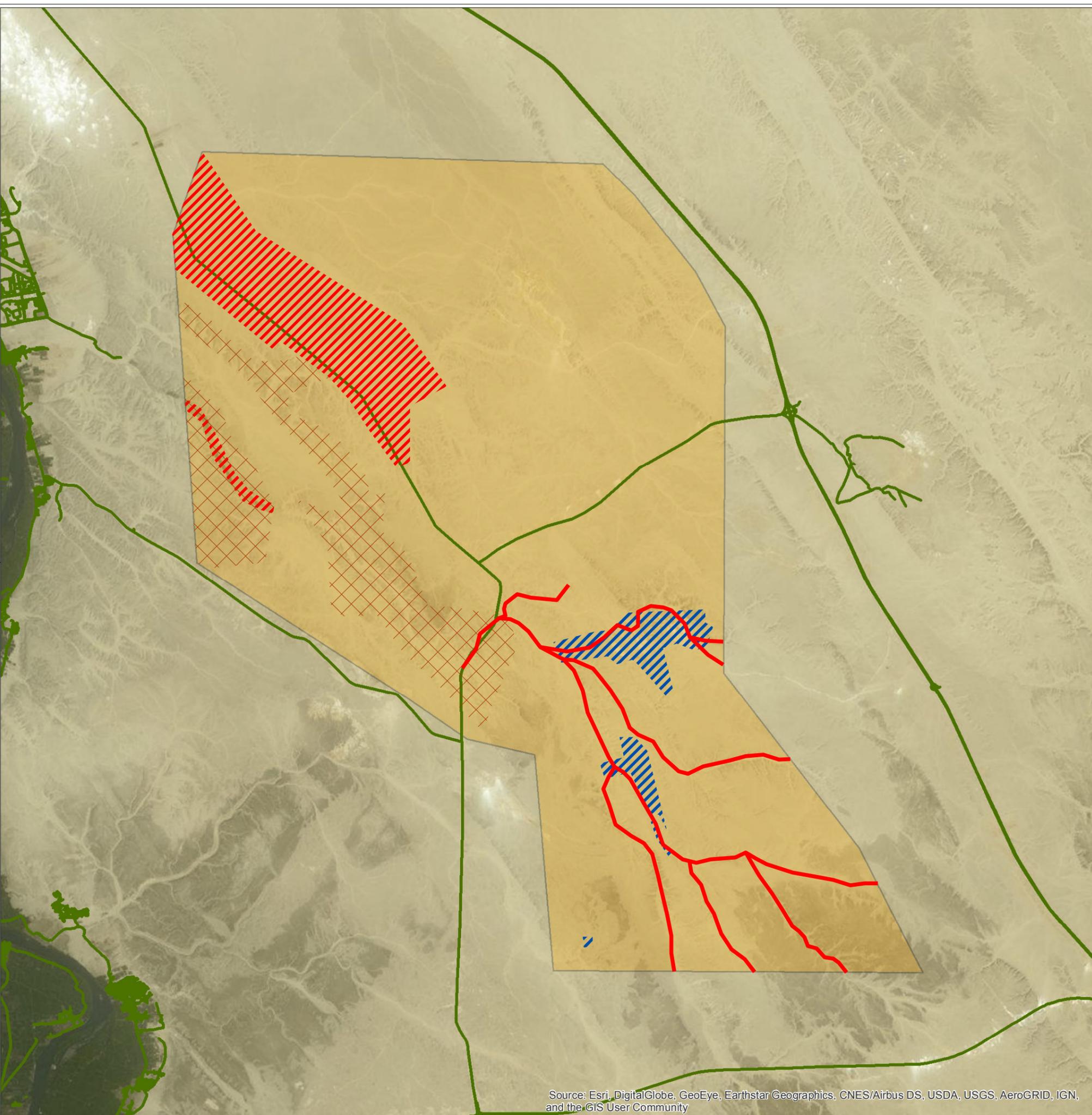
---

<sup>6</sup> <http://www.ebrd.com/downloads/about/history/workers.pdf>

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 7.1:**  
 Zones preclusive or less favourable for PV solar power development in the East Solar-1 subarea as a result of the impact assessment (mitigation measures)



**Bordering of East Solar-1 subarea**

 East Solar-1 subarea

**Roads**  
 road

**Zones preclusive for PV solar power development**

 due to economic activities (farming)  
 due to economic activities (mining)

**Zones unfavourable for PV solar power development**

 due to geomorphology  
 wadi of importance



Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt) SESA Solar Report

client: New and Renewable Energy Authority (NREA), Ministry of Electricity and Renewable Energy

Map 7.2: Zones preclusive or less favourable for PV solar power development in the East Solar-2 subarea as a result of the impact assessment (mitigation measures)



Bordering of East Solar-2 subarea

East Solar-2 subarea

Roads road

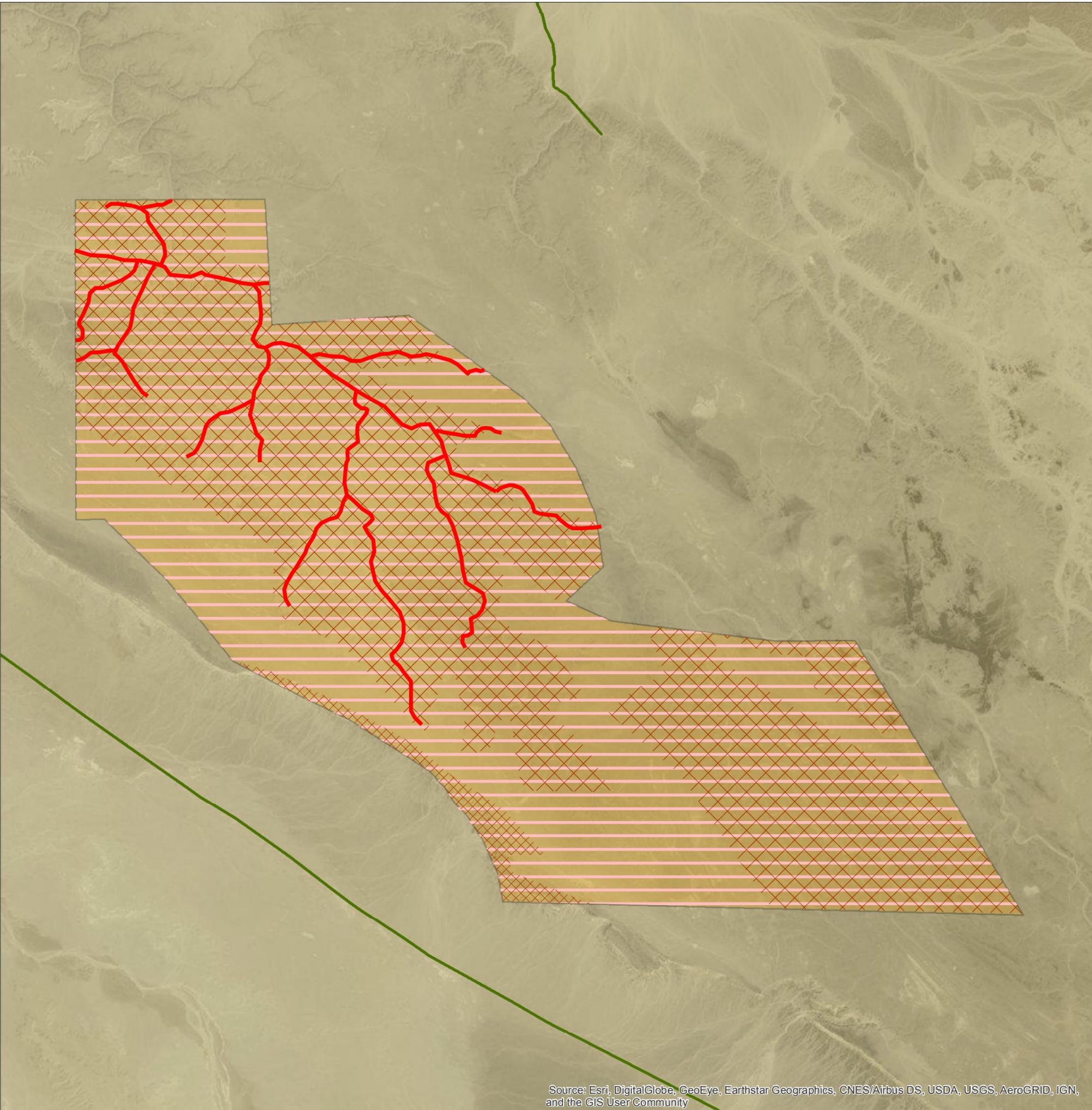
No restrictions exists for PV solar power development in the East Solar-2 subarea!



**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map 7.3:**  
 Zones preclusive or less favourable for PV solar power development in the East Solar-3 subarea as a result of the impact assessment (mitigation measures)



**Bordering of East Solar-3 subarea**

 East Solar-3 subarea

**Roads**  
 road

**Zones preclusive for PV solar power development**

 due to geomorphology

**Zones unfavourable for PV solar power development**

 due to geomorphology  
 due to accessibility  
 wadi of importance



## 8 Environmental and Social Management and Monitoring Plan

### 8.1 Environmental and Social Management

In order to meet all environmental and social requirements, certain measures/actions need to be considered, applied and implemented during the bidding, planning, construction and post-construction phase for each individual solar PV plant that would be erected in the accepted zones. Applicable measures are summarised in the following Environmental and Social Management Plan (ESMP) under Table 8-1.

It is understood that NREA will lance tenders for the selection of private investors for the individual 50 MW solar PV plant plots and will supervise the investors during the lifetime of the projects. It is essential that mitigation measures, i.e. the ESMP, become part of the tender documents and in the subsequent contract with investors. Moreover, thorough consideration/implementation of all requirements, measures need to be supervised during the planning, construction, operation and dismantling of each 50 MW solar PV plant. As part of this supervisory task, NREA will also be the address and in charge of following up any grievance during the lifetime of each project.

**Table 8-1: Environmental and Social Management Plan**

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Environmental and Social Management
All Phases	<u>Grievance</u>	EBRD PR1 and PR 10, Best Practice	Introduce a grievance mechanism that applies through life cycle of the solar PV power development to be taken care of the Egyptian Authority in charge.
Bidding and Planning Phase	<u>Health and safety risks</u>	EBRD PR1 and PR4, Voluntary and Best Practice	Make keeping standards as defined in the General Environmental, Health and Safety Guidelines of April 2007 a minimum obligation in the Tender Documents for each individual plot.
			Make the assignment of a fully authorised health and safety engineer during the construction phase obligatory in the Tender Documents.
			Make a health and safety plan for each construction site obligatory in the Tender Documents.
			Make provision of safety tools & equipment as per accepted standards by the Contractor a bidding condition in the Tender Documents.
	<u>Keeping mitigation measures</u>	EBRD PR 1, Best Practice	Make keeping mitigation measures defined for the construction, operation and decommissioning phase in this study obligatory to investors when tendering the 50 MW plots.
	<u>Impact on habitats, flora and fauna</u>	EBRD PR 6, Best Practice	Avoid installing wire fences and steel cables or, if absolutely required, mark them in order to make them more perceivable. Avoid or minimise lighting of solar PV plants. Avoid construction works in important Wadis systems. Avoid impacting on particular structures (like caves or crevices) that might form a suitable habitat for animals (to be con-

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Environmental and Social Management
			sidered in project-specific ESIA's).
		EBRD PR 6, Best Practice	Build the grid within a solar PV power project and the grid between different projects by underground cables. If the use of overhead lines cannot be avoided, such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015) in order to avoid the risk of electrocution of large birds.
<b>Construction phase</b>	<u>Health and safety risks</u>	EBRD PR4, EP3, Best Practice	Make Keeping the Equator Principle "EP3 - Applicable Environmental and Social Standards" as well as the IFC and EBRD Performance Standards (PS) respectively Performance Requirements (PR) as a minimum condition.
		EBRD PR4, Best Practice	Contractor and Subcontractor shall assign a health and safety engineer/supervisor fully authorised in giving health and safety instructions
		EBRD PR4, Best Practice	Establish an H&S plan prior to start of any construction measure.
		EBRD PR4, Best Practice	Make safety tools and equipment available and train in proper utilisation.
		EBRD PR4, Best Practice	Construct and make available temporary hygienic sanitary facilities at the construction site.
		EBRD PR4, Best Practice	Assure stoppage of erection works during weather conditions beyond safety limits (e.g. sandstorms).
	<u>Protection of water resources</u>	EBRD PR3, Best Practice	Install water tanks to protect wells from over-utilisation: One tank at the batching plant with a minimum volume corresponding to the water demand for foundation pouring of one day. One tank at the water supply well with a minimum volume equal to the largest tank lorry. Minimise water consumption.
	<u>Traffic</u>	EBRD PR4, Best Practice	Carry out heavy haulage transports during hours of low traffic load (late evening or night times) and safeguard them with convoy cars.
	<u>Pollution</u>	EBRD PR3, Best Practice	Assure good workmanship and housekeeping supervised by skilled staff to assure minimise wastewater and solid waste generation and to assure adequate disposal of domestic, hazardous waste and wastewater
	<u>Non-hazardous waste disposal</u>	EBRD PR3, Best Practice	Collect and safely store, separate recyclable fraction, bury biodegradable fraction, ash and residual waste on an environmentally safe waste disposal site (treatment sites and landfills). If this is not practicable, desert pits with final soil coverage of at least 1.5 m).
	<u>Hazardous waste disposal</u>	EBRD PR3, Best Practice	Avoid spillage of oil, diesel or grease into the soils, collect used oils or greases and bring them for recycling.

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Environmental and Social Management
	<u>Domestic wastewater treatment</u>	EBRD PR3, Best Practice	Construct simple two stage anaerobic treatment plant with rinsing of treated water into desert gravel for post-treatment at the sanitary facilities of each construction yard.
		EBRD PR3, Best Practice	At the end of construction works: require the contractor to put the construction site into a tidy condition – excavations are to be backfilled, heaps of excavation material are to be levelled and waste is to be properly disposed of
	<u>Impact on habitats, flora and fauna</u>	EBRD PR 6, Best Practice	Restrict all activities to the boundaries of the construction areas, storage positions and access roads/tracks. Any use of the surroundings must be strictly avoided.
		EBRD PR 6, Best Practice	Avoid importing new species of urban and rural environments into the area (e.g. together with construction materials and containers).
		National Legislation	Comply with the regulations defined in Article 28 of the Egyptian Law no. 4/1994 for the Protection of the Environment amended by Law 9/2009.
	<u>Labour and working conditions</u>	EBRD PR 7, Best Practice	Employ construction labour as much as possible from near to the areas where construction works will take place, i.e. from the nearest villages to the Nile Valley.
		EBRD PR 2 and PR 7, IFC PR2, Best Practice	Comply with the fundamental principles and rights of workers and accommodation standards fulfilling the requirements of EBRD (PR2) and IFC (PS2) and of the national labour and employment laws.
		EBRD PR 7, Best Practice	Any temporary accommodation facilities at the site need to be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers.
<b>Operation and maintenance phase</b>	<u>Health and safety risks</u>	EBRD PR4, Best practice	Assure that O&M at the solar PV plant is only carried out by personnel who have passed a special safety training course.
	<u>Cultural Heritages</u>	EBRD PR 8, IFC PS 8, national Legislation	Develop a chance find procedure for use during construction. Train workers, contractors and sub-contractors in the implementation of the chance find procedure
<b>Decommissioning</b>	<u>Land-use and landscape</u>	EBRD PR 6, Best Practice	Remove solar PV installations at the end of the lifetime and return the landscape to a tidy condition (levelling of heaps, backfilling of excavations)

## 8.2 Monitoring Arrangements and Actions

The purpose of environmental monitoring is to ensure that the designed mitigation measures are implemented on the ground. The environmental monitoring follows the management plan and shall be carried out in four phases:

- Bidding and planning phase
- Implementation and operation phase
- Checking and corrective actions phase
- Management review phase

This compliance monitoring provides control for adhering to the conditions defined in the ESMP. The responsibility for monitoring must lie with the Competent Authority, which was already entrusted with the tendering. This authority needs to guide and supervise the individual project owners. Moreover, the financing institutes may make keeping the monitoring and a corresponding reporting a condition in the financing agreements. A budget needs to be made available to facilitate monitoring by the Authority. In addition, project investors may establish their own monitoring program to supervise the Contractor's works, depending on the requirements from the financing institutions.

Also the adherence to health and safety standards to be implemented by the owner's qualified health and safety engineer, acting in the field independently from eventual instructions of the owner, and should be monitored by an external expert as required by the financing institute.

The E&S management team shall consist as a minimum 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. Typically, an external consultant will be hired to fulfil the role of the EHS focal point to supervise the project.

The Contractors will be responsible for the preparation, and maintaining of all reports, procedures, audit reports, incident reports, non-conformities, records and community complaints as well as the implementation on site. If any new process is introduced on-site or new impacts are found, the existing procedures shall be updated accordingly.

The environmental parameters shall be monitored as per the plan to keep track of environmental impacts, if any, due to the construction activities. The following parameters shall be tracked periodically to monitor the impact to the environment during construction phase:

- Noise
- Wastewater discharges
- Gaseous emissions
- Ambient air quality
- Waste streams generated
- Recruitment of local population
- Labour conditions
- Public complaints (Grievance)

It is, in any case, necessary to develop project-specific monitoring plans for the construction phase and to adapt such plans for the operation phase of solar PV plants. A generic monitoring program for the construction phase is suggested for the following aspects:

**Table 8-2: Generic monitoring program**

Environmental aspects	Monitoring location	Frequency	Responsibility
Air Quality - Dust	On-Site and access road	Monitoring shall be daily during significant dust generating activities (for dust monitoring) or during periods of high winds, otherwise weekly	Contractor's Project Manager, E&S Coordinator
Noise	On-Site	Biweekly/High amounts of noisy activities	Contractor's Project Manager, E&S Coordinator
Wastewater	On-Site	Daily	Contractor's Project Manager, E&S Coordinator
Waste Management	On-Site	Daily	Contractor's Project Manager, E&S Coordinator
Hazardous Waste Management	On-site	Daily	Contractor's Project Manager, E&S Coordinator
Grievance Mechanism	On-Site	Regularly	Contractor's Project Manager, E&S Coordinator
Traffic Management	On-site, access roads	Weekly	Contractor's Project Manager, E&S Coordinator
Solid Waste Disposal	Solid Waste Storage Areas	Monthly	Contractor's Project Manager, E&S Coordinator
Emergency Monitoring	Not applicable	Every time there is an emergency	Contractor's Project Manager, E&S Coordinator
Social / Labour Recruitment	The projects shall seek to employ local workers where possible and, where appropriate, shall offer training to enhance the development of skills within the local workforce	The number of local population employed in the project need to be monitored in order to assess the effectiveness of the Recruitment Policy that will be developed for the construction phase	Contractor's Project Manager, E&S Coordinator

Environmental aspects	Monitoring location	Frequency	Responsibility
Social/ Labour Accommodation	On-Site	Weekly	Contractor's Project Manager, E&S Coordinator

Furthermore, an HSE management and performance report regarding the on-going works on project sites shall be prepared on a monthly and quarterly basis.

- Summary of accidents/incidents within the past month
- Summary of daily and cumulative man hours worked
- Loss time due to accidents/incidents
- 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
- Environmental monitoring data

## 9 Bibliography and References

- Al Amar (2011): Environmental and Social Considerations Survey. Preparatory Survey to Establish a Wind Farm at the West Nile Valley in the Arab Republic of Egypt. Draft Report submitted in November 2011 by Al Amar Consulting Group S.A. to Oriental Consultants co., LTD (Tokyo, Japan). 182 p.
- Baha El Din, S. M. (1999): Directory of important bird areas in Egypt. The Palm Press. Cairo. 113p.
- Baha El Din, M. (2006): A guide to the reptiles and amphibians of Egypt. American University Press. Cairo. New York. 359 p.
- Birdlife International (2015): Guidance on appropriate means of impact assessment of electricity power grids on migratory soaring birds in the Rift Valley / Red Sea Flyway. Regional Flyway Facility. Amman, Jordan.
- Birdlife International (2017): Birds and Solar Energy within the Rift Valley/ Red Sea Flyway. <http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf>
- Brinkmann, R., O. Behr, F. Korner-Nievergelt, J. Mages, I. Niermann & M. Reich (2011): Zusammenfassung der praxisrelevanten Ergebnisse und offene Fragen. In: Brinkmann, R., O. Behr, I. Niermann & M. Reich (Hrsg.): Entwicklung von Methoden zur Untersuchung und Reduktion des Kollisionsrisikos von Fledermäusen an Onshore-Windenergieanlagen. Umwelt und Raum 4: 425-457.
- Carlbro (2009): Preliminary Draft. Bird Migration Study El Zayt, Egypt. Report from bird migration studies autumn 2008 and spring 2009. Report for Italgen - Italcementi Group.
- DeVault, T. L., T. W. Seamans, J. A. Schmidt, J. L. Belant & B. F. Blackwell (2014): Bird Use of Solar Photovoltaic Installations at US Airports: Implications for Aviation Safety. USDA National Wildlife Research Centre - Staff Publications. 1418. [http://digitalcommons.unl.edu/icwdm\\_usdanwrc/1418](http://digitalcommons.unl.edu/icwdm_usdanwrc/1418)
- Drewitt, A. L. & R. H. W. Langston (2006): Assessing the impacts of wind farms on birds. Ibis 148: 29-42.
- ecoda (2012): Final Report on the Ornithological Investigation at the West Nile Valley in Arab Republic of Egypt. Reported on 1 October 2012, to Oriental Consultants Co., Ltd. (Tokyo, Japan) and Japan International Cooperation Agency (JICA; Tokyo, Japan). 82p.
- EEAA – Egyptian Environmental Affairs Agency (2015): Clearing House Mechanism of Egypt, National Biodiversity Strategy and Action Plan (NBSAP) - NCS -. [http://www.egyptchm.info/?page\\_id=796](http://www.egyptchm.info/?page_id=796).
- EEAA (2009): Egyptian Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2nd edition).
- EEAA (2013): EIA guidelines and monitoring protocols for wind energy development projects” (Ministry of State for Environmental Affairs and the Egyptian Environmental Affairs Agency 2013).
- Abd El-Ghani, M. M., F. Salama & M. Abdel Aleem (2014): Flora and vegetation of the Eastern Desert of Egypt. LAP Lambert Academic Publishing. Saarbrücken. Cairo. 300 p.
- Fouda, M. (2016): Protected Areas of Egypt : towards the future. [https://portals.iucn.org/library/sites/library/files/styles/publication/public/book\\_covers/BC-2006-048.jpg](https://portals.iucn.org/library/sites/library/files/styles/publication/public/book_covers/BC-2006-048.jpg).

- Haas, D., M. Nipkow, G. Fiedler, R. Schneider, W. Haas & B. Schürenberg (2015): Protecting birds on powerlines: a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects. On behalf of NABU - German Society for Nature Conservation / BirdLife Partner Germany. Bonn 38p.
- Harhash, K. A., El-Henawy, M. T., Abdel Fattah, H. F. & M. S. Antar (2015): Conservation oriented habitat classification scheming and mapping of Egypt. *Environmental Systems Research* 4: 8. DOI 10.1186/s40068-015-0034-1.
- Harrison, C., H. Lloyd & C. Field (2017): Evidence review of the impact of solar farms on birds, bats and general ecology (NEER012). Technical Report to Natural England. DOI: 10.13140/RG.2.2.24726.96325.
- Hoath, R. (2009): A field guide to the mammals of Egypt. American University Press. Cairo. New York. 236 p.
- IUCN (International Union for Conservation of Nature) (2017): The IUCN Red List of Threatened Species. <http://www.iucnredlist.org/> (downloaded on 1 June 2017).
- Langston, R. H. W. & J. D. Pullan (2004): Effects of wind farms on birds. *Nature and environment*, no 139. Council of Europe Publishing, Strasbourg.
- Lesham, Y. & Y. Yom-Tov (1996): The Magnitude and timing of migration by soaring raptors, pelicans and storks over Israel. *Ibis* 138: 188-203.
- Mellone, U., R. H. G. Klaassen, C. Garcia-Ripollés, R. Liminana, P. López-López, D. Pavón, R. Strandberg, V. Urios<sup>1</sup>, M. Vardakis & T. Alerstam (2012): Interspecific Comparison of the Performance of Soaring Migrants in Relation to Morphology, Meteorological Conditions and Migration Strategies. *PLoS ONE* 7(7): e39833. doi:10.1371/journal.pone.0039833.
- Meyburg, B.-U., C. Meyburg & P. Paillat (2012): Steppe Eagle migration strategies – revealed by satellite telemetry. *British Birds* 105: 506-519.
- Meyburg, B.-U., P. Paillat & C. Meyburg (2003): Migration routes of steppe eagles between Asia and Africa: a study by means of satellite telemetry. *The Condor* 105: 219-227.
- Mostafa, Ashraf Aboul-Fetoooh (2012): Caves of the Nile Valley (Governorate of Assiut, Middle Egypt): a long-term interaction between human societies and their environment. Vol. 18 - n° 1.
- Munzbergova, Z. & D. Ward (2002): Acacia trees as keystone species in Negev desert ecosystems. *Journal of vegetation Science*. Volume 13 (2): 227–236.
- Osborn D. J. & I. Helmy (1980): The contemporary land mammals of Egypt (including Sinai). Published by Field Museum of Natural History. New Series, No. 5.
- Percival, S. (2005): Birds and wind farms: what are the real issues? *British Birds* 98: 194-204.
- RSPB – Royal Society for the protection of Birds (2011): Solar power. RSPB Briefing, March 2011.
- RSPB – Royal Society for the protection of Birds (2017): Solar Power. RSPB Policy Briefing, May 2017.
- Saleh, M. A. (1993). Habitat Diversity and Land Vertebrates. In: Kassas, M. (ed.) *Habitat Diversity: Egypt*. Publications of National Biodiversity Unit. No.1, Cairo, pp. 165–131.
- Saleh, M. (1997): Amphibians and reptiles of Egypt. Publications of National Biodiversity Unit. No. 6: 234 pp.
- Walston Jr., L. J., K. E. Rollins, K. E. LaGory, K. P. Smith & S. A. Meyers (2016): A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United States. *Renewable Energy* 92 (2016) 405-414.

[https://ac.els-cdn.com/S0960148116301422/1-s2.0-S0960148116301422-main.pdf?\\_tid=d588facc-faaa-11e7-bbf4-00000aab0f26&acdnat=1516099909\\_57179b10a906e335d8a16a4a3e669df7](https://ac.els-cdn.com/S0960148116301422/1-s2.0-S0960148116301422-main.pdf?_tid=d588facc-faaa-11e7-bbf4-00000aab0f26&acdnat=1516099909_57179b10a906e335d8a16a4a3e669df7)

Zahran M. A. & Willis A. J. (2009): The Eastern Desert. In: The Vegetation of Egypt. Plant and Vegetation, Vol 2. Springer, Dordrecht.

**10 Annex**

## **10.1 Annex A: Scoping Phase**

### **10.1.1 Annex A1: Scoping Report**

# Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region

Scoping Report – Rev. 03 – Final Report



October 2016



and Renewable Energy Authority (NREA)  
Ministry of Electricity and Renewable Energy

# Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region

Scoping Report –Rev. 03 – Final Report

Prepared for:

New and Renewable Energy Authority (NREA), Egypt

Prepared by

JV Lahmeyer International and ecoda Environmental Consultants

c/o Lahmeyer

Friedberger Str. 173

61118 Bad Vilbel

Germany

## Table of Contents

ملخص تنفيذي .....	6
Executive Summary .....	9
1 Introduction.....	12
2 SESA and Scoping Process .....	14
2.1 SESA Process and Objectives .....	14
2.2 Scoping Process and Objectives .....	16
2.3 Stakeholder Engagement for Scoping .....	17
3 Legal and administrative framework.....	19
3.1 Policy context .....	19
3.2 Legal and regulatory framework in Egypt .....	19
3.3 EBRD Performance Requirements.....	20
3.4 Equator Principles.....	22
4 Project description .....	24
4.1 The project area and its vicinity .....	24
4.2 Typical features and layout of windfarm projects .....	26
4.3 Typical features of PV solar projects .....	29
5 Social and environmental baseline conditions and data gaps .....	32
5.1 General .....	32
5.2 Physical environment .....	32
5.3 Biological environment.....	33
5.4 Social environment.....	36
5.4.1 General .....	36
5.4.2 Demographics.....	36
5.4.3 Labour Force.....	38
5.5 Landuse in the project area.....	38
5.6 Data gaps in baseline information.....	40
6 Potential and anticipated impacts and mode of assessment .....	43
6.1 General .....	43
6.2 Determination of significance levels of potential impacts.....	43
6.3 Potential and anticipated impacts of wind power development on the areas East Wind-1 and East Wind-2.....	45
6.4 Potential and anticipated impacts of solar power development on the areas East Solar-1, East Solar-2 and East Solar-3.....	50
7 Project Implementation Schedule .....	54
7.1 Implementation of the subject SESA studies .....	54
7.2 Implementation of subsequent wind power and PV solar power projects .....	56

## List of Figures

Figure 1: The Project Area including initial RE development areas based upon already prescribed height restrictions for developments in the Project Area.....	13
Figure 2: Key stages of the SESA .....	15
Figure 3: East Nile RE development areas .....	25
Figure 4: Typical windfarm layout for a pre-dominant wind direction – example of Zafarana wind farm (Egypt).....	27
Figure 5: Inside wind farm view .....	28
Figure 6: Remote wind farm view on desert ground .....	28
Figure 7: Setup of a PV Plant.....	29
Figure 8: Typical ‘Mounting Structure’ erected on site .....	30
Figure 9: Example for inverter and transformer arrangement.....	30
Figure 10: Example of a PV Plant .....	31
Figure 11: Typical PV Plant layout.....	31
Figure 12: Desert ground in the south of the East Wind-1 area .....	33
Figure 13: Wadi with shrubs and single trees crossing the East Solar 3 area (July 2016) .....	34
Figure 14: Lizard (most probably Bosk’s fringe-toed lizard ( <i>Acanthodactylus boskianus</i> )) recorded in the Project Area in April 2016 .....	35
Figure 15: Spotted sandgrouse recorded during bird monitoring in April 2016.....	35
Figure 16: Agricultural activities in the Wadi al Masnji (July 2016) .....	39
Figure 17: Implementation Schedule of the SESA wind and SESA solar studies.....	55
Figure 18: Likely Schedule of 50 MW Wind and PV Solar Power Investment Implementation .....	57

## List of Tables

Table 1: Key components of a PV Plant .....	30
Table 2: Estimated population and their percentage distribution in 2014 (CAPMAS, 2015) .....	37
Table 3: Separation urban / rural population as per census 2006.....	37
Table 4: Mortality and births rates and natural increase in 2014* .....	37
Table 5: Five largest employment markets in 2014 .....	38
Table 6: Overview of data gaps.....	40
Table 7: Significance level of impacts .....	44
Table 8: Significance of potential impacts of wind power projects.....	45
Table 9: Significance of potential impacts of solar PV power projects.....	50

List of Annexes

Annex A: Stakeholder Engagement Plan

## ملخص تنفيذي

يهدف هذا التقرير لتحديد نطاق إجراء دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية (SESA) لتطوير مشاريع للطاقة المتجددة في منطقة بمساحة 2200 كيلومتر مربع تقع إلى الشرق من نهر النيل في مصر في ثلاث محافظات: بني سويف والمنيا وأسيوط، وقد تم إعداد هذا التقرير الاستكشافي بمشاركة شركة لا ماير الدولية Lahmeyer وشركة إيكودا ecoda للاستشارات البيئية لحساب هيئة الطاقة الجديدة والمتجددة (NREA) في مصر، وستقوم الشركتين أيضا بإعداد دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية الكاملة.

وفي أعقاب صدور القانون الرئاسي لتعريفه تغذية الطاقة المتجددة (FIT) في مصر في ديسمبر 2014، اشترك البنك الأوروبي للتشبيد والتعمير مع الحكومة المصرية لتحديد مجموعة من مشاريع الطاقة المتجددة (من الرياح والمصادر الشمسية) ليتم تمويلها من قبل مستثمرون أجانب مؤهلين مباشرة (الاستثمارات الأجنبية المباشرة)، ومن المتوقع أن كل مشروع سيكون بقدرة 50 ميغاوات. وقد حددت الحكومة المصرية ثلاث مناطق واسعة مناسبة لمشاريع الطاقة المتجددة الضخمة سواء من الطاقة الشمسية أو الرياح وفقا لهذا القانون منها منطقة بمساحة 2200 كيلومتر مربع تقع إلى الشرق من نهر النيل، وقد تم تحديد هذه المنطقة استنادا إلى البيانات الموجودة عن إمكانيات الطاقة الشمسية وطاقة الرياح واستخدام الأراضي الراهن.

ولضمان التقييم الاستراتيجي للقضايا البيئية والاجتماعية المحتملة المرتبطة بتطوير مشاريع الطاقة المتجددة في هذه المنطقة ("منطقة المشروع") ولاخطار الهيئات المسؤولة عن اتخاذ قرار تطوير هذه المشاريع، فإن الحكومة المصرية وهيئة الطاقة الجديدة والمتجددة تقوم بإجراء دراسة لتقييم الأثر البيئي والاجتماعي الاستراتيجية (SESA) لمنطقة المشروع، وهذه الدراسة هي عملية منهجية لدعم القرار تساعد على ضمان مراعاة السمات البيئية والاجتماعية وشروط الاستدامة على نحو فعال في السياسة والتخطيط وإعداد البرامج ويدعم البنك الأوروبي للتشبيد والتعمير هذه الدراسة.

### ولدراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية الأهداف التالية:

- توفير مصدر موثوق للبيانات البيئية والاجتماعية لمنطقة المشروع لخطط تنمية الطاقة المتجددة ولموالي المشاريع البيئية.
- تحديد مناطق في منطقة المشروع تكون مناسبة لتنمية الطاقة المتجددة القائمة على الرياح الطاقة الشمسية مع تحديد الاعتبارات البيئية والاجتماعية.
- تحديد وتقييم الآثار البيئية والاجتماعية المحتملة المرتبطة بتطوير وتشغيل مشاريع الطاقة المتجددة في منطقة المشروع وتحديد تدابير التخفيف والإدارة لمعالجة هذه الآثار المحتملة بما في ذلك توصيات بشأن تصميم المشروع.
- إشراك أصحاب المصلحة بما في ذلك أفراد من الجمهور في التطوير المخطط لمشاريع الطاقة المتجددة في منطقة المشروع.
- تطوير قاعدة بيانات نظام المعلومات الجغرافية التي سيتم استخدامها لمشاريع الطاقة المتجددة في المستقبل.
- توفير التدريب لهيئة الطاقة المتجددة على دراسات تقييم الأثر البيئي والاجتماعي الاستراتيجية ونظام المعلومات الجغرافية.

وتطبق دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية عملية مشابهة لتلك المستخدمة في دراسة تقييم الأثر البيئي لتطوير المشاريع على نطاق واسع، ويوثق هذا التقرير المرحلة الاستكشافية لدراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية.

وتحدد المرحلة الاستكشافية نطاق دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية ولها الأهداف التالية:

- تحديد الشروط الأساسية البيئية والاجتماعية المعروفة بالفعل.
- تحديد الآثار البيئية والاجتماعية المحتملة وتقديم تقييم أولي لمدى أهميتها.

- تحديد أية دراسات أو أبحاث تكون مطلوبة لمزيد من فهم الشروط الأساسية في منطقة المشروع ولتقييم الآثار.
- إشراك أصحاب المصلحة وإخطارهم بدراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية وإطلاعهم على المرحلة الاستكشافية لها.

وقد تم تنفيذ المرحلة الاستكشافية على النحو التالي:

- مراجعة أولية لمنطقة المشروع ولخطط التنمية المقترحة ولمفاهيم وتصاميم مشاريع الطاقة المتجددة النمطية.
- تحديد الآثار المحتملة وأهميتها والمعلومات الأساسية اللازمة ومستوى التقييم ومنهجية التقييم.
- توثيق الدراسة الاستكشافية في مسودة تقرير لتوفير المعلومات الأولية لأصحاب المصلحة الرئيسيين.
- إشراك أصحاب المصلحة في القرار من خلال اجتماع مع أصحاب المصلحة الرئيسيين.
- مراجعة وتحديث التقرير الاستكشافي وفقا لنتائج الاجتماع الاستكشافي وعملية الفحص الشاملة لتحديد النطاق النهائي لدراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية.
- عرض التقرير الاستكشافي لأصحاب المصلحة الرئيسيين والجمهور (عبر مواقع هيئة الطاقة الجديدة والمتجددة والبنك الأوروبي للتنشيد والتنمية).

وقد تم تقديم مسودة التقرير الاستكشافي لهيئة الطاقة الجديدة والمتجددة في 27 يونيو 2016 وفي وقت لاحق، تم ارسال التقرير إلى أصحاب المصلحة الرئيسيين الذين تم تحديدهم في المحافظات الثلاثة مع دعوتهم للاجتماع الاستكشافي الذي تم عقده في 12 يوليو 2016 في مقر هيئة الطاقة الجديدة والمتجددة في القاهرة، وقد تتضمن هذا الاجتماع ما يلي:

- 1- عرض لدراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية والغرض من الاجتماع الاستكشافي:
  - أ) المهام والأهداف والنتائج المتوقعة من دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية.
  - ب) الغرض من الاجتماع الاستكشافي.
  - ت) وصف السمات النمطية وتخطيط مشاريع طاقة الرياح والطاقة الشمسية في المناطق الصحراوية وتأثير اتجاه الرياح السائد / محاذاة ألواح الطاقة الشمسية الكهروضوئية.
  - ث) نظرة عامة أولية للظروف البيئية والاجتماعية الأساسية في منطقة المشروع.
  - ج) تحديد فجوات البيانات في المعلومات الأساسية.
- 2- تحديد نطاق دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية: مناقشة واستعراض المشاريع المرجحة للطاقة المتجددة والآثار البيئية والاجتماعية المحتملة ومدى أهميتها ومستوى التقييم المطلوب ومنهجية التقييم:
  - أ) تطوير مشاريع طاقة الرياح.
  - ب) تطوير مشاريع الطاقة الشمسية الكهروضوئية.
  - ت) إعداد قائمة بالآثار الهامة المحتملة ومنهجية التقييم.
- 3- استعراض قائمة أصحاب المصلحة والنظر في مدخلاتهم.
- 4- استعراض المعلومات المقدمة من أصحاب المصلحة.

ويتم إدراج نتائج مناقشات أصحاب المصلحة والمعلومات المفصّل عنها وخطط دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية في خطة إشراك أصحاب المصلحة، المرفقة بهذا التقرير الاستكشافي، ويتم اعتبار خطة إشراك أصحاب المصلحة على أنها وثيقة حية سيتم تنفيذها وتحديثها مع مرور الوقت للتأكد من أنها تظل مناسبة خلال إعداد دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية وخلال تطوير مشاريع الطاقة المتجددة في منطقة المشروع.

وكان من نتائج الاجتماع الاستكشافي التوصل إلى قائمة من الآثار المحتملة والمتوقعة ومدى أهميتها ومدى التقييم المطلوب ومنهجيات التقييم التي يتعين تطبيقها، ثم بعد ذلك تم تحديث هذا التقرير الاستكشافي الذي يحدد نطاق دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية ومن الملاحظ أن نطاق دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية يمكن تعديله خلال مراحل تطويره وسيتم اعتبار الآثار التالية في دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية:

- الآثار المترتبة على استخدام الأراضي القائمة في منطقة المشروع.
- الآثار والفوائد الاجتماعية والاقتصادية.
- التغييرات في اللاندسكيب والآثار البصرية.
- الآثار على النباتات والحيوانات من خلال استخدام الأراضي وأنشطة المشروع الأرضية.
- الآثار على الطيور نتيجة فقدان الموائل والتداخل مع مسارات هجرتها ومخاطر التصادم مع مكونات مشاريع طاقة الرياح والطاقة الشمسية.
- استخدام موارد المياه ومعالجة مياه الصرف الصحي والتخلص منها.
- الآثار المرتبطة بإدارة النفايات والتخلص منها.
- الآثار على نوعية الهواء.
- الضوضاء والاهتزازات والتداخلات الكهرومغناطيسية وانعكاس الضوء / التظليل.
- الآثار على التراث الأثري والثقافي.
- مخاطر الصحة والسلامة المهنية.
- الآثار على حركة المرور وخدمات المرافق والبنية التحتية.
- مخاطر السيول.
- المخاطر الزلزالية.

ويهدف هذا التقرير الاستكشافي إلى إبلاغ أصحاب المصلحة، بما في ذلك الجمهور، بمشاريع الطاقة الجديدة والمتجددة المستقبلية في منطقة المشروع وللتعرف على ردود أفعالهم للاستفادة بها في إعداد دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية.

## Executive Summary

This report is the Scoping Report which defines the scope for undertaking a Strategic Environmental and Social Impact Assessment (SESA) for the development of renewable energy (RE) projects in a 2,200 km<sup>2</sup> area located to the east of the Nile River in Egypt across three Governorates: Beni Suef, Minia and Assuit. This Scoping Report has been prepared by a Joint Venture of Lahmeyer International and ecoda Environmental Consultants on behalf of the New & Renewable Energy Authority (NREA) in Egypt. The same Joint Venture will be responsible for the SESA.

Following the issuance of the Renewable Energy Feed-in Tariff (FiT) presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (EBRD), has been engaged in partnership with the Government of Egypt (GoE) to identify a portfolio of RE projects (from wind and solar sources) to be financed by prequalified Foreign Direct Investors (FDIs). It is expected that each project will be of 50 MW in capacity.

The GoE has identified three large areas suitable for development of RE mega farms for both wind and solar projects under the newly issued FiT law including a 2,200 km<sup>2</sup> area located to the east of the Nile River. This area has been identified based on existing data on solar and wind power potential and existing land use.

To ensure a strategic level assessment of the potential environmental and social issues associated with the development of RE projects in this area (the "Project Area") and to inform the decision making process for project development, the GoE, together with the NREA, is undertaking a Strategic Environmental and Social Assessment (SESA) Study for the Project Area. A SESA is a systematic decision-support process that helps to ensure that environmental, social and other sustainability aspects are considered effectively in policy, plan and programme making. The SESA is supported by the EBRD.

The SESA has the following objectives:

- To provide a reliable source of environmental and social data for the Project Area to inform RE development plans, environmental permitting and project financing.
- To identify areas in the Project Area, which are suitable for RE development based on wind and solar potential and environmental and social considerations.
- To identify and assess potential environmental and social impacts associated with RE project development and operation in the Project Area and define mitigation and management measures to address these potential impacts, including recommendations on project design.
- To engage with stakeholders, including members of the public on the planned development of RE projects in the Project Area.
- To develop a Geographic Information System ("GIS") database, which will be used to inform future RE projects.
- To provide training to NREA on SESA, Environmental and Social Impact Assessment (ESIA) and GIS.

The SESA has adopted a typical SESA (similar to an ESIA) process to inform project development over a large area. This report documents the scoping stage of the SESA process.

The scoping stage defines the scope of the SESA and has the following objectives:

- Establish the already known environmental and social baseline conditions.
- Identify potential environmental and social impacts and present an initial assessment on their significance.
- Identify any studies or surveys that are required to further understand the baseline conditions in the Project Area and inform the assessment of impacts.
- Engage with stakeholders to inform them about the SESA and allow them to inform the Scoping stage and SESA.

The scoping stage has been implemented as follows:

- Initial review of the Project Area, proposed development plans and typical RE project concepts and designs;
- Impact identification exercise to identify potential impacts, their potential significance, the necessary baseline information required, level of assessment and assessment methodology;
- Documentation of the scoping review in a draft scoping report for provision of preliminary information to key stakeholders;
- Undertaking initial stakeholder engagement through a scoping meeting with identified key stakeholders;
- Revision and updating of the draft scoping report according to the findings of the scoping meeting and overall scoping process to determine the final scope of the SESA study; and
- Disclosure of the scoping report to key stakeholders and to the public (via websites of NREA and the EBRD).

The draft scoping report was issued to NREA on June 27<sup>th</sup>, 2016. Subsequently, the report was circulated to the identified key-stakeholders, including those in the three Governorates together with an invitation for the scoping meeting. The scoping meeting was held on July 12<sup>th</sup>, 2016 at NREA offices in Cairo. The meeting was composed of the following:

1. Presentation on the SESA and the purpose of the scoping meeting
  - a) Tasks, objectives and expected results of the SESA;
  - b) Purpose of the scoping meeting;
  - c) Description of typical features and layout of wind power and solar power projects in desert areas with predominant wind direction / alignment of PV solar;
  - d) Preliminary overview of the baseline environmental and social conditions in the Project Area; and
  - e) Data gaps in baseline information.
2. Scoping the SESA: Discussion and review of likely RE project and potential environmental and social impacts, potential impact significance, level of assessment required and assessment methodology:
  - a) Wind power development;

- b) PV solar power development; and
  - c) Establishment of list of potentially significant impacts and assessment methodology
3. Review of stakeholder list and consideration of stakeholder input
  4. Inquiry of specific information from stakeholders

Stakeholder engagement and information disclosure plans for the SESA are captured in a Stakeholder Engagement Plan (SEP), which is attached to this Scoping Report. The SEP is seen as a living document which will be implemented, and updated over time to ensure it is appropriate, during SESA development, SESA disclosure and during RE project development in the Project Area.

As an outcome of the scoping meeting, a list of potential and anticipated impacts, their potential significance, the extent of assessment required and the assessment methodologies to be applied were defined. The Scoping Report was then updated (this document) and serves to define the scope of the SESA. It is noted, however, that the scope of the SESA may be adjusted during the course of SESA development. The following impacts will be considered in the SESA:

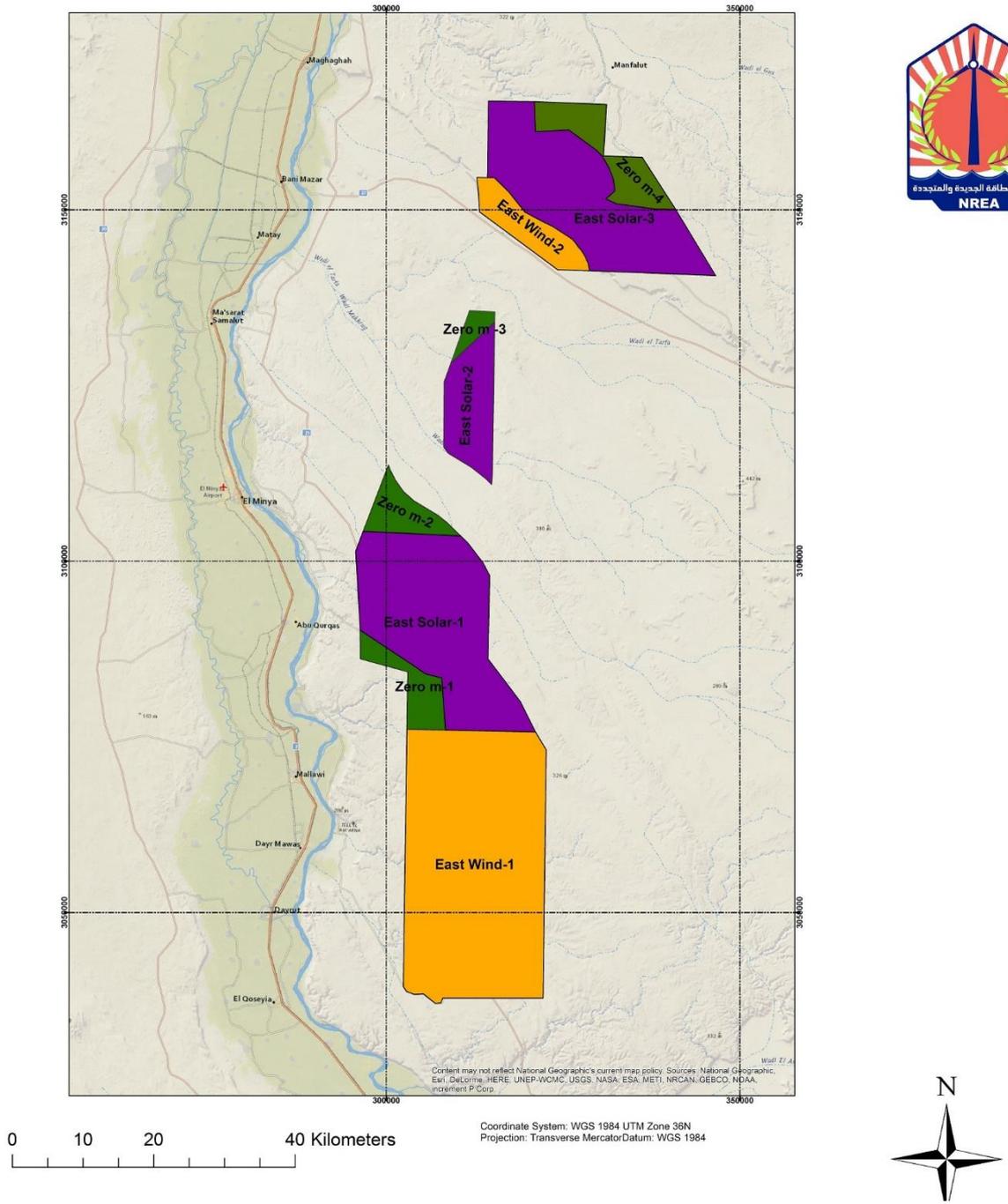
- Impacts on existing land use through project land-take;
- Socio-economic impacts and benefits;
- Changes to the landscape character and visual impacts;
- Impacts on terrestrial flora and fauna through land take and project activities;
- Impacts to avifauna (birds) through loss of habitat, interaction with migrations routes and collisions risks;
- Use of water resources, waste water treatment and disposal;
- Impacts associated with waste management and disposal;
- Impacts on air quality;
- Noise, vibration, electromagnetic interferences and light reflection/shadowing (wind RE);
- Impacts on archaeological and cultural heritage construction and operational activities;
- Occupational health and safety risks;
- Impacts on traffic, utility services and other infrastructure;
- Water run-off / flash flood risk; and
- Seismicity risks.

The scoping report is disclosed to inform stakeholders, including the public, about the future development of the Project Area and to illicit feedback prior to and during SESA development.

## 1 Introduction

This report is the Scoping Report which defines the scope for undertaking a Strategic Environmental and Social Impact Assessment (SESA) for the development of renewable energy (RE) projects in a 2,200 km<sup>2</sup> area located to the east of the Nile River in Egypt across three Governorates: Beni Suef, Minia and Assuit. This Scoping Report has been prepared by a Joint Venture of Lahmeyer International and ecoda Environmental Consultants on behalf of the National Renewable Energy Authority (NREA) in Egypt. The same Joint Venture will be responsible for the preparation of the SESA.

Following the issuance of the Renewable Energy Feed-in Tariff (FiT) presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (EBRD), has been engaged in partnership with the Government of Egypt (GoE) to identify a portfolio of RE projects (from wind and solar sources) to be financed by prequalified Foreign Direct Investors (FDIs). It is expected that each project will be of 50 MW in capacity. The GoE has identified three large areas suitable for development of RE mega farms for both wind and solar projects under the newly issued FiT law including a 2,200 km<sup>2</sup> area located to the east of the Nile River. This area has been identified based on existing data on solar and wind potential and existing land use. To ensure a strategic level assessment of the potential environmental and social issues associated with the development of RE projects in this area (the "Project Area"), and to inform the decision making process for project development, the GoE, together with the NREA, is undertaking a Strategic Environmental and Social Assessment (SESA) Study for the Project Area. A SESA is a systematic decision-support process that helps to ensure that environmental, social and other sustainability aspects are considered effectively in policy, plan and programme making. The SESA is supported by the EBRD.



**Figure 1: The Project Area including initial RE development areas based upon already prescribed height restrictions for developments in the Project Area.**

## **2 SESA and Scoping Process**

### **2.1 SESA Process and Objectives**

The SESA has the following objectives:

- To provide a reliable source of environmental and social data for the Project Area to inform RE development plans, environmental permitting and project financing.
- To identify areas in the Project Area, which are suitable for RE development based on wind and solar potential and environmental and social considerations.
- To identify and assess potential environmental and social impacts associated with RE project development and operation in the Project Area and define mitigation and management measures to address these potential impacts, including recommendations on arrangement of plots for individual wind or solar power projects.
- To engage with stakeholders, including members of the public on the planned development of RE projects in the Project Area.
- To develop a Geographic Information System ("GIS") database, which will be used to inform future RE projects.
- To provide training to NREA on SESA, Environmental and Social Impact Assessment (ESIA) and GIS.

The SESA has adopted a typical SESA (similar to an ESIA) process to inform project development over a large area. This report documents the scoping stage of the SESA process. It includes the following key stages:



**Figure 2: Key stages of the SESA**

Within the areas allocated to RE development the SESA shall

- Identify environmental or social constraints and define avoidance (excluding areas) or restriction measures (e.g. keeping minimum distances) or other mitigation measures (attributes: preclusive, restrictive and favourable);
- Identify technical constraints for RE development, e.g. steep slopes, migrating dunes (attributes: preclusive, restrictive/less favourable and favourable); and
- Determine the wind and the solar potential over the respective areas.

By considering the environmental, social and technical attributes as well as the wind/solar power potential distribution the SESA shall identify

- areas that are favourable for RE development (wind power or photovoltaic solar power);

- areas that are less favourable but can be developed with restrictions; and
- areas in which RE development is precluded.

The SESA will show areas where the development of wind power and PV solar power will be possible with the least environmental and social impacts. The results shall be mapped differentiating into zones where RE development i) is possible without restrictions, ii) possible but with restrictions such as future monitoring and verification, iii) critical and only possible with significant mitigation measures and iv) precluded.

The SESA will inform future projects and investment decisions, facilitate and inform future environmental permitting requirements and project financing for the development individual investment projects of 50 MW each within these areas.

## 2.2 Scoping Process and Objectives

The scope of the SESA is defined at an early stage in the SESA process through a scoping study, the results of which are documented in this report. This scoping stage in the process has the following objectives:

- Establish the already known environmental and social baseline conditions in the Project Area.
- Identify potential environmental and social impacts associated with the development of RE projects in the Project Area and present an initial assessment of their potential significance.
- Identify any studies or surveys that are required to further understand the baseline conditions in the Project Area, inform the assessment of impacts and determine suitable RE development areas.
- Engage with stakeholders to inform them about the SESA and allow them to inform the scoping stage and SESA.

The scoping stage of the SESA has been implemented as follows:

- Initial review of the Project Area, proposed development plans and typical RE project concepts and designs.
- Impact identification exercise to identify potential impacts, their potential significance, the necessary baseline information required, level of assessment and assessment methodology;
- Documentation of the scoping review in a draft scoping report for provision of preliminary information to key stakeholders;
- Undertaking initial stakeholder engagement through a scoping meeting with identified key stakeholders;

- Revision and updating of the draft scoping report according to the findings of the scoping meeting and overall scoping process to determine the final scope of the SESA study; and
- Disclosure of the scoping report to key stakeholders and to the public (via websites of NREA and the EBRD).

The scoping determines which impacts are likely to be significant and should become main focus of the SESA. Scoping also identifies data availability and data gaps. The scoping process determines the appropriate spatial and temporal scopes for the assessment and suggests suitable survey methodologies.

### 2.3 Stakeholder Engagement for Scoping

It is essential that the scoping report and the SESA are not developed in isolation and therefore it is necessary to engaged various stakeholders in the SESA process to elicit feedback and to inform the scope of the SESA. The SESA approach to stakeholder engagement and disclosure is captured in a Stakeholder Engagement Plan (SEP), which is attached to this Scoping Report. The SEP is seen as a living document which will be implemented, and updated over time to ensure it is appropriate, during SESA development, SESA disclosure and during RE project development in the Project Area. The SEP defines who the SESA stakeholders are, the various stages when stakeholders, including the public, will be engaged and how, during and after the SESA process and the type of information to be disclosed.

As the first step in stakeholder engagement and information disclosure, the draft Scoping Report was issued, following submission to NREA on June 27<sup>th</sup>, 2016, and circulated to various key stakeholders, including those in the three Governorates together with an invitation for the scoping meeting. The scoping meeting was held on July 12<sup>th</sup>, 2016 at NREA offices in Cairo. The meeting was composed of the following:

1. Presentation on the SESA and the purpose of the scoping meeting:
  - a) Tasks, objectives and expected results of the SESA;
  - b) Purpose of the scoping meeting;
  - c) Description of typical features and layout of wind power and solar power projects in desert areas with predominant wind direction / alignment of PV solar;
  - d) Preliminary overview of the baseline environmental and social conditions in the Project area; and
  - e) Data gaps in baseline information.
  
2. Scoping the SESA: Discussion and review of likely RE project and potential environmental and social impacts, potential impact significance, level of assessment required and assessment methodology;
  - a) Wind power development;
  - b) PV solar power development; and
  - c) Establishment of list of potentially significant impacts and assessment methodology.

3. Review of stakeholder list and consideration of stakeholder input
4. Inquiry of specific information from stakeholders

As an outcome of the Scoping meeting, a list of potential and anticipated impacts, their potential significance and the extent of assessment and the assessment methodologies to be applied were defined. The Scoping Report was then updated (this document) and serves to define the scope of the SESA. It is noted, however, that the scope of the SESA may be adjusted as necessary during the course of SESA.

### 3 Legal and administrative framework

#### 3.1 Policy context

The Project Area, together with two other areas, was allocated by Presidential Decree No 456 of 2014, which was modified by the Decree No 116 of 2016 for the development of wind and solar energy projects. The presidential decree is a result of preceding central Egyptian power development planning with involvement of different, relevant Ministries and Authorities. Wind and solar potential, site suitability as well as potential environmental and social impacts were considered during the identification of the RE development areas.

The SESA will consider the Egyptian legal and regulatory framework, EBRD Performance Requirements and the Equator Principles. While compliance with Egyptian legal and regulatory requirements is obligatory, the SESA will adopt the strictest requirements, Egyptian or international whichever is strictest. Thus, the conditions for later international project financing shall be fulfilled.

#### 3.2 Legal and regulatory framework in Egypt

A legal and regulatory framework for a Strategic Environmental and Social Assessment, e.g. an E&S Assessment for a regional development, plan or programme, does not exist in Egypt. Relevant for the SESA, however, is the legal and regulatory framework for Environmental Impact Assessment (EIA), which, though not explicitly stated in the designation, comprises the social assessment as well. The legal basis for EIA was established by Law No. 4 of 1994, the Law on Protection of the Environment and its Executive Regulations 1995 (Prime Ministers Decree 338). According to these Regulations the Egyptian Environmental Authority (EEAA) has the authority for approval of bases and procedures for the assessment of environmental impacts of projects.

The law was amended by Law 9/2009 to update environmental legislation. Major amendments include:

- An EIA shall be prepared for both, new establishments and expansion of existing establishments.
- The EEAA can penalise an investor with fines, if conditions imposed by the EIA process would not be implemented.
- The public consultation has been made mandatory for Form C projects, i.e. projects requiring full EIA, in addition to a public disclosure with an Arabic executive summary.

Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2<sup>nd</sup> edition (2009) steer the EIA and environmental approval process. According to these guidelines “Generation of electricity using wind or solar energy, including power lines” is a category C project type and has to undergo a full EIA.

The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process on the social and environmental aspects with concerned parties to minimize potential negative environmental and social impacts, strengthen social acceptance of the project, informing the concerned parties that the environmental impacts will be minimised to levels that are low as reasonably practical and

achieve the balance between legitimate requirements for development and environmental protection.

Consultation is undertaken at least twice during the EIA process: the first in the phase of identifying the scope of the EIA and the second after the preparation of the draft EIA report. Scoping shall be prepared by establishment of a stakeholder engagement plan, listing the concerned parties that will be consulted and methods of consultation. A meeting will be held with EEAA to discuss the plan and the meeting could result in increasing the concerned parties or modifying the method of consultation.

The Egyptian Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2<sup>nd</sup> edition (2009) contain a provision with regard to projects in a development, for which an integrated EIA has been prepared (e.g. for a cluster of foundries or tourist centres; in analogy for a cluster of wind or PV solar power projects). In this case the individual projects of similar nature will be required to abide by the requirements of the category that is less strict than its original category. Accordingly, once an integrated EIA (also designated as regional or strategic EIA) was prepared and approved for a cluster development of wind or PV solar power according to category C requirements, for later individual investment projects out of the cluster the EIA will have to follow the requirements of category B, making use of the assessment results of the integrated EIA and applying any measures, restrictions, etc. defined in the E&S action or management and monitoring plan. The SESA will facilitate and inform the later EIA and environmental approval process for individual RE projects. The SESA takes into consideration the requirements and guidelines for EIA in Egypt.

### 3.3 EBRD Performance Requirements

The European Bank for Reconstruction and Development (EBRD) supports the development of the SESA and is further active in providing finance for development projects in Egypt including potential RE projects in the Project Area and elsewhere. The EBRD, as a signatory to the European Principles for the Environment, is committed to promoting the adoption of EU environmental principles, practices and substantive standards. Moreover, EBRD recognises the ratification of international environmental and social agreements, treaties and conventions by its countries of operations. The EBRD seeks to ensure that projects satisfy and fulfil the following conditions:

- A project/or operational activities are socially and environmentally sustainable;
- A project/or operational activities are respectful to the rights of affected workers and communities; and
- A project/or operational activities is designed and operated in compliance with applicable regulatory requirements and good international practice.

As the SESA is supported by the EBRD it is necessary that the SESA will apply the EBRD’s environmental and social requirements, which are defined in the EBRD’s Environmental and Social Policy of May 2014 together with its associated Performance Requirements. All projects financed by the EBRD shall be structured to meet the requirements of this Policy. According to its E&S Policy, large scale wind power installations for energy production (wind farms) are category A projects (equivalent to category C in Egypt), requiring comprehensive E&S impact assessment or an ESIA. Smaller individual RE projects, such as those below 50MW are generally categorised as B requiring less E&S assessment.

As part of its E&S Policy, the EBRD has adopted a comprehensive set of specific Performance Requirements (PRs) that the projects are expected to meet:

*PR 1: Assessment and Management of Environmental and Social Impacts and Issues*

*PR 2: Labour and Working Conditions*

*PR 3: Resource Efficiency and Pollution Prevention and Control*

*PR 4: Health and Safety*

*PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement*

*PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources*

*PR 7: Indigenous Peoples*

*PR 8: Cultural Heritage*

*PR 9: Financial Intermediaries*

*PR 10: Information Disclosure and Stakeholder Engagement*

The Performance Requirements, with the exception of PR 7 and PR9, will be applied to the SESA to fulfil the conditions for future financing of RE projects by the EBRD. Of special relevance for the SESA is PR 1, with the key requirements to:

- Identify and evaluate environmental and social impacts and issues of the project;
- Adopt a mitigation hierarchy approach to address adverse environmental or social impacts and issues to workers, affected communities, and the environment from project activities;
- Promote improved environmental and social performance of clients through the effective use of management systems; and
- Develop an ESMS tailored to the nature of the project, for assessing and managing environmental and social issues and impacts in a manner consistent with relevant PRs.

This corresponds to the approach of this subject strategic environmental and social assessment studies. As the SESA covers the development of various RE projects over a large area it corresponds to a Category A project (equivalent to Class C as per Egyptian regulations), i.e. projects that could result in potentially significant adverse future environmental and/or social impacts which cannot readily be identified or assessed and will require the client to carry out a comprehensive Environmental and Social Impact Assessment (ESIA). The ESIA process includes a scoping stage to identify the potential future environmental and social impacts associated with the project. This SESA considers the EBRD's requirement for ESIA and category A projects. The SESA will be used by the EBRD and other financial institutions to inform financing decisions on individual RE projects.

For information disclosure and stakeholder engagement PR 10 is of high importance. Accordingly, stakeholder engagement shall take place by providing local communities that are directly affected by the project and other relevant stakeholders with access to timely, relevant, understandable and accessible information, in a culturally appropriate manner, and free of manipulation, interference, coercion and intimidation. Stakeholder engagement will involve the following elements: stakeholder identification and analysis, stakeholder engagement planning, disclosure of information, consultation and participation, grievance mechanism, and ongoing reporting to relevant stakeholders. Considering that Egyptian regulatory requirements are less demanding, PR10 will be applied

for stakeholder engagement. Performance Requirements 2 to 8 (excluding PR7) will be applied in the course of the execution of the SESA studies.

As a signatory to the European Principles for the Environment, the EBRD is committed to promoting the adoption of EU environmental principles, practices and substantive standards. In this respect the SESA will take into consideration the principles of the EU Directive 2001/42/EC of June 27<sup>th</sup>, 2001 on the assessment of effects of certain plans and programmes on the environment (the EU Strategic Environmental Impact Assessment Directive) as well as other standards, directives and good international practice relevant to SESA and RE development.

### 3.4 Equator Principles

RE projects in the Project Area are likely to be developed by prequalified Foreign Direct Investors (“FDIs”). These FDIs are likely to require financing from financing institutions. Many financing institutions have adopted the Equator Principles (EP), which are applied to projects subject to finance and are similar the EBRD Performance Requirements. Currently 84 Equator Principles Financial Institutions (EPFIs) in 35 countries have officially adopted the EPs, covering over 70 percent of international Project Finance debt in emerging markets. EPFIs commit to implementing the EP in their internal environmental and social policies, procedures and standards for financing projects.

Accordingly, to meet the international financing requirements of private investors, the SESA will apply, in addition the EBRD Performance Requirements, the requirements of the Equator Principles (The Equator Principles (EP) III are effective from 4 June 2013.).

The Equator Principles Financial Institutions (EPFIs) will only provide Project Finance and Project-Related Corporate Loans to projects that meet the requirements of Principles 1-10:

- Principle 1: Review and Categorization
- Principle 2: Environmental and Social Assessment
- Principle 3: Applicable Environmental and Social Standards
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan
- Principle 5: Stakeholder Engagement
- Principle 6: Grievance Mechanism
- Principle 7: Independent Review
- Principle 8: Covenants
- Principle 9: Independent Monitoring and Reporting
- Principle 10: Reporting and Transparency

As defined in Principle 3, for projects located in Non-Designated Countries like Egypt, the assessment process evaluates compliance with the applicable IFC Performance Standards of 2012 on Environmental and Social Sustainability (Performance Standards) and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) (Exhibit III).

IFC Performance Standards:

- 1 Assessment and Management of Environmental and Social Risks and Impacts
- 2 Labour and Working Conditions
- 3 Resource Efficiency and Pollution Prevention
- 4 Community Health, Safety and Security
- 5 Land Acquisition and Involuntary Resettlement
- 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources
- 7 Indigenous Peoples
- 8 Cultural Heritage

The Performance Standards are similar to the EBRD Performance Requirements although there are some limited differences. The SESA will ensure that both sets of requirements are met.

World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) are split into General Guidelines and Industry Sector specific guidelines. The general guidelines cover environmental, occupational health and safety and community health and safety aspects that could be applied to any project. Of special relevance is the sector guideline “Environmental Health and Safety Guidelines for Wind Energy” which will be considered during impact assessment and mitigation in the SESA. No sector guideline on PV solar power exists as yet. The SESA will, however, consider what is regarded as Good International Industry Practice (GIIP) for PV solar power projects.

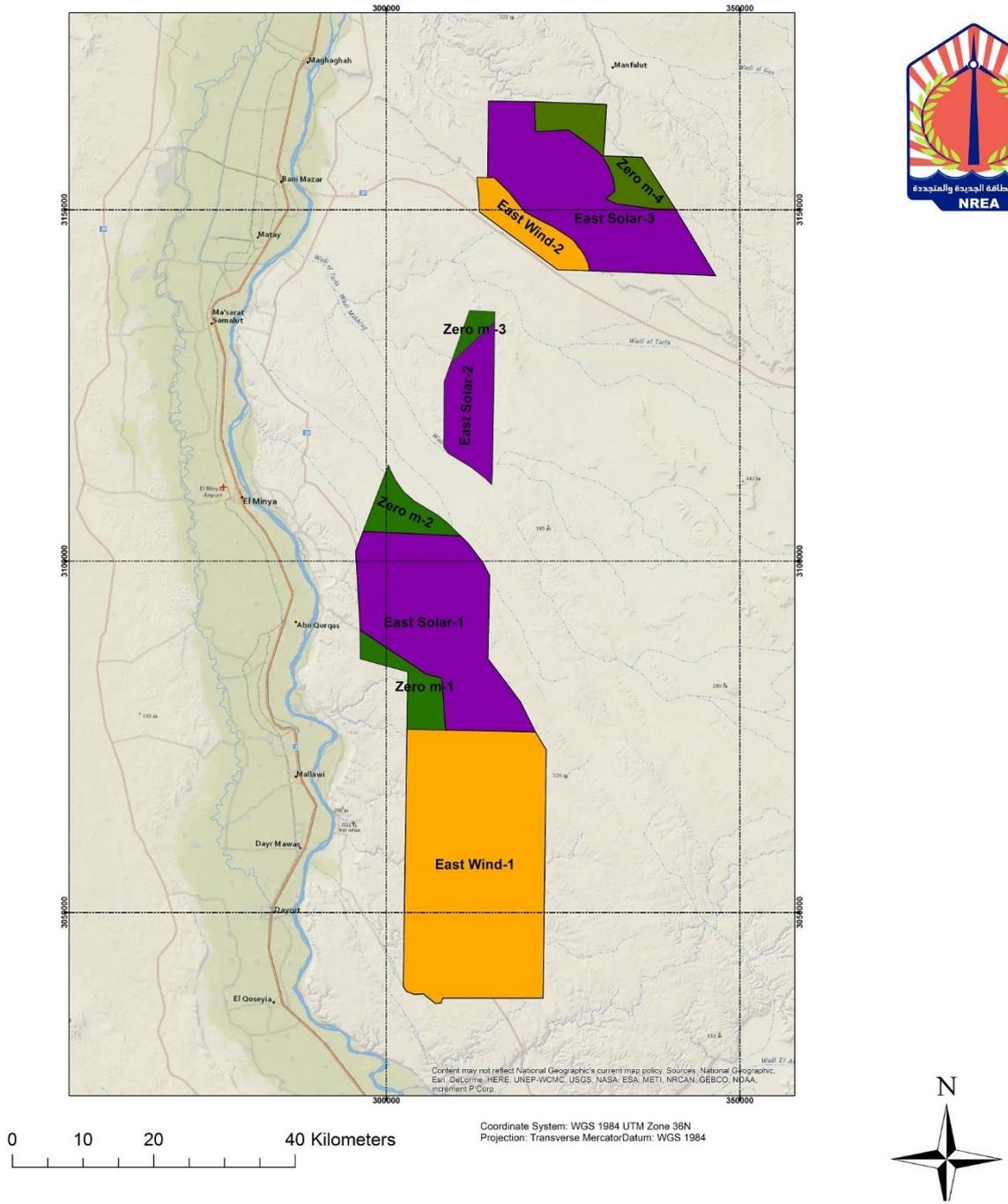
## **4 Project description**

### **4.1 The project area and its vicinity**

The Project Area, which corresponds to the area allocated by Presidential Decree No 456 of 2014, modified by the Decree No 116 of 2016, for the use by wind and solar energy projects, is located in the East of the Nile River Valley at a nearest distance of 8 km to the Nile Valley, at the latitude of Maghada in the North and El Quoseyia in the South, all on desert land. The intended RE development areas are shown in Figure 3. The orange-coloured areas have building height limits of 150 m and shall be used for wind power development (EastWind-1 and East Wind-2). The purple-coloured areas with maximum building heights of 5 m shall be used for photovoltaic solar power projects (East Solar-1, East Solar-2 and East Solar-3). In the green-coloured areas the building height limit is zero, i.e. these areas have to be kept free from any construction or structures. The building height limits are a requirement of the Egyptian Ministry of Defence.

The five areas for wind and solar projects, to the extent that there will be no E&S and/or technical constraints, shall be developed in clusters of 50 MW plots. Accordingly, wind power plots would be in the order of 5 km<sup>2</sup> and photovoltaic plots in the order of 1 to 2 km<sup>2</sup>. The typical layout of wind farms and photovoltaic projects are described in Sections 4.2 and 4.3 respectively.

The hyper-arid areas are almost free of any vegetation. Settlements are located inside or next to the Nile Valley only, i.e. significantly outside the areas. Inside the area only very few isolated economic activities take place such as agricultural groundwater irrigation schemes, stone crushing or mining. An inventory of these economic activities and their legal status will be carried out during the upcoming field studies and social implications duly considered in assessment and mitigation.



**Figure 3: East Nile RE development areas**

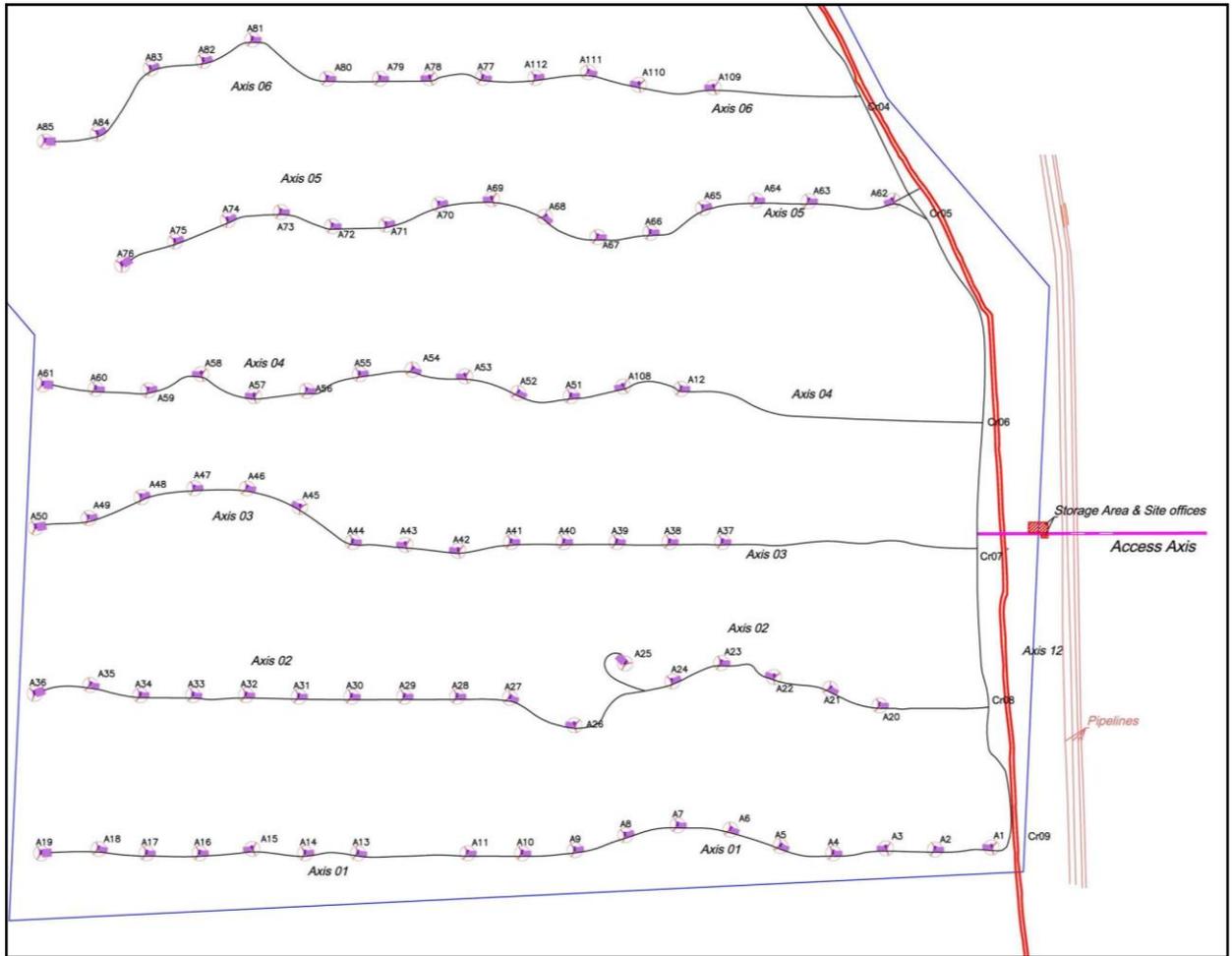
## **4.2 Typical features and layout of windfarm projects**

The typical features of a wind farm are as follows:

- Three bladed wind turbines (wind turbine generator or WTG) with rotor diameters of about 80 to 120 m and maximum tip height of 150 m above ground installed in rows East to West (considering the predominant wind direction from North) at about 250 to 350 m distance along the rows. The distance between rows will be about 800 m to 1200 m.
- Medium voltage windfarm internal grid made by underground cable. Kiosks for ring main stations might be installed next to each WTG.
- High voltage substation for power evacuation at high voltage level and high voltage overhead transmission lines (OHTL). Collector substations and OHTL shall serve for power evacuation of several 50 MW RE plots combined. OHTL may be interconnectors to existing lines near the Nile River Valley but also new transmission lines to the load centres in the North. The design and need for OHTL will be defined through detailed power, load and power grid expansion studies once likely generation capacity in the Project Area is known.
- Internal windfarm gravel roads of about 8 m width as well as construction platforms of compacted gravel (hard stands) with dimensions in the order of 100 x 60 m mainly depending on the dimensions of the WTG blades.
- External access roads from existing road network.
- Central service buildings such as possibly control room, spare part stores, workshops and worker facilities for service personnel.

Windfarm construction works typically extend across 6 % to 8 % of the overall windfarm plot while this is reduced to about 5 % of the land once the windfarm is operational. More than 90 % of a wind farm area will remain untouched. To a major extent, the natural environment can be preserved and/or other economic activities in the area can continue or initiated in parallel to wind power utilisation.

A layout plan showing a typical windfarm configuration in a homogeneous desert area near to the Gulf of Suez with a predominant wind direction is presented below (see Figure 4). Moreover, an inside view and a remote view of a typical wind farm built in rows on desert ground, as expected for the Project Area with predominant winds from one direction are presented in Figure 5.



- Legend:**
- Axis, access roads
  - = Existing Transmission Line
  - = Existing Petrol Pipelines

**Figure 4: Typical windfarm layout for a pre-dominant wind direction – example of Zafarana wind farm (Egypt)**



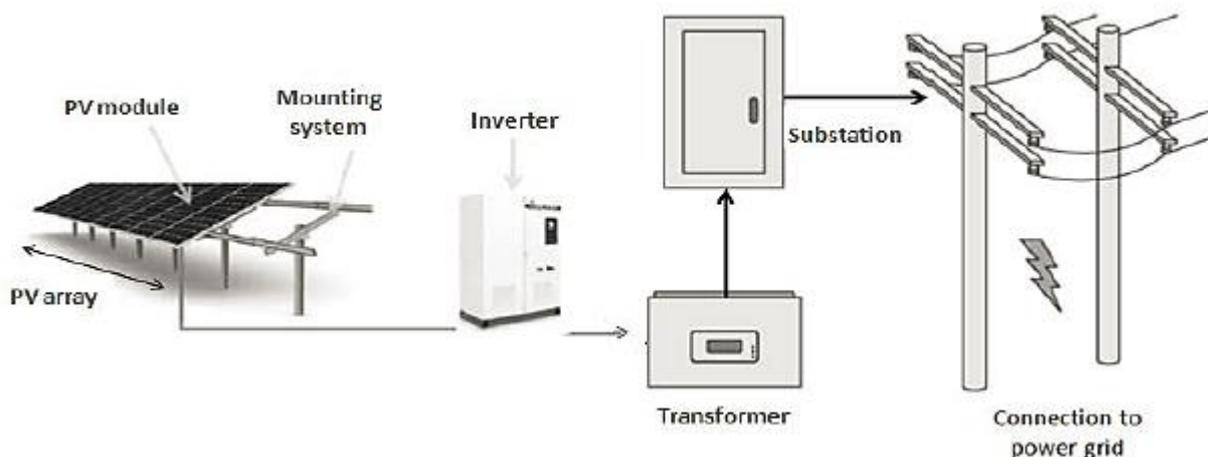
**Figure 5: Inside wind farm view**



**Figure 6: Remote wind farm view on desert ground**

### 4.3 Typical features of PV solar projects

A Photovoltaic (PV) plant generates electricity from solar radiation through use of a PV Module which is made up of several solar cells. Solar cells produce Direct Current (DC) which is converted to Alternating Current (AC) in inverters before the plant is connected to the grid. A simplified setup of a PV plant is shown in Figure 7.



**Figure 7: Setup of a PV Plant**

In general, a solar PV power plant of size 50 MW is generally divided into smaller units (often called blocks) consisting of a number of solar arrays connected to a single inverter. Onsite infrastructure consists of:

- PV Panels are grouped into “solar arrays”. A 50 MW PV project may have PV panels of capacity ranging from 250 W to 300 W. A typical dimension of a solar PV Panel could be 1950 mm x 990mm x 40mm and weighs around 18 - 25 kgs. Materials used for PV modules, independent of technology, in general, are recyclable and non-hazardous.
- Mounting Structure (Supporting Structure) is used for mounting of the PV modules that generate electricity. The mounting structure can either be fixed or tracking (following the sun).
- DC-AC Inverters for conversion of the DC electricity from the PV arrays (through LV cables) to AC electricity are located in each block. AC is further fed to the transformer before being evacuated through the utility grid. A typical inverter and transformer arrangement which is used in large scale solar power plants is shown below.

Typically, the solar PV plant will also have offsite infrastructure, which generally consists of the transmission lines from the PV plant to the nearest sub-station. These lines can either be underground or overhead.

Table 1 provides an overview of key components of a 50MW solar PV plant.

A general large scale PV power plant as built and a typical PV plant layout is shown in Figure 10.

**Table 1: Key components of a PV Plant**

Component	Basic Description
Project Capacity	50MW (AC)
Project Area	100 ha to 200 ha depending on the technology (fixed or sun tracking) and orographic conditions
Other infrastructure	Underground low voltage (LV) and medium voltage (MV) cables Inverter room and transformer units Warehouse, office, substation



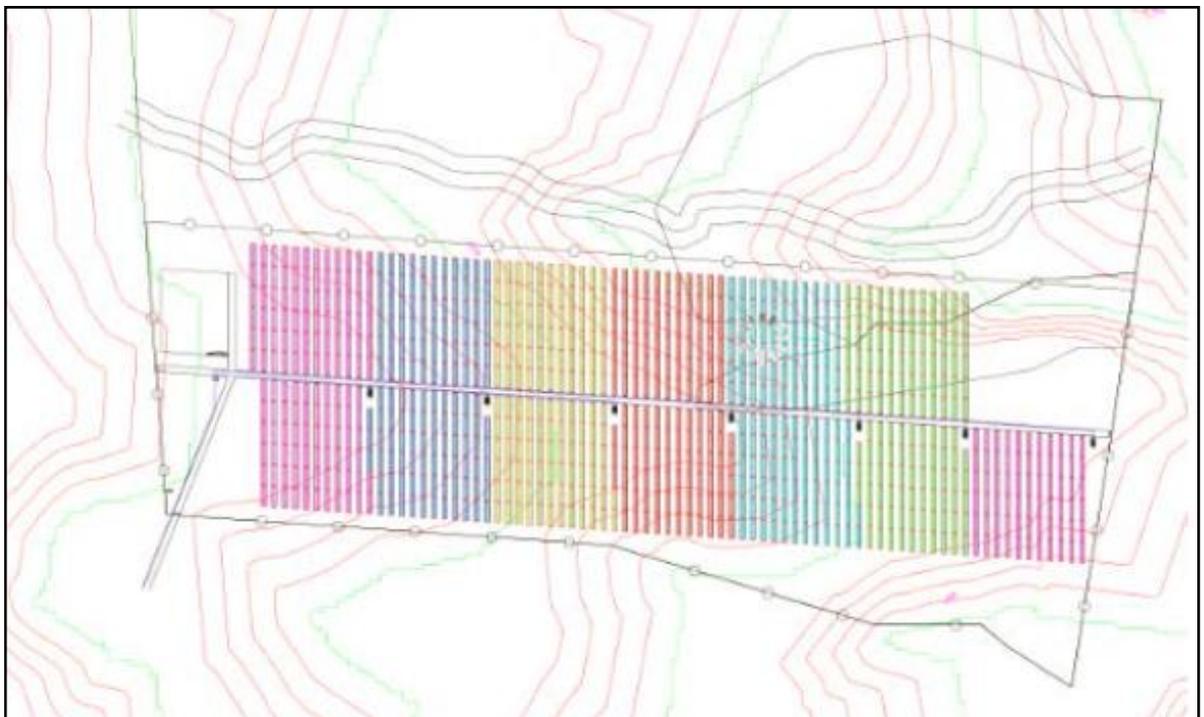
**Figure 8: Typical ‘Mounting Structure’ erected on site**



**Figure 9: Example for inverter and transformer arrangement**



**Figure 10: Example of a PV Plant**



**Figure 11: Typical PV Plant layout**

## **5 Social and environmental baseline conditions and data gaps**

### **5.1 General**

This scoping report has been compiled during the initial scoping phase of the SESA. The project area is located in a remote desert area in the Upper Nile region and as result environmental and social data and information are limited. No historical baseline studies are available. Therefore, the baseline information presented in this report is limited and drawn from regional studies and some initial field surveys and tours of the Project Area. Gaps in environmental and social baseline data are, however, identified and will be addressed during the course of the SESA through field surveys and studies.

### **5.2 Physical environment**

In the absence of data measured inside or nearby the Project Area, climate data have been taken from a station in El Minya, about 25 km to the west from the centre of the Project Area. The climate (Source: Minya Climate Normals 1960 – 1990 – more recent data not available) can be characterised as hyper-arid with an annual average temperature of 21.3°C, average maximum temperatures of 29.8°C and average minimum temperatures of 13.0 °C. Thus, daily temperature differences are of an order of 17 °C. Extreme temperatures occur in June with an average high of 36.9 °C and in January with an average low of 3.9 °C. The record high at El Minya was 48 °C and the record low was -3.4 °C. Rain can occur sporadically during the months October to March. The average annual precipitation is about 5 mm. Monthly sunshine hours vary from 236 h (December) to 382 h (July) with an annual total of 3,666 hours.

From the Wind Atlas for Egypt, 2005, it is known that the prevailing wind direction is from the north with an average expected wind speed in the order of 7 to 8 m/s. Extreme gusts may occur during thunderstorms. Sand storms occur occasionally. Air pollution is limited to dust caused by strong winds or locally by the few stone crushing and mining activities.

The altitude of the Project Area is mostly between 200 and 300 m a.s.l., which is about 150 m above the level of the Nile Valley. Water flow may occur sporadically in wadis resulting from intense thunderstorm rains. The probability of occurrence is very low.

The landscape is generally undulating desert ground with some discontinuities caused by wadis or faults. However, in the northern subareas (mainly in the border area between East Wind-2 and East Solar-3) the landscape shows pronounced characteristics with a major fault near Wadi Tarfa in south-eastern to north-western direction between a plateau and the lower southwestern desert towards the Nile with an altitude difference of about 100 m. Geologically (Geological Map of Egypt 1981) the area is classified as Eocene consisting of thick marine limestone with minor clay beds. Several fault lines occur in the area. Earthquake risks will need to be considered through application of adequate construction norms.



**Figure 12: Desert ground in the south of the East Wind-1 area**

### 5.3 Biological environment

Due to the hyper-arid climate of the Eastern Desert the vegetation of the Project Area is expected to be neither rich in species, nor dense in populations. Most of the Eastern Desert plants belong to the Sahara-Sindian phytogeographical region. Goodman and Hobbs<sup>1</sup> (1988, p. 76) described the vegetation of the Egyptian Desert as follows: “Vast portions of the region are devoid of any plant cover, particularly in the north. The higher plant concentrations tend to be in wadi bottoms, on shaded mountain slopes, and in deep canyons.”

According to an analysis of aerial images and site visits conducted in April and July 2016, no large vegetated areas have been identified. The main habitat type in the Project Area is dry desert (gravel and pebbles) almost completely devoid of vegetation. The wadis tend to support the most vegetation due to generally higher soil moisture levels. Hence, desert-adapted perennial shrubs and small trees including *Acacias*, *Zizyphus* and *Tamarix* species can be found in wadis. A larger wadi that might be considered as a sensitive area has been found in the East Solar 3 area (see Figure 12). Aside from this wadi, no other sensitive area has been identified so far.

Further site visits will be conducted in autumn 2016 and spring 2017 with the aim to gather further data on vegetated areas and on typical habitats in the Project Area.

---

<sup>1</sup>Goodman, S. M. & J. J. Hobbs (1988): The ethnobotany of the Egyptian Eastern Desert: A comparison of common plant usage between two culturally distinct Bedouin groups. *Journal of Ethnopharmacology* 23:73-89.



**Figure 13: Wadi with shrubs and single trees crossing the East Solar 3 area (July 2016)**

Due to the harsh living conditions animal diversity and density is expected to be very low in the Project Area. However, as known from the Western Desert, invertebrate species (insects and spiders) might be occasionally abundant in desert areas (in particular flies from the families *Muscidae*, *Syrphidae*; observations during the bird monitoring conducted in the West Nile area in 2012). Single species of reptiles, such as lizards (see Figure 14), are present in Project Area as well.

Local bird fauna includes Brown necked raven (*Corvus ruficollis*), Spotted sandgrouse (*Pterocles senegallus*, see Figure 15), Desert lark (*Ammomanes deserti*), White crowned black wheatear (*Oenanthe leucopyga*) and other species in low numbers. No information is available on bird migration in the East Nile region. During a survey conducted in autumn 2011 and spring 2012 bird migration was very limited in the West Nile region (ecoda, 2012<sup>2</sup>). No particular migration route was identified in the surveyed West Nile area.

According to Hoath (2009), the mammal species of the Eastern Desert show a close parallel to those of South Sinai, e.g. Spiny mouse (*Acomys russatus*), Bushy-tailed jird (*Sekeetamys calurus*) or

<sup>2</sup> ecoda (2012): Final Report on the Ornithological Investigation at the West Nile Valley in Arab Republic of Egypt. Unpublished Report on behalf of Oriental Consultants Co., Ltd. and Japan International Cooperation Agency (JICA). 42 p. + Annex

Nubian ibex (*Capra nubiana*). Despite the Nile acting as a barrier for a number of terrestrial animals, some species like Lesser egyptian jerboa (*Jaculus jaculus*) or Lesser egyptian gerbil (*Gerbillus gerbillus*) occur in both the Western and Eastern Desert.



**Figure 14: Lizard (most probably Bosk's fringe-toed lizard (*Acanthodactylus boskianus*)) recorded in the Project Area in April 2016**



**Figure 15: Spotted sandgrouse recorded during bird monitoring in April 2016**

## 5.4 Social environment

### 5.4.1 General

The Project Area is located outside the Nile River Valley in the desert and extends across three Governorates: Beni Suef, Menia and Assiut. Settlements are not present in the Project Area, being concentrated in the Nile Valley and the adjacent areas. The nearest distance of the intended windfarm area (up to 150 m building height) to the Nile Valley, and populated areas, is about 8 km at the latitude of Mallawi. Nearest distance of intended PV solar development is about 6 km at the latitude of Abu Quorquas.

Economic activities are concentrated in the Nile Valley in all of the three governorates:

- Beni Suef is an agricultural governorate with extended rural areas within the Nile Valley. The most important crops produced include: wheat, cotton and sugar cane in addition to medical and aromatic plants.
- Menia is an agricultural governorate as well. Cotton, wheat, onion, and sugar cane are the main crops. The governorate has made major strides in industry, particularly in food processing, spinning and weaving and chemicals industries, and in the establishment of an industrial zone.
- Assiut is considered the trade capital of Upper Egypt. The governorate is famous for the production of cotton, wheat, maize, corn, fava beans, citrus, pomegranate, mangoes, grapes, and banana. The governorate adds to the industrial activities by hosting big industries such as: fertilizers, pharmaceuticals, cement and petroleum as well as small industries.

### 5.4.2 Demographics

The total population of the three governorates in 2014 was estimated as 12,258,729 (on basis of data gathered in the 2006 census). This accounts for about 14 % of Egypt's total population.

Table 2 illustrates the total populations of the three governorates, indicating a clear prevalence of male over female inhabitants in all three governorates.

The estimated population numbers indicate an increase between 2006 and 2014 by about 18 % in the Governorates of Beni Suef and Assiut and 21 % in the Menia Governorate with urban population clearly exceeding rural population as shown in Table 5.

This increase can be mainly explained with the high birth rate, which exceeds the mortality rate by about seven times as shown in Table 6.

**Table 2: Estimated population and their percentage distribution in 2014 (CAPMAS, 2015<sup>3</sup>)**

Governorate	Share of total population in Egypt [%]	Total	Female	Male
Beni Suef	3.2	2 856 812	1 402 807	1 454 005
Menia	5.9	5 156 702	2 527 909	2 628 793
Assiut	4.8	4 245 215	2 079 570	2 165 645
<b>Total</b>	<b>13.9</b>	<b>12 258 729</b>	<b>6 010 286</b>	<b>6 248 443</b>

**Table 3: Separation urban / rural population as per census 2006<sup>4</sup>**

Governorate	Total	Rural	Urban
Beni Suef	2 291 618	1 758 938	532 680
Menia	4 166 299	3 377 765	788 534
Assiut	3 444 967	2 533 479	911 488
<b>Total</b>	<b>9902884</b>	<b>7670182</b>	<b>2232702</b>

**Table 4: Mortality and births rates and natural increase in 2014\*<sup>5</sup>**

Governorate	Natural increase		Mortality		Births	
	Rate (1)	Number	Rate (1)	Number	Rate (1)	Number
Beni Suef	30.6	86077	5.4	15097	36	101174
Menia	30.2	153134	5.2	26629	35.4	179763
Assiut	29.2	122 164	6.1	25 581	35.3	147 745
<b>Average / Total</b>	<b>30</b>	<b>361375</b>	<b>5.6</b>	<b>67307</b>	<b>35.6</b>	<b>428 682</b>

\* Preliminary Data

(1) Rate per thousand of Population

<sup>3</sup> Source: Egypt Statistical yearbook, 2015, CAPMAS (Central Agency for Public Mobilization and Statistics)

<sup>4</sup> Source: Egypt Statistical yearbook, 2015, CAPMAS

<sup>5</sup> Source: Egypt Statistical yearbook, 2015, CAPMAS

### 5.4.3 Labour Force

Between 2009 and 2014, about 14.5 % of the employed population in Egypt are located in the three governorates. This equates to about 3,484,100 employed individuals in 2014. The majority of the employed individuals are employed in the urban region of Menia (about 1,500,000 employees in 2014), followed by Assiut and Beni Suef with about 1,000,000 and 900,000 employees respectively.

The unemployment rate significantly increased during the period of 2009 to 2014 from 1.5 % (Beni-Suef), 1.9 % (Menia) and 4.3 % (Assiut) to 10.9 % in Beni Suef; 12.5 % in Menia; 12.8 % in Assiut. This can be mainly explained by the increase of population but not an increase in jobs. These rates are slightly below the average unemployment rate for whole Egypt of 13 %. In 2014, the number of unemployed females in the three governorates was 1.5 to 3.0 times higher than for males.

Between 34 % (Assiut) and 49 % (Beni Suef) of all employees in the three governorates are involved in the agriculture sector. The construction sector accounts for the second largest employment market, followed by education. The following table provides an overview of the five largest sectors which account for approximately 80 % of all employed individuals.

**Table 5: Five largest employment markets in 2014<sup>6</sup>**

Governorate	Share of the total employment market in the three Governorates					
	Education	Public Administration	Transportation	Construction	Agriculture	Total
<b>Beni Suef</b>	<b>6%</b>	<b>7%</b>	<b>5%</b>	<b>13%</b>	<b>47%</b>	<b>78%</b>
Male	5%	9%	7%	19%	33%	73%
Female	9%	4%	0%	0%	75%	89%
<b>Menia</b>	<b>9%</b>	<b>7%</b>	<b>4%</b>	<b>10%</b>	<b>49%</b>	<b>80%</b>
Male	7%	9%	5%	13%	43%	77%
Female	16%	3%	0%	0%	69%	89%
<b>Assiut</b>	<b>12%</b>	<b>8%</b>	<b>5%</b>	<b>18%</b>	<b>34%</b>	<b>76%</b>
Male	8%	7%	5%	21%	34%	76%
Female	35%	11%	1%	0%	31%	78%

## 5.5 Landuse in the project area

A large majority of the Project Area is free from competing landuses. Limited economic activities extend near to and inside the Project Area such as along the road Samalut to Ras Ghareb or at the

<sup>6</sup> Source: Egypt Statistical yearbook, 2015, CAPMAS (Central Agency for Public Mobilization and Statistics)

western border of the East Wind-1 area. Agricultural activities are located inside the East Wind-1 area along the Minya Assiut Road, inside the Wadi al Masnji (see Figure 15) and in the South near the Tall Amarna Road.



**Figure 16: Agricultural activities in the Wadi al Masnji (July 2016)**

Other economic activities in the Project Area include stone crushing and mining.

The area is crossed by several major asphalt roads, among them the desert road, which is a highway from Cairo to Assiut. Traffic load is quite low compared to the road capacity.

Current landuses and planned future landuse activities will be investigated in more detail during the SESA and mitigation identified if necessary to mitigate impacts associated with RE development on economic activities in the Project Area.

Archaeological, historical and cultural heritage may exist within or close to the Project Area (e.g. historical graveyards). This will be reviewed further during the SESA.

## 5.6 Data gaps in baseline information

Below is an overview of the current gaps in social and environmental baseline information. The gaps in information will be addressed during the course of the SESA to ensure a robust understanding of the baseline conditions in the Project Area and to allow an appropriate level of impact assessment and mitigation measure design.

**Table 6: Overview of data gaps**

Issue	Gaps	Required actions
Land use/Land-take	Detailed information on current farming, stone crushing, mining and other activities in the Project Area.	Site reconnaissance, approach of owners and of relevant Governorate authorities to identify locations of such activities, legal status, type of business, number of people employed as well as any intended expansion or future planning in the area.
Socio-economic effects	Statistics, landuse survey, employment market and an assessment of technology components that can be locally produced.	Data collection and desks studies, interviews, field investigation to identify population that could be affected by and/or benefit from RE development. Assessment of manufacturing options in the relevant Governorates of components and effects of improved know how on modern technologies as means to boost future development in the Governorates. The SESA will also investigate the potential presence of Bedouins in the Project Area.
Terrestrial flora and fauna	Only preliminary on-site information available.	Field surveys along representative cross sections and in sensitive areas; fauna identification includes spotting of indirect signs such as spoor, droppings, burrows, etc.
Avifauna	Only preliminary on-site information available.	Systematic bird monitoring programme by local and international ornithologists during spring and autumn migration 2016/2017 over the whole area dedicated to wind power utilisation. Surveys of local birds / breeding birds over the whole project area.

Issue	Gaps	Required actions
Water resources and waste water	Sources of freshwater for project water supply.	<p>By means of interviews collect information on current groundwater supply of irrigation schemes in the area during field surveys; approach of relevant Governorate authorities to identify potential sources with sufficient surplus yield of fresh water supply for construction and operation of future RE projects; demand estimates be based on specific consumption rates (on own estimates); assessment of need of buffer tanks to balance pumping demand.</p> <p>Assessment of need of appropriate waste water treatment schemes (domestic, hazardous).</p>
Domestic and hazardous waste management	Existing domestic waste disposal facilities and appropriateness.	<p>Approach of relevant Governorate authorities to identify waste management schemes that can be joined to or applied by the future RE projects (relevance especially for the construction phase).</p> <p>Assessment of appropriate options for on-site treatment of domestic waste with Governorate Authorities.</p> <p>Assessment of recycling options for hazardous (e.g. used oil grease) and other waste and of need for regular disposal (e.g. used batteries, damages PV panels, etc.).</p>
Noise, vibrations, electromagnetic interferences and light reflection / shadowing	Presence or not of sensitive receptors in the Project Area.	Site reconnaissance to identify any sensitive receptors (settlements, sensitive environmental areas) within and near to the Project Area and to confirm the presence or not of tele-transmission/repeater stations or radar stations that could be affected by RE development.
Archaeological, historical and cultural heritage	Presence or not of cultural heritage in or near the Project Area.	Site reconnaissance and inquiry with relevant authorities to identify cultural heritage in or near the Project Area.
Traffic, utility services and other infrastructure	Width, surfacing and quality of roads in and near the Project Area as well as traffic numbers.	Desk study and site reconnaissance to identify and assess roads in and near the Project Area.

	Other infrastructure such as overhead transmission lines.	Verification of traffic loads of relevant access roads to the area by short term observations during different times
Run-off regime/flash floods	Flash flood risks in the absence of any information or data on discharge.	Desk study on catchment areas that might be prone to flash floods from topographical maps. Inspection of respective wadis and interviews of villagers.
Seismicity	Seismicity and earthquake risk of Project Area.	Review of available data and Egyptian seismic building code regarding coverage of the Upper Egypt East Nile Region.

## 6 Potential and anticipated impacts and mode of assessment

### 6.1 General

The scoping phase is carried out as the initial phase of the SESA study. Inputs and judgements are based on desk studies and results of site surveys results carried out, input received from stakeholders and on experience gained by the Consultant in similar projects in Egypt at the Gulf of Suez desert areas and the Upper Egypt West Nile areas. Potential environmental and social impacts may occur during the different stages of RE development including during construction, operation and decommissioning. The following sections identify and describe the potential E&S impacts associated with wind power and PV solar power projects and the presumed significance level of E&S impacts, which will be considered and assessed in the SESA.

Once potential and anticipated impacts with their potential significance are established the scope of studies, surveys and/or investigations is defined to close data gaps and to detail the impacts and their definite significance.

When the significance of a given impact will have been finally characterised in the further course of the SESA process, the next step will be to evaluate what mitigation measures are warranted. In keeping with the Mitigation Hierarchy (*1. Avoidance, 2. Reduction/minimisation, 3. Mitigation, 4. Restoration/offset/compensation measures*), the priority will be to first apply mitigation measures to the source of the impact (i.e. to avoid or reduce the magnitude of the impact from the associated project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets.

### 6.2 Determination of significance levels of potential impacts

During the SESA process the significance levels of impacts will be finally determined as a function of event magnitude and receptor sensitivity. The significance of impacts depends on the existence of receptors in or next to the project area (e.g. birds, other fauna & flora, dwellings), what will be investigated in the course of the SESA process. At this initial scoping stage of the SESA with most baseline surveys and investigations still to be completed, a detailed and definite determination of significance of many impacts is not yet possible. Instead a precautionary approach is applied considering the potential significance an impact may have, e.g. if sensitive receptors will be identified.

For each impact, an initial opinion of its potential significance is provided together with the assessment methodology that will be applied during the SESA. In the context of this scoping significance of potential impacts is defined and classified into four levels (see Table 9).

**Table 7: Significance level of impacts**

Significance level of impacts	Description of significance level
<b>negligible</b>	An impact of negligible significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
<b>minor</b>	An impact of minor significance is one where a resource/receptor including people) will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/vulnerability/importance. In either case, the magnitude should be well within applicable standards and/or legal limits.
<b>moderate</b>	An impact of moderate significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Moderate impacts are to be reduced to a level that is as low as reasonably practicable and to be managed effectively and efficiently.
<b>major</b>	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors (including people). An aim of impact assessment is to get to a position where a project / a development does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area.

As part of the scoping process, potential impacts associated with RE development in the Project Area were identified. This impact identification exercise considered the nature of RE projects, the technology applied and the receiving environment. The impacts and likelihood for an impact to be significant was further informed by the Consultants` experience in numerous projects at the Gulf of Suez and the West Nile Area. Further potential impact identification and screening was carried out with key stakeholders during the scoping meeting on July 12<sup>th</sup>, 2016, during which the preliminary list of impacts was adjusted and amended.

A detailed assessment is undertaken for impacts which are potentially to be of major or moderate significance potentially affecting sensitive or important resources and/or receptors. Significant impacts need to be avoided or reduced through development design, location or other mitigation measures.

### 6.3 Potential and anticipated impacts of wind power development on the areas East Wind-1 and East Wind-2

Typical potential E&S impacts resulting from wind power projects, their potential significance (as per preliminary definition in Table 7) and the planned assessment are listed in the Table 8 (see below). Such impacts result from construction works (such as road and foundation works, cable trenching and cable laying works, erection by large crane, construction of substation and auxiliary buildings, Overhead Transmission Line (OHTL), regular and heavy transport) and from the operation of windfarms (such as the rotation of the WTG rotors with a blade tip end speed in the order of 300 km/h, related noise, vibrations, electromagnetic interferences, light reflection / shadowing, and landscape modification). Decommissioning (after 20 years lifetime) will be limited to the dismantling of WTGs and foundations, as it can be expected that existing infrastructure will be further used (e.g. refurbishment of windfarm).

**Table 8: Significance of potential impacts of wind power projects**

Issue	Potential Impacts (Wind power)	Potential Significance	Assessment Methodology
Landuse / land-take	<p><u>Construction Phase:</u> Area coverage rate of about 6 % to 8 % of the land</p> <p><u>Operation Phase:</u> Area coverage rate about 5 %.</p> <p>Relevant for project subareas, where economic activities (farming, stone crushing, mining) take place (impact zone 0.5 km)</p>	moderate(for both phases)	<p>Field survey of existing economic activities; determination of locations, type of activity, number of people employed.</p> <p>Information gathering from authorities related to legal status of current activities and any future planning in the area</p> <p>For current activities definition of mitigation measures to avoid impacts.</p>
Socio-economic effects	<p><u>Construction Phase:</u> No adverse impacts expected, if competing uses are adequately considered in planning; positive effects in employment</p> <p><u>Operation Phase:</u> Nature preservation and resource conservation (saving of conventional energy, emission reduction, creation of employment) (impact zone 40 km)</p>	moderate(for both phases)	<p>Acquisition of statistics on social key parameters and analysis of negative and positive impacts of the RE projects.</p> <p>Field survey to confirm that the project area with immediate surrounding is free from dwellings; in case of dwellings to identify locations and mitigation.</p> <p>The SESA will also investigate the potential presence of Bedouins in the Project Area.</p> <p>Assessment of positive effects</p>

			<p>e.g. employment opportunities, local manufacturing options for components, effect of getting acquainted with modern technologies.</p> <p>Assessment of potential negative effects.</p>
Landscape character and visual impact	<p><u>Construction and Operation Phase:</u></p> <p>Deterioration of landscape due to the wind power installations; due to distances to next settlements and to vast desert character little risk of being affected (impact zone 10 km)</p>	minor (for both phases)	<p>Discussion of current and modified landscape character; in case of sensitive receptors inside or nearby the area: visualisation of future wind farm.</p>
Terrestrial flora and fauna	<p><u>Construction and Operation Phase:</u></p> <p>Disturbance, destruction or loss of habitats; possibly of major significance in case of existence of sensitive receptors (impact zone 2 km)</p>	minor to moderate (for both phases)	<p>Field surveys along representative cross sections and in sensitive areas; fauna identification includes spotting of indirect signs such as footprints, excrements, burrows.</p> <p>Drawing conclusions regarding eventually necessary level of protection and mitigation measures to avoid/reduce impacts.</p>
Avifauna	<p><u>Construction Phase:</u></p> <p>Disturbance or loss of habitats (breeding birds)</p> <p><u>Operation Phase:</u></p> <p>Disturbance or loss of habitats (breeding birds); vulnerability of migrating birds such as collision with wind turbine rotors, negative effects on migration route and / or wellbeing of birds (increased energy consumption) (impact zone 5 km)</p>	major (for both phases)	<p>Systematic bird monitoring programme during a spring and an autumn season in 2016/2017 over the whole area dedicated to wind power utilisation with the focus on potential bird migration.</p> <p>Surveys on local birds / breeding birds over the whole project area.</p> <p>According to relevance drawing conclusions regarding eventually necessary level of protection and mitigation measures.</p>
Water resources and waste water	<p><u>Construction Phase:</u></p> <p>Minor effects on water resources due to low water</p>	minor (for both phases)	<p>Estimates of water consumption, identification of potential sources of water supply with</p>

	<p>consumption and waste water generation during construction (impact zone 1 km) <u>Operation Phase:</u> In case of construction of manned service buildings on the site discharge of waste water from sanitary installations to the environment would occur, if no proper waste water treatment is applied</p>		<p>surplus capacities through contact with local authorities, consider possible need of buffer tanks for balancing pumping demand and estimate effects on the resources.  Assess waste water treatment requirements for domestic; appropriate waste water treatment schemes.</p>
Domestic and hazardous waste management	<p><u>Construction and Operation Phase:</u> Limited waste generation; no hazardous waste generation related impacts, if handling according to accepted standards (impact zone 1 km)</p>	minor (for both phases)	<p>Description of type and quantities of domestic and hazardous waste (e.g. used oil) expected during construction and operation.  Identify waste management schemes for domestic waste that can be joined to or applied by the future RE projects (relevance especially for the construction phase).  Define methods of hazardous waste handling and treatment.  Assessment of recycling options for hazardous (e.g. used oil grease) and other waste and of need for regular disposal (e.g. used batteries).</p>
Air quality	<p><u>Construction Phase:</u> Occasionally occurrence of dust due to earthworks and transport at single spots only (impact zone up to 1 km)</p>	minor (for construction phase only)	<p>Discussion of sources and relevance of air pollution caused (relevant during construction stage).  As applicable definition of minimisation measures (e.g. water spraying) mainly for occupational health reason.</p>
Noise, vibrations, electromagnetic interferences and light reflection / shadowing	<p><u>Operation Phase:</u> In the absence of receptors (settlements) inside or nearby to the Project Area effects are negligible (impact zone up to 1.5 km)</p>	minor (for operation phase only)	<p>Discussion of the effects originating from the project and making evident that there are no sensitive receiving bodies.  If dwellings or other sensitive receiving bodies would be identified in or next to the</p>

(public health aspects)			<p>area: Calculation of zones of influence of noise emissions from wind farm and of shadowing/flicker and necessary distances.</p> <p>Assurance that there are no tele-transmission/repeater stations or radar in near distance that could be disturbed; if existing: definition of avoidance measures.</p>
Archaeological, historical and cultural heritage	<p><u>Construction Phase:</u> Might be existing at the western border, subject to site reconnaissance and stakeholder input (impact zone 1 km)</p>	negligible to major (if impacted)(for both phases)	<p>Verification of non-existence during site survey and inquiry of authorities.</p> <p>If existing: Duly consideration by avoidance/mitigation.</p>
Occupational health and safety risks	<p><u>Construction Phase and Operation Phase (Maintenance):</u> Relevant especially during construction and wind turbine installation works but also for maintenance/repair works: significance is minor if generally accepted health and safety standards as strictly applied by renowned companies are followed (impact zone 0.2 km for wind power installations)</p>	minor (for both phases)	<p>Discussion of risks associated with the construction and operation of wind projects and definition of necessary mitigation.</p> <p>Assess effects of dust development on occupational health and appropriate mitigation (e.g. water spraying).</p> <p>Define application of international health and safety standards during project development.</p>
Impact on traffic, utility services and other infrastructure	<p><u>Construction and Operation Phase:</u> Little relevance due to current low traffic loads on good existing roads; low water consumption during construction; negligible during operation (impact zone 10 km)</p>	minor (for construction phase only)	<p>Assess sources of water, sand and gravel supply and corresponding transport routes.</p> <p>Description of transport infrastructure, current traffic loads and expected additional traffic due to construction measures; verification of low current traffic loads by short term monitoring.</p> <p>Assessment of significance of impacts, and, if significant, definition of avoidance or mitigation measures.</p>

Run-off / flash flood risk	<p><u>Construction and Operation Phase:</u></p> <p>Flash floods may occur during occasional strong rains in catchments prone for flash floods (shape of catchments and downward slope)</p>	moderate (for both phases)	<p>Desk study on catchment area and slopes to determine wadis that could cause flash floods; interviews of local people; site survey.</p> <p>Mitigation by definition of proper rules for siting of installation.</p>
Earthquake risks	<p><u>Construction and Operation Phase:</u></p> <p>Fault lines shown on the geological map might be indicator for earthquake risk</p>	minor (for both phases)	<p>Fault lines shown in the geographical map will be transferred to the GIS data base; review of available data and of Egyptian seismic building code regarding coverage of the Upper Egypt East Nile Region.</p>

## 6.4 Potential and anticipated impacts of solar power development on the areas East Solar-1, East Solar-2 and East Solar-3

Environmental and social impacts resulting from PV projects are mainly related to land take and landscape as well as to any existing fauna and flora. In the table below the potential environmental impacts are assessed following the same screening matrix as for the screening matrix for wind power projects considering the existing conditions in the Project Area.

**Table 9: Significance of potential impacts of solar PV power projects**

Issue	Potential Impacts (Solar power)	Significance level	Assessment Methodology
Landuse / land-take	<p><u>Construction and Operation Phase:</u> Area coverage ratio of about 70% to 90 % during construction and operation; highly relevant for project subareas, where economic activities (farming, stone crushing, mining) take place (impact zone 0.5 km)</p>	moderate to major (for both phases)	<p>Field survey of existing economic activities; determination of locations and type of activity.</p> <p>Information gathering from authorities related to legal status of current activities and any future planning in the area.</p> <p>For ongoing activities definition of mitigation measures to avoid impacts.</p>
Socio-economic effects	<p><u>Construction Phase:</u> No adverse impacts expected, if competing uses of the area are adequately considered in planning; positive effects in employment</p> <p><u>Operation Phase:</u> Nature preservation and resource conservation (saving of conventional energy, emission reduction, creation of employment) (impact zone 40 km)</p>	moderate (for both phases)	<p>Acquisition of statistics on social key parameters and analysis of negative impacts and benefits of the RE projects.</p> <p>Field survey to confirm that the PV solar project area is free from dwellings; in case of dwellings to identify locations and legal status, and mitigation of impacts by application of mitigation measures.</p> <p>The SESA will also investigate the potential presence of Bedouins in the Project Area.</p> <p>Assessment of positive effects e.g. employment opportunities.</p> <p>Assessment of potential negative effects.</p>
Landscape character and visual impact	<p><u>Construction and Operation Phase:</u></p>	minor (for both phases)	<p>Discussion of current and modified landscape character.</p> <p>In case of sensitive receptors inside or next to the area assessment of</p>

	<p>Deterioration of landscape due to PV installations; limited visibility due to low building height; due to larger distances to next settlements and to vast desert character little risk of being affected (impact zone 3 km)</p>		<p>effects of change of the landscape; if relevant, mitigation according to mitigation hierarchy.</p>
<p>Terrestrial flora and fauna</p>	<p><u>Construction and Operation Phase:</u> Disturbance, destruction or loss of habitats; possibly of major significance in case of existence of sensitive receptors (impact zone 300 m)</p>	<p>minor to moderate (for both phases)</p>	<p>Field surveys along representative cross sections and on presumed sensitive areas; fauna identification includes spotting of indirect signs such as footprints, excrements, caves.  Drawing conclusions regarding eventually necessary level of protection and mitigation measures.</p>
<p>Avifauna</p>	<p><u>Construction Phase:</u> Disturbance or loss of habitats (breeding birds) <u>Operation Phase:</u> Disturbance or loss of habitats (breeding birds); vulnerability of migrating birds due to lake effects (impact zone 5 km)</p>	<p>major (for both phases)</p>	<p>Surveys on local birds / breeding birds over the whole project area. Extrapolation of data on migrating birds to solar areas and assessment of relevance of bird migration. According to relevance drawing conclusions regarding eventually necessary level of protection and mitigation measures.  Framed PV solar panels shall apply to avoid lake effects of large PV plants unless no risks for birds are demonstrated.</p>
<p>Water resources and waste water</p>	<p><u>Construction Phase:</u> Very minor effects due to low water resource consumption and waste water generation during construction <u>Operation Phase:</u> Negligible; only for cleaning (impact zone 1 km)</p>	<p>minor (for construction phase only)</p>	<p>Discussion of estimated water consumption, identification of potential sources of water supply through contact with local authorities, consider possible need of buffer tanks for balancing pumping demand and estimate effects on the resources.  Assess waste water treatment requirements for domestic and hazardous waste water; appropriate waste water treatment schemes.</p>

Domestic and hazardous waste management	<p><u>Construction and Operation Phase:</u></p> <p>Limited waste generation; no hazardous waste generation, if handling according to accepted standards (impact zone 1 km)</p>	minor (for construction phase only)	<p>Description of kind and quantities of domestic and hazardous waste (e.g. used batteries) expected during construction and operation.</p> <p>Identify waste management schemes for domestic waste that can be joined to or applied by the future RE projects (relevance especially for the construction phase).</p> <p>Define methods of hazardous waste handling and treatment with preference on recycling.</p> <p>Assessment of recycling options for hazardous waste and of need for regular disposal (e.g. used batteries, damaged solar cells?).</p>
Air quality	<p><u>Construction Phase:</u></p> <p>Occasionally occurrence of dust due to earthworks and transport during construction at single spots only (impact zone up to 1 km)</p>	minor (for construction phase only)	<p>Discussion of sources and relevance of air pollution caused (relevant during construction phase).</p> <p>As applicable definition of minimisation measures (e.g. water spraying).</p>
Noise, vibrations, electromagnetic interferences and light reflection (public health aspects)	<p><u>Construction Phase:</u></p> <p>Noise and vibrations may occur during construction, if ramming of frame supports/piles is applied</p> <p><u>Operation Phase:</u></p> <p>Light reflection during operation from panels only, if low efficiency PV panels would be chosen</p> <p>In the absence of receptors (settlements) inside or nearby the project area effects are negligible (impact zone up to 500 m)</p>	minor (for both phases)	<p>Discussion of the effects originating from the project and making evident that there are no sensitive receiving bodies.</p> <p>If dwellings or other sensitive receptors are identified in or next to the area: keeping minimum distances.</p> <p>Define requirements for PV panel surfaces to minimise reflection.</p> <p>Avoid ramming of piles at night.</p>
Archaeological, historical and cultural heritage	<p><u>Construction and Operation Phase:</u></p> <p>May exist at the western border, subject to site reconnaissance and stakeholder input (impact zone 1 km)</p>	negligible to major (if impacted) (for both phases)	Verification of non-existence during site survey and inquiry of authorities; if existing: due consideration by avoidance/mitigation measures.

Occupational health and safety risks	<p><u>Construction and Operation Phase:</u></p> <p>Risks are small if generally accepted health and safety standards as strictly applied by renowned companies are followed (impact zone 50 m)</p>	minor (for both phases)	<p>Discussion of risks associated with the construction and operation of solar projects and definition of necessary mitigation.</p> <p>Assess effects of dust development on occupational health and appropriate mitigation (e.g. water spraying).</p> <p>Define application of international health and safety standards during project development.</p>
Impact on traffic, utility services and other infrastructure	<p><u>Construction Phase:</u></p> <p>Little relevance due to low utilisation of capacities of existing roads and low water consumption during construction</p>	minor (for construction phase only)	<p>Assess sources of water, sand and gravel supply and corresponding transport routes.</p> <p>Description of transport infrastructure, current traffic loads and expected additional traffic due to construction measures; verification of low current traffic loads by short term monitoring.</p> <p>Assessment of significance of impacts, and, if significant, definition of mitigation measures.</p>
Run-off / flash flood risk	<p><u>Construction and Operation Phase:</u></p> <p>Flash floods may occur in wadis due to occasional strong rains in catchments prone for flash floods (shape of catchments and downward slope)</p>	moderate (for both phases)	<p>Desk study on catchment area and slopes to determine wadis that could cause flash floods; interviews of local people; site survey.</p> <p>Mitigation through proper siting during design stage.</p>
Seismicity risks	<p><u>Construction and Operation Phase:</u></p> <p>Fault lines shown on the geological map might be indicator for higher earthquake risk</p>	minor (for both phases)	<p>Fault lines shown in the geographical map will be transferred to the GIS data base; consideration of seismicity risks from existing data sources; highlighting the requirement of consideration of appropriate local earthquake design standards.</p>

## **7 Project Implementation Schedule**

### **7.1 Implementation of the subject SESA studies**

The SESA studies (wind and solar) are the initial step of project development on the areas allocated by presidential decree to RE utilisation at the East Nile. Time critical for the completion of the studies is the necessary completion of a complete bird monitoring over two migration periods (full spring and full autumn). Accordingly, the study can be concluded after completion and evaluation of the spring monitoring in 2017, preparation of draft studies and execution of public hearing in autumn 2017.

To timely implement the studies, instead of an originally planned parallel wind and solar measurement programme, the wind and solar power potential distribution over the respective areas shall be determined by the use of wind reanalysis data and satellite solar radiation data.

The study implementation schedule is shown in Figure 17 below.



## **7.2 Implementation of subsequent wind power and PV solar power projects**

The tentative project schedule for first 50 MW wind and solar power developments is intended to show anearliest possible but still realistic time schedule of project implementation in the area as a mean to inform stakeholders. Future projects will be tendered for international investors and awarded to those offering the lowest feed-in tariff. Once the SESA studies have evidenced suitable 50 MW plots for RE development in the area being E&S compatible and technically feasible, tendering may be initiated by preparation of Tender Documents. In parallel the planning of the expansion of the Egyptian power grid for power evacuation need to be started including ESIA for future line corridors up to the load centres.

Wind power financing and investment decisions require a detailed assessment of the financial feasibility. It is generally accepted standard to have wind studies executed by independent acknowledged experts and based on wind measurements according to IEC. A measuring series of two years is assumed to be the minimum.

The same applies with regard to the need of radiation measurements. However, solar power estimates in such regions are less sensitive and shorter measurement periods in conjunction with satellite data can deliver reliable results.

A tentative project implementation period is shown in the project implementation schedule (Figure 18) below. Accordingly, first 50 MW plots of PV solar may be materialised up to 2020 and first wind power plots of 50 MW up to 2021.

**SESA East Nile - Likely Wind and Solar Power Project Implementation Schedule for 50 MW RE investments**

Activity (Work) only major tasks shown	Quarters from supposed Start of Wind Measurement																							
	2017				2018				2019				2020				2021				2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>SESA Wind &amp; Solar Studies</b>																								
<b>Wind and solar Measuring Programme</b>																								
<b>Wind Power Development (50 MW Plots)</b>																								
Preparation of Tender Documents																								
Wind Resource Assessment																								
Tendering including Evaluation																								
Power Purchase Agreement, Grid Connection Agreement and Environmental Permitting																								
Site Investigations and detailed Planning																								
Manufacturing & Transport (e.g. wind turbines, towers, transformers, cables, remote control system)																								
Construction and Erection Works																								
Comissioning																								
<b>Solar PV Power Development</b>																								
Preparation of Tender Documents																								
Solar Resource Assessment																								
Tendering including Evaluation																								
Power Purchase Agreement, Grid Connection Agreement and Environmental Permitting																								
Site Investigations and detailed Planning																								
Manufacturing & Transport (e.g. pannels, racks, transformers, cables, remote control system)																								
Construction and Erection Works																								
Comissioning																								

Legend:  Estimated time requirement

**Figure 18: Likely Schedule of 50 MW Wind and PV Solar Power Investment Implementation**

## **Annex A: Stakeholder Engagement Plan**

# Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region

Framework Stakeholder Engagement Plan – Rev. 04 –  
Final Updated Report



May 2018

# Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region

## Annex 1 to the Scoping Report

Framework Stakeholder Engagement Plan – Rev. 04 – Final Updated Report

Prepared for:

New and Renewable Energy Authority (NREA), Egypt

Prepared by

JV Lahmeyer International and ecoda Environmental Consultants

c/o Lahmeyer

Friedberger Str. 173

61118 Bad Vilbel

Germany

## Table of Contents

1	Introduction—Summary of Project .....	1
2	Regulatory Requirements in Egypt.....	2
3	Other Requirements to be observed.....	3
4	Summary of previous Stakeholder Engagement Activities .....	4
5	Identification of Stakeholder and Communication Methods.....	4
6	Disclosure of Information.....	1
6.1	General .....	1
6.2	Disclosure of information during the SESA study.....	1
6.3	Disclosure of information for each individual project.....	2
7	Stakeholder Engagement Programme during the SESA process.....	2
8	Public Grievance Mechanism .....	4
8.1	General and procedure .....	4
8.2	Grievance Contact address and sample grievance form.....	4

## List of Tables

Table 1: List of identified key-stakeholders .....	1
--	---

## 1 Introduction—Summary of Project

The Government of Egypt (“GoE”) has identified three large areas suitable for development of Renewable energy (“RE”) mega farms for both wind and solar sources, under the newly issued FIT law. The East of Nile project area is one of these three areas. To ensure a strategic level assessment of the potential environmental and social issues as well as of technical issues for the East Nile project area, which extends over 2200 km<sup>2</sup> across the three Governorates of Beni Suef, Minia and Assuit (the “project area”), a Strategic Environmental and Social Assessment Study (SESA) is being carried out by the New and Renewable Energy Authority (NREA). It shall serve to inform and provide an information base for later investments and to facilitate the environmental permitting process for future individual RE projects of 50 MW each to be developed by foreign investors within the project area.

The overall SESA consist of four major components, namely (i) determination of wind and solar power potential over the area, (ii) Strategic Environmental and Social Assessment (SESA) studies for wind and solar power development, (iii) establishment of a GIS baseline information data base and E&S sensitivities in the area and (iv) the provision capacity building and training.

Within the areas allocated to RE development the SESAs for wind and solar power shall

- Identify environmental or social constraints and potential impacts and define avoidance (excluding areas) or restriction measures (e.g. keeping minimum distances) or other mitigation measures (at-tributes: preclusive, restrictive, and favourable);
- Identify technical constraints for RE development (e.g. steep slopes, migrating dunes) - (attributes preclusive, restrictive/less favourable and favourable); and
- Determine the wind and solar potential over the respective areas.

By superimposition of environmental, social and technical attributes as well as of the wind/solar power potential distribution the SESA shall identify:

- areas that are favourable for RE development,
- areas that are less favourable and can be developed with restrictions only, and
- areas on which RE development is not permitted.

Thus, areas where development of wind and PV solar power will be possible with the least environmental and social impacts will be shown. Results shall be mapped differentiating into zones where RE construction i.) is possible without restrictions, ii.) possible but subject to future monitoring and verification, iii.) critical and only possible given significant mitigation measures and iv) to be excluded.

Stakeholder engagement focusses on the E&S impact assessment portion within the project component “(ii) SESA studies for wind and solar power development”, i.e. the component of integrated ESIA of these studies, and the subsequent tendering and implementation phase for the individual

50 MW projects of private investors. These SESA studies and the inherent public participation/consultation process have to comply with national and international regulatory requirements to meet the goal to facilitate the later private investments and to obtain the environmental permissions for the later individual 50 MW projects.

Stakeholder engagement is foreseen already from the beginning of the study to collect and consider information on environmental and social important issues or requirements as well as on concerns or interest of stakeholders regarding the project development, thus already contributing to the definition of the scope of the study. This Stakeholder Engagement Plan (SEP) sets out the plan for appropriately engaging with stakeholders to ensure the timely provision of relevant and understandable information and to create a process that provides opportunities for all stakeholders, to express their views and concerns, and allows NREA to consider and respond to them.

Stakeholder engagement is an ongoing process between a developer or project and its project stakeholders that extends throughout the life of the project (planning, construction, operation and dismantling/renaturation). It encompasses a range of activities and approaches. It also includes a grievance mechanism for people to raise any concerns to their attention during all the stages of the project.

Stakeholder engagement requirements established in this SESA study shall become binding for the further project stages for each individual investor by adequately consideration in the future tender/contract conditions and through enforcement by Egyptian Environmental Affairs Agency (EEAA), NREA and lenders.

## **2 Regulatory Requirements in Egypt**

A legal and regulatory framework for a Strategic Environmental and Social Assessment, e.g. an E&S Assessment for a regional development, does not exist in Egypt. Relevant for such a study is the legal and regulatory framework for Environmental Impact Assessment (EIA), which, though not explicitly stated in the designation, comprises the social assessment as well. The legal basis for ESIA was established by Law No. 4 of 1994, the Law on Protection of the Environment and its Executive Regulations 1995 (Prime Ministers Decree 338). According to these Regulations the Egyptian Environmental Authority (EEAA) has the authority for approval of bases and procedures for the assessment of environmental impacts of projects.

EEAA Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2nd edition - 2009) are steering the environmental permitting process. According to these guidelines “Generation of electricity using wind or by solar energy, including power lines” is category C project type and has to undergo a full EIA. The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process on the social and environmental aspects with concerned parties to minimize potential negative environmental and social impacts, strengthen social acceptance of the project, informing the concerned parties that the environmental impacts will be minimized to levels that are low as reasonably practical and achieve the balance between legitimate requirements for development and environmental protection.

Consultation is undertaken at least twice during the EIA process: The first in the phase of identifying the scope of the project EIA, and the second is after the preparation of the draft EIA. Scoping shall be prepared by establishment of a stakeholder engagement plan, listing the concerned parties that will be consulted and method of consultation. A meeting shall be held with EEAA to discuss the plan and the meeting could result in increasing the concerned parties or modifying the method of consultation. A grievance mechanism is not explicitly required by Egyptian regulations.

The Egyptian Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2nd edition (2009) contain a provision with regard to projects in a development, for which an integrated EIA has been prepared (e.g. for a cluster of foundries or tourist centres; in analogy for a cluster of wind or PV solar power projects). In this case the individual projects of similar nature will be required to abide by the requirements of the category that is less strict than its original category. Accordingly, once an integrated EIA (also designated as regional or strategic EIA) was prepared and approved for a cluster development of wind or PV solar power according to category C requirements, for later individual investment projects out of the cluster the EIA will have to follow the requirements of category B, making use of the assessment results of the integrated EIA and applying any measures, restrictions, etc. defined in the E&S action plan (E&S management and monitoring plan).

### **3 Other Requirements to be observed**

Other important requirements regarding stakeholder engagement are those of Financing Institutions relevant for financing of the subject study (EBRD) and those likely to provide finance for the individual RE projects.

The EBRD’s E&S policy is defined in the document: “Environmental and Social Policy, May 2014”. All projects financed by the EBRD shall be structured to meet the requirements of this policy. The EBRD, as a signatory to the European Principles for the Environment, is committed to promoting the adoption of EU environmental principles, practices and substantive standards. Moreover, EBRD recognises the ratification of international environmental and social agreements, treaties and conventions by its countries of operations.

EBRD requirements are defined in the Project Requirements (PRs) contained in the policy document. Of special relevance for stakeholder engagement is PR 10 “Information Disclosure and Stakeholder Engagement”. This Performance Requirement recognises the importance of an open and transparent engagement between a client, its workers, local communities directly affected by the project and, where appropriate, other stakeholders as an essential element of good international practice (GIP) and corporate citizenship. To be effective, stakeholder engagement should be initiated at an early stage of the project cycle. Essential elements are (i) public disclosure of appropriate information, (ii) meaningful consultation with stakeholders, and (iii) an effective procedure or mechanism by which people can make comments or raise grievances. NREA is expected to identify and engage with stakeholders as an integral part of the SESA and during project development together with the individual RE project developers.

Stakeholder engagement required by EBRD will involve the following elements: stakeholder identification and analysis, stakeholder engagement planning, disclosure of information, consultation and participation, grievance mechanism, and ongoing reporting to relevant stakeholders. The SESA process will identify and document the various individuals or groups who (i) are affected or likely to be affected (directly or indirectly) by the project (affected parties), or (ii) may have an interest in the project (other interested parties).

EBRD requirements go in parallel to those of international financing institutions (e.g. World Bank, Asian Development Bank, etc.).

Recognised private banks have committed themselves to follow the “Equator Principles”. Stakeholder engagement requirements of EBRD are stricter than those of Equator Principles. Thus, following the EBRD stakeholder engagement process, both, Egyptian regulatory requirements and “Equator Principles” requirements as a condition for private Bank financing are fulfilled.

#### **4 Summary of previous Stakeholder Engagement Activities**

The selection of the East Nile areas for RE development is the results of coordination between Ministries under the aspects of low environmental impacts and land use conflicts. This subject SESA study is the first environmental and social study carried out at the start of RE development activities in the area. Except high level discussions in the Central Ministries there was no previous stakeholder engagement prior to the establishment of this SEP.

#### **5 Identification of Stakeholder and Communication Methods**

As an Egyptian regulatory requirement the EEAA Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guide-lines”, 2nd edition - 2009) defines the stakeholders to be involved, as a minimum:

- EEAA and its regional branch offices
- Competent administrative authorities, indicated as per the project location and nature
- The governorate in which the project is located
- Local popular councils
- Representative from affected communities such as neighbouring facilities, people living near the project (This is related to the project location, type and resulting impacts.)

In addition optionally

- Local NGOs interested in environment
- Local universities and research centres
- Other concerned parties

According to definition of EBRD PR10, stakeholders are individuals or groups who

- i. are affected or likely to be affected (directly or indirectly) by the project (affected parties); or
- ii. may have an interest in the project (other interested parties).

Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses. In the course of project implementation the wider definition of stakeholders, i.e. including individuals shall apply.

In the initial phase of the SESA study stakeholder identification focus on key stakeholders. The list of stakeholders is gradually expanded and made more detailed in the course of the execution of the SESA study mainly according to inputs received from EEAA, from Governorates and according to findings during field investigations in the area and in its surroundings. An initial list of stakeholders was discussed, adjusted, amended and agreed during the scoping meeting at NREA on July 12<sup>th</sup>, 2016 together with EEAA. It already considers initial area reconnaissance results with special consideration of the remoteness of the project area. This list is updated during the execution of the study and after the site reconnaissance in particular. The identified stakeholders and proposed communication methods with status May 2018 is listed in the following.

**Table 1: List of identified key-stakeholders**

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
<b>SESA Study Phase</b>			
<u>Chairman Egyptian Environmental Affairs Agency (EEAA)</u>	30 Misr - Helwan Agricultural Road - Maadi - Cairo, Egypt - P.O. Box 11728 Tel: 25256452; Fax: 25256490 E-mail: By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	Central Authority in charge of environmental and social impact regulation and enforcement on National level with subordinated departments in the Governorates; Central Authority for environmental permitting.	Identification of stakeholders Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>Director of Central Department of Environmental Impact Assessment (EEAA)</u>	EEAA Misr Helwan El Zeray st. Nahed Yossif Phone: 01120000673 By Visits; E-mail, Telephone; Fax Official invitation for scoping and public hearing	Department within EEAA headquarters in charge of environmental and social impact assessment and clearance in Egypt that will be responsible for approval of ESIA studies. Consultation is also required by Law.	Identification of stakeholders Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
<p><u>General manager of protected areas EEAA</u></p>	<p>EEAA Misr Helwan El Zeray st. Eng. Mohamed Salem By Visits; E-mail, Telephone; Fax Official invitation for scoping and public hearing</p>	<p>Department within EEAA headquarters in charge of establishment, management and supervision of protected areas. Consultation required regarding existence and possible planning of protected areas within the zones of influence of the SESA development.</p>	<p>Identification of stakeholders Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development</p>
<p><u>Manager of Environmental Department, Beni Suef Governorate</u></p>	<p>By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing</p>	<p>Department within the Governorate. Administration and enforcement of environmental and social affairs on Governorate level.</p>	<p>Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development</p>
<p><u>Manager of Environmental Department, Menia Governorate</u></p>	<p>Phone: 0862326021 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing</p>	<p>Department within the Governorate. Administration and enforcement of environmental and social affairs on Governorate level.</p>	<p>Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing</p>

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
			During RE planning and development
<u>Head of Environmental Department, Assiut Governorate</u>	Phone: 01224064206 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	Department within the Governorate. Administration and enforcement of environmental and social affairs on Governorate level.	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>Regional Office of EEAA, Northern Part of Upper E</u>	Phone: 01007361355 Asyut By Visits; E-mail, Telephone; Fax	In charge of environmental approval of Form B projects	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>Manager of Information Department, Beni Suef Governorate</u>	Phone: 2242072 By Visits; E-mail, Telephone; Fax	Administrative unit on Governorate level that avails of information on socio-economic statis-	Scoping meeting During course of SESA preparation

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
		tics, existing land-use and development planning in the areas of influence of the SESA process.	Review of scoping report and SESA Public Hearing During RE planning and development
<u>Manager of Information Department, Menia Governorate</u>	Phone: 0862362773 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	Administrative unit on Governorate level that avails of information on socio-economic statistics, existing land-use and development planning in the areas of influence of the SESA process.	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>General Secretary Beni Suef Governorate</u>	End of Ahmad Oraby Road- Beni Suef city Tel:- 082232300 Fax:- 082232300 E-Mail: baniswif@idsc1.gov.eg Homepage: www.benisuef.gov.eg By Visits, E-mail, Telephone, Fax; Invitation for scoping and public hearing	Representing the Regional Authority; in charge of all Governorate departments; Though the RE development planning is under the National Government, i.e. under Presidential Decree, the role of the Governorate administration is important especially regarding representation of regional interests, coordination of RE development planning with regional planning or source of information through subordinated departments (e.g. knowledge on usufruct or property rights on land inside and near to project area)	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
<u>General Secretary Menia Governorate</u>	Korinish al Nile street near Hours hotel Tel:- 0862343001 Fax:- 0862342764 E-Mail : menya@idsc1.gov.eg Homepage: www.minia.gov.eg By Visits, E-mail, Telephone, Fax; Invitation for scoping and public hearing	Representing the Regional Authority; in charge of all Governorate departments; though the RE development planning is under the National Government, i.e. under Presidential Decree, the role of the Governorate administration is important especially regarding representation of regional interests, coordination of RE development planning with regional planning or source of information through subordinated departments (e.g. knowledge on usufruct or property rights on land inside and near to project area)	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>General Secretary Assiut Governorate</u>	Al Nil Street extension of Almohafza Road – Assiut Phone: 088 2313158 Fax: 0882325025 E-Mail: assiut@hinet.com.eg Homepage: www.assiut.gov.eg By Visits, E-mail, Telephone, Fax; Invitation for scoping and public hearing	Representing the Regional Authority; in charge of all Governorate departments; though the RE development planning is under the National Government, i.e. under Presidential Decree, the role of the Governorate administration is important especially regarding representation of regional interests, coordination of RE development planning with regional planning or source of information through subordinated departments (e.g. knowledge on usufruct or property rights on land inside and near to project area)	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>Head of Solid Waste Management Department, Menia Governorate</u>	Phone/Fax : 2392 57 086 mobile 01066107488 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	Expected input on proper construction waste management under regional conditions and regarding possible coordination of construction waste handling with existing waste management schemes.	Scoping meeting During course of SESA preparation Review of scoping report and SESA

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
			Public Hearing During RE planning and development
<u>Deputy Minister of Irrigation, Assiut Governorate</u>	Eng. Ahmed Fouad Ahmed Ismail Phone: 01099918607 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	Special focus on irrigation in Assiut Governorate. Information on features and development opportunities and planning of irrigation schemes as can be found in the South of the project area; possibilities of coordination with RE development; Representing interest of farming and expansion of farming next or within the areas.	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>Urban planning department manager, Beni Suef Governorate</u>	Phone: 2243465 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	Potentially interested in the RE development in the Beni Suef Governorate portion of the area in the North and definition of Grievance Mechanism. Urban planning is not likely to be affected	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>Head of Planning Department, Minya Governorate</u>	By E-mail, Telephone; Fax Invitation for scoping and public hearing	RE development planning might be in conflict with Minya Governorate investment planning, especially regarding the planned Minya airport east of Al Minya; interest in compatible planning	Scoping meeting During course of SESA preparation Review of scoping report and SESA

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
			Public Hearing During RE planning and development
<u>Head of Misr El Wosta Electricity Distribution company</u>	Phone: 086- 2346733 / 086-2347296 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	Interest of a regional distributor in RE power generation development to stabilise power supply	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>General Manager ESIA Specialist Egyptian Electricity Transmission Company</u>	Phone: 0114840848 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing	RE development may affect the power grid expansion planning; EETC to introduce its' interest into the SESA process	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>Local government, potentially interested population, in the neighbored Nile</u>	Dissemination of General Information on Project and Grievance Address by leaflets and advertisement on public boards, Public Bulletin Board; NREA website;	General interest in the studies and the RE development with associated modern technologies: Bedouins: Claims on the land inside the desert project area	During course of SESA preparation Review of scoping report and SESA Public Hearing

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
<u>Valley, Bedouins, institutes or organisations</u>	Advertisement of public hearing in Al Ahram news paper		Communications during RE planning and development Through grievance mechanism
<u>Local press, local research centre &amp; local universities, NGOs</u>	Invitation by letter and confirmation by E-mail or phone	Press: Interest in reporting on the RE development; mean for distribution of information on the SESA process and public participation; Local research centres and local universities: Potentially interested in the studies and the RE development associated with establishing modern Technologies in the areas; may offer opportunities for research and training NGOs: Groups to introduce their special interests such as gender equality, employment opportunities, environment protection,	During course of SESA preparation Public Hearing During RE development
<u>Bird Life representative in Egypt</u>	Email: <a href="mailto:noon@natureegypt.org">noon@natureegypt.org</a> Phone: 0020 10 20 34 40 66 By E-mail, Telephone; Fax Invitation for scoping and public hearing	Interest in Bird issues with special focus on bird protection.	Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
<u>EBRD</u>	Regular reporting	As financing institution of the SESA study and potentially later investments interested in a proper implementation of the SESA process	During course of SESA preparation Review of scoping report and SESA

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
			Public Hearing During RE planning and development
<u>Ministry of Transportation (Egypt) - General Authority for Roads, Bridges and Land Transport</u>	<b>Fax:</b> +20 2-2389-2176 Phone: +20 2-2795-2344 By Telephone; Fax Invitation for public hearing PRIMARY ADDRESS El Nasr Road Ezbet El Arab Area Egypt Nasr City	Any future access to the defined project plots which would require construction of additional access roads or new junctions must be coordinated with the relevant authority. Further, the relevant permits for transport of heavy equipment must be coordinated accordingly.	Public Hearing During planning and execution of individual solar projects for East Solar-2 subarea.
<u>Telecommunication providers:</u>  Etisalat Egypt Orange Egypt Telecom Egypt Vodafone Egypt	Etisalat Egypt : Phone: 35346333 K28 Cairo Alex Desert Road - Inside Smart Village  Abu Rawash , Giza  Orange Egypt: Phone: 16110 Nile City Building 2005C, Cornishe El-Nil, Ramlet Bou-laq.	As telecommunication towers in the East Wind-1 area were identified during the site reconnaissance, it is necessary to consider a corridor in order to avoid interferences between wind turbines and the telecommunication signals. Details must be discussed with the relevant providers.	Public Hearing During planning of individual solar projects for East Wind-1 subarea.

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
	<p>Cairo, Egypt. Postal Code: 11221</p> <p>Telecom Egypt: Email: Phone</p> <p>Vodafone Egypt: Media Relations Sr. Specialist Phone: 25294769 Email: Pakinam.rashed@vodafone.com</p> <p>Invitation for public hearing</p>		

## **6 Disclosure of Information**

### **6.1 General**

The subject Strategic Environmental and Social study is a strategic study to assess the environmental and social impacts associated with the development of RE projects with its' typical features in the study area and to determine necessary mitigation measures for the implementation of individual projects. In a second phase for each of the 50 MW projects the investor will have to carry out an assessment drawing on the SESA to inform the environmental permitting process based on the definite layout of the project with its final technical characteristics. Accordingly, as it regards information disclosure in the frame Stakeholder Engagement Plan within this SESA study one has to differentiate into

- Information disclosure in the course of this subject study
- Information disclosure during environmental permitting, implementation and operation of the individual projects

The Egyptian Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2nd edition (2009) contain a provision with regard to projects in a development, for which an approved integrated EIA has been prepared (e.g. for a cluster of foundries or tourist centres; in analogy for a cluster of windfarms or PV solar power projects). In this case the individual projects of similar nature will be required to abide by the requirements of the category that is less strict than its original category. I.e. category B would apply not requiring another public consultation process and making use of the assessment results of the integrated/strategic ESIA and applying any measures, restrictions, etc. defined in the E&S action plan (E&S management and monitoring plan). This corresponds also to the mode of handling individual projects in areas covered by earlier ESIA large area framework studies at the Gulf of Suez. Accordingly, information disclosure during the project implementation phase will focus on regular reporting and keeping of the grievance mechanism.

### **6.2 Disclosure of information during the SESA study**

Within the course of the SESA study the following information material shall be prepared for disclosure:

- a leaflet on the planned development in Arabic for information of local stakeholders in the course of the study, containing also grievance mechanism contact details and reference to web sites and physical locations where reports are published and to journals/newspapers where the public hearing will be advertised;

- a scoping report describing the planned development with possible impacts with a summary in Arabic for information of stakeholders to be distributed to and finalised with stakeholders;
- This Stakeholder Engagement Plan; and
- the SESA wind power and SESA solar power report including environmental and social action plan, monitoring plan, health and safety performance, and implementation of the grievance mechanism with an executive summary in Arabic to be distributed as draft to stakeholders and to be finalised with stakeholder input after the public hearing.

Leaflets shall be disclosed on public boards in the three governorate offices and handed out to local actors during field investigations. Scoping report and the SESA wind power and solar power reports shall be disclosed through NREA's and EBRDs websites. Draft SESA wind power and solar power reports will be circulated prior to the public hearing to those parties that will be directly invited to the public hearing. Moreover, they shall be made available to the public through the three Governorate offices and as downloads from NREAs', EBRD's and Consultants' home page.

### **6.3 Disclosure of information for each individual project**

The environmental and social action plan, monitoring plan and the health and safety performance requirements as well as the grievance mechanism defined in the SESA reports shall be made mandatory to investors within the tender documents and contracts for the 50 MW plots. Moreover, they shall become part of the environmental permit of each individual RE investment project when applying according to category B EIA.

Project owners shall prepare quarterly reports as part of the monitoring to EEAA/NREA on the progress/performance of the project (during planning and construction/operation), the measures taken in accordance to the environmental and social action plan and with regard to health and safety. The report shall be disclosed to the public through the project owners / NREAs website.

## **7 Stakeholder Engagement Programme during the SESA process**

Opportunities for stakeholder engagement are already listed in chapter 5. Public comments and consultation shall be achieved by

- Information disclosure and consultation of local actors during field investigations;
- Scoping together with key stakeholders;
- Disclosure of scoping report and SESA wind and SESA solar reports;

- Distribution of leaflets on the SESA process with address for collecting more information and
- Participation in Public Hearing.

Grievance Mechanism will be established and applies for both, the SESA study phase and the phase of individual project planning, implementation and operation.

As requested by EEAA during the scoping meeting in July 2016 public hearing shall be executed in Minya, considering that Beni Suef and Asiat are located quite remote from the project areas. Transport of stakeholders from other governorates and from Cairo shall be supported by the project.

## **8 Public Grievance Mechanism**

### **8.1 General and procedure**

NREA will receive and consider all comments and complaints associated with the preparation of the SESA studies and subsequently the implementation of the individual RE projects. Any comments or concerns of any person or organisation can be brought to the attention of NREA verbally or in writing (by post or email) or by filling in a grievance form (see example at end).

All comments and complaints will be responded to the complainant either verbally or in writing, in accordance with the preferred method of communication specified by the complainant, if contact details of the complainant are provided.

All grievances will be registered and acknowledged within 5 working days and responded to within 20 working days of receiving the grievance. Individuals who submit their comments or grievances have the right to request that their name be kept confidential.

During the implementation phase of individual projects, NREA will monitor the way in which grievances are being handled by the Contractor(s) and ensure they are properly addressed within deadlines specified above.

NREA will keep a grievance log of all grievances, based on which grievance management reports will be produced and included in the annual environmental and social reports, posted on the NREA-website.

A separate, internal grievance mechanism shall be made available for Contractors' employees during the implementation phase of individual projects.

### **8.2 Grievance Contact address and sample grievance form**

The contact address for grievances is

New and Renewable Energy Authority

Attention: Nefesa Hasan, Manager Environmental Affairs, Department of Studies, Research and Technical Affairs.

Street Address: Dr. Ibrahim Abou El Naga St., Abbas El-Akkad Extension

City: Nasr City, Cairo

Country: Egypt

Telephone: +202 2271 3174

Facsimile number: +202 2271 7173

E-Mail: [nefesa\\_hassan@hotmail.com](mailto:nefesa_hassan@hotmail.com)

### Complaints Sample Form

<b>Reference No:</b>	
<b>Full Name</b>	
<b>Contact information and preferred method of communication</b>  Please mark how you wish to be contacted (mail, telephone, e-mail).	<input type="checkbox"/> <b>By Post: Please provide postal address:</b>  _____ _____ _____
	<input type="checkbox"/> <b>By Telephone:</b>  _____
<input type="checkbox"/> <b>By E-mail</b> _____	
<b>Description of incident or grievance:</b> What happened? Where did it happen? To whom did it happen? What is the result of the problem? Source and duration of the problem?	
<b>Date of incident/grievance</b>	
	<input type="checkbox"/> <b>One time incident/grievance (date _____)</b> <input type="checkbox"/> <b>Happened more than once (how many times? ____)</b> <input type="checkbox"/> <b>On-going (currently experiencing problem)</b>
<b>What would you like to see happen to resolve the problem?</b>	

Signature: \_\_\_\_\_

Date \_\_\_\_\_

**10.1.2 Annex A2: Report on the Scoping Meeting**

**Strategic Environmental and Social Assessment of  
Renewable Energy Projects in the East Nile Region**

***Summary of the Results of the  
Scoping meeting at  
NREA on July 12<sup>th</sup>, 2016***

**Annexes:**

Annex 1: Presentation during scoping meeting .....	7
Annex 2: Potential and anticipated impacts of wind power and PV solar power development and level of assessment .....	24
Annex 3: List of Stakeholders as agreed with EEAA .....	37
Annex 4: Attendance sheets – Scoping Meeting .....	40

## **General**

The scoping meeting was held in the auditorium of NREA on July 12<sup>th</sup>, starting 10:00 a.m. with the participation of key stakeholders having been invited for this meeting. The meeting was conducted by Dr. Bergen and Dr. Niemann from the JV Lahmeyer & ecoda.

Major issues of the meeting were:

1. Presentation to inform about the project and the purpose of the scoping meeting
  - a. The tasks, objectives and expected results of the Strategic Environmental and Social Assessment
  - b. Purpose of the scoping Meeting
  - c. Description of typical features and layout of wind power and solar power projects in Desert Areas with predominant wind direction / alignment of PV solar
  - d. Preliminary overview of the project environment as already available in this early phase of the study
  - e. Data Gaps in baseline information
2. Discussion, adjustment or amendment of potential and anticipated impacts & level and methodology of assessment (Screening and Scoping)
  - a. Wind power development
  - b. PV solar power development
  - c. Establishment of Final List of Significance of Impacts and Levels and Methodology of Assessment
3. Review of List of Stakeholders and amendment with stakeholder input
4. Inquiry of specific information from stakeholders

### ***1. Presentation***

With regard to the presentation we refer to the presentation document enclosed as **Annex 1**.

### ***2. Discussion, adjustment or amendment of potential and anticipated impacts, assessment level and methodology***

Discussion was based on preliminary lists of anticipated impacts, level and methodology of assessment separately for wind power and solar power projects. Major additional topics / aspects that require consideration were:

Social-economic impacts:

- Additionally assess number of people working on isolated business in the area
- Assessment of opportunities of local manufacturing of components
- Judgement of effects of improved knowledge of modern Wind Energy generation / PV solar power technologies (e.g. by dissemination of information material and by on the job training during construction) to boost future development in the region

Water resources & waste water:

- Identify appropriate source(s) of water supply and effects to the resources
- Assess the potential need of buffer tanks to avoid overstressing resources by fast fill of tankers
- Waste water treatment to be differentiated into domestic and hazardous waste water

Domestic and hazardous waste management:

- Assessment of appropriate options for on-site treatment of domestic waste
- Assessment of recycling options for hazardous waste and of the need for regular disposal of hazardous waste (e.g. used batteries, broken panels)

Air pollution

- Dust development at the construction site may not be a general environmental problem affecting the population but should be considered under occupational health aspects

Occupational Health

- Application of internationally accepted health and safety standards
- Special consideration to dust protection at construction site

Further aspects to be considered

- Surface runoff with special emphasis to identify Wadis that are likely for flash flood risks
- Assessment of existence of fault lines and reference to consideration of local earthquake design standards
- Special aspects to be considered for PV solar are water consumption for periodical cleaning during operation and application of framed solar panels, if problems with birds could occur

The scope of assessment considering stakeholder inputs is enclosed as **Annex 2.**

**3. *Review of List of Stakeholders and amendment with stakeholder input***

The current list of stakeholders was discussed, revised and amended with input of stakeholders. According to EEAA the inclusion of local NGOs, local research centres, local universities and local press for the public hearing is a requirement. The list was coordinated with EEAA and, as confirmed by EEAA, fulfils the requirement of agreement of stakeholder list with EEAA, as stipulated by Egyptian regulations. A copy of this revised stakeholder list is enclosed as **Annex 3**.

**4. Inquiry of specific information from stakeholders**

Information requirement	Received information / Mode of getting access to information
Governorate department that can inform about legal status of economic activities inside the desert areas?	Stone crushing activities to be investigated at the Crusher Department in the Governorate
Exact Borders of Governorates; Detailed map with borders of Governorates (current maps in hand show project area under Governorate of Red Sea)?	NREA to issue letter; information to be obtained from governmental survey department
Will individual projects require Class B EIA without public Participation?	Since recently in Egypt the ESIA assessment is differentiated into 4 classes. In addition to A, B and C a “scoped Class B ESIA” was introduced. Such “scoped Class B” requires a more in depth assessment than in case of the common Class B, using data of the previous strategic ESIA study. Another public participation is not required for the “scoped Class B” assessment.
Appropriate locations for dissemination of information about the Project?	As a download on NREA and EBRD website (scoping report and draft and final studies) Ongoing public participation through spreading of leaflet on the project through public boards and informally during interviews and/or at the site Advertisement of public hearing: One of the three governmental newspapers & on public boards of El Minya, Assiut and Beni Suef Key stakeholders need to be invited by letter
Facilities for Public Hearing?	EEAA informed that the place for public hearing shall be El Minya, being located most centrally and not remote like Assiut and Beni Suef
Tower coordinates of the 500 kV line from Ras Ghareb crossing the project area + 5 km each side?	Indicative indication of area where the 500 kV line is crossing the project area and request EETC to provide coordinates of the transmission line towers inside the area and up to 5 km outside the area.

#### ***5. Stakeholders participating in the scoping meeting***

Key stakeholders were jointly identified with NREA and invited to the scoping meeting at NREA. Invitations were either sent by Fax letter or personally handed over by personnel of the Consultant's team.

The invitation of key stakeholders from the Governorates El Minya, Assiut and Beni Suef extended to taking over of travel cost and of allowances for the visits to Cairo. The majority of local key stakeholders invited were from El Minya, reflecting that the more complex organisation of the El Minya Governorate administration than for the other two governorates and that most of the project area is located in this province and near to El Minya. Though Minya Governorate (General Secretary of Minya Governorate) confirmed NREA the participation of 10 delegates, NREA received a last minute fax on July 11<sup>th</sup> in which the Governorate informed that delegates are hindered to participate for different reasons.

Beside the participation of numerous counterparts of NREA major players in the scoping meeting were the two delegates from the Egyptian Environmental Affairs Agency (EEAA), one delegate from the Governorate Assiut and the delegate from the Transmission Company (EETC). The Attendance sheets are enclosed as **Annex 4**.

Though stakeholder participation in the scoping meeting suffered from last minute cancellation of the Minya delegates EEAA considered the scoping meeting and its results to be satisfactory.

Annex 1: Presentation during scoping meeting

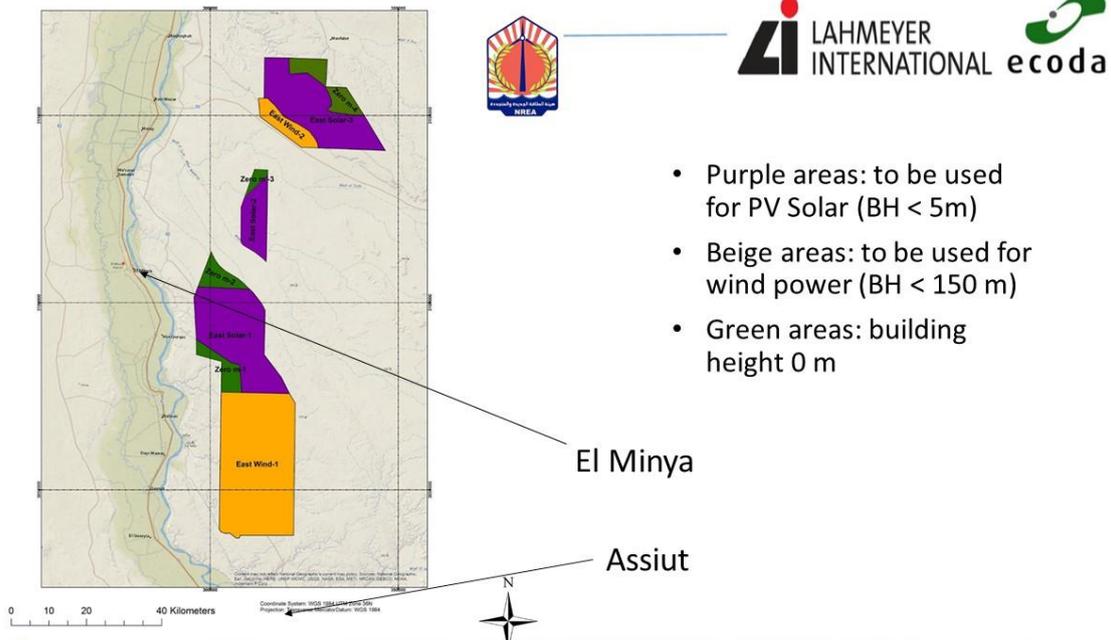
Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region

Scoping Meeting July 12<sup>th</sup>, 2016

- Purpose of the SESA
- Purpose of the Scoping Meeting
- Project Description

**Separate Working Document:**

- Social & Environmental Baseline Information & Data Gaps
- Potential & Anticipated Impacts
- Final List of Significance of Impacts and Levels of Assessment
- Further Stakeholders



- Purple areas: to be used for PV Solar (BH < 5m)
- Beige areas: to be used for wind power (BH < 150 m)
- Green areas: building height 0 m

El Minya

Assiut

## The Strategic Environmental and Social Assessment (SESA) Study

Consist of 4 major elements

- Determination of solar and wind power potential over the areas
- SESA studies for wind and solar power development
- Establishment of an GIS data base containing baseline information as well as all information regarding environmental and social sensitives in the area
- Training components

## The Strategic Environmental and Social Assessment (SESA) Study

- It is an strategic environmental and social impact assessment framework study on the overall area for typical wind power and PV solar power installations intended for the area
- It shall establish the E&S frame conditions, anticipated impacts and define necessary avoidance, restrictions/minimisation and restoration/offset measures for the later development on the area
- It shall identify subareas suitable at best for development of wind power / PV projects (under consideration of different criteria: favourable, restrictive and preclusive)
- It shall serve as an information base to facilitate later investments
- It shall facilitate Foreign Direct Investors to obtain the environmental clearance for intended individual future projects of 50 MW each

## The Strategic Environmental and Social Assessment (SESA) Study

Within the areas allocated to RE development it shall:

- Identify environmental or social constraints and define avoidance (excluding areas) or restriction measures (e.g. keeping minimum distances) or other mitigation measures (Attributes: preclusive, restrictive, favourable).
- Identify technical constraints for RE development (e.g. steep slopes, migrating dunes) - (Attributes preclusive, restrictive/less favourable and favourable)
- Determine the wind and the solar potential over the respective areas

## The Strategic Environmental and Social Assessment (SESA) Study

By superimposition of E&S and technical attributes as well as of the wind power potential distribution over the area it shall:

- Identify the areas that are favourable for RE development
- Identify the areas that are less favourable and can be developed with restrictions only
- Identify areas on which RE development is banned

## Purpose of the Scoping Meeting

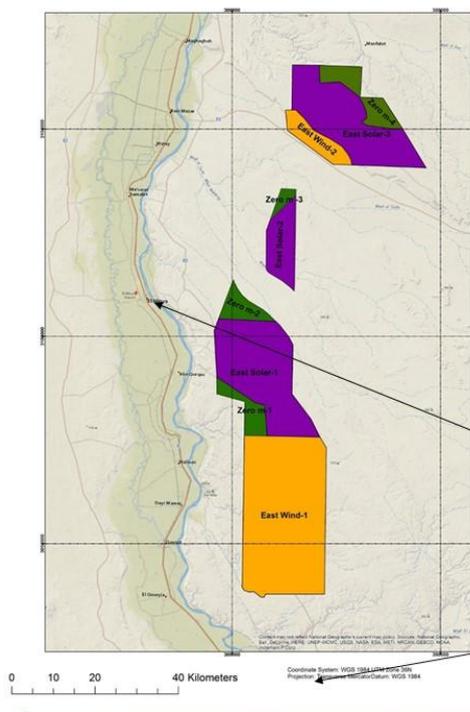
- While RE power potential determination and assessment of technical suitability are engineering tasks following accepted standards/norms the E&S assessment requires input of stakeholders to assure that scope and methods cover all relevant aspects adequately
- Thus, scoping focusses on study element “Assessment of environmental and social impacts”.
- Scoping meeting is first step in public participation process to be concluded with other consultations and the Public Hearing on the draft Strategic Environmental and Social Impact Study
- Screening of potential impacts and determination of their significance
- Stakeholders’ opinion sought to ensure that all potential aspects will be properly addressed in the study
- Result: Scope of the Strategic Environmental and Social Impact Assessment (SESA) and mode of assessment are defined

## Stakeholders

- Internal and external people who are affected by the project
- People who avail on Know How of the area and who can contribute essential information
- Relevant local /regional authorities in charge of the area or within the impact zone of the project
- Interest groups or people with reasonable interest in the project
- EBRD

## The Project Area

- Greater area allocated by Presidential Decree No 111 of 2016 for the use by wind power and PV solar energy projects (about 2,200 km<sup>2</sup>)
- Area reduced by limitation of building height to 0 m by the Ministry of Defence
- Wind power: Plots of 50 MW on areas with permitted building height of 150 m
- PV solar power: Plots of 50 MW on areas with permitted building height of 5 m



- Purple areas: to be used for PV Solar (BH < 5m)
- Beige areas: to be used for wind power (BH < 150 m)
- Green areas: building height 0 m

El Minya

Assiut

### Typical Features of a Wind Power Project

- Three bladed wind turbines (WTG); rotor diameters of about 120 m, maximum tip height of 150 m; installed in rows East to West (predominant wind direction from North) at about 350 m distance along the rows. The distance between rows about 1200 m.
- Medium voltage windfarm internal grid made by underground cable or OHL. Kiosks for ring main stations might be installed next to each WTG.
- High voltage substation for power evacuation at high voltage level.
- Gravel roads of about 8 m width and construction platforms of compacted gravel (hard stands) of about 100 x 60 m mainly depending on the dimensions of the WTG blades.
- Eventually central service buildings such as control room, spare part stores or even living facilities for service personnel.



Windfarm in  
Egyptian Desert



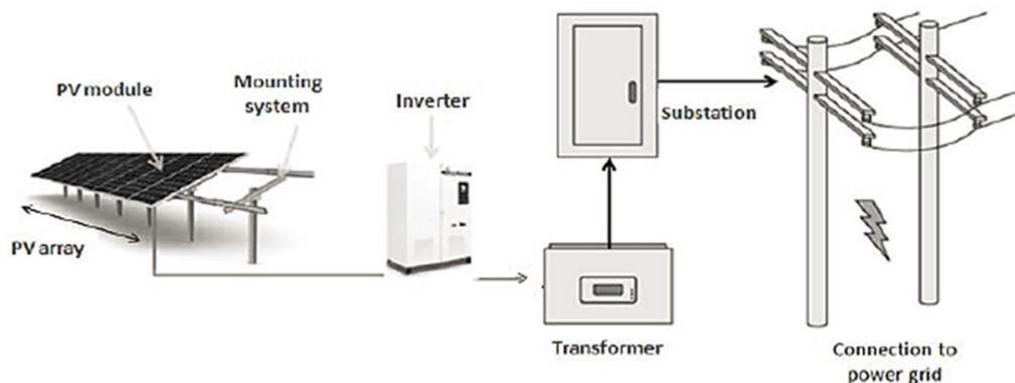
Distance View to a Windfarm



Windfarm arrangement

- Windfarm construction affects about 6 % to 8 % of the overall area during construction; Occupies permanently about 5 % of the land only (foundations, platforms, trenches, gravel roads)
- More than 90 % of the area remains untouched.
- Thus, the natural environment can be mostly preserved and/or other economic activities in the area can be continued or initiated in parallel to wind power utilisation.
- 50 MW plot size: About 8 km<sup>2</sup>

### Typical Features of a PV Solar Power Project





PV Solar  
Project

Construction  
Phase



PV Plant  
Example



Typical  
Arrangement

PV Power  
Plant

- PV Panels are grouped into 'solar arrays'. A 50 MW PV project may have PV panels of capacity ranging from 250 W to 300 W. A typical dimension of a solar PV Panel could be 1950 mm x 990mm x 40mm and weighs around 18 – 25 kgs.
- The mounting structure can either be fixed or tracking (following the sun).
- Area requirement of a 50 MW plot: About 2 km<sup>2</sup>

### Baseline Information

- Physical environment
- Biological environment
- Social environment
- Landuse in the project area

### Physical Environment

- Undulated desert ground with some discontinuities caused by Wadis or faults. In the Northern subareas (mainly in the border area between East Wind-2 and East Solar-3) a major fault near Wadi Tarfa in south-eastern to north-western direction between a plateau and the lower southwestern desert: Altitude difference of about 150 m.
- Hyper-arid: Sporadic rain during October to March. Average: 5 mm/a.
- Annual average temperature of 21.3 °C; average max. of 29.8 °C ; average min. of 13.0 °C. Daily temperature differences about 17 °C. Record high at El Minya was 48 °C; record low -3.4 °C.



Desert ground in  
the south of the  
East Wind-1 area

### Biological Environment

- Due to the hyper-arid climate of the Eastern Desert the vegetation of the project area is not expected to be rich in species.
- Vast portions of the region are devoid of any plant cover. Only in wadis grass spots and pseudo-savannah with single trees, shrubs and herbs can be found.
- Numerous insect species and single species of reptiles are expected to occur. Local bird fauna of special species of low number and desert prone mammals species should be present in the area.
- No knowledge on significance for migrating birds.



Single shrubs in a Wadi



Spotted sandgrouse recorded during bird monitoring in April 2016

### Social Environment

- The project areas consist of vast desert plains without settlements. Nearest distance of the project area to the populated Nile Valley is about 8 km at the latitude of Mallowi.
- High unemployment rate. Workers can be hired from the settlements in the Nile Valley for construction works. During the operation phase local employment of workers limited to maintenance activities and guarding.
- Very few sporadic economic activities extend towards or even inside the project area such as along the road Samalut to Ras Gareb or at the western border of the East Wind-1 area.
- Agricultural activities were observed inside the East Wind-1 area along the Minya Assiut Road, inside the Wadi al Masnji or in the South near the Tall Amarna Road.



Agriculture  
in the Wadi  
al Masnji

### Landuse in the Project area

- As already described before
- In addition to agriculture: Stone crushing & mining



### Social and environmental baseline information and data gaps

Issue	Gaps	Planend Actions
Landuse/Land-take	Detailed information on current farming, stone crushing, any other mining activities in the area	<i>Site reconnaissance, approach of owners and input of relevant Governorate Authority</i>
Socio-economic impacts	Statistics, land-use	<i>Data collection and desks studies, field investigation</i>
Landscape character and visual impact	Verification of non-existence of sensitive receptors	<i>If existing take photos during site investigations towards RE site for visual impact simulation</i>
Terrestrial flora and fauna	Only preliminary on-site information available	<i>Verify and update information through site survey to specify baseline information</i>
Avifauna	Only preliminary on-site information available	<i>Migrating Birds: Full spring and autumn monitoring programme - wind power Survey on local birds</i>
Water resources & waste water	Sources of freshwater for project water supply	<i>Site reconnaissance</i>

### Social and environmental baseline information and data gaps

Issue	Gaps	Planend Actions
Domestic and hazardous waste management	Existing domestic waste disposal facilities and appropriateness	<i>Approach relevant Governorate authorities for input</i>
Air quality	None	<i>None</i>
Noise, vibrations, electro-magnetic interferences & light reflection/ shadowing	Verification of non-existence of sensitive receptors inside or next to the areas	<i>Site survey</i>
Archaeological, historical and cultural heritages	Verification of non-existence of relevant sites inside or next to the areas	<i>Site reconnaissance; Approach relevant authorities for input</i>
Occupational health and safety risks	None (International standards to apply)	<i>None</i>
Impact on traffic, utility services and other infrastructure	Identification of likely transport routes of gravel, sand and fresh water	<i>Site reconnaissance</i>

### Tasks of this scoping meeting

- Screening of potential impacts separately for the Wind Power and the PV Solar Power projects together with key stakeholders to verify the proposed scope and level of assessment, and, if required, to adjust and amend
- To collect additional baseline information on matters with significant potential impact
- To identify further stakeholders to be involved in the course of the project

### Level of significance

Level I: Detailed Assessment	Undertaken on important social and environmental subjects, which will probably be significantly affected by the project and which are probably directly associated with the project. These subjects may lead to restrictions and might have in turn an effect on the project.
Level II: Indicative Assessment	Indicative assessment to be undertaken on important social and environmental subjects which have a lower risk to be significantly affected by the project.
Level III: Cursory Assessment	Undertaken on subjects, which are believed to have a low risk to be affected by the project.
Level IV: No Assessment	Subjects which are known to have no or negligible risk of being affected, in particular those which are not associated with the project site might be screened out.

Scoping to be continued with  
working document

Annex 2: Potential and anticipated impacts of wind power and PV solar power development and level of assessment

*Wind Power Development*

	<b>Potential Impacts (Wind power)</b>	<b>Level of Significa nce/ Assesm ent</b>	<b>Mode of Assessment</b>	<b>Comments/ Stakeholder Input/ Additions/Modi fications etc.</b>
Landuse/ Land-take	Area coverage rate of about 6 % to 8 % of the land during construction and about 5 % during operation; relevant for project subareas, where economic activities (farming, stone crushing, mining) take place  (impact zone 0.5 km)	<i>Detailed Assessment</i>	<i>Field survey on existing economic activities; determination of locations, type of activity,  Information gathering from authorities related to legal status of current activities and any future planning in the area  For current activities definition of social mitigation measures to avoid conflicts according to mitigation hierarchy: 1. Avoidance, 2. Mitigation, 3. Restoration/offset measures</i>	No. of people employed

	<b>Potential Impacts (Wind power)</b>	<b>Level of Significance/ Assessment</b>	<b>Mode of Assessment</b>	<b>Comments/ Stakeholder Input/ Additions/Modifications etc.</b>
Socio-economic effects	No adverse impacts expected, if competing uses are adequately considered in planning; positive effects in employment, nature preservation and resource conservation (saving of conventional energy, emission reduction, creation of employment)  (impact zone 40 km)	<i>Indicative Assessment</i>	<i>Acquisition of statistics on social key parameters and analysis of negative and positive impacts of the RE projects;</i>  <i>Field survey to confirm that the project area with immediate surrounding is free from dwellings; in case of dwellings to identify locations</i>  <i>Assessment of positive effects e.g. employment opportunities</i>  <i>Assessment of potential negative effects.</i>	Assessment of local manufacturing options (in the governorates) of components for the technologies  Assessment of effects on improved know how on modern technologies (dissemination of information material and on the job training), boost for further development
Landscape character and visual impact	Deterioration of landscape due to the wind power installations, due to distances to next settlements and to vast desert character little risk of being affected  (impact zone 10 km)	<i>Cursory Assessment</i>	<i>Discussion of current and modified landscape character; in case of sensitive receiving bodies inside or nearby the area: Visualisation of future wind farm</i>	

	<b>Potential Impacts (Wind power)</b>	<b>Level of Significance/ Assessment</b>	<b>Mode of Assessment</b>	<b>Comments/ Stakeholder Input/ Additions/Modifications etc.</b>
Terrestrial flora and fauna	Disturbance, destruction or loss of habitats; Possibly relevant; to be investigated through field investigation in the course of the study  (impact zone 2 km)	<i>Detailed Assessment</i>	<i>Field surveys along representative cross sections and on presumed sensitive areas; Fauna identification includes spotting of indirect signs such as footprints, excrements, borrows  Drawing conclusions regarding eventually necessary level of protection and mitigation measures</i>	
Avifauna	Disturbance or loss of habitats (breeding birds); vulnerability of migrating birds such as collision with wind turbine rotors, negative effects on migration route  (impact zone 5 km)	<i>Detailed Assessment</i>	<i>Systematic bird monitoring programme during a spring and an autumn season over the whole area dedicated to wind power utilisation with the focus on potential bird migration;  Surveys on local birds / breeding birds over the whole project area.  According to relevance drawing conclusions regarding eventually necessary level of protection and mitigation measures</i>	

	<b>Potential Impacts (Wind power)</b>	<b>Level of Significa nce/ Assesm ent</b>	<b>Mode of Assessment</b>	<b>Comments/ Stakeholder Input/ Additions/Modi fications etc.</b>
Water resources & waste water	Very minor effects due to low water resource consumption and waste water generation during construction  (impact zone 1 km)	<i>Cursory Assesm ent</i>	<i>Discussion of estimated water consumption, potential sources of water supply, effect on water resources, waste water treatment requirements; appropriate waste water treatment schemes</i>	Identify appropriate source(s) of water supply and effects to the resources  Assessment of need of buffer tanks to balance pumping demand  Separately for domestic and hazardous waste water

<p>Domestic and hazardous waste management</p>	<p>Limited waste generation during construction; no hazardous waste generation, if handling according to accepted standards</p> <p>(impact zone 1 km)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Description of kind and quantities of domestic and hazardous waste (e.g. used oil) expected during construction and operation.</i></p> <p><i>Identify waste management schemes for domestic waste that can be jointed to or applied by the future RE projects (Relevance especially for the construction phase).</i></p> <p><i>Define methods of hazardous waste handling and treatment</i></p>	<p>Assess of appropriate options for on-site treatment of domestic waste</p> <p>Assessment of recycling options for hazardous waste (e.g. used oil grease) and of need for regular disposal (e.g. used batteries, damages solar cells?)</p>
<p>Air quality</p>	<p>Occasionally occurrence of dust due to earthworks and transport during construction at single spots only</p> <p>(impact zone up to 1 km)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Discussion of sources and relevance of air pollution caused (relevant during construction stage)</i></p> <p><i>As applicable definition of minimisation measures (e.g. water spraying)</i></p>	<p>(see occupational health)</p>
<p>Noise, vibrations, electro-magnetic interferences and light reflection / shadowing</p>	<p>In the absence of receiving bodies (settlements) inside or nearby to the project area effects are negligible</p> <p>(impact zone up to 1.5 km)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Discussion of the effects originating from the project and making evident that there are no sensitive receiving bodies</i></p> <p><i>If dwellings or other sensitive receiving bodies would be identified in or next to the area:</i></p>	

(public health aspects)			<i>Calculation of zones of influence of noise emissions from wind farm and of shadowing/flicker Assurance that there are no teletransmission/repeater stations or radar in near distance that could be disturbed; if existing: Definition of avoidance measures</i>	
Archaeological, historical and cultural heritages	Might be existing at the western border, subject to site reconnaissance and stakeholder input  (impact zone 1 km)	<i>Cursory Assessment</i>	<i>Verification during site survey and inquiry of authorities; If existing: Duly consideration by avoidance/mitigation measures.</i>	
Occupational health and safety risks	Relevant especially during construction and wind turbine installation works as well as maintenance; risks are small, if generally accepted health and safety standards as strictly applied by renowned companies are followed  (impact zone 0.2 km)	<i>Cursory Assessment</i>	<i>Discussion of risks associated with the construction and operation of wind projects and definition of necessary mitigation</i>	Assess effects of dust development on occupational health and appropriate mitigation  Application of accepted health and safety standards

<p>Impact on traffic, utility services and other infrastructure</p>	<p>Little relevance due to low capacity utilisation of existing roads and low water consumption during construction; negligible during operation  (impact zone 10 km)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Description of transport infrastructure, current traffic loads and expected additional traffic load due to construction measures  Assessment of significance of impacts, and, if significant, definition of avoidance or mitigation measures</i></p>	
<p><b>Any further issue to be considered as per stakeholder input</b></p>	<p>Flash Flood risks; earthquake risks</p>	<p><i>Detailed Assessment</i></p>	<p><i>Desk study on catchment area and slopes to determine Wadis that could cause flash floods; Interviews of local people; Site survey  Earthquake: Existence of fault lines and reference to consideration of local earthquake design standards</i></p>	

*Solar power development*

<b>Issue</b>	<b>Potential Impacts (PV Solar Power)</b>	<b>Level of Significance/ Assessment</b>	<b>Mode of Assessment</b>	<b>Comments/ Stakeholder Input/ Additions/Modifications etc.</b>
Landuse/ Landtake	<p>Area coverage ratio of about 70% to 90 % during construction and operation; highly relevant for project subareas, where economic activities (farming, stone crushing, mining) take place</p> <p>(impact zone 0.5 km)</p>	<i>Detailed Assessment</i>	<p><i>Field survey on existing economic activities; determination of locations, type of activity</i></p> <p><i>Information gathering from authorities related to legal status of current activities and any future planning in the area</i></p> <p><i>For ongoing activities definition of social mitigation measures to avoid conflicts according to mitigation hierarchy: 1. Avoidance, 2. Mitigation, 3. Restoration/offset measures</i></p>	

Issue	Potential Impacts (PV Solar Power)	Level of Significance/ Assessment	Mode of Assessment	Comments/ Stakeholder Input/ Additions/Modifications etc.
Socio-economic effects	<p>No adverse impacts expected, if competing uses of the area are adequately considered in planning; positive effects in employment, nature preservation and resource conservation (saving of conventional energy, emission reduction, creation of employment)</p> <p>(impact zone 40 km)</p>	<i>Indicative Assessment</i>	<p><i>Acquisition of statistics on social key parameters and analysis of negative and positive impacts of the RE projects;</i></p> <p><i>Field survey to confirm that the PV/Solar project area is free from dwellings; in case of dwellings to identify locations &amp; legal status</i></p> <p><i>Assessment of positive effects, e.g. employment opportunities</i></p> <p><i>Assessment of potential negative effects</i></p>	See additions under wind power
Landscape character and visual impact	<p>Deterioration of landscape due to the PV installations; limited visibility due to low building height; due to larger distances to next settlements and to vast desert character little risk of being affected</p> <p>(impact zone 3 km)</p>	<i>Cursory Assessment</i>	<p><i>Discussion of current and modified landscape character;</i></p> <p><i>in case of sensitive receiving bodies inside or next to the area assessment of the change of the landscape</i></p>	

Issue	Potential Impacts (PV Solar Power)	Level of Significance/ Assessment	Mode of Assessment	Comments/ Stakeholder Input/ Additions/Modifications etc.
Terrestrial flora and fauna	Disturbance, destruction or loss of habitats; Possibly relevant; to be investigated through field investigation in the course of the study  (impact zone 300 m)	<i>Detailed Assessment</i>	<i>Field surveys along representative cross sections and on presumed sensitive areas; Fauna identification includes spotting of indirect signs such as footprints, excrements, burrows  Drawing conclusions regarding eventually necessary level of protection and mitigation measures</i>	

Avifauna	Disturbance or loss of habitats (breeding birds); (impact zone 5 km)	<i>Detailed Assessment</i>	<i>Surveys on local birds / breeding birds over the whole project area.  According to relevance drawing conclusions regarding eventually necessary level of protection and mitigation measures</i>	Remark: Framed PV solar power applies unless no risk for birds is evidenced
Water resources & waste water	Very minor effects due to low water resource consumption and waste water generation during construction  Negligible during operation  (impact zone 1 km)	<i>Cursory Assessment</i>	<i>Discussion of estimated water consumption, potential sources of water supply, effect on water resources, waste water treatment requirements; appropriate waste water treatment schemes</i>	Remark: Consideration of regular cleaning
Domestic and hazardous waste management	Limited waste generation during construction; no hazardous waste generation, if handling according to accepted standards  (impact zone 1 km)	<i>Cursory Assessment</i>	<i>Description of kind and quantities of domestic waste expected during construction and operation.  Identify waste management schemes for domestic waste that can be jointed to or applied by the future RE projects (Relevance especially for the construction phase).</i>	See remarks regarding wind power
Air quality	Occasionally occurrence of dust due to earthworks and transport during construction at single spots only  (impact zone up to 1 km)	<i>Cursory Assessment</i>	<i>Discussion of sources and relevance of air pollution caused (relevant during construction stage)  As applicable definition of minimisation measures (e.g. water spraying)</i>	See remarks regarding wind power

<p>Noise, vibration, electromagnetic interferences and light reflection (public health aspects)</p>	<p>Noise &amp; vibrations may occur during construction, if ramming of frame supports is applied; light reflection during operation from panels only, if non appropriate PV panels would be chosen In the absence of receiving bodies (settlements) inside or nearby the project area effects are negligible. In the absence of receiving bodies (settlements) inside or nearby to the project area effects are negligible.  (impact zone up to 500 m)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Discussion of the effects originating from the project and making evident that there are no sensitive receiving bodies If dwellings or other sensitive receiving bodies would be identified in or next to the area: Assess potential impacts and appropriate mitigation measures</i></p>	
<p>Archaeological, historical and cultural heritages</p>	<p>Might be existing at the western border, subject to site reconnaissance and stakeholder input  (impact zone 1 km)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Verification during site survey and inquiry of authorities; If existing: Duly consideration by avoidance/mitigation measures.</i></p>	
<p>Occupational health and safety risks</p>	<p>Relevance especially during construction; risks are small if generally accepted health and safety standards as strictly applied by renowned companies are followed  (impact zone 20 m)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Discussion of risks associated with the construction and operation of PV solar power projects and definition of requirements to follow internationally accepted standards</i></p>	<p>Relevance of dust for occupational health</p>

<p>Impact on traffic, utility services and other infrastructure</p>	<p>Little relevance due to low capacity utilisation of existing roads and low water consumption during construction; completely negligible during operation  (impact zone 10 km)</p>	<p><i>Cursory Assessment</i></p>	<p><i>Description of transport infrastructure, current traffic loads and expected additional traffic due to construction measures</i>  <i>Assessment of significance of impacts, and, if significant, definition of avoidance or mitigation measures</i></p>	<p>Assess sources of water, sand and gravel supply and corresponding transport routes</p>
<p><b>Any further issue to be considered as per stakeholder input</b></p>	<p>Flash Flood risks; earthquake risks</p>	<p><i>To be identified</i></p>	<p><i>Desk study on catchment area and slopes to determine Wadis that could cause flash floods; Interviews of local people</i>  <i>Earthquake: Existence of fault lines and reference to consideration of local earthquake design standards</i></p>	

### Annex 3: List of Stakeholders as agreed with EEAA

Stakeholders	Communication & Proposed Method
<b>SESA Study Phase</b>	
Chairman Egyptian Environmental Affairs Agency (EEAA)	30 Misr - Helwan Agricultural Road - Maadi - Cairo, Egypt - P.O. Box 11728 Tel: 25256452; Fax: 25256490 E-mail: By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Director of Central Department of Environmental Impact Assessment (EEAA)	EEAA Misr Helwan El Zeray st. Nahed Yossif Phone: 01120000673 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
General manager of protected areas EEAA	EEAA Misr Helwan El Zeray st. Eng. Mohamed Salem By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Manager of Environmental Department, Beni Suef Governorate	Mr. Tarek Sameir Kamel Phone: 0822352567 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Manager of Environmental Department, El Minya Governorate	Mr. Mohamed Saad Hassan Phone: 0862326021 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Head of Environmental Department, Assiut Governorate	Mr. Nader Shehata Dous Phone: 01224064206 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Manager of Information Department, Beni Suef Governorate	Mr. Hamdy Mostafa Salem Sleim Phone: 2242072 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Manager of Information Department, El Minya Governorate	Mr. Shehab El Dein Ismail Phone: 0862362773 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing

<b>Stakeholders</b>	<b>Communication &amp; Proposed Method</b>
General Secretary Beni Suef Governorate	Regional Authority, department in charge of usufruct or property rights on land inside and near to project area and knowledgeable of any relevant planning 4400488 / 4400722 / 4400894 By Visits, E-mail, Telephone, Fax; Invitation for scoping and public hearing
General Secretary El Minya Governorate	Regional Authority, department in charge of usufruct or property rights on land inside and near to project area and knowledgeable of any relevant planning Telephone 086-9242740 By Visits, E-mail, Telephone, Fax; Invitation for scoping and public hearing
General Secretary Assiut Governorate	Regional Authority, department in charge of usufruct or property rights on land inside and near to project area and knowledgeable of any relevant planning Phone 04845039 Invitation for scoping and public hearing
Head of Solid Waste Management Department, El Minya Governorate	Mr. Aly Ahmed El Asmaay Phone/Fax : 2392 57 086 mobile 01066107488 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Deputy Minister of Irrigation, Assiut Governorate	Eng. Ahmed Fouad Ahmed Ismail Phone: 01099918607 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Urban planning department manager, Beni Suef Governorate	Ms. Noha Farag Khater Phone: 2243465 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Head of Planning Department, El Minya Governorate	Eng. Remon Reda By E-mail, Telephone; Fax Invitation for scoping and public hearing
Bird Life representative in Egypt	Mr Osama Alnouri Email: noor@natureegypt.org Phone: 0020 10 20 34 40 66 By E-mail, Telephone; Fax Invitation for scoping and public hearing
Head of Misr El Wosta Electricity Distribution company	Eng. Medhat Ewais Fouda Phone: 086- 2346733 / 086-2347296 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing

General Manager ESIA Specialist Egyptian Electricity Transmission Company	Eng. Mohsen El Banna Phone: 0114840848 By Visits; E-mail, Telephone; Fax Invitation for scoping and public hearing
Potentially interested population in the neighbored Nile Valley, institutes or organisations	Public Bulletin Board; NREA website; Advertisement of public hearing in one of the three governmental newspapers
Local press, local research center & local universities, NGOs	Invitation by letter and confirmation by E-mail or phone
European Bank for Reconstruction and Development (EBRD)	James Lea-Cox, Principal Environmental Advisor Phone: +442073388587 By E-mail, Telephone; Fax Invitation for scoping and public hearing

Annex 4: Attendance sheets – Scoping Meeting

	<u>Communication &amp; Proposed Method</u>	<u>Please confirm attendance by signature</u>
NREA Mina Nabi/Ranzy	mina_vodafone@yahoo.com	Mina
NREA asmaa Kandel	eng-as_ka@yahoo.com	asmaa
NREA Refasa Hassa	refasa_hassa@hotmail.com	Refasa
NREA Mohamed El-Khayat	t-vicechair@nrea.gov.eg	Mohamed El-Khayat
NREA Ehab Ismail	ehab4768@gmail.com	Ehab Ismail
NREA Mohamed Selim	moyhn99@gmail.com	Mohamed Selim
NREA/Medhat Abdel Aziz	m_21267@yahoo.com	Medhat Abdel Aziz
Others		
ASRPA A. MAGUI	local consultant	A. Magui
Islam elsalamany		Islam elsalamany
Salma Amir		Salma Amir
Dr. F. Berger	ecoda ENVIRONMENTAL CONSULTANTS berger@ecoda.de	Dr. F. Berger
Ahmed Medhat		Ahmed Medhat
Monza Hussien	EETC	Monza Hussien

Ahmed Mamdouh NREA (ahmed.mamdouh2008@yahoo.com)

Salim Saged Awad (NREA) Salim Saged Awad

Tamer mohamed@delkader (NREA) Eng Tamer1164@yahoo.com

Ahmed Athia Tolba (NREA) engahmed\_tolba@hotmail.com

Moustafa Al-Mabrouk, EEAA - Assiut RBo.  
moustafa\_mabrouk@yahoo.com

	<u>Communication &amp; Proposed Method</u>	<u>Please confirm attendance by signature</u>
NREA	Asmaa Fouad shehab	asmaa.fouad.47@yahoo.com
NREA	Suzan Adel Ibrahim	
NREA	Amery Salah	EEAA Amery
NREA	Amia Ibrahim	EEAA Amia
NREA	AKmal Mahmoud	
NREA	↳ <akmal.mahmoud@gmail.com>	
Others		

JV



## 10.2 Annex B: Project Information Flyer



**Arab Republic of Egypt**  
**Ministry of Electricity and Energy**  
**New and Renewable Energy Authority (NREA)**



**Strategic Environmental and Social Assessment of Wind Power  
and PV Solar Power Energy Projects in the East Nile Region**

**Financed by European Bank for Reconstruction and  
Development (EBRD)**

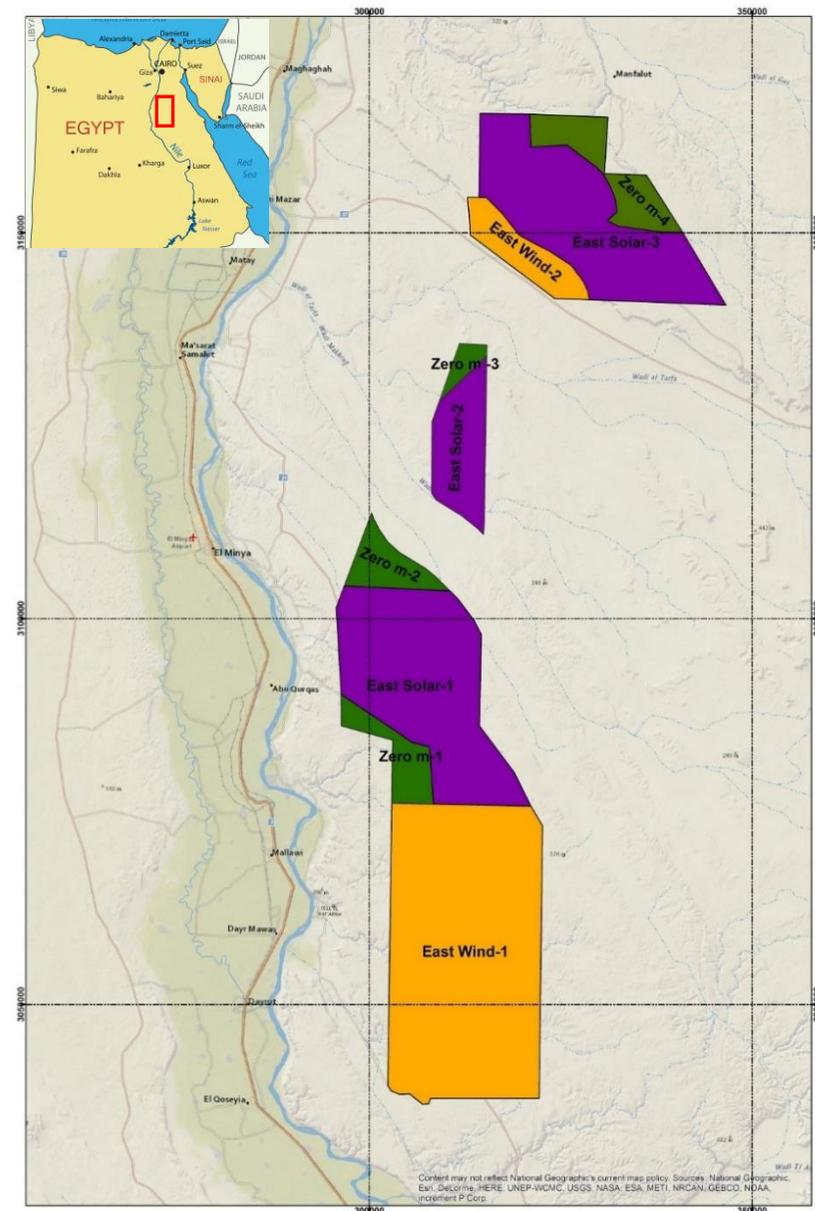
**Execution of Assessment Study 2016 – 2017**

***Information to facilitate Public Participation***

The GoE has identified the East of Nile area, which was allocated by Presidential Decree No 456 of 2014 and modified by the Decree No 116 of 2016 for the use by wind power and solar energy projects. To ensure a strategic level assessment of the potential environmental and social issues associated with this major development a Strategic Environmental and Social Assessment Study (SESA) for the area across the three Governorates of Beni Suef, Minia and Assuit (the “Project Area”). The SESA will identify areas within the East of Nile project area that are suitable for wind and solar power development considering environmental and social, the wind and solar power potential and technical issues.

The overall SESA consists of 4 major components, such as determination of solar and wind power potential over the areas, establishment of an GIS data base containing baseline information as well as all information regarding environmental and social sensitives in the area, Training and SESA studies for wind and solar power development

The objective of Public Participation is to get information, opinions, concerns or suggestions regarding the strategic environmental and social assessment of wind and PV solar power in or next to the project areas (pink-coloured solar power areas, beige coloured wind power areas) as shown on the map.





View of Wind Farm on Desert Ground

The Assessment of potential impacts and definition of mitigation measures to the extent necessary for construction and operation covers the following major fields:

- Landuse/Landtake
- Socio-economic effects
- Landscape character and visual impact
- Terrestrial flora and fauna
- Avifauna
- Water resources & waste water
- Domestic and hazardous waste management
- Air quality
- Noise, vibrations, electromagnetic interferences and light reflection / shadowing (public health aspects)
- Archaeological, historical and cultural heritages
- Occupational health and safety risks/ earthquake risks
- Impact on traffic, utility services and other infra-structure
- Run-off / Flash flood risk



View of Mounting Structures of a PV Solar Plant

People, organisations or interest groups with reasonable interest in the development project, or who are affected by the project or who avail of know-how and can contribute information on the project area and immediate surroundings may address their suggestions, concerns or information to

New and Renewable Energy Authority

Attention: Nefesa Hasan, Manager Environmental Affairs, Department of Studies, Research and Technical Affairs.

Street Address: Dr. Ibrahim Abou El Naga St., Abbas El-Akkad Extension

City: Nasr City, Cairo

Telephone: +202 2271 3174

Facsimile number: +202 2271 7173

E-Mail: nefesa\_hassan@hotmail.com

Documents of the study as well as date and venue of Public Hearing will be disclosed on the NREA homepage: <http://www.nrea.gov.eg>

## **10.3 Annex C: Interviews**

### **10.3.1 Annex C1: Overview of Interviews**

Strategic Environmental and Social Assessment of Wind Energy Projects in the East Nile Region - Executed interviews

Data	Person / entity	Location	Interviewed Persons	Interviewer	Relevant Issues/Expectations/ concerns/interests
04.10.2016	Dr. Shehab el Din Ismail	El Minya government building	Head of Minia Governorate Information Center	Tony Moens De Hasse Omneya Nour Eddin	Officials on the governorate level feel excluded since they were not included in selection of the area. The presidential decree means they have no potential for future urban expansion in Eastern Desert.
04.10.2016	Mr. Mohamed Abdel Fatah Mr. Atef Taha Dr. Ibrahim	El Minya government building	Function of interviewer Person Assistant Secretary General, Minia Governorate Public Property Officer, Minia Governorate Geological Advisor to the Minia Governor	Project team 1)	Departments of Information, Public Property and the Geological Adviser will participate in discussing the SESA study and providing necessary input for the team
04.10.2016	Mr. Essam El Bedewy Mr. Mohamed Abdel Fatah Mr. Atef Taha Dr. Ibrahim	El Minya government building	Governor, Minia Governorate Assistant Secretary General, Minia Governorate Public Property Officer, Minia Governorate Geological Advisor to the Minia Governor	Project team 1)	The Governor also expressed interest in the study and indicated that it is in the benefit of the governorate to collaborate with the study team.
04.10.2016	El Minya governorate	El Minya government building	Gen. Secretary + Governor	Project team 1)	Governorate of El Minya ensures support to the project team and requested coordinates of the investigation area
05.10.2016	Fouly Kamel Moussa	El Minya government building	Supervisor of Minia Governorate Investment Office	Tony Moens De Hasse Omneya Nour Eddin	NREA needs to clearly declare its ownership over the land to avoid illegal encroachments. It is forbidden to start any industrial activities outside of the official industrial zones
05.10.2016	Dr. Mohamed Saad Dr. Nada Ashour	El Minya government building	Head of Environment Department, Minia Governorate Researcher, Environment Department, Minia Governorate	Tony Moens De Hasse Omneya Nour Eddin	The main two obstacles that occur close or at the project areas are: Land reclamation activities and Quarry activities
05.10.2016	Dr. Alaa el Din Mohamed Hassan	El Minya government building	Head of Quarrying Department, Minia Governorate	Tony Moens De Hasse Omneya Nour Eddin	There are plans to move the quarry areas to the east after the army road. 7 Kms to the east of the road. But this still needs some time to be implemented
05.10.2016	Workers for quartzite exploration	Wind 1 Area	N/N	Dep. Project Director / Task Leader Wind Energy	No reservatons against wind power. If wind power will be installed in their working area, they will look for new sites.
05.10.2016	Worker for execution of new ground water ressources for irrigation.	Wind 1 Area	N/N	Dep. Project Director / Task Leader Wind Energy	Drillings will be performed up to depth of 230m (Ground water is found in depths from 170m). Extesion of irrigation / drilling areas is planned. The whole drilling is through limestone, water is sweetwater.
06.10.2016	Mr. Badr Said		Head of the Local Government Unit in Abyoha, Abu Qorqas District	Tony Moens De Hasse Omneya Nour Eddin	New land reclamation activities occur at the ends of the village close to the desert areas; The industrial zone is not as active as it was
06.10.2016	Khalil Mohamed Kamal		Farmer	Tony Moens De Hasse Omneya Nour Eddin	water quality is good (40m depth with pump), The main need of the farmers at newly reclaimed land is to be connected to electricity to operate the water pumping equipment without diesel which is too expensive
06.10.2016	Mr. Mohamed Effat Mr. Sayed Ibrahim Naguib Mr. Mekhymar Fathy Mohamed		Head of the Local Government Unit in Beni Hassan, Abu Qorqas District Head of Urban planning unit at Abu Qorqas district Head of Antiquities inspectors of Beni Hassan archaeological site	Tony Moens De Hasse Omneya Nour Eddin	The area has a large archaeological plateau; Currently tourism activities are limited. So there is high unemployment. Beni Hassan now depends mainly on agriculture
06.10.2016	Mr. Mohamed Abdel Awad Hussien		Head of the Local Government Unit at Tal Beni Omran, Deir Mwas District	Tony Moens De Hasse Omneya Nour Eddin	Tel Beni Omran is an agricultural area. No Quarry activities or industrial activities occur. There is a large archaeological site in the area. New expansion plans are related to the establishment of the New Tel el Amarna city
06.10.2016	Hamada Hassaan		Farmer	Tony Moens De Hasse Omneya Nour Eddin	They work together as a family (50 people); - Water quality is good and they plant different types of crops without problems
06.10.2016	Privat workers, picking up excavation material from former road construction	Wind 1 Area	N/N	Task Leader Wind Energy	Workers collect excavation material as privat individuals which they sell to companies.
07.10.2016	Safy Mahmoud Senosy		Farmers	Tony Moens De Hasse Omneya Nour Eddin	They are reclaiming the area gradually; All types of crops are growing well in the area. The water is not salty. They plant Malt, Wheat and Fenugreek

07.10.2016	Hany Aby Mohamed Aly Hamam		Farmers	Tony Moens De Hasse Omneya Nour Eddin	The solar project is important to create job opportunities at the area; They heard of another electricity project in the area (Chinese project)
07.10.2016	Mr. Sayed Ba'gar		Land dealer at Beni Suef / Assuit Desert road (Old desert road)	Tony Moens De Hasse Omneya Nour Eddin	most of the areas along the old desert road are sold. Many actors have already started using the land including companies; He is ready for cooperation to arrange for land acquisition of the project; design ideally leave between 3-4 kms to avoid conflict with current land owners
07.10.2016	Mr. Mohamed Abdallah Mr. Rafik Costandi Ms. Angela Hoffman		Sekem Farm - Wadi el Afareet - Farm operator - Sekem school social officer - Bio dynamic farming specialist	Tony Moens De Hasse Omneya Nour Eddin	They plan to install a solar system to operate the water pumps; the farm suffered severe damages during the storm rain in 2011 and they planted higher trees to protect the land. A buffer zone is needed between other development activities about 100 meters to protect the plants (to be organic certified).
07.10.2016	Essam Zaki Younan		Mine owner	Tony Moens De Hasse Omneya Nour Eddin	He mentioned that they do not prefer to apply for formal permit since they will have to pay very high fees for the government
08.10.2016	Hisham Abdel Kawy		Head of the local government unit of Zawyet Zultan Basha, Minia District	Tony Moens De Hasse Omneya Nour Eddin	Archaeological sites exist along the mountain, there are also illegal house encroachments at the archaeological areas; Artisan area in Zawya Baharia; The main socio-economic activities are quarry mining and agriculture
08.10.2016	Magdy Shehata		Head of agriculture sector of Zawyet Zultan Basha, Minia District	Tony Moens De Hasse Omneya Nour Eddin	Land reclamation requires more labourers in addition to more capital investment at the beginning to dig a well and turn the land into a productive state
31.10.2016	Fathma El-Khayat Iman Ali Hala Mahmoud	Assiut governorate building	Information and Studies Department Planning Department      Environmental Department	Medhat / Local Support Manager for JV LI/ecoda Dr. Frank Bergen / Representative of JV LI/ecoda	The Planning Department, the Information and Studies Department and the Environmental Department signaled their willingness to support the JV LI/ecoda in carrying out the SESA Study, i.e. by providing required data
04.03.2017	Asman Adel Said Hafez Adel Said	Abdel	workers at type fixing garage	Mohamed Alsilan	They are happy of the wind farm development as it brings business to them directly and in the area

1) Dr. E-J. Niemann, M. Drosch, R. Ares Garcia, T. Moens de Hase, Dr. Omneya.

### 10.3.2 Annex C2: Outcomes of Interview Forms

## Face to Face Interview Form

No:	1
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Dr. Shehab el Din Ismail
Function of interviewer Person	Head of Minia Governorate Information Center
Contact Information	Postal address: Minia Governorate Main Building Telephone: ..... Email: .....
Subject of Interview	Request relevant secondary data related to the project areas
<p>Information / Option received:</p> <p>The Information Center has statistical information about all villages and districts at Minia Governorate. Official letter from NERA should be sent in order to provide the data to the project team.</p> <p>The team discussed with him the existing activities in the project area, he noted that some activities occur at the project area:</p> <ul style="list-style-type: none"> <li>- Quarry activities</li> <li>- Land Reclamation and cultivation at some area</li> <li>- Archaeological areas at Tal el Amarna and Beni Hassan</li> </ul> <p>Governorate officials feel excluded since the governorate has no jurisdiction on the project area (the project is officially located outside of the governorate borders).</p> <p>Officials on the governorate level feel excluded since they were not included in selection of the area. The presidential decree means they have no potential for future urban expansion in Eastern Desert.</p> <p>Received Documents:</p> <ul style="list-style-type: none"> <li>- Number of Quarry Mines at Minia Governorate</li> <li>- Details about the Industrial Zone at Al Matahra Baharya</li> </ul>	

Signature of Interviewer:

Date: October 4, 2016

No:	2
Name of Interviewer	All Team
Full Name of interviewed Person	Mr. Mohamed Abdel Fatah Mr. Atef Taha Dr. Ibrahim
Function of interviewer Person	Assistant Secretary General, Minia Governorate Public Property Officer, Minia Governorate Geological Advisor to the Minia Governor
Contact Information	Postal address: Minia Governorate Main Building Telephone: Mr. Taha: 01060327810 Email: .....
Subject of Interview	Introduce the project and discuss future development plans of the governorate
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- The SESA study team explained the aim of the project.</li> <li>- The team also emphasized the difference between the East Nile and West Nile projects. And that this project is independent from the West Nile and actually has nothing to do with it.</li> <li>- The Secretary General explained that the governorate officials were mixing between both projects and were thinking that the two projects are one.</li> <li>- The Secretary General indicated that NREA team should participate in the mission.</li> <li>- The governorate was not able to participate in the scoping session but would like to participate in the coming events</li> <li>- Departments of Information, Public Property and the Geological Adviser will participate in discussing the SESA study and providing necessary input for the team.</li> <li>- The relevant developmental plans in the area include: <ul style="list-style-type: none"> <li>o Extension of some villages and cities in the Eastern Desert: plans were submitted but no official decree has been issued yet</li> <li>o There are plans to establish an airport (about 15 thousand feddans)</li> </ul> </li> </ul>	

Signature of Interviewer:

Date: October 4, 2016

No:	3
Name of Interviewer	All Team
Full Name of interviewed Person	Mr. Essam El Bedewy Mr. Mohamed Abdel Fatah Mr. Atef Taha Dr. Ibrahim
Function of interviewer Person	Governor, Minia Governorate Assistant Secretary General, Minia Governorate Public Property Officer, Minia Governorate Geological Advisor to the Minia Governor
Contact Information	Postal address: Minia Governorate Main Building Telephone: ..... Email: .....
Subject of Interview	Introduce the project and discuss future development plans of the governorate
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- The team introduced the SESA study to the governorate</li> <li>- The team explained the importance of working in collaboration with the governorate to understand the needs and developmental plans of the governorate and take them into consideration.</li> <li>- The team emphasized the importance of knowing about all the current and future developmental plans of the area in order to take them into consideration in the design.</li> <li>- The Governor also expressed interest in the study and indicated that it is in the benefit of the governorate to collaborate with the study team.</li> <li>- The Governor instructed the governorate team to collaborate with the SESA study team and to provide realistic developmental plans.</li> <li>- Data to be given to the project will be supervised by the Governor.</li> </ul>	

Signature of Interviewer:

Date: October 4, 2016

No:	4
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Fouly Kamel Moussa
Function of interviewer Person	Supervisor of Minia Governorate Investment Office
Contact Information	Postal address: Minia Governorate Main Building Telephone: ..... Email: .....
Subject of Interview	Request relevant secondary data related to the project areas
<p>Information / Option received:</p> <p>Some activities needs to be strongly investigated:</p> <ul style="list-style-type: none"> <li>- Land reclamation activities (some of those activities may be used in the future as housing areas).</li> <li>- NREA needs to clearly declare its ownership over the land to avoid illegal encroachments. (Officially claim its ownership by advertising or fencing)</li> <li>- Minia Governorate has 4 official industrial zones. It is forbidden to start any industrial activities outside of the official industrial zones. Hence no industrial activities should be expected to occur outside of those areas.</li> <li>- It is important to discuss with the "National Center for Planning Land Use جهاز تخطيط استخدامات اراضي الدولة"</li> <li>- The Investment office will prepare a report about Minia Governorate development plans to submit to NREA. An official letter should be sent from NREA in order to provide the project team with relevant data.</li> <li>- Expected future development plans for the project to take into consideration, include: <ul style="list-style-type: none"> <li>o Expansion of New Malawy city</li> <li>o Expansion of New Minia City</li> <li>o Expansion of Industrial areas</li> </ul> </li> </ul>	

Signature of Interviewer:

Date: October 5, 2016

No:	5
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Dr. Mohamed Saad Dr. Nada Ashour
Function of interviewer Person	Head of Environment Department, Minia Governorate Researcher, Environment Department, Minia Governorate
Contact Information	Postal address: Minia Governorate, Mogama' el Masaleh Telephone: Dr. Mohamed Saad: 01144637723 Dr. Nada: 01007301936 Fax: 086 2326021 Email: .....
Subject of Interview	Discuss relevant environmental impacts
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- The main two obstacles that occur close or at the project areas are: <ul style="list-style-type: none"> <li>o Land reclamation activities</li> <li>o Quarry activities</li> </ul> </li> <li>- The Environment Department is responsible for monitoring of the air pollution arising from the quarry areas. It is noted that air pollution in these areas exceeds the maximum permissible limits by far (100 times for particles). They are not able to do anything since they cannot close any of the quarries and most of them are not licensed. Actually New Minia city has high rates of air pollution</li> <li>- There are no protected areas around the project areas.</li> <li>- There is an industrial area in Beni Mazar (Senarya) – Cement factories</li> <li>- Another industrial area in Sheikh Fadl which includes ASEC cement factory and Royal Cement factory (cement factories increase air pollution especially after they changed to coal. Despite the air monitoring system but they are not able to enforce fines on violating companies.</li> <li>- Sand storms only occur at some seasons (end of summer and autumn) their impact is not so strong on increasing air pollution levels.</li> <li>- Child labour occurs in many cases in quarry areas.</li> <li>- The department tried to held awareness raising activities against the impacts of quarries but still the impacts are high.</li> </ul>	

Signature of Interviewer:

Date: October 5, 2016

No:	6
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Dr. Alaa el Din Mohamed Hassan
Function of interviewer Person	Head of Quarrying Department, Minia Governorate
Contact Information	Postal address: Minia Governorate Main Building Telephone: 01020303103 Email: <a href="mailto:aem5151@yahoo.com">aem5151@yahoo.com</a>
Subject of Interview	Discuss issues related to quarrying activities at the area
Information / Option received:	
<ul style="list-style-type: none"> <li>- The quarry department can provide accurate data about the locations of the quarries. An official correspondence is requested with the project coordinate (Neimann sent the coordinates - Omneya called him and he will come to NREA for a detailed meeting when in Cairo).</li> <li>- There are plans to move the quarry areas to the east after the army road. 7 Kms to the east of the road. But this still needs some time to be implemented.</li> <li>- Estimation of the number of workers varies between 250 thousand workers and in other estimations 25 thousand workers (which is more reasonable from his opinion). There are around 600 quarries each employs an average of 50 workers. In addition to indirect job such as transportation and loading.</li> <li>- Most of the quarries in the area prefer to work without licenses since the new law 98/2014 about mining has substantially increased the annual fees they pay. Most of the quarries prefer to work unlicensed and paying fines to them is cheaper from paying the legal fees.</li> <li>- There are two NGOs that worked with the quarry workers and studied their situation: جمعية رعاية وتطوير العاملين بالمحاجر – جمعية وادي النيل</li> <li>- In case of environmental violations, he informs the environment department in the governorate that does not take a serious action.</li> <li>-</li> </ul>	

Signature of Interviewer:

Date: October 5, 2016

No:	7
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Mr. Badr Said
Function of interviewer Person	Head of the Local Government Unit in Abyoha, Abu Qorqas District
Contact Information	Postal address: Telephone: 01003029716 Email:
Subject of Interview	Field visits to villages at East Nile Areas
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- Villages located at the East Nile area that are affiliated to Abyoha Local Government Unit are: <ul style="list-style-type: none"> <li>o Al Matahra Baharya</li> <li>o Nowirat</li> </ul> </li> <li>- There is an industrial area at Al Matahra Bahrya. It has several factories including Crystal Asfour, Petrochemicals, composting and metal refining.</li> <li>- The industrial zone is not as active as it was. Many of the workers lost their jobs which had an impact on increasing unemployment in the village.</li> <li>- New land reclamation activities occur at the ends of the village close to the desert areas.</li> <li>- Population of Al Matahra Baharya: 3700 persons, Nowirat: 3500 persons</li> <li>- Except for the land reclamation and the industrial area there are no future expansion plans in the village towards the eastern desert</li> <li>-</li> </ul>	

Signature of Interviewer:

Date: October 6, 2016

No:	8
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Khalil Mohamed Kamal
Function of interviewer Person	Farmer
Contact Information	Postal address: Telephone: Email:
Subject of Interview	Farmers at Nowirat Village – Land Reclamation
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- Several Farming activities occur at the outskirts of Nowirat and Matahra villages. This farming entails reclamation of desert areas surrounding the villages</li> <li>- Farmers in those areas are able to farm most of the conventional crops such as: Sorghum and trefoil – area is good for cultivation and all types of crops can be grown.</li> <li>- He mentioned that the water quality is very good and is not salty, it is suitable for all types of crops</li> <li>- Water is available at a depth of 40 meters, they extract water using pumps from the well.</li> <li>- They depend on diesel to operate the pumping equipment since electricity is not connected.</li> <li>- The main need of the farmers at newly reclaimed land is to be connected to electricity to operate the water pumping equipment without diesel which is too expensive.</li> <li>- About 1000 persons working in the new reclaimed land. Mainly workers without their families</li> <li>- He has 5 children.</li> </ul>	

Signature of Interviewer:

Date: October 6, 2016

No:	9
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Mr. Mohamed Effat Mr. Sayed Ibrahim Naguib Mr. Mekhymar Fathy Mohamed
Function of interviewer Person	Head of the Local Government Unit in Beni Hassan, Abu Qorqas District Head of Urban planning unit at Abu Qorqas district Head of Antiquities inspectors of Beni Hassan archaeological site
Contact Information	Postal address: Telephone: Mr. Effat: 01280064805 / 01004916660 Email:
Subject of Interview	Field visits to villages at East Nile Areas
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- Affiliated villages located at the East Nile to Beni Hassan Local Government Unit are: <ul style="list-style-type: none"> <li>o Beni Hassan(40,000 persons)</li> <li>o Beni Hassan el Shrouk (22,000 persons)</li> <li>o Naga' el Dek (10,000 perons)</li> <li>o Sheikh Temy</li> <li>o El Arab</li> </ul> </li> <li>- The area has a large archaeological plateau.</li> <li>- It used to receive large numbers of tourists so many were employed in tourism. Currently tourism activities are limited. So there is high unemployment</li> <li>- Average family size is 8 persons (6 children)</li> <li>- Beni Hassan now depends mainly on agriculture</li> <li>- Quarrying activities also attract large number of workers from the villages</li> <li>-</li> </ul>	

Signature of Interviewer:

Date: October 6, 2016

No:	10
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Mr. Mohamed Abdel Awad Hussien
Function of interviewer Person	Head of the Local Government Unit at Tal Beni Omran, Deir Mwas District
Contact Information	Postal address: Telephone: 01006165255 Email:
Subject of Interview	Field visits to villages at East Nile Areas
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- Affiliated villages at the East Nile close to the desert areas: <ul style="list-style-type: none"> <li>o Tel Beni Omran (9087 persons)</li> <li>o Hag Kandeel (6000 persons)</li> <li>o Nasser (1000 persons)</li> <li>o Geziret el Tel (5000 persons)</li> </ul> </li> <li>- The average family size 7 persons.</li> <li>- Tel Beni Omran is an agricultural area. No Quarry activities or industrial activities occur.</li> <li>- There is a large archaeological site in the area</li> <li>- New expansion plans are related to the establishment of the New Tel el Amarna city. The project was submitted to the Cabinet two years ago awaiting a decree (1157 feddans)</li> <li>- New Malawy City</li> <li>- Active NGOs: <ul style="list-style-type: none"> <li>o Community development association at Tel Beni Hassan</li> <li>o Ebad el Rahman NGO</li> </ul> </li> <li>-</li> </ul>	

Signature of Interviewer:

Date: October 6, 2016

No:	11
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Hamada Hassaan
Function of interviewer Person	Farmer
Contact Information	Postal address: Telephone: Email:
Subject of Interview	Field visits to land reclamation activities in the wind area
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- They started reclaiming the land 3 years ago</li> <li>- They work together as a family (only the males are staying in the land) gradually reclaiming the area</li> <li>- Originally their grandfather and family were working in quarry mining then they thought of the opportunity to explore farming in the area.</li> <li>- They are a family of about 50 persons working together.</li> <li>- Water quality is good and they plant different types of crops without problems</li> <li>- They stay on the farm and go home to the village once every month</li> </ul>	

Signature of Interviewer:

Date: October 6, 2016

No:	12
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Safy Mahmoud Senosy
Function of interviewer Person	Farmers
Contact Information	Postal address: Telephone: 01099915275 Email:
Subject of Interview	Land reclamation area along Beni Suef / Assuit Desert road (Old desert road)
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- The farm started about 3 years ago – it's total area is about 70 feddans. Not all of the land is reclaimed yet. They are reclaiming the area gradually according to the available resources</li> <li>- They dug a well for pumping water about 140 meters – 200 meters depth of the well</li> <li>- The owner of the farm is lieutenant General Yasser.</li> <li>- Workers in those farms do not live with their families. They work in the farm and families stay in the home village. He has 7 children</li> <li>- Usually people purchase the land from one person (Sayed Ba'gar) then they reclaim the land and reconciliation with the government and pay necessary fees to own the land legally.</li> <li>- All types of crops are growing well in the area. The water is not salty. They plant Malt, Wheat and Fenugreek</li> </ul>	

Signature of Interviewer:

Date: October 7, 2016

No:	13
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Hany Aby Mohamed Aly Hamam
Function of interviewer Person	Farmers
Contact Information	Postal address: Telephone: 0100 7390343 01010601011 Email:
Subject of Interview	Land reclamation area along Beni Suef / Assuit Desert road (Old desert road)
Information / Option received:	
<ul style="list-style-type: none"> <li>- Usually people purchase the land from one person (Sayed Ba'gar) then they reclaim the land. After farming for several years the owners reconcile with the local authority and pay certain fines to own the land legally (after proving they have been farming for several years).</li> <li>- Crops are all growing very well. The water is not salty. Malt, Wheat and Fenugreek</li> <li>- There are many investors along the old road including companies.</li> <li>- They pay electricity fees (16000 LE/ 3 months)</li> <li>- Average price for feddan between 7000 – 8000 LE uncultivated and about 15000 LE cultivated</li> <li>- Usually 2-3 persons work on full time basis at the farm in addition to seasonal labourers</li> <li>- The solar project is important to create job opportunities at the area</li> <li>- They heard of another electricity project in the area (Chinese project)</li> </ul>	

Signature of Interviewer:

Date: October 7, 2016

No:	14
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Mr. Sayed Ba'gar
Function of interviewer Person	Land dealer at Beni Suef / Assuit Desert road (Old desert road)
Contact Information	Postal address: Telephone: 01001880513 Email:
Subject of Interview	Land reclamation area along Beni Suef / Assuit Desert road (Old desert road)
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- Mr. Ba'gar was identified by all stakeholders (including governmental sources) to be coordinating the illegal land reclamation activities along the old desert road.</li> <li>- He arranges land deals for the persons who want to reclaim the land in the area.</li> <li>- From his point of view: most of the areas along the old desert road are sold. Many actors have already started using the land including companies. Free plots are located towards the south of the road and along the connection to the new eastern road.</li> <li>- He is ready for cooperation to arrange for land acquisition of the project. The convention is that Bedouins (Arabs) are informal owners of the land. In order to avoid any conflicts with the local population, any land arrangements must include discussion with the Bedouins. He can arrange reaching settlement between the new developments and the existing farming activities</li> <li>- He also mentioned another issue to be taken into consideration. According to prevalent conventions, land owners consider the back of the land their natural potential for extension. The project should take into consideration in the design leaving a minimum of 1.5 kms behind the existing farms. Ideally leave between 3-4 kms to avoid conflict with current land owners.</li> <li>- It is recommended to carry further consultation with this stakeholder during planning of the project areas. Mutual deals can be reached such as providing security services or employment of some Bedouins in return of their efforts.</li> </ul>	

Signature of Interviewer:

Date: October 7, 2016

No:	15
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	- Mr. Mohamed Abdallah - Mr. Rafik Costandi - Ms. Angela Hoffman
Function of interviewer Person	Sekem Farm - Wadi el Afareet - Farm operator - Sekem school social officer - Bio dynamic farming specialist
Contact Information	Postal address: Telephone: 0122 3999161 Email: rafik.costandi@sekem.com Angela.hoffman@sekem.com
Subject of Interview	Sekem Farm activities
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- The farm started in this area about 9 years ago since 2009</li> <li>- They farm leek, dill, parsley, cilantro in addition to aromatic and pharmaceutical plants.</li> <li>- The length of the farm (in the wadi) is 18 kms, with a width of 250 meters at maximum.</li> <li>- Reclaimed areas are about 6 kms from the beginning the remaining is not reclaimed yet. 120 feddans are productive, 316 feddans prepared for farming out of the total area 1000 feddans.</li> <li>- The farm includes also a small guest house and housing area for workers.</li> <li>- Water is found at depth of 140 m and its surface about 96 meters. The water allows planting any types of crops.</li> <li>- They employ 19 permanent workers and 30 seasonal workers</li> <li>- The most important problem they face is electricity supply. Diesel is too expensive and it is also very expensive to connect to the electricity grid.</li> <li>- They plan to install a solar system to operate the water pumps.</li> <li>- They pay security fees to the Bedouins (about 3500-3800 LE/month)</li> <li>- They also paid the Bedouins when they bought the land originally</li> <li>- The farm suffered severe damages during the storm rain in 2011 and they planted higher trees to protect the land and built two drains to avoid similar damages in the future.</li> <li>- A buffer zone is needed between other development activities about 100 meters to protect the plants (to be organic certified).</li> </ul>	

Signature of Interviewer:

Date: October 7, 2016

No:	16
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Hisham Abdel Kawy
Function of interviewer Person	Head of the local government unit of Zawyet Zultan Basha, Minia District
Contact Information	Postal address: Telephone: 01150106292 Email:
Subject of Interview	Field visits to villages at East Nile Areas
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- Zawya el Baharia</li> <li>- Zawya el Qeblya</li> <li>- Archaeological sites exist along the mountain, there are also illegal house encroachments at the archaeological areas</li> <li>- Artisan area in Zawya Baharia</li> <li>- The main socio-economic activities are quarry mining (40% of village workforce) and agriculture (40% of village workforce). The remaining work in handicrafts</li> <li>- Total population of Zawya is 16000 persons</li> </ul>	

Signature of Interviewer:

Date: October 8, 2016

No:	17
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Essam Zaki Younan
Function of interviewer Person	Mine owner
Contact Information	Postal address: Telephone: Email:
Subject of Interview	
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- Quarry mining is a big industry in the area and several mines exist (he mentioned 3000 mines but this is substantially higher than governmental estimations that indicate 600 mines)</li> <li>- He mentioned that they do not prefer to apply for formal permit since they will have to pay very high fees for the government.</li> <li>- Each mine employs at least 30-35 workers in cutting and extracting bricks in addition to indirect activities related to loading and transportation.</li> <li>- From his point of view there is no potential in exploring quarry mining in the areas of the project. The ore mainly exist at the areas near new Menia and the army road but other mines do not have much potential.</li> <li>-</li> </ul>	

Signature of Interviewer:

Date: October 7, 2016

No:	18
Name of Interviewer	Tony Moens De Hasse Omneya Nour Eddin
Full Name of interviewed Person	Magdy Shehata
Function of interviewer Person	Head of agriculture sector of Zawyet Zultan Basha, Minia District
Contact Information	Postal address: Telephone: Email:
Subject of Interview	Field visits to villages at East Nile Areas
<p>Information / Option received:</p> <ul style="list-style-type: none"> <li>- About 40% of the population of Zawya work in agriculture</li> <li>- about 2-3 workers are employed in each feddan of the old agriculture land</li> <li>- The main problems facing farmers are: <ul style="list-style-type: none"> <li>o The deteriorated revenue of farming after selling the crops.</li> <li>o Small tenures do not allow mechanization (very difficult to invest)</li> <li>o Spread of pests in some crops may cause disasters for farmers</li> <li>o Fertilizers may not be available at some times (this year the situation is better).</li> <li>o Encroachments on cultivated land that led to rapid shrinking of the fertile land</li> </ul> </li> <li>- Land reclamation requires more labourers in addition to more capital investment at the beginning to dig a well and turn the land into a productive state.</li> <li>- Mostly owners of the new reclaimed areas are from the surrounding villages</li> <li>- The new land needs about 10 workers per feddan (2-3 permanent workers in addition to seasonal workers)</li> <li>-</li> <li>-</li> </ul>	

Signature of Interviewer:

Date: October 8, 2016

Contacted stakeholders by phone:

Mr. Ismail el Faham	Head of Minia District	01001971326
Mr. Hisham Fayez	Head of Abu Qorqas District	01060925583
Mr. Ibrahim el Araby	Head of Malawy District	01282023377 01099154065
Mr. Aly Makboul	Head of Deir Mwas District	01003382513
Mr. Mostafa Abdalla	Head of Social Solidarity Directorate	01004229662

-

#### **10.4 Annex D: Official Communication between NREA and Regional Governorates**

#### 10.4.1 Annex D1: List of communication between NREA and the Governorates

No.	Letter Rev. (if available)	Date of letter	Subject	Sender	Recipient	Content	Comment
1		04.07.2016	Scoping meeting	NREA	El Minya Governorate	Invitation to scoping meeting	Invitation letter submitted via Fax
2		04.07.2016	Scoping meeting	NREA	Assiut Governorate	Invitation to scoping meeting	Invitation letter submitted via Fax
3		11.07.2016	Scoping meeting	El Minya Governorate	NREA	Governorate asks NREA to postpone the meeting from 12 July to 19 July	
4			Scoping meeting	NREA	El Minya Governorate	NREA informs El Minya Governorate that it is not possible to postpone the scoping meeting	
5		12.07.2016	Scoping meeting			Scoping Meeting at NREA office	no Governorate present
6		30.10.2016	Data collection	NREA	El Minya Governorate	NREA informs El Minya Governorate that on 31 October, the Consultant will visit the Governorate for collecting the data.	
7		04.10.2016 / 31.10.2016	N/A			Consultant visits El Minya Governorate	Consultant visits El Minya Governorate and explained the project and received some data unofficially.

No.	Letter Rev. (if available)	Date of letter	Subject	Sender	Recipient	Content	Comment
8		07.11.2017	N/A	N/A	N/A	Consultant visits Assiut Governorate	The Planning Department, the Information and Studies Department and the Environmental Department indicated their willingness to support the JV LI/ecoda in carrying out the SESA Study, i.e. by providing required data.
9			Data collection	NREA	El Minya Governorate	<p>NREA asks El Minya Governorate for support in collecting statistic data and information, in particular on:</p> <ul style="list-style-type: none"> <li>- The population in surrounding areas of the Project.</li> <li>- Activities and projects to be established in the areas surrounding the Project in the future.</li> <li>- The compatibility of the infrastructure.</li> </ul> <p>Furthermore, in the referred letter dated 23 March 2017, it is probably announced that the Consultant will visit the Governorate during the period 26-28.03.2017.</p>	A few days before the planned visit, the Consultant's local coordinator and NREA jointly called El Minya Governorate to confirm the visit. During this call, El Minya Governorate informed that a visit is not required and they will send an official letter (see item 10)

No.	Letter Rev. (if available)	Date of letter	Subject	Sender	Recipient	Content	Comment
10			Data collection	El Minya Governorate	NREA	<p>El Minya Governorate informed NREA that the Consultant has not visited the Governorate as mentioned by NREA (which is not in line with the agreements of the phone call mentioned under item 9) and that the Governorate is preparing the required data, provided that:</p> <ul style="list-style-type: none"> <li>- A copy in Arabic of the contract between New and Renewable Energy Authority and the above-mentioned consulting office.</li> <li>- A copy in Arabic of the protocol with the European Bank for Re-construction and Development (EBRD) to carry out this project is provided to the Governorate.</li> </ul>	On basis of this request, it is assumed that the data procurement has not been further followed up by NREA

JV



**10.4.2 Annex D2: Letters**



## يد الاستاذ/ سكرتير عام - محافظ المنيا

تحية طيبة وبعد...

في البداية يسعدني أن أتقدم لسيادتكم بخالص التقدير على دعمكم لمشروعات هيئة الطاقة الجديدة والمتجددة.

أشرف بإحاطة سيادتكم بان الهيئة تقوم حاليا بإعداد الدراسة الاستراتيجية لتقييم الأثر البيئي والاجتماعي لإنشاء مشروعات طاقة متجددة لإنتاج كهرباء من طاقة الرياح والطاقة الشمسية وذلك على مساحة ٢٢٠٠ كم<sup>٢</sup> بمنطقة شرق النيل (بنى سويف - المنيا - اسيوط) والممولة بمنحة لا ترد من البنك الاوروبى لاعادة الاعمار والتنمية EBRD، والمخصصة بقرار السيد رئيس الجمهورية رقم ١١٦ لسنة ٢٠١٦.

والحاقاً بخطابنا الى سيادتكم المؤرخ ٢٣ مارس ٢٠١٧ بشأن زيارة استشاري المشروع المكتب الاستشاري لاماير الالمانى خيراؤه المكلفين باعداد هذه الدراسة لديوان عام المحافظة لتوضيح فكرة المشروع وايضا لادماج خطط التنمية الخاصة بالمحافظة ضمن الدراسة الاستراتيجية للمنطقة (مرفق صورة) ، وقد طلب الاستشاري موافاته ببعض البيانات المطلوبة لإستكمال هذه الدراسة حيث ان من اهداف الدراسة الاستراتيجية ما يلي :

١. تحديد وتقييم الآثار البيئية والاجتماعية المحتملة المرتبطة بتطوير وتشغيل مشاريع الطاقة المتجددة في منطقة المشروع وتحديد تدابير التخفيف ومعالجة الآثار المحتملة بما في ذلك توصيات بشأن تصميم المشروع.
٢. عرض نتائج الدراسات على المجتمع المحلى للاستفادة بارائهم فى خطط انشاء هذه المشروعات وكذلك خطط تطوير منطقة المشروع حيث سوف يتم اقامة اجتماع يحضره جميع المهتمين بالمشروع لعرض الدراسة .

وحيث أن دراسة الأثر الاجتماعي للمشروع تتضمن دراسة اثره على خفض نسب البطالة وكذلك اثر المشروع على رفع الكفاءات الفنية للعاملين بالمحافظة عن طريق التدريب المتخصص.  
لذا فقد رأيت الكتابة لسيادتكم لإضافة مزيد من دعمكم لمشروعات الطاقة المتجددة، والتكرم بالتنبيه نحو توفير بيانات استشاري لاماير تساعده فى إعداد الدراسة بصورة جيدة تقبلها وزارة البيئة وكذلك الجهات الدولية التي سوف تقوم بالاستثمار فى انشاء مثل هذه المشروعات وهى :

- عدد السكان بالمناطق المحيطة بمنطقة المشروع.
- الانشطة والمشروعات التي سوف تقوم بالمناطق المحيطة مستقبلاً.
- مدى توفر المرافق بمنطقة المشروع من عدمه.

وتفضلوا بقبول فائق الاحترام،،،

نائب الرئيس التنفيذي

للدراستات والبحوث والشئون الفنية

دكتور مهندس / محمد مصطفى الخياط  
٢٠١٧



خطاب  
كياتي  
لسيادتك

من  
سما  
كامل  
بجانب  
الاسم

سعر الوحدات يعول على سعر الوحدة ، ويؤخذ بالسعر المبين بالتفقيط فى حالة وجود اختلاف بينه وبين السعر المبين بالأرقام .

وتكون نتيجة هذه المراجعة هى الأساس الذى يعول عليه فى تحديد سعر العطاء .  
وتجرى عملية تفريغ العروض المالية وفقاً للشروط والضوابط المنصوص عليها بهذه اللائحة بالنسبة لتفريغ العروض الفنية .

بمراعاة ما تقضى به أحكام المادة ١٦ من قانون تنظيم المناقصات والمزايدات تتولى لجنة البت إجراء المفاضلة والمقارنة بين العروض بعد توحيد أسس المقارنة من جميع النواحي الفنية والمالية - مع الأخذ فى الاعتبار شروط توفير الضمان والصيانة وقطع الغيار ومستلزمات التشغيل وشروط السداد والتسليم وغيرها من العناصر التى تؤثر فى تحديد القيمة المقارنة للعطاءات بحسب ظروف وطبيعة موضوع التعاقد .

وإذا تضمنت شروط الطرح تقييم العروض بنظام النقاط ، فيتم ترتيب أولوية العطاءات بقسمة القيمة المالية المقارنة لكل عطاء على مجموع النقاط الفنية الحاصل عليها .

وترفع لجنة البت محضراً بإجراءاتها وتوصياتها للسلطة المختصة لتقرير ما تراه .

تلغى المناقصة قبل البت فيها بقرار مسبب من السلطة المختصة إذا استغنى عنها نهائياً أو إذا اقتضت المصلحة العامة ذلك .

ويجوز إلغاء المناقصة فى أى من الحالات الآتية :

( أ ) إذا لم يقدم سوى عطاء وحيد أو لم يبق بعد العطاءات المستبعدة إلا عطاء واحد .

( ب ) إذا اقترنت العطاءات كلها أو أغلبها بتحفظات .

( ج ) إذا كانت قيمة العطاء الأقل تزيد على القيمة التقديرية .



يكلف مدير إدارة المشتريات موظفاً أو أكثر تحت إشرافه بتفريغ العروض الفنية على الاستمارة المعدة لذلك من ثلاث صور وعليه أن يعيد إيداعها فى آخر كل يوم فى الخزانة المقفلة حين الانتهاء من التفريغ وتدوين جميع ملاحظات واشتراطات مقدمى العروض ويجب أن تتم هذه العملية فى أقل وقت ممكن حتى يتسنى البت فى المناقصة قبل انقضاء مدة سريان العطاءات وتعمل مطابقة للعروض على كشف التفريغ من اثنين من المراجعين وتوقع بما يفيد هذه المطابقة ثم تقدم إلى لجنة البت .

يكون تشكيل لجان البت بقرار من السلطة المختصة برئاسة موظف مسئول وعضوية عناصر فنية ومالية وقانونية وفق أهمية وطبيعة التعاقد .  
ويجب أن يشترك فى عضوية لجنة البت من تنديه وزارة المالية لذلك وعضو من إدارة الفتوى المختصة بمجلس الدولة يندبه رئيسها وذلك فى الحدود المنصوص عليها بقانون تنظيم المناقصات والمزايدات .

تتولى لجنة البت دراسة العروض الفنية للتحقق من مطابقتها للمواصفات والشروط الصريحة على أساسها المناقصة ، وللجنة أن تشكل من بين أعضائها أو غيرهم من أهل الخبرة لجاناً فنية لدراسة العروض ورفع تقرير بنتائج الدراسة إلى لجنة البت .  
وللجنة أن تستوفى من مقدمى العروض ما تراه من بيانات ومستندات واستيضاح ما غمض من أمور فنية بما يعينها فى إجراء عملية التقييم الفنى الدقيق للعروض وذلك دون الإخلال بتكافؤ الفرص والمساواة بين مقدمى العروض .  
وعلى اللجنة أن تبين بالتفصيل الكافى أوجه النقص والمخالفة للشروط والمواصفات فى العطاءات التى تسفر الدراسة عن عدم قبولها فنياً .

محافظة المنيا  
مكتب خدمة المستثمرين

٢٣١٥٠  
٢٠١٧/٥/١٩

السيد الدكتور مهندس / محمد مصطفى الخياط  
نائب رئيس هيئة تنمية واستخدام الطاقة الجديدة والمتجددة  
بوزارة الكهرباء والطاقة المتجددة .  
تحية طيبة وبعد ...

بالإشارة الي كتاب سيادتكم المؤرخ ٢٧/٤/٢٠١٧ بشأن طلب توفير البيانات المطلوبة لخبراء  
المكتب الاستشاري ( لاماير الالماني ) لاعداد الدراسات الخاصة بإنشاء محطات رياح  
ومحطات طاقة شمسية علي مساحة ٢٢٠٠ كم٢ بمنطقة شرق النيل ( بني سويف - المنيا -  
اسيوط ) .

نتشرف بالاحاطه بما يلي :-

اولا :- سبق ان ورد للمحافظة كتاب سيادتكم المؤرخ ٢٣/٣/٢٠١٧ برغبة خبراء هذا  
المكتب في زيارة محافظة المنيا في الفتره من ٢٦-٢٨/٣/٢٠١٧ لمقابلة المسؤولين  
عن الانشطه والدراسات الخاصه بهذا المشروع . الا انه لم تتم هذه الزيارة في الموعد  
المحدد ولم يرد من سيادتكم ما يفيد الاعتذار عن عدم الحضور ومبررات ذلك .

ثانيا :- يجري حاليا اعداد البيانات المطلوبة واتخاذ الاجراءات اللازمه في هذا الشأن  
وسيتم اخطار سيادتكم بنتيجة الدراسة فور الانتهاء منها .

مع رجاء موافاتنا بما يلي :-

١ - صورة ( باللغة العربية ) من التعاقد المبرم بين الهيئة والمكتب الاستشاري المذكور  
لاعداد الدراسات المطلوبه .

٢ - صورة ( باللغة العربية ) من البروتوكول الموقع مع البنك الدولي لاعادة الاعمار  
والتنمية EBRD لتنفيذ هذه المشروعات بمنحة لا ترد .

وتفضلوا سيادتكم بقبول فائق الاحترام والتقدير ...

رجاء المتابعة مع الاستشاري والاستمرار في توفير البيانات المطلوبة

المهندس محمد مصطفى الخياط  
نائب رئيس هيئة تنمية واستخدام الطاقة الجديدة والمتجددة

السكرتير العام  
30-5-2017

( نبيل عبد الرحمن منصور )

السيد / محمد مصطفى الخياط  
نائب رئيس هيئة تنمية واستخدام الطاقة الجديدة والمتجددة

السيد / محمد مصطفى الخياط  
نائب رئيس هيئة تنمية واستخدام الطاقة الجديدة والمتجددة

السيد / محمد مصطفى الخياط  
نائب رئيس هيئة تنمية واستخدام الطاقة الجديدة والمتجددة

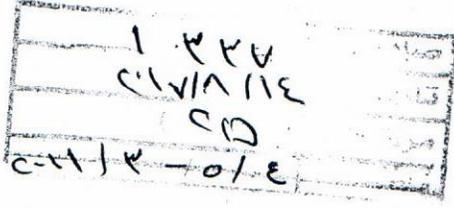
إذا اختلف أعضاء لجنة البت فى الرأى حول قبول أو رفض أى من العطاءات فيتم إثبات ذلك فى محضر اللجنة ويكون الفصل فيه للسلطة المختصة وفى حالة الاختلاف فى الرأى مع العضو الفنى فيجوز لرئيس اللجنة أن يطلب عضواً آخر للانضمام إلى العضو الأول للاسترشاد برأيه فإذا اتفق رأيهما يؤخذ به وإن اختلفا يعرض الأمر على رئاستهما لترجيح أحد الرأيين .

وترفع لجنة البت محضراً بتوصياتها موقِعاً من جميع أعضائها ومن رئيسها للسلطة المختصة لتقرير ما تراه .

بعد اعتماد توصيات لجنة البت من السلطة المختصة تتولى إدارة المشتريات إخطار مقدمى العروض المقبولة فنياً بموعد ومكان انعقاد لجنة فتح المظارف المالية - السابق تقديمها منهم - ليتسنى حضورهم أو مندوبيهم أعمال اللجنة .  
ويجب مراعاة انقضاء سبعة أيام عمل على الأقل بين تاريخ إعلان أسباب القرارات الخاصة بقبول أو استبعاد العروض الفنية فى لوحة الإعلانات المخصصة لهذا الغرض وبين تاريخ إرسال الإخطارات الخاصة بموعد فتح المظارف المالية .

تجتمع لجنة فتح المظارف بذات تشكيلها السابق فى الموعد والمكان المحددين لفتح المظارف المالية وتتولى اللجنة مباشرة ذات الإجراءات المنصوص عليها بهذه اللائحة بشأن فتح المظارف الفنية بعد التحقق من سلامة المظارف المالية ووجود رقم العطاء وتوقيع أعضاء اللجنة السابق إثباته على كل مظروف بجلسة فتح المظارف الفنية .

يكلف موظف مسئول أو أكثر بمراجعة العروض المالية قبل تفرغها مراجعة حسابية تفصيلية والتوقيع عليها بما يفيد هذه المراجعة وإذا وجد اختلاف بين سعر الوحدة وإجمالى



السيد اللواء / ماجد عبد الكريم

السكرتير العام لمحافظة أسيوط

تحية طيبة... وبعد ...

بالإشارة الى الدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعى لمساحة ٢٢٠٠ كم<sup>٢</sup> بمنطقة شرق النيل والممولة بمنحة لا ترد من البنك الاوروبى لاعادة الاعمار والتنمية EBRD .

أتشرف باحاطة سيادتكم بأن الهيئة بصدد الاعداد لجلسة المشاورة الجماهيرية للمشروع لعرض نتائج الدراسة والحصول على التعليقات عليها حتى يتسنى الانتهاء من النسخة النهائية للدراسة وارسالها الى جهاز شئون البيئة للحصول على الموافقة البيئية ، وفى هذا الاطار نود التذكير بنتائج جلسة المشاورة الاولى ( مرفق لسيادتكم طيه نسخة من التقرير وكذلك ملخص باللغة العربية).

رجاء التفضل بموافاة الهيئة بأية تعليقات او اضافات ترغبون سيادتكم فى اخذها فى الاعتبار قبل عقد جلسة المشاورة الجماهيرية النهائية للدراسة.

وتفضلوا بقبول فائق الاحترام،،،،

الرئيس التنفيذي

دكتور مهندس / محمد مصطفى الخياط

خالص  
كياتى ٩

13-8-2017

مرفق (CD)

مينا  
٢٠١٤/٧/٢٠





١٢٣٥	صان
٢٠١٧/٨/١٤	تاريخ
٥٥	مرفقات
٥١٤-١١/٣	رقم

السيد الأستاذ / يسرى عبد المنعم عبد الرحمن

السكرتير العام لمحافظة بنى سويف

تحية طيبة... وبعد...،،،

بالإشارة الى الدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعى لمساحة ٢٢٠٠ كم<sup>٢</sup> بمنطقة شرق النيل والممولة بمنحة لا ترد من البنك الاوروبى لاعادة الاعمار والتنمية EBRD.

أتشرف باحاطة سيادتكم بأن الهيئة بصدد الاعداد لجلسة المشاورة الجماهيرية للمشروع لعرض نتائج الدراسة والحصول على التعليقات عليها حتى يتسنى الانتهاء من النسخة النهائية للدراسة وارسالها الى جهاز شئون البيئة للحصول على الموافقة البيئية ، وفى هذا الاطار نود التذكير بنتائج جلسة المشاورة الاولى ( مرفق لسيادتكم طيه نسخة من التقرير وكذلك ملخص باللغة العربية).

رجاء التفضل بموافاة الهيئة بأية تعليقات او اضافات ترغبون سيادتكم فى اخذها فى الاعتبار قبل عقد جلسة المشاورة الجماهيرية النهائية للدراسة.

وتفضلوا بقبول فائق الاحترام...،،،

الرئيس التنفيذي

دكتور مهندس / محمد مصطفى الخياط

خالص  
تحية

13-8-2017

- مرفق (CD)

من  
٢٠١٧/٨/١٤



محافظة المنيا

مكتب السكرتير العام المساعد

السيد دكتور مهندس / محمد صلاح السبكي

الرئيس التنفيذي - هيئة تنمية واستخدام الطاقة الجديدة والمتجددة

تحية طيبة وبعد ...

بالإشارة إلى كتاب سيادتكم رقم (١١٢٤) المؤرخ في ٢٠١٦/٦/٢٨ بشأن عقد جلسة المشورة الجماهيرية الأولى الخاصة بالدراسة الإستراتيجية لتقييم الأثر البيئي والاجتماعي لمساحة ٢٢٠٠ كم<sup>٢</sup> والمخصصة للهيئة بمنطقة شرق النيل لإنشاء مشروعات توليد الكهرباء من مصادر الطاقة المتجددة (الخلايا الشمسية الفوتوفلطية و طاقة الرياح) وذلك يوم الثلاثاء الموافق ١٢ يوليو ٢٠١٦ الساعة ١٠،٠٠ صباحا بمقر الهيئة ودعوة عدد (١٠) أعضاء من المحافظة لحضور هذه الجلسة.

نتشرف بالإحاطة بأن المحافظة تطلب تأجيل عقد هذه الجلسة إلى يوم الثلاثاء من الأسبوع التالي الموافق ١٩ يوليو ٢٠١٦ وذلك لاعتذار بعض السادة المدعوين عن الحضور نظرا لالتزامات طارئة.

برجاء التفضل بالإحاطة .

وتفضلوا سيادتكم بقبول وافر الاحترام ...

السكرتير العام المساعد

محمد عبد الفتاح آدم

٢٠١٦/٧/١١

وارد رئيس قطاع بحوث  
مدير عام المختبرات  
مدير عام المكتبة الحيوية  
مدير عام الدراسات  
المستقبلية

١٦٤٠  
٢٠١٦/٧/١٢

تسليم بالنظر والإفاد  
الرد مقضاهم باءاد في ١١  
١٦/٧/١٢

٢٩٠٧
٢٠١٦/٧/١١
القلم المالي والإداري
القلم المشروعات والتشغيل
القلم الفني
الإدارة العامة للمعلومات
الإدارة العامة للتدريب
الإدارة العامة للعلاقات الخارجية
الإدارة العامة للتخطيط
القلمية

محمد عبد الفتاح آدم

٢٠١٦/٧/١١

محمد عبد الفتاح آدم

٢٠١٦/٧/١١

## 10.5 Annex E: Public Hearing Report

# Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

## Final Public Hearing Report

**Horus Tourism Resort**  
**Cornich El-Nile, El-Minya, Egypt**  
*Thursday, 28<sup>th</sup> June 2018*



September 2018

# Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

## Final Public Hearing Report

### Prepared for:

New and Renewable Energy Authority (NREA), Egypt

Attn: Eng. Nefesa Hassan

Copy: Eng. Hala, Eng. Asmaa

J. Lea-Cox (EBRD), Y. Deghedi (EBRD)

### Prepared by:

JV Lahmeyer International GmbH & ecoda Environmental Consultants

c/o Lahmeyer International GmbH

Friedberger Str. 173

61118 Bad Vilbel

Germany

Report Status: Approved

### Revision History:

Revision	Date	Author	Checked by	Approved by	Description
00	21.09.2018	Dr. Maher Azis	Dr. Frank Bergen Matthias Drosch	Matthias Drosch Dr. Frank Bergen	Draft Report
01	26.09.2018	Dr. Maher Azis	Dr. Frank Bergen Matthias Drosch	Matthias Drosch Dr. Frank Bergen	Final Report - Adding Arabic translation

## Table of Contents

<b>1</b>	<b>General</b> .....	<b>1</b>
1.1	Introduction .....	1
1.2	Public Hearing – Objectives and Approach .....	1
<b>2</b>	<b>Introductory Statement</b> .....	<b>5</b>
<b>3</b>	<b>Key comments / questions during the open discussion</b> .....	<b>6</b>
<b>4</b>	<b>Arabic Summary</b> .....	<b>17</b>
<b>6</b>	<b>Annex</b> .....	<b>20</b>
6.1	Annex A: Public Hearing Advertisement in Al-Akhbar on Monday, 4 <sup>th</sup> June 2018.....	20
6.2	Annex B: Official Invitation Letters.....	22
6.3	Annex C: Official Invited Stakeholders by NREA.....	24
6.4	Annex D: Lists of Participants .....	27
6.5	Annex E: Public Hearing Agenda .....	33
6.6	Annex F: Notes and Comments by the Attendees .....	34
6.7	Annex G: Selected Photos .....	44
6.8	Annex H: Copy of the Delivered Presentations (on separate USB Stick) .....	47

List of Figures

Figure 1-1: Presentation of the SESA Study Findings by Dr. Maher Aziz .....3  
Figure 1-2: Dr. Aziz answers questions of the Audience .....3

## **1 General**

### **1.1 Introduction**

A Strategic Environmental and Social Impact Assessment (SESA) for the development of renewable energy (RE) projects in a 1,725 km<sup>2</sup> area (2,200 km<sup>2</sup> during the proposal stage and before modification of the area by the Government of Egypt –GoE) located to the east of the Nile River in Egypt across the three Governorates Beni Suef, El Minya and Assiut has been carried out by the Joint Venture of Lahmeyer International and ecoda Environmental Consultants on behalf of the New Renewable Energy Authority (NREA) in Egypt.

Following the issuance of the Renewable Energy (RE) Feed-in Tariff (FiT) presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (EBRD) has been engaged in partnership with the Government of Egypt (GoE) to identify a portfolio of RE projects (from wind and solar sources) to be financed by prequalified Foreign Direct Investors (FDIs). It is expected that each project will be of 50 MW capacity.

The GoE has identified three large areas suitable for development of RE mega farms for both wind and solar projects under the newly issued FiT law including a 1,725 km<sup>2</sup> area (East Wind-1 and East Wind-2 area with building height limit of 150 m and three East Solar areas with building height limit of 5 m) located to the east of the Nile River (the "Project Area"). These areas were identified by the GoE based on existing data on solar and wind potential and existing land use. To ensure a strategic level assessment of the potential environmental and social issues associated with the development of RE projects in this area, and to inform the decision-making process for project development, the GoE, together with the NREA, have assigned a Strategic Environmental and Social Assessment (SESA) Study for the Project Area. A SESA is a systematic decision-support process that helps to ensure that environmental, social and other sustainability aspects are considered effectively in policy, plan and programme making. The SESA has been financed by the EBRD.

### **1.2 Public Hearing – Objectives and Approach**

As part of the EEAA public consultation and disclosure requirements, the New and Renewable Energy Authority (NREA) (or their consultants) must consult and involve primary and secondary stakeholders in the planning, development, construction and operation of wind energy and solar PV power plants in the East Nile Region. This includes the requirement to hold a public consultation meeting to inform all interested parties about the main conclusions of the SESA and to receive their feedback and concerns..

The public consultation meeting (public hearing) for wind energy and solar PV projects with a total capacity around 9,600 MW (2,000 MW wind farms and 7,600 MW solar PV farms) which are located in an area of about 1,725 km<sup>2</sup> in the East Nile Region across the three governorates of Beni Suef, El Minya and Assiut was held in El Minya City on Thursday, 28<sup>th</sup> June 2018. This report details the proceedings of the meeting, including the presentations and the main content and conclusions made in the question and answer session.

The methodology adopted for the preparation and disclosure of the SESA Study was participatory and involving for the various groups of stakeholders. The views and consultations of stakeholders not only added value to the findings but also increased the sense of stakeholders' ownership to the project and involved awareness raising and capacity building for local stakeholders on technical issues of relevance to the project.

To obtain comments from the stakeholders on the drafted SESA, the Consultant arranged a Public Hearing after the preparation of the Draft SESA Reports. The Public Hearing event has been held at Horus Tourism Resort, Cornich El-Nile, El Minya, in El Minya Governorate, Egypt. The event had the primary interest of engaging wider range of relevant stakeholders and disclosing the SESA preliminary results including identified impacts and proposed mitigation measures and allowing all stakeholders the opportunity to comment on the Draft SESA Reports. The participants' feedbacks were meant to inform the final version of the SESA Reports through full consideration and incorporation of the relevant comments.

The Public Hearing invitation was publicly announced in Al-Akhbar national newspaper in Arabic on Monday, 4<sup>th</sup> June 2018 (scanned copy of the announcement is attached in Section 6.1 Annex A). This announcement contained a reference to the website of NREA and EBRD for downloading an Arabic and an English version of the Non-Technical Summary of the Draft SESA Reports and the draft Final Recommendation Report. In addition, personal invitations have been distributed to key stakeholders along with Non-Technical Summary of the Draft SESA Reports and Final Recommendation Report. Parts of the invitations have been circulated by NREA, while other parts have been circulated by the SESA Consultant. As per the requirements of EEAA, the list of proposed participants in the Public Hearing included various categories of relevance to the projects.

Arabic and English registration forms were prepared and used during the Public Hearing for documenting the lists of participants. Section 6.4 Annex D includes the translated lists of participants and the scanned registration forms of the Public Hearing. A total of around 35 participants of various affiliations participated in the Public Hearing. The stakeholders who participated in the event were governmental organizations, non-governmental organizations, media, neighbouring communities of the projects area, private sector organizations as well as consultants.

The Public Hearing was directed by highly responsible leading persons of the main parties involved in the SESA study: Representative of the Project Sponsor (EBRD, James Lea-Cox), the SESA Consultant Mr. Matthias Drosch (Lahmeyer International) and Dr. Frank Bergen (ecoda Environmental Consultants), Representative of the EEAA, Mr. Mohamed Abdullah, and Representative of NREA, Eng. Akmal Mohamed.

The Public Hearing was divided into two main sessions as indicated in the attached Agenda in section 6.5 Annex E. The first session involved the welcome speech by representatives of NREA. This was followed by a comprehensive presentation on the project overview, the applied methodology and the key findings of the SESA study by representative of the SESA Consultant, Dr. Maher Aziz. Another presentation by Dr. Maher Aziz was focussing on the specific findings and recommendations of the study. Copies of the delivered presentations are attached in section 6.8 Annex E.



**Figure 1-1: Presentation of the SESA Study Findings by Dr. Maher Aziz**



**Figure 1-2: Dr. Aziz answers questions of the Audience**

This session was followed by a 30 minutes break that has been followed by an open discussion session where all participants were invited to raise their comments and feedback on the presented information. During this session, the concerned stakeholders from governmental authorities as well as the team of consultants provided replies on the raised issues. In order to ensure efficient documentation for the participants' feedback, several tools have been employed. This included video recording and feedback sheets which have been distributed to participants to keep written records of their comments. The written feedback sheets are attached in section 6.6 Annex F.

Several raised issues have already been included in the Draft SESA Reports. Participants were invited to download and scrutinise the Draft SESA Reports and the Final Recommendation Report which were made available on the NREA'S and EBRD's websites. The other relevant comments and feedback which have been raised were considered - to the extent possible - in the final versions of the SESA Reports.

The following sections present the key issues raised during the Public Hearing event.

## 2 Introductory Statement

### **Eng. Akmal Mohamed– General Director for Studies of NREA and Representative of the Chief Executive Officer (CEO) of NREA**

Eng. Akmal Mohamed welcomed the audience to the meeting and explained the NREA Authority and key principles of NREA when executing electricity generating projects and provided an indication of NREA's operation philosophy.

He said: "On behalf of the Ministry of Electricity and Renewable Energy, I welcome all of you. It is my pleasure to meet with you regarding the presentation of the Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region which focus on the development on various wind farm and solar PV Projects in the East Nile Region of Egypt. The wind and solar PV projects shall be implemented according to scenarios as proposed in the SESA to achieve the highest possible installed capacity and covers the needs of electricity demand in the area and in Egypt on a sustainable way.

Increasing renewable energy share in the energy mix of Egypt requires dedicated effort within the Government and between the Government and national and international investors. Egypt formulated a strategy to have 42 % contribution of renewable energy of the total energy demand by the year 2035.

With good co-operation between Egypt and the international and regional investors, this project will have the opportunity to be a landmark.

We believe that NREA, as part of the Ministry of Electricity and Renewable Energy, will benefit a lot from the study outcomes which will add value to the development of wind and solar PV power projects. It gives me pleasure to confirm that the Governorates of the Beni Suef, El Minya and Assiut are highly appreciating allocating as much as possible of the land eligible for accommodating clean electricity generation by wind and solar PV power and therefore is so much welcoming studies that aim to preserving ecological life and protecting nature assets. Thank you very much for coming and participating with us.

It is our pleasure to have you all with us today and hopefully your opinions, ideas, discussions and contributions will support our proposals and add valuable recommendations to the SESA study outcomes."

### **3 Key comments / questions during the open discussion**

**QUESTION – 1: Prof. Hesham Abbass Kamel –  
Director General of Planning and Follow-up,  
General Secretariat of the Province**

Thank you very much for the presentation from which we greatly gained a lot of knowledge, and we have a couple of questions. Based on the information that has been given here, there is more than a question on the issue as there is a difference between the solar power and the wind power: First, which of them is less or more expensive than the other? And if this cost is less, can the power supply for a house be obtained solely from the solar power plant, and is it sufficient efficient to match lowest tariff? Then why do we have the both different wind and solar powers? Is there no solar power in the wind zone and the opposite? We want the less cost and the biggest return. The second question, we would like to know the financing details of this project and understand how the cycle is turning around.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

The funding of this project is laid upon the private sector as the government will not be contributing in any of its costs. The state does not inject its investments into these projects but is encouraging investment in Egyptian policies under the Electricity Law in 2015 which provides investors with many incentives to invest in the renewable energy. The state has also worked on the ‘tariff of nutrition’, which is the distinctive tariff where the state produces electricity kilowatt hours at 96 piasters per kilowatt hour I produce. That means if I buy from someone else, I cannot buy it for less than what I produce and sell – I buy it for 90 or 96. Then it is bought from a grand investor for 140 piaster, which is 50 piaster more than the cost, with an incentive, and that is in the ‘nutrition tariff encouragement program’ for the sale to the consumer and for the investor’s investment and profit with good returns. So if he says, I produce the kilowatts for 96 piasters, the government would buy it for 140 piasters – also 50 piasters more. That is what the government calls ‘great stimulus’ for foreign investment, and this ‘tariff’ is for home use. That means if I put a solar panel over my house instead of what I pay for the plates, I can sell the country state and gain too. This continues for a limited and specified amount of time and the state is preplanning so that there wouldn’t be any loss to it.

**One of the Audience: And what about the state-controlled loan?**

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

There would be no loan. The investor comes bringing his own money or he comes with the accommodating bank that would finance the project and the government would not bear the finances and for that it’s highly beneficial economically as it wouldn’t pay anything or look for a repossession. This project is laid upon the private sector so it removes a load of finances from upon the state’s shoulders that they may be saved for investments for the development of health, education, social development, industry, and agriculture at the national level according to the principle of ‘you win, we win - I make you win and win with you`.

**As for the Second Part of the Question: Dr. Eng. Maher Aziz – SESA Advisor**

Is it possible to run other projects in the future in the wind farms areas? The distance between each turbine is approximately 350 meters and the distance between the rows is approximately 1 kilometre, which is 1,000 meters and therefore the available spaces can also be used for solar PV. Of course, this can be done but the state in this region has specified that the total area under investigation 2,200 km<sup>2</sup>, resulting in an area of 1,750 km<sup>2</sup> after excluding areas with height restrictions. This area is divided into 5 subareas (3 for the solar power generation and 2 for the wind power generation). Later in the future, new solar power plants can be established within the wind farms areas as a second step in the planning, and it is being planned to establish more solar power plants in the future within the wind power plants but the studies have not yet been exposed to this issue and is until now not concerned with it where the most suitable locations for each technology have been chosen.

Moreover, the solar power plants are still more expensive than wind power but the expenses of the solar power plants decrease much rapidly whence we were in all our expectations so much that since 2018 their expenses are close to the costs for wind power but still higher: the investment per Megawatt installed capacity for wind farms amounts to about 1 million dollars whereas the equivalent costs for solar power ranges between 1.2 to 1.4 million dollars per MW according to the type of technology as the solar power plant technologies have improved. We're speaking of different technologies, but we must use them all because they all decrease in prices and if I open the door for all options and use all applicable variables in power and reduce the power problems in Egypt, then we need to use various sources of power. Also, we have to keep in mind that we would use nuclear power even though it costs almost 4 or 5 times our regular power costs and we must use all the available choices to overcome the current power problem and this is projected to happen in not less than 20 years (with such a plan) on the future depletion of gas. This means that if we don't keep in mind today to utilise power from all sources: wind, solar, nuclear, and coal, we would fall into a dilemma like the one we have fallen in in the years 2010 and 2015.

**QUESTION – 2: Prof. Shehab El-Din –**

**Director of Information and Decision Support Branch in the Province**

**The first question has been answered**

You said that the State would buy from the investor with 50 piasters more than the price of the generation costs. If so, we would get into the story of who would finance such subsidies and the removal of subsidies. Thus, it would be supported by the state, and then the support would be removed from the citizen to make the citizen pay for the power with increasing prices to cover the cost between the investor and the state.

**Second Question:**

We, as a governorate, know of specifying million feddans of land for the wind power stations starting in the West Nile in 2008 and 2009. We have seen neither wind nor solar power plants but we don't have enough information for us as citizens, as political and social leaders to be transparent with the

citizens: is there any timetable for us to understand the current plan for producing such power especially with the nearing of the Renaissance dam problem and the lessening of the Nile river flow?

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

Thank you for your question.

**Eng. Mohammed Akmal - General Director of Environmental Studies,  
New and Renewable Energy Authority (NREA)**

What is currently being done for the power plants is the state's strategic plan whose goal is to reach installed capacity of 7,000 MW by 2020 through wind farms, and we are indeed close to 2020 and what governs the outcome of these projects is funding and the private sector has the bigger role in the funding while the commission's role is to conduct seminars, set the environment, organize the studies and pave the roads. Implementation then takes its course within 20 months after getting the approval of the Project's Environmental Agency. We're preparing the land and the facilities so that there wouldn't be any adjournment and that is through studies to specify the suitable locations to set up the stations so that there wouldn't be any excuse, and these environmental studies are financed by international banks.

**Dr. Eng. Maher Aziz – SESA Advisor**

People are forgetting that Egypt has been through a political disruption for 4 or 5 years and as soon as conditions have settled down, the bidding was set for the investors. Framework conditions in the past have not been suitable. Not a single investor would have come to you while the people had been on top of each other and there had been murders in the streets.

**General Director of Properties in the Province:**

You know the environmental conditions relating to the land and you know that there is a 1.5 million feddans of land specialized for the new and renewable energy commission in Minya in 2009, which has been renewed in 2014 and 2016, these have been under productive agricultural transgressions on the land for 6 years. We would continue to attend hearings, meetings and seminars to hear you and hear the commission and the ministry and there would still be the same environmental problem. How would this land be treated with?

First of all, the ownership value of these lands, 2,200 Km<sup>2</sup> in the East and 4,200 km<sup>2</sup> in the West, is not worth 1% of the total space and no matter how much it increases it would still be very limited. Also, the Power Commission along with the Ministry of Electricity with the Province are dealing with the owners either by mutual consent or compensation.

The Minister of Electricity wants the governor to decide for the removal of 40 thousand feddans in the Western Sahara region.

The ownership problem will be solved: by mutual consent, compensation, by removal, or by any means. In all cases, these lands would be claimed even if by removal.

The ministry and local authorities in the province would claim these lands. As far as my knowledge is limited being a Consultant to the Minister of Electricity, all problems are laid upon the action table

and the 'action' of what we would do with this. The cultivated lands have already been counted and measured in centimetres. All is set and laid under consideration of choosing the most appropriate solutions: here goes mutual consent and there goes removal.

**QUESTION - 3: Dr. Mohammed Moussa –**

**Professor of Science – El Minya University, and Consultant of El Minya Governor**

You have chosen 1.5 Million feddans in the West and 0.5 million in the East. The Western 1.5 million feddans have fallen in a closed basin in which the wind farms have been established. Why on earth is there a chirp named Ghird Abu Mahariq starting from Burj Al Arab until here? There, you are opposite to the directions of the wind and that way you can never get any wind power from it while the 0.5 million Eastern feddans is excellent in the wind power.

**ANSWER: Eng. Ashraf Abdel-Mageed – Consultant Engineer**

I have prepared studies as I have been a Consultant to the commission for 18 years. Today, we are speaking of the East of the Nile and to stay comfortable, we need to be on the West of the Nile. The studies have shown that the regions on the west are not suitable for the wind power stations to be established and some locations have been set for 1,500 MW and 10 wind measurement stations have been installed and afterwards, 3 stations have been stolen – that is what you don't know. We installed the stations and then they get stolen after a month. After theft and trespassing people start cultivating. The winds have been measured in the studies for 2.5 years only. In the end, not all locations now have become suitable as only data for a period of 6 months are available for some sites at the Western Nile.

Political leadership has taken 1.5 million feddans, citizens turned them into an agricultural project.

**Dr. Eng. Maher Aziz – SESA Advisor**

There isn't an investor who would lay any investments in something that is not working.

**Eng. Ashraf Abdel-Mageed – Consultant Engineer**

The Commission has given a letter to the province that they do not want the rest of the land. I myself came to you to show you the decision of the President of the Republic. I will send you a photocopy of this letter so that this West of the Nile story would be closed. We are East of the Nile

**QUESTION – 4: Dr. Mohammed Moussa –**

**Professor of Science – El Minya University, and Consultant of El Minya Governor**

This is a hearing and you are here to hear us. I've been a son of Minya for 35 years, and I have taught as a teaching assistant in the mountain region, obtained my PhD about the East of Nile from Austria. When we discussed things, we all used to reach a correct point of view. When the 1.5 million feddans were brought in the discussion, we used to say that the salinity there is 1,000 and that the land is not suitable for agriculture and they use to think we are country men and did not hear us. In the end, the state wastes millions of pounds and there were no 2 feddans of wind farms out of the 1.5 million feddans.

East of the Nile is good and it is suitable for wind energy and solar energy as the hill's inclination is 260 to 360 meters about the sea level. If we add to that 150 meters, it would be 500 meters above sea level meaning that I am facing the wind coming from the North and a high meeting point for the sun making it suitable for solar energy. That means if I implement a wind farm or a solar power plant in the East it will be okay.

I have advantages in the East and that is the existence of the Assiut reservoir. There is also a line connecting the Aswan reservoir to the Krimat station – a single wire and I would reach the regional network.

Note to this: I have, from South to North, Valley Assiut, Valley Ibrahim, Valley Abu-Fasad, Valley Abu Hatab, Valley Umran Al-Bahr, Valley Al-Qabli, Valley Al-Barshawi, Valley of Worship, Valley Al-Sheikh, Valley Sinor, Valley Ghayada. All these valleys are subject to catastrophic floods every 5 years or 10 years. If we avoid these valleys I can easily get wind energy or solar energy.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

Thank you and the study has indeed indicated that these valleys should be avoided. The environmental studies cannot be done except on the environment.

**QUESTION - 5: Ms. Amany Saleh**

You have to keep in mind that the environmental studies are covering the areas of floods and they include a plan to counter the floods while the irrigation and water resources are being approved.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

The geomorphology and soil are studied and impact prediction is evaluated in chapter 5.2.5 of the project. No risks are expected.

**QUESTION - 6: Eng. Mohammed Abdullah -  
Representative of the EEAA**

Please record all discussions, questions and answers and include them in the study.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

All discussions are recorded and will be included in the study.

**QUESTION - 7: Dr. Mohammed Moussa –  
Professor of Science – El Minya University and Consultant of El Minya Governor**

Here in Minya, we wish from the investors at least one “electricity tower”. We want a change in our activities like Ben Suf: civilization means roads and power. We have roads but still no power. Let us solve the power problem correctly that we may serve the people correctly.

**ANSWER: Eng. Ashraf Abdel-Mageed – Consultant Engineer**

As for the West of the Nile story, I promise you that any valleys and flood reservoirs are included in the design of any plant whether it is a solar power plant or a wind power station to avoid establishing any plant on it.

As for the East of the Nile region, in a letter from the commission that has been there for 6 or 7 months, the lands which would be used for construction have been set and specified.

I was the first to bring you the President’s decision by myself and we had a discussion with your excellencies in 3 or 4 sessions in which we have mentioned our concerns for the transgressions, but no one answered our questions. We have done our part and the professor knows. We met with the General Officer the Governor and we have not been answered. We have sent letters to be supplied with some information in 2016 and they have not been answered. The commission have sent more than one letter: Assiut provided feedback and so did Beni Suf. The only one who did not provided any feedback at all was El Minya. We also collected some information by ourselves. As for the transgressions, any land, whether agriculture or quarries, it has been determined and set.

**Dr. Eng. Maher Aziz – SESA Advisor**

Communication can be pursued with Eng. Akmal to ensure that the letter has arrived to the Province.

**Eng. Akmal Mohamed – General Director for Studies of NREA**

The subject of transgressions is not in your favour or ours.

**Dr. Eng. Maher Aziz – SESA Advisor**

The subject of transgressions requires communication with the Province and communication with the New and Renewable Energy Authority if this letter has reached the Governor but has not reached the Executive administrator, then it must reach him.

**Eng. Ahmed Tolba – New and Renewable Energy**

Commission: There is a court order now for removal.

**Prof. Nada Ashour - Director of the Environment Department in the Province**

The location you have spoken of in the East is constantly under much complaint from the electricity company especially of the quarries dust in it. You've also mentioned that the washing of the solar cells is done by water, but what about the wind towers?

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

This issue is the responsibility of the Egyptian company for electricity transmission. They have a technique called 'cleaning insulators under voltage'. Such technique has specialized cars and work teams. This is done along the line with a fashion that has been long used and so it would be done the same way in an agreement between the investor and the Egyptian company for electricity transmission to use the same techniques and technologies.

**Prof. Nada Ashour - Director of the Environment Department in the Province**

As for the washing of the solar cells with water, is this economically feasible since the water in the Eastern desert is on a large distance: would a well be used? Or would the Nile Water be transported to the site? Has the economics of this been taken into consideration?

**Dr. Eng. Maher Aziz – SESA Advisor**

The investor is the one who would resolve the water transportation issue: from the network or a well. This will be done in cooperation with the Province, and such a strategic plan would be divided into several parts each of which would be specified according to the most suitable. The investor is the one to apply: digging a well or transporting water from the Nile, which has been done before several times in many different projects and sites and it requires the Province to take part in the plan as well as the environmental Executive along with other stakeholders. Our part, the Power Commission, is to develop implementation scenarios and contracts.

**QUESTION – 8: Professor Osama Ali - Citizens Service Office,  
General Secretariat of the Province**

Is it feasible for the investment commission to start bidding in these lands as a real opportunity for investors working in the field of Power?

If you have any proposal, Mr. Governor to the Minister of Electricity, and this is great idea, for these investments to be run through the investment commission. This idea is very important so please don't disregard it.

**ANSWER: Chemist/ Amany Salah –  
Studies & Research Department (NREA)**

Companies that work in the field of New and Renewable Energy are qualified and registered within the power commission. There is also a list of investors inside the commission – not any company working in the field of power has to present its own specific environmental study for the project.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

That is why we call 'communication' with the Ministry of Electricity so that we would recognize how to reach the investor and the legal path for the investor to enter such licensing and qualification because as you have preferred the mechanism of rehabilitating the investor, I ask you gratefully to address the Ministry how to register for people who would come by you.

**QUESTION - 9: Prof. Hesham Abbass Kamel, Director General of Planning and  
Follow-up General Secretariat of the Province**

How would the state buy this power? I fear the matter of support.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

Prof. Amany has just grabbed my attention to such an issue: that the commission has stopped the nutrition tariff as it is the end of the nutrition tariff period and since the time specified for it is over, but do you have any idea that Germany paid for the investors 16 Billion Euros in 2013 to support the implementation of renewable energy projects. Growth of these renewable energy projects will not ensue in any country in the world except through a financial support from governments. We've gone through the tariff until the projects stabilized. The tariff order came out for only a period.

**Eng. Ashraf Abdel-Mageed – Consultant Engineer**

So in most large chip projects such as the cement and ceramics industries which are dealing now without support: you produce at 1.25 pounds and it is sold to him with 1 pound, why is there no support?

**Dr. Eng. Maher Aziz – SESA Advisor**

The last adjustment in the prices is the increase in the prices of heavy industries from 135 to 140 piasters, which is the last increase of the prices of heavy industries and this means that it removes part of the support from the citizen.

**QUESTION - 10: Professor Osama Ali - Citizens Service Office  
General Secretariat of the Province**

The studies did not include the possibility of cultivating these areas because they are large areas.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

In the wind farms, you should not cultivate as you must stay away from agriculture due to the presence of migratory birds. Agriculture would attract the local birds and the migratory birds would come down, eat and live in that place which is dangerous. For this reason, we need to stay away of agriculture nearby the wind towers just as we need to stay away from the valleys.

**QUESTION - 11: Eng. Mohammed Abdullah –  
General Director of Energy Department, EEAA**

There are 3 issues I would like to address:

At the beginning of the offer we are used to the special offer and that is the one in which we are informed that the reviews and researches have been carried out funded by the Construction Bank and European Investment Bank. Your excellency mentioned that the hearing is conducted in accordance with international banking standards and such international standards require that an Environmental Impact Assessment (EIA) would be carried out but not the hearing, whereas the hearing is a requirement of an Egyptian law as it has been presented on one of the slides in the lecture presentation.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

The slide will be modified because the lecture is the first one according to the 1999 regulation starting that time. As for the new regulation, it is about 155 pages on public advice.

**Eng. Mohammed Abdullah –**

**General Director of Energy Department, EEAA**

Secondly, your excellency mentioned that implementation is the best that can be done in the occupational health and safety in accordance with international requirements and standards, but you did not mention at all that this is done in accordance with the Egyptian standards and that is not right.

**ANSWER: Dr. Eng. Maher Aziz – SESA Advisor**

Of course not as these power stations originally are implemented in accordance with Egyptian laws and standards but I wanted to clarify that the funding would be impossible in case of trespassing any of the international laws that are much stricter than the Egyptian laws.

**Eng. Mohammed Abdullah –**

**General Director of Energy Department, EEAA**

For public consultation, according to the guide, there is a minimum extent of attendance. I claim that this hearing has not covered half of the minimum extent of attendance from the target entities according to the guide, please do review the guide, to revise if there are sufficient attendance to fulfil the requirements. Also, each project requires a specific project study, covering the transfer step (Consultants' note: transmission lines) and transformer stations which should be submitted in a separate study.

**Chemist/ Amany Salah –**

**Studies & Research Department (NREA)**

Sometimes when the project is covering more than one province, more than one hearing is held to cover all the provinces.

**Eng. Akmal Mohamed– General Director for Studies of NREA**

The invitations were directed by the Commission to all entities as well as a newspaper advertisement to cover the rest of the audiences.

**Dr. Eng. Maher Aziz – SESA Advisor**

What can excuse us from holding this hearing again is that the candidates' statements would be submitted as the executive regulation defines the bodies about 15 parties including the responsible civil associations in the province. We assured that these invitations have reached all parties and we thank Prof. Mohammed for that as we should present a list of the attendees and the advertisement that has been published.

I would also like to draw your attention that there are 3 provinces taking part in the project. All involved parties of these provinces been invited because the representation of these entities is very important and so is the communication with all of the entities. The requirements of the hearing are needed to fulfil the requirements of EEA.

**Chemist/ Amany Salah – Studies & Research Department (NREA)**

The law identifies 2 hearings and not one, and the first hearing could just be considered a separate meeting or a big session.

(Consultant's note: two hearings have been performed, considering scoping meeting and public hearing)

## 4 Arabic Summary

### جنرال لواء 1

#### مقدمة -1.1

دراسه التقييم الاستراتيجي البيئي والاجتماعي لتطوير مشاريع الطاقة المتجددة في منطقة مساحتها 1725 كيلومتر مربع (2200 كيلومتر مربع خلال مرحلة الاقتراح وقبل تعديل المنطقة من قبل الحكومة المصرية) الواقعة إلى الشرق من نهر النيل في مصر عبر المحافظات الثلاث بني سويف ، المنيا وأسيوط قام بها تحالف استشاري الماني مكون من شركه لامير وشركه ايكودا بالنيابة عن هيئة الطاقة الجديدة والمتجددة في مصر.

بعد إصدار القانون الرئاسي لتعريفه التغذية في مجال الطاقة المتجددة في مصر في ديسمبر 2014 ، شارك البنك الأوروبي للإنشاء والتعمير في شراكة مع الحكومة المصرية لتحديد مجموعة من مشاريع 5 و7 الطاقة المتجددة (من مصادر الرياح والطاقة الشمسية) يتم تمويلها من قبل المستثمرين الأجانب المؤهلين

ومن المتوقع أن يكون كل مشروع قدرة 50 ميغاوات..

وقد حددت الحكومة المصرية ثلاث مناطق كبيرة مناسبة لتطوير وتنمية مزارع الطاقة المتجددة من مشاريع طاقة الرياح والطاقة الشمسية بموجب قانون تعريفه التغذية الموحد الصادر حديثاً ، وهذه المناطق تبلغ مساحتها 1725 كيلومتر مربع (شرق الرياح -1 ومنطقة الشرق-الرياح 2 مع اقصى حد ارتفاع 150 متراً للمباني ، وثلاث مناطق شمسي شرق ذات حد ارتفاع اقصى للبناء 5 أمتار) تقع شرق نهر النيل ("منطقة المشروع").

وتم تحديد هذه المناطق من قبل الحكومة المصرية بناءً على قاعده البيانات الموجودة لمشروعات الطاقة الشمسية وطاقة الرياح والاستخدام الحالي للأراضي. ولضمان تقييم المستوى الاستراتيجي للقضايا البيئية والاجتماعية المحتملة والمرتبطة بتطوير مشاريع الطاقة المتجددة في هذا المجال ، وإعلام صناع القرار للبدء في المشروع ، قامت الحكومة المصرية ، بالاشتراك مع هيئة الطاقة الجديدة والمتجددة ، بعمل دراسه بيئية استراتيجية و دراسة تقييم الاثر الاجتماعي لمنطقة المشروع. وهذه الدراسة هي عملية دعم لاتخاذ قرار يبين انه تم الاخذ في الاعتبار جميع الجوانب البيئية والاجتماعية وغيرها من جوانب الاستدامة بشكل فعال في السياسات والتخطيط ووضع البرامج اثناء الدراسة. تم تمويل هذه الدراسة من قبل البنك الأوروبي للإنشاء والتعمير.

## 1.2 – جلسة استماع عامة

### الأهداف والمنهج

كجزء من متطلبات التشاور والمناقشة العامة حسب متطلبات جهاز شئون البيئة ، يجب على هيئة الطاقة الجديدة والمتجددة (أو مستشاريها) استشارة وإشراك أصحاب المصلحة الأساسيين والثانويين في تخطيط وتطوير وبناء وتشغيل محطات طاقة الرياح والطاقة الشمسية الكهروضوئية. في منطقة شرق النيل. ويشمل ذلك اشتراط عقد اجتماع تشاوري عام لإطلاع جميع الأطراف المهتمة على النتائج الرئيسية التي إليها الدراسة وملاحظاتهم والتعليقات والإراء حول الدراسة. توصلت

الاجتماع التشاوري العام (جلسة استماع عامة) لمشروعات طاقة الرياح والطاقة الشمسية الكهروضوئية بسعة إجمالية تبلغ حوالي 9600 ميغاوات (2000 ميغاوات من طاقة الرياح و 7600 ميغاوات من الألواح الشمسية الكهروضوئية) التي تقع في منطقة تبلغ مساحتها حوالي 1725 كيلومتر مربع في منطقة شرق النيل في محافظات بني سويف والمنيا وأسيوط عقدت في مدينة المنيا يوم الخميس الموافق 28 يونيو 2018. ويتضمن هذا التقرير تفاصيل أعمال الاجتماع ، بما في ذلك العروض والمحتوى الرئيسي والاستنتاجات التي تم التوصل إليها في جلسة الأسئلة والأجوبة.

كانت المنهجية المعتمدة في إعداد وإعلان الدراسة قائمة على مشاركة جميع الاطراف وتشارك فيها مجموعات مختلفة من أصحاب المصلحة. لم تضاف آراء ومشاورات أصحاب المصلحة قيمة مضافة للنتائج فحسب ، بل زادت أيضًا من الشعور بملكية أصحاب المصلحة للمشروع وتضمنت زيادة الوعي وبناء القدرات لأصحاب المصلحة المحليين بشأن القضايا الفنية ذات الصلة بالمشروع.

للحصول على تعليقات من أصحاب المصلحة حول مشروع الدراسة ، قام الاستشاري بترتيب جلسة استماع عامة بعد إعداد مسودة وملخص لتقارير الدراسة. تم عقد جلسة الاستماع العامة في منتجع حورس السياحي - كورنيش النيل - المنيا ، في محافظة المنيا - مصر. وكان الحدث الرئيسي للاهتمام بإشراك مجموعة أوسع من أصحاب المصلحة المعنيين والكشف عن النتائج الأولية للدراسة بما في ذلك التأثيرات المحددة وتدابير التخفيف المقترحة وإتاحة الفرصة لجميع أصحاب المصلحة للتعليق على مسودة تقارير الدراسة وكان الهدف من ردود المشاركين هو اعداد النسخة النهائية لتقارير الدراسة من خلال النظر بشكل كامل ودمج التعليقات ذات الصلة والاعتماد في الاعتبار جميع الملاحظات التي ذكرت بالجلسة.

تم الإعلان عن دعوة جلسته الاستماع في جريدة الأخبار الوطنية باللغة العربية يوم الاثنين الموافق 4 يونيو 2018 (مرفق نسخة من هذا الإعلان في القسم 1.4 الملحق A). تضمن هذا الإعلان إشارة إلى موقع الويب الخاص ب هيئة الطاقة الجديدة والمتجددة و البنك الأوروبي للإنشاء والتعمير لتنزيل نسخة عربية وإنجليزية من الملخص غير الفني لمسودة تقارير الدراسة ومشروع التقرير النهائي للتوصيات. بالإضافة إلى ذلك ، تم توزيع دعوات شخصية على أصحاب المصلحة الرئيسيين بالإضافة إلى ملخص غير فني لمسودة تقارير الدراسة وتقرير التوصيات النهائي. تم توزيع أجزاء من الدعوات من قبل هيئة الطاقة الجديدة والمتجددة ، في حين تم توزيع أجزاء أخرى من قبل استشاري الدراسة وذلك وفقا لمتطلبات جهاز شئون البيئة . وتضم قائمة المشاركين المقترحين في جلسة الاستماع العامة فئات مختلفة ذات صلة بالمشاريع.

تم إعداد نماذج التسجيل باللغة العربية والإنجليزية خلال جلسة الاستماع العامة لتوثيق قوائم المشاركين. (القسم 4.4 يتضمن الملحق D القوائم المترجمة للمشاركين ونماذج التسجيل المصوره ضوئياً للجلسة العامة). وقد شارك ما مجموعه حوالي 35 مشاركاً من مختلف الانتماءات في جلسة الاستماع العامة. وكانت الجهات المعنية التي شاركت في الحدث منظمات حكومية ، ومنظمات غير حكومية ، ووسائل إعلام ، ومجتمعات محلية مجاورة لمنطقة المشاريع ، ومنظمات القطاع الخاص بالإضافة إلى الاستشاريين.

تم اداره جلسة الاستماع العامة من قبل أشخاص رئيسيين ذوي مسؤولية عالية من الأطراف الرئيسية المشاركة في الدراسة وهم : ممثل البنك الأوروبي للإنشاء والتعمير جيمس ليا كوكس) واستشاري المشروع من شركه لا ماير مهندس ماتيس دروش ود فرانك بيرجن من ايكودا استشاري هجره الطيور والدكتور محمد عبد الله ممثل جهاز شؤون البيئة وممثل هيئة الطاقة الجديدة والمتجددة م. أكمل محمد

تم تقسيم جلسة الاستماع العامة إلى دورتين رئيسيتين كما هو موضح في جدول الأعمال المرفق في القسم 4-5 المرفق اي. وقد اشتملت الجلسة الأولى على كلمة ترحيب من ممثلي هيئة الطاقة الجديدة والمتجددة. تبع ذلك عرض شامل وكذلك نظرة عامة على المشروع ، والمنهجية التطبيقية والنتائج الرئيسية للدراسة من قبل ممثل استشاري الدراسة ( الدكتور ماهر عزيز) وكذلك عرض آخر للدكتور ماهر عزيز يركز على النتائج والتوصيات المحددة للدراسة. وتوجد نسخ من هذه العروض في القسم 4-8 الملحق اي.

وأعقب هذه الجلسة استراحة مدتها 30 دقيقة تليها جلسة مناقشة مفتوحة دعي فيها جميع المشاركين إلى إبداء تعليقاتهم وتعليقاتهم على المعلومات المقدمة. وخلال هذه الدورة ، قدم أصحاب المصلحة المعنيين من السلطات الحكومية وكذلك فريق الخبراء الاستشاريين ردوداً على القضايا المطروحة. من أجل ضمان توثيق فعال لملاحظات المشاركين ، تم استخدام العديد من الأدوات. ويشمل ذلك تسجيلات الفيديو وأوراق الملاحظات التي تم توزيعها على المشاركين للاحتفاظ بسجلات مكتوبة من تعليقاتهم. وتوجد صور من أوراق الملاحظات الخطية في القسم 4.6 المرفق اف

تم بالفعل إدراج العديد من القضايا التي تم طرحها في مسودة تقارير الدراسة. وقد تمت دعوة المشاركين لتنزيل التقرير وفحص مسودة تقارير الدراسة وتقرير التوصيات النهائي المتاح على مواقع هيئة الطاقة الجديدة والمتجددة و البنك الأوروبي للإنشاء والتعمير. تم النظر في التعليقات والملاحظات الأخرى ذات الصلة التي أثيرت - إلى أقصى حد ممكن - في الإصدارات النهائية لتقارير الدراسة.

تعرض الأقسام التالية القضايا الرئيسية التي أثيرت أثناء جلسه الاستماع

6 Annex

6.1 Annex A: Public Hearing Advertisement in Al-Akhbar on Monday, 4<sup>th</sup> June 2018



**هيئة الطاقة الجديدة والمتجددة**  
**تتشرف**  
بدعوة الجهات المعنية للمشاركة وابداء الرأي  
في جلسة المشورة الجماهيرية المزمع عقدها عن  
التقييم البيئي والاجتماعي الاستراتيجي لشارع الطاقة المتجددة  
(طاقة الرياح والطاقة الشمسية الفوتوفلطية) في منطقة شرق النيل  
**وذلك يوم الخميس ٢٨ يونيو ٢٠١٨**  
بقاعة مؤتمرات منتجع حورس السياحي بالمنيا - كورنيش النيل  
ويمكن لراغبي الاطلاع على الملخص غير الفني بالعربية والانجليزية  
ومشروع التقرير النهائي للدراسة على المواقع الالكترونية التالية:  
**هيئة الطاقة الجديدة والمتجددة** [www.nrea.gov.eg](http://www.nrea.gov.eg)  
وموقع البنك الاوروبي لاعادة الاعمار والتنمية  
<http://www.ebrd.com/work-with-us/projects/tcpsd/egypt-strategic-environmental-and-social-assessment-of-renewable-energy-projects-in-the-east-nile-area.html>  
**للاستعلام:**  
م/ اكمل محمود ٠١٠٠٢٧٥٣٥٠٦  
م/ اسماء ٠١٢٨٠١٣٤٠٩٤

**Translation of the Advertisement**

**New & Renewable Energy Authority (NREA)**

We've the pleasure to  
invite the concerned parties to participate and express their  
opinion in the Hearing Meeting to be held on the  
**Strategic Study for the Assessment of the  
Environmental and Social Impacts of the Project of Wind  
and Solar PV in East Nile Region**

**On Thursday 28.6.2018 at**

**The conference hall of Horus Tourism Resort, Nile  
Cornish, El Minya**

***The non-technical summary in Arabic & English and  
the final draft report are available at:***

**New & Renewable Energy Authority site:**

[www.nrea.gov.eg](http://www.nrea.gov.eg)

**European Bank for Reconstruction and**

**Development site:**

[http://www.ebrd.com./work-with-us/projects/tcpsd/egypt-  
strategic-environmental-and-social-assessment-of-  
renewable-energy-projects-in-the-east-nile-area.html](http://www.ebrd.com./work-with-us/projects/tcpsd/egypt-strategic-environmental-and-social-assessment-of-renewable-energy-projects-in-the-east-nile-area.html)

**For more information contact:**

Eng. Akmal Mahmud Tel. 01002753506

Mrs. Asmaa: Tel. 01280134094

6.2 Annex B: Official Invitation Letters

Ministry of Electricity & Renewable Energy  
New & Renewable Energy Authority  
(NREA)  
Dr. Ibrahim Aboulnaga St., Ext. of Abbas El Akkad St.,  
Nasr City, Cairo, Egypt



وزارة الكهرباء والطاقة المتجددة  
هيئة تنمية واستخدام الطاقة الجديدة والمتجددة  
شارع د. إبراهيم أبو النجا - امتداد شارع عباس العقاد  
حي الزهور - مدينة نصر - القاهرة

٥٧٨	رقم
/ /	تاريخ
(٤)	ملاحظات
٢٠١٨/٢/٥	توقيع

السيد /

تحية طيبة ... وبعد،،،،

أشرف بدعوة سيادتكم لحضور جلسة المشورة الجماهيرية الخاصة بالدراسة الاستراتيجية لتقييم الأثر البيئي والاجتماعي لمساحة ٢٢٠٠ كم<sup>٢</sup> والمخصصة للهيئة بمنطقة شرق النيل بمحافظات ( بنى سويف - المنيا - أسيوط ) لإنشاء مشروعات توليد الكهرباء من مصادر الطاقة المتجددة (الخلايا الشمسية الفوتولطية و طاقة الرياح ) في مصر حيث تتميز بأنها من أكثر تكنولوجيات الطاقة المتجددة صداقة للبيئة، ولا تسبب أي تلوث بيئي .  
وستقوم الهيئة بالتعاون مع فريق عمل المشروع و المكتب الاستشاري البيئي بعرض ومناقشة المسودة النهائية لدراسة تقييم التأثيرات البيئية والاجتماعية لكافة الجهات المعنية المحيطة بمنطقة المشروع.  
هذا وسوف يتم عقد الاجتماع بمشيئة الله يوم الخميس الموافق ٢٨ يونيو ٢٠١٨ بقاعة مؤتمرات منتجع حورس السياحي بالمنيا - كورنيش النيل في تمام الساعة العاشرة صباحاً.

ونحن نتطلع إلي تشريف سيادتكم لحضور الاجتماع .

وتفضلوا بقبول فائق الاحترام ،،،

الرئيس التنفيذي  
دكتور مهندس / محمد مصطفى الضباط

اسماء كامل  
المحل  
٢٠١٨  
٢٠١٨

P.O.Box : 4544 Masakin Dobat - Elsaff  
El-Hay El-Sades, Nasr City,Cairo  
Fax : (202) 22717173 - 22717172  
Tel. Switch : 22725891, 2, 3, 4

ص . ب : ٤٥٤٤ مكتب بريد مساكن ضباط الصف  
الحي السادس - مدينة نصر - القاهرة  
فاكس : ٢٢٧١٧١٧٣ - ٢٢٧١٧١٧٢ (٢٠٢)  
٢٢٧٢٥٨٩١ ٢ ٣ ٤ ٥ ٦ ٧ ٨ ٩ ١٠ ١١ ١٢

## **Translation**

**Ministry of Electricity & Renewable Energy  
New & Renewable Energy Authority (NREA)**

Dr. Ibrahim Aboulnaga Street ext. of Abbas El Akkad Street  
Nasr City – Cairo- Egypt  
Our Ref. 978 –

Dear .....

Salutation,

I'm pleased to invite you to attend the public hearing meeting related to the Strategic Environmental and Social Impact Assessment study for the area of 2200 km<sup>2</sup> assigned to NREA in east Nile region in the Beni Suef-Minya-Assiut governorates for the establishment of projects of electricity generation from renewable energy sources (solar voltaic panels and wind turbines) given that they are environmentally friendly and causes no pollution.

NREA in cooperation with the project team and the environmental consulting office will discuss the final draft of the Strategic Environmental and Social Impact Assessment study with all interested stakeholders.

The public hearing meeting will be held, GOD willing, on Thursday 28.6.2018 at the conference hall of Horus Hotel, Minia, Nile Cornish, on 10:00 am.

We are looking forward to meet you there,  
Best Regards,

**CEO**  
**Dr. Eng. Mohamed Mustafa Al Khayat**

### 6.3 Annex C: Official Invited Stakeholders by NREA

In addition to the Advertisement in the Al-Akhbar newspaper of Monday, 4th June 2018, the following stakeholders had been invited by NREA, in collaboration with EBRD through official letters of 04-06-2018 to participate in the Public Hearing on 28th June, 2018:

#	Name	Position	Contact Details
<b>EEAA</b>			
1.	Eng. Mahmud Allam	Chairman of Central Administration for EIA	
2.	Mr. Mohamed Abdallah	EEAA Energy Projects General Manager	
3.	Mr. Ayman Hamada	Biological Diversity- Nature Protection Sector	
4.	Eng. Ahmed Salem	Nature Protection Sector Chairman	
<b>Beni Suef Governorate</b>			
5.	Eng. Sherif Habib	Beni Suef Governor	Tel: 082-2323000 Fax: 082-2322000
6.	Mr. Hamdi Mustafa Salem	Governorate Information System Manager	Tel. 0822242072
7.	General Hossam El Din Refaat	Beni Suef Governorate Secretary	Tel. 082-4400488 Fax. 082- 2243471
8.	Mrs. Noha Farag Khater	Environmental Planning Manager	Tel.082-2243465
9.	Eng.Tareq Samir Kamal	Environmental Affairs Manager	Tel. 0822352567
10.	Mrs. Sahar Saber Hassan	Information Center Manager	Tel. 082-2243472 Fax. 082-2242045
11.	Mrs. Lamia Ahmed Galal	Governorate Investment Office	Tel. 082-2242041
12.	Mr. Mohamed Attia Mursi	State Properties Manager	Tel. 082-2334220
13.	General Khaled Sayed Ahmed	Local Council Chairman	Tel. 082-2320619
14.	Mr. Adel Sayed Abdel Qader	Bebaf District Local Council Chairman	Tel. 082-4400438
15.	Mr. Mahmud Al Maghrabi	Fashn District Local Council Chairman	Tel. 082-7660853
16.	Beni-Sueif University	Beni-Sueif University – Dean Office	Fax. 082-2322000
17.	Better Life for Development and Training Association, Beni-Sueif Governorate	Better Life for Development and Training Association, Beni-Sueif Governorate	Fax. 082-2322000

<b>El Minya Governorate</b>			
18.	Mr. Essam El Bedewi	El Minya Governorate	Tel. 086-2343001 Fax. 086-2342764
19.	Minya Governorate Secretary	El Minya Governorate Secretary	Tel. 086-2343001 Fax. 086-2343273
20.	Mr. Ali Ahmed El Esami	Solid Waste Management Sector Chief	Tel./Fax. 086-239257 Cell. 01066107488
21.	Mr. Mohamed Abdallah	Youth Employment Department	Fax. 086-3202329
22.	Mr. Sayed Galal	Planning and Control Dept.	Tel. 086-2233111
23.	Mr. Shehab El Din Ismail	Information Center Manager	Tel. 086-2362773
24.	Mr. Mohamed Saad Hassan	Environmental Affairs Manager	Tel. 086-2326021
25.	Mr. Hesham Abbas	Governorate Planning Manager	Fax. 086-2375160
26.	Eng. Sayed El Fuly	Governorate Investors Services Dept.	Fax. 086-2319779 Cell. 01005692536
27.	Eng. Sayed Helmi	Maghagha District Local Council Chairman	Tel. 086-7550300 Fax. 086-7553345
28.	Eng. Osama Anwar	Bani Mazar District Local Council Chairman	Tel. 086-9242740
29.	General Nasr Fathi	Matai District Local Council Chairman	Tel. 086-3924600
30.	General Gamal Mubark Qenawi	Samalut District Local Council Chairman	Tel. 086-7710386
31.	Eng. Ismail Abdel Aziz	Minya District Local Council Chairman	Tel. 086-2369809
32.	Eng. Medhat Hassanein	Industrial Area Manager	Cell. 01004565005 Fax. 086-2330545
33.	Eng. Ali Maqbul	Dir Mawas District Local Council Chairman	Tel. 086-20110444 Fax: 086-2330545
34.	Eng. Mohamed Abdel Rehim	Abu Qurgas District Local Council Chairman	Tel. 086-2420655 Fax. 086-2420723
35.	El Minya University	El Minya University, Dean Office	Fax. 086- 2343273
36.	Regional Union for Associations and NGOs in El Minya Governorate	Regional Union for Associations and NGOs in El Minya Governorate	Fax. 086- 2343273

<b>Assiut Governorate</b>			
37.	Eng. Yasser El Disuqi	Asyut Governor	Tel. 088-2313158 Fax. 088-2325025
38.	Asyut Governorate Secretary	Asyut Governorate Secretary	Tel. 088-2313138 Fax. 088-2325025
39.	Eng. Nader Shehata	Environment Sector Manager	Cell. 01224064206 Fax. 088-2301009
40.	Mrs. Zeinab Salman	Environmental Planning Manager	Cell. 01062393094 Fax. 088-4970227
41.	Mr. Osman El Hussein	Tourist Sector Manager	Cell. 01069778438 Fax. 088-2310010
42.	Assiut University	Assiut University, Dean Office	Fax. 088-2325025
43.	Charity Association for Assiut Governorates' Sons	Charity Association for Assiut Governorates' Sons	Tel. 088-3222002
<b>Egyptian Electricity Transmission Company</b>			
44.	Eng. Medhat Ewis Fuda	Central Egypt Company for Electricity Distribution	Tel. 086-2346733
45.	EIA Manager of the Egyptian Company for Electricity Transportation	EIA Manager of the Egyptian Company for Electricity Transportation	
<b>Other Parties</b>			
46.	Orange Telecom Company representative		
47.	Vodafone Telecom Company representative		
48.	Etisalat Telecom Company representative		
49.	WE Telecom Company representative		

Further invitations were communicate via telephone, such as to environmental organizations and Bedouins settled in the surroundings of the project area.

6.4 Annex D: Lists of Participants






Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)

Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Registration Form

No.	Name	Position and Firm	Email	Telephone	Signature
1	انور محمد احمد	استشاري		01222170835	
2	ميرنا عبد النور	بالاسم		01203255075	
3	محمد عبد المنعم	مهندس		012227474057	
4	عبد المنعم			01283574764	
5	محمد عبد المنعم			01205736464	
6	محمد عبد المنعم			0112002969	
7	محمد عبد المنعم			0112002969	
8	محمد عبد المنعم			0112002969	



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



JV LAI - ecoda



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Registration Form

No.	Name	Position and Firm	Email	Telephone	Signature
9	عبدالله	مدير		0115775001	[Signature]
11	James Lau-Cox	ESRD	Lau-Cox@ESRD.com		[Signature]
11	Mathias Drosch	PM, Kubernetik & Funktionen	ma.hi@k.fhn-wg.at		[Signature]
14	محمد عبدالمجيد	مدير		0100500007	[Signature]
13	Ujjwal Sinha	NREA	MIN_Vedafan@nrea.gov.in	011271909	[Signature]
10	Dr. Frank Beyrer	NREA	eng@med.uni-wuerzburg.de	017410704	[Signature]
17	محمد عبدالمجيد	ecoda	benjer@ecoda.de	019782034158	[Signature]
14	محمد عبدالمجيد	مدير	Uct-a-ba@ecoda.gov.eg	01067344517	[Signature]
			Mohamed.Nadour@ecoda.gov.eg	01006655676	[Signature]





Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



JV LAI - ecoda



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Registration Form

No.	Name	Position and Firm	Email	Telephone	Signature
٢٧	Fayeg Mohamed Farag	manager of EFA Alminia		0100934657	
٢٨	ديا كوس او كوس	مدير ادارة مشاريع	haleika@ghoo.com	01021483655	
٢٩	اسمى زهنا محمد	مدير ادارة مشاريع		01009867080	
٣٠	محمد احمد محمد	مدير ادارة مشاريع			
٣١	محمد احمد محمد	مدير ادارة مشاريع			
٣٢	اسمى زهنا محمد	مدير ادارة مشاريع			
٣٣	اسمى زهنا محمد	مدير ادارة مشاريع			
٣٤	اسمى زهنا محمد	مدير ادارة مشاريع			
٣٥	اسمى زهنا محمد	مدير ادارة مشاريع			

## Translation

<p align="center"><b>Public Hearing for Strategic Environmental and Social Assessment (SESA) of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt) Horus Tourism Resort, Corniche El-Nile, El Minya, Egypt, Thursday 28.06.2018</b></p> <p align="center"><b>Registration Form</b></p> <p align="right"><b>Sheet 1</b></p>				
No.	Name	Job Title	e-mail	Phone No.
1.	Ahmed Abdel Majeed	Consultant		01222170835
2.	Merna Essam	Tourism		012003255015
3.	Hani Abdel Ghani			01227474057
4.	Yaser Hamed Abdel Badeeh			01283524764
5.	Mohamed Negem			01205736464
6.	Yehia Rashed	Minya governorate		01116254949
7.	Mustafa Selim	Minya governorate		01128391042
8.	Mohamed Hassan	Minya governorate		

<p align="center"><b>Public Hearing for Strategic Environmental and Social Assessment (SESA) of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt) Horus Tourism Resort, Corniche El-Nile, El Minya, Egypt, Thursday 28.06.2018</b></p> <p align="center"><b>Registration Form</b></p> <p align="right"><b>Sheet 2</b></p>				
No.	Name	Job Title	e-mail	Phone No.
9.	Ahmed Mohamed Yassin	Policeman		0112633551
10.	James Lea Cox	EBRD		
11.	Matthias Drosch	Lahmeyer International		
12.	Mohamed Akmal Mahmud	Studies Manager - NREA		0112753506
13.	Nina Ramzi	NREA		01004781959
14.	Ahmed Al Sayed	NREA		01063156570
15.	Dr. Frank Bergen	Ecoda Environmental Consultants		+49-1782094158
16.	Ibrahim Gaber	Minia telecom		01067344537
17.	Mohamed kamel Mustafa	Minia governorate		01006655676

**Public Hearing for Strategic Environmental and Social Assessment (SESA)  
of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)  
Horus Tourism Resort, Corniche El-Nile, El Minya, Egypt, Thursday 28.06.2018**

**Registration Form**

**Sheet 3**

<b>No.</b>	<b>Name</b>	<b>Job Title</b>	<b>e-mail</b>	<b>Phone No.</b>
18.	Mohamed AbdAllah	EEAA		01146009804
19.	Talaat Hagag			01055007770
20.	Shehab El Din Mohamed	Minia governorate		01006720891
21.	Hesham Abbas	Planning manger		01006340616
22.	Maha Ibrahim	Physician		01068214647
23.	Ahmed	NREA		01120000605
24.	Sedqi Munir			01224570570
25.	Dr. Nada Ashur	Environmental manager		01007301936
26.	Lamia Hashem	EIA manager – Minia		01001496606

**Public Hearing for Strategic Environmental and Social Assessment (SESA)  
of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)  
Horus Tourism Resort, Corniche El-Nile, El Minya, Egypt, Thursday 28.06.2018**

**Registration Form**

**Sheet 4**

<b>No.</b>	<b>Name</b>	<b>Job Title</b>	<b>e-mail</b>	<b>Phone No.</b>
27.	Farag Mohamed Farag	EEAA		01000934657
28.	Dr. Mohamed Mussa	Consultant		
29.	Asmaa Mohamed Ali	Planning Manager		01021483655
30.	Nada Radi Mohamed			01003867080
31.	Mohamed Abdel Satar	NREA		0105730578
32.	Osama Abdel Badeeh	Investment office		01010557535
33.	Mohamed Ali			
34.	Amer Mohamed	Minia governorate		
35.	Atef Ali Mohamed	Minia governorate		01090337810

## 6.5 Annex E: Public Hearing Agenda



Ministry of Electricity & Renewable Energy  
New and Renewable Energy Authority



JV



**Public Hearing for Strategic Environmental and Social Assessment (SESA)  
of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)  
Horus Tourism Resort – Corniche El-Nile, El Minya, Thursday 28.06.2018**

### Time Table for the Public Hearing Session

The attendees were representatives of investors, developers, governmental officials, citizens and stakeholders as shown in the Invitees and Attendees Tables.

Time	Activity	Speaker
9:00 – 10:00	Registration	
10:00 – 10:30	Welcome Speech	NREA representative EEAA representative EBRD representative SESA Consultant representative, (JV LI & ecoda)
10:30-11:30	Overview of the project Arabic presentation of the main finding and conclusions of the SESA for <b>Wind Energy Projects</b> Questions / Answer with regards to the SESA Wind Report	Dr. Maher Aziz, SESA Consultant
11:30– 11:45	Coffee Break	
11:45 – 12:30	Overview of the project Arabic presentation of the main finding and conclusions of the SESA for <b>Solar Energy Projects</b> Questions / Answer with regards to the SESA Wind Report	Dr. Maher Aziz, SESA Consultant
12:30 – 12:45	Presentation of identified areas for wind and solar energy planning	Mr. Drosch, SESA Consultant
12:30– 13:00	Lunch and informal exchange	
13:45 – 14:15	Final conclusions and recommendations	Dr. Maher Aziz, SESA Consultant
14:15– 15:15*	Open discussion	Dr. Maher Aziz, SESA Consultant (moderator)
15:15– 15:30	Synopsis and end PH	Dr. Maher Aziz, SESA Consultant

\* if required the open discussion in the afternoon can even be extended.

**6.6 Annex F: Notes and Comments by the Attendees**

 Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel  
Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional)..... *Osama Ali Badi*

Position and Organization (optional)..... *Minia investors office*

Mobile (optional)..... *01010557535*

Email (optional)..... *Miniainvestorsoffice@gmail.com*

Your comments and suggestions

*أنا سعيد جداً بالعرض الذي تم تقديمه في هذا الاجتماع  
وأنه سيكون له أثر إيجابي كبير على التنمية الاقتصادية في المنطقة*

Please submit your comments' sheet to the consultant to include your views in the study

 Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel  
Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional)..... *Farag Mahamed Farag*

Position and Organization (optional)..... *manager of works of SEEA Alminia*

Mobile (optional)..... *01002934667*

Email (optional).....

Your comments and suggestions

*No Comment, it's good presentation*

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional)..... Lamiaa Shaikhon Nashem  
Position and Organization (optional)..... Environmental affairs agency  
Mobile (optional)..... 0100 14 96 606  
Email (optional)..... lamiaa.shaikhon@yahoo.com

Your comments and suggestions

Excellent Presentation

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional).....  
Position and Organization (optional).....  
Mobile (optional).....  
Email (optional).....

Your comments and suggestions

افضل لم يرد أسئلة من قبلهم  
الاجابة انهم اذى جوده اعلى

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional)..... دكتور محمد عبد الله

Position and Organization (optional).....

Mobile (optional)..... 01025054774

Email (optional)..... md@ecoda.com

Your comments and suggestions

هذا العمل في المنطقة الشرقية من النيل  
و هو مشروع كبير يجب تسيير العمل

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional)..... hady said Abd Elghany nren

Position and Organization (optional).....

Mobile (optional)..... 0122-7474057

Email (optional)..... hady.said@yahoo.com 01227474057

Your comments and suggestions

هذا العمل في المنطقة الشرقية من النيل  
و هو مشروع كبير يجب تسيير العمل  
بالتفصيل في المنطقة الشرقية

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional).....hany said Abdelghany mamen

Position and Organization (optional).....مؤيد لانتشار مشاريع الطاقة المتجددة

Mobile (optional).....019227474057

Email (optional).....019227474057

Your comments and suggestions

كيف يمكن تحسين التقويم البيئي ومعايير التقييمات وإدراجها في الدراسات  
المعمول عليها وتكثيفها

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional).....د. هلايكه حسن أبو حنيفة أبو لعل

Position and Organization (optional).....الاستشارية الجيولوجية للمناخ

Mobile (optional).....01288169854

Email (optional).....helaika@yahoo.com

Your comments and suggestions

بوجد صاحة ١٥ مليون ونصف فدان بمساحة الطاقة الجديدة منها مليون فدان من المراير  
التي سيتم الاتصاف لوضعها من هوف ترسيمات فلاحية اما نصف مليون مترم ايل واطها  
يصلح لانتاج الطاقة الشمسية اذا تم عمل دراسات جيولوجية كدرؤيه توضح أماكن  
العصف الجربة وشحنت أماكن الوديه. فمهمها لوضع خريطة كورياتي من الترفه،  
ولا بد من إعادة الدراسات في اختيار اواقع ويتم التوفير الخاصة ايك نصف  
مليون فدان من الترفه.



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional)..... *Maha Mohamed Mohamed*

Position and Organization (optional)..... *E.I.T. Clinic, Minia*

Mobile (optional)..... *01068214627*

Email (optional).....

**Your comments and suggestions**

*I want to know when these projects will be finished?  
and I want to know the costs regarding to the  
poor people and middle societies.*

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional)..... *Nada Ashour Abd-Elzaker*

Position and Organization (optional)..... *Manager of EMU - Minia Governorate*

Mobile (optional)..... *01007301936*

Email (optional)..... *dr\_nada2004@yahoo.com*

**Your comments and suggestions**

*\* اتصال تواترهم بالتقنية عن طريق الواقع معك اطلعني على صور ومعلومات  
ولاحظت انهم يريدون انشاء مشاريع في مناطق كثيرة (مناطق كثيرة) في  
منطقة البحيرة الاقتصادية مع اهتمامهم على انشاء مشاريع في مناطق كثيرة*

Please submit your comments' sheet to the consultant to include your views in the study

*\* دعتهم الى التفتيش بالحقائق من قبلهم لانتاجت بعد اجراءات اولية لهذه  
المشروعات وراستعانا بهم خلال مراحل الاعداد والتفتيش*



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional) Mohamed Nader Kamel  
Position and Organization (optional) WE2 - Customer Care  
Mobile (optional) 01550158777  
Email (optional) Mohamed.Nader@ke.eg

Your comments and suggestions

Best regards and good luck

Please submit your comments' sheet to the consultant to include your views in the study



Ministry of Electricity and Energy  
New and Renewable Energy Authority (NREA)



Public Hearing on Thursday, 28 June, 2018

For the  
Strategic Environmental and Social Assessment of Renewable Energy Projects (Wind and Solar PV) in the East Nile Region (Arab Republic of Egypt)

Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants ( optional) Wael Mohamed Abass  
Position and Organization (optional) WE2 - Manager of Media exchange  
Mobile (optional) 01550155995  
Email (optional) Wael.abass@ke.eg

Your comments and suggestions

Best W @ good luck

Please submit your comments' sheet to the consultant to include your views in the study

## Translation

### Participants' Comments

**Name of the Participant (optional):** Osama Ali Bayumi

**Position and Organization (optional):** Minya Investors Office

**Mobile (optional):** 01010557535

**Email (optional):** [miniainvestorsoffice@gmail.com](mailto:miniainvestorsoffice@gmail.com)

**Your Comments and suggestions:** The invitation of the investors in the field of energy to attend this meeting is a good promotional tool.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Farag Mohamed Farag

**Position and Organization (optional):** EEAA Minia Branch Manager

**Mobile (optional):** 01000934657

**Email (optional):**

**Your Comments and suggestions:** No comment, it was a good presentation.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Lamiaa Shaikhon Hashem

**Position and Organization (optional):** EEAA

**Mobile (optional):** 01001496606

**Email (optional):** lamiaashakhon@yahoo.com

**Your Comments and suggestions:** Excellent presentation.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Yehia Rashed Shehata

**Position and Organization (optional):** Minya Governorate

**Mobile (optional):** 01001496606

**Email (optional):**

**Your Comments and suggestions:** These projects will offer many employment opportunities for the people of Assiut and Upper Egypt.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Yaser Gaber Abdel Badeeh AbdAllah

**Position and Organization (optional):** Minia Governorate

**Mobile (optional):** 01283522764

**Email (optional):**

**Your Comments and suggestions:** These projects will offer many employment opportunities for the people of Upper Egypt.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Hani Said Abdel Ghani

**Position and Organization (optional):**

**Mobile (optional):** 01227474057

**Email (optional):**

**Your Comments and suggestions:** Why the project is divided into 3 stages: 16, 34 & 38?

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Hani Said Abdel Ghani

**Position and Organization (optional):** Malawi Educational Department

**Mobile (optional):** 01227474057

**Email (optional):**

**Your Comments and suggestions:** How can people apply for work in these projects?

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Dr. Mohamed Mussa Abu El Elaa

**Position and Organization (optional):** Governorate geological advisor

**Mobile (optional):** 01288169854

**Email (optional):** [heleika@yahoo.com](mailto:heleika@yahoo.com)

**Your Comments and suggestions:** There are 1.5 million acres assigned for energy generation, of which 1 million acre in the Western Desert which can be considered unsuitable. The 0.5 million acres in the East of the Nile can be used for solar energy stations after a geological study which indicates the locations of the wadis to be avoided. The study must be repeated again to determine the suitable locations for solar and wind energy projects.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Maha Mahmud Mohamed

**Position and Organization (optional):** Minia governorate

**Mobile (optional):** 01068214647

**Email (optional):**

**Your Comments and suggestions:** I want to know when these projects will be completed and I want to know the impact on the low and middle class people.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Nada Ashour Abdel Zaher

**Position and Organization (optional):** Minia governorate

**Mobile (optional):** 01007301936

**Email (optional):** [dr\\_bionada2004@yahoo.com](mailto:dr_bionada2004@yahoo.com)

**Your Comments and suggestions:** There is a possibility of accumulating of the quarries dust on the solar panels and wind turbines and therefore they must regularly be washed with water. What is the source of water, its quantity and cost of transporting it to the projects sites? How can we integrate the environmental study with the economic feasibility study, so we can attract investors?

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Mohamed Nader

**Position and Organization (optional):** Minia governorate

**Mobile (optional):** 015500158777

**Email (optional):** Mohamed.nader@te.eg

**Your Comments and suggestions:** Best regards and good luck.

*Please submit your comments' sheet to the consultant to include your views in the study.*

**Name of the Participant (optional):** Wael Mohamed Abbas

**Position and Organization (optional):** Manager of Minia Exchange

**Mobile (optional):** 01550155995

**Email (optional):** wael.abbas@te.eg

**Your Comments and suggestions:** Best regards and good luck.

*Please submit your comments' sheet to the consultant to include your views in the study.*

6.7 Annex G: Selected Photos







**6.8 Annex H: Copy of the Delivered Presentations (on separate USB Stick)**

## 10.6 Annex F: Manual for identification of coordinates of preclusive and unfavourable zones

Coordinates of preclusive and unfavourable zones can easily be extracted from ArcGIS by using the tools “Feature Vertices To Points” (advanced license) and “Add XY Coordinates” which is available at NREA office. These tools have already been successfully applied in the GIS-Workshop. Identification of coordinates of polygons is a two-step process:

- Step 1: Use the ArcGIS tool “Feature Vertices To Points” to convert the preclusive and unfavourable zones (Polygon feature class) into a point feature classes.
- Step 2: Use the ArcGIS tool “Add XY Coordinates”

## 10.7 Annex G: Non-Technical Summary

# Strategic Environmental and Social Assessment of Solar Energy Projects in the East Nile Region (Arab Republic of Egypt)

## Non-Technical Summary (NTS) of the Final SESA Solar Report



September 2018



New and Renewable Energy Authority (NREA)  
Ministry of Electricity and Renewable Energy

# Strategic Environmental and Social Assessment of Solar Energy Projects in the East Nile Region (Arab Republic of Egypt)

## Non-Technical Summary (NTS) of the Final SESA Solar Report

### Prepared for:

New and Renewable Energy Authority (NREA), Egypt

Attn: Eng. Nefesa Hassan

Copy: Eng. Hala, Eng. Asmaa

J. Lea-Cox (EBRD), Y. Deghedi (EBRD)

### Prepared by:

JV Lahmeyer International GmbH & ecoda Environmental Consultants

c/o Lahmeyer International GmbH

Friedberger Str. 173

61118 Bad Vilbel

Germany

Report Status:      Approved

### Revision History:

Revision	Date	Author	Checked by	Approved by	Description
01	08.11.2017	Dr. Frank Bergen Dr. Ernst Niemann Tony Moens de Hase Dr. Omneya Nour Eddin Matthias Drosch	Matthias Drosch Nicolas Veneranda Dr. Frank Bergen	Dr. Frank Bergen Matthias Drosch	NTS of the Draft SESA Solar Report
02	25.01.2018	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	NTS of the Second Draft SESA Solar Report – considering comments from NREA and EBRD
03	25.05.2018	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	NTS of the Final Draft SESA Solar Report – considering comments from NREA and EBRD
04	25.09.2018	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	NTS of the Final SESA Solar Report

## Table of Contents

<b>1</b>	<b>Objective and Scope</b> .....	<b>1</b>
1.1	Objectives and Scope of the overall SESA Process.....	1
1.2	Objectives and Approach of the SESA Solar Report .....	2
<b>2</b>	<b>The Project Area</b> .....	<b>3</b>
<b>3</b>	<b>Legislative Framework and International Environmental and Social Standards</b> .....	<b>5</b>
<b>4</b>	<b>Description of a Typical Solar Power Project</b> .....	<b>6</b>
4.1	Construction Works .....	6
4.2	Operation and Maintenance Works.....	7
4.3	Decommissioning Works .....	7
<b>5</b>	<b>Methodology and Approach</b> .....	<b>8</b>
5.1	Stakeholder Engagement and Public Consultation .....	8
5.2	Baseline Studies on Existing Physical, Biological and Social Environment .....	9
5.3	Technical and Land-Use Criteria for Classification of Area as preclusive of less favourable.....	10
5.4	Basic Approach for the Impact Assessment .....	11
<b>6</b>	<b>Existing Environment</b> .....	<b>12</b>
6.1	Physical Environment.....	12
6.2	Biological Environment.....	13
6.3	Social and Economic Environment.....	16
<b>7</b>	<b>Prediction of Impacts</b> .....	<b>18</b>
7.1	Physical Environment.....	18
7.2	Biological Environment.....	21
7.3	Social and Economic Environment.....	23
<b>8</b>	<b>Mitigation Measures</b> .....	<b>26</b>
8.1	General Management and Mitigation - Best Practice .....	26
8.2	Physical environment.....	27
8.3	Biological environment .....	29
8.4	Social environment .....	30
8.5	Special Mitigation Features in the individual East Solar Subareas .....	32
<b>9</b>	<b>Environmental and Social Management and Monitoring Plan</b> .....	<b>36</b>

**List of Figures**

Figure NTS 6-1: Limestone Stratification at WP 60\_4 in the north of the East Solar-2 subarea (left) and pocketed weathered Limestone at WP 42\_3 (East Solar-3) .....12

**List of Tables**

Table NTS 9-1: Environmental and Social Management Plan.....36

**List of Maps**

Map NTS 2-1: Overview on the location and the extent of the Project Area and of different subareas based upon already prescribed height restrictions for RE developments .....4

Map NTS 8-1: Restrictions for solar power developments in the East Solar-1 subarea .....33

Map NTS 8-2: Restrictions for solar power developments in the East Solar-2 subarea .....34

Map NTS 8-3: Restrictions for solar power developments in the East Solar-3 subarea .....35

## 1 Objective and Scope

### 1.1 Objectives and Scope of the overall SESA Process

The Government of Egypt (GoE) has identified three large areas suitable for development of Renewable Energy (RE) farms for both wind and solar energy projects in Egypt. Among these, an area of 2,200 km<sup>2</sup> with a usable area of 1,725 km<sup>2</sup> (425 km<sup>2</sup> were excluded due to military height limitations, see section 0.2) located to the east of the Nile River across three Governorates Beni Suef, El Minya and Assiut has been identified based on existing data on solar and wind potential and existing land-use (the "Project Area"; see section 0.2). To ensure a strategic level assessment of potential environmental and social issues associated with the development of such projects and to inform the decision-making process for project development two Strategic Environmental and Social Assessments (SESAs) have been conducted. A SESA is a systematic decision-support process that helps to ensure that environmental, social and other sustainability aspects are considered effectively in policy, plan and programme making. The SESA process for the Project Area has the following objectives:

- To provide a reliable source of environmental and social data for the Project Area to inform RE development plans, environmental permitting and project financing.
- To identify eventually existing zones of technical or social constraints for RE development within the Project Area.
- To identify and assess potential environmental and social impacts associated with RE project development and operation in the Project Area and define mitigation and management measures to address these potential impacts, including recommendations on arrangement of plots for individual wind or solar power projects.
- To identify areas in the Project Area, which are suitable for RE development based on the outcome of the environmental and social impact assessments.
- To engage with stakeholders, including members of the public on the planned development of RE projects in the Project Area.
- To develop a Geographic Information System ("GIS") database, which will be used to inform future RE projects.
- To determine the spatial distribution of wind and solar power potential of the area.
- To identify and outline best possible areas for wind power and solar power development considering technical, environmental and social RE power potential aspects.
- To identify eventually existing further requirements (data procurement/measurements, studies, administrative) for RE development on the identified areas.

In addition, during the course of the SESA, the Consultant provided training to the staff of the New and Renewable Energy Authority (NREA) on SESA, Environmental and Social Impact Assessment (ESIA) and GIS.

## 1.2 Objectives and Approach of the SESA Solar Report

This subject report, the SESA Solar Report, focuses on the social and environmental assessment to define the suitability for solar PV power development within the greater East Solar-1, East Solar-2 and East Solar-3 subareas identified by NREA considering technical, social or environmental constraints.

Considering the environmental, social and technical attributes and the significance of predicted impacts the study identifies

- areas that are favourable for solar power development;
- areas that are less favourable, but can be developed with restrictions; and
- areas in which solar power development is precluded.

The results, which are also entered into a GIS database, are mapped by overlaying the hard criteria and predicted impacts. Thus, within the SESA Solar Report, areas are classified from the point of view of social and environmental criteria as well as of the physical-technical constraints. A further differentiation within the subareas of equal technical, environmental and social suitability (favourable or less favourable) took place according to the spatial solar radiation distribution, which, however, is not part of this report and is dealt with in the separate Final Recommendation Report.

This SESA Solar Report is analogous to a regional ESIA study for the East Solar-1, East Solar-2 and East Solar-3 subareas. It shall facilitate the later environmental permitting for the intended 50 MW solar power plots of private investors.

## 2 The Project Area

The East Nile Area originally refers to an area of 2,200 km<sup>2</sup> with a usable area of 1,725 km<sup>2</sup> and is mainly located in the Governorates of El Minya. Smaller portions are extending to the Assiut Governorate in the south and to the Beni Suef Governorate in the north (see Map NTS 2–1). With the modification in 2016 three subareas with a total of 425 km<sup>2</sup> were excluded from further RE developments due to military height limitations (“zero height”, see Map NTS 2–1) leading to two subareas for wind power development (East Wind-1 and East Wind-2) and three subareas for solar power (photovoltaic - PV) development (East Solar-1, East Solar-2 and East Solar-3) defined by NREA. This report comprises the SESA Solar Report for the East Solar-1, East Solar-2 and East Solar-3 subareas.

The Project Area is located in the Eastern Desert consisting of a rolling sandy highland that rises abruptly from the Nile Valley and merges some 80 to 137 km east of the Nile into the Red Sea Mountains.

### East Solar-1

The East Solar 1 subarea is the largest (416 km<sup>2</sup>) and the most southern of the three solar subareas. The East Solar-1 subarea has an extension of 28 km from north to south and lateral lengths of about 18 km (west to east) in the north and 11 km in the south.

The area belongs to the El Minya Governorate. The most western part is located about 5 km away from the Nile Valley. It starts about 10 km south of the East Solar-3 subarea and is directly connected to the East Wind-1 subarea further to the south.

### East Solar-2

The East Solar-2 subarea amounts to 179 km<sup>2</sup> and is located in the East of El Minya governorate. It starts about 15 km south of the East Solar-3 subarea. The area is crossed in the south by the new Highway from El Minya to Ras Ghareb.

### East Solar-3

The northern border of the most northern East Solar-3 subarea of 363 km<sup>2</sup> is located in the south of Cairo at about 160 km linear distance and at 60 km linear distance to Beni Suef. It is located northeast of the Cliff, the south-eastern part is even at the Cliff's edge, which extends to about 70 km to the east in parallel to the old Ras Ghareb road. The majority of the area consists of complex terrain with deep valleys and Wadis.

In the SESA Solar Report, the following terminations are used to distinguish between different areas:

- Project Area: whole area useable for RE developments (1,725 km<sup>2</sup>)
- Subareas: East Solar-1 or East Solar-2 or East Solar-3 subarea
- Zones: favourable, less favourable and preclusive zones as defined under section 5 and 6

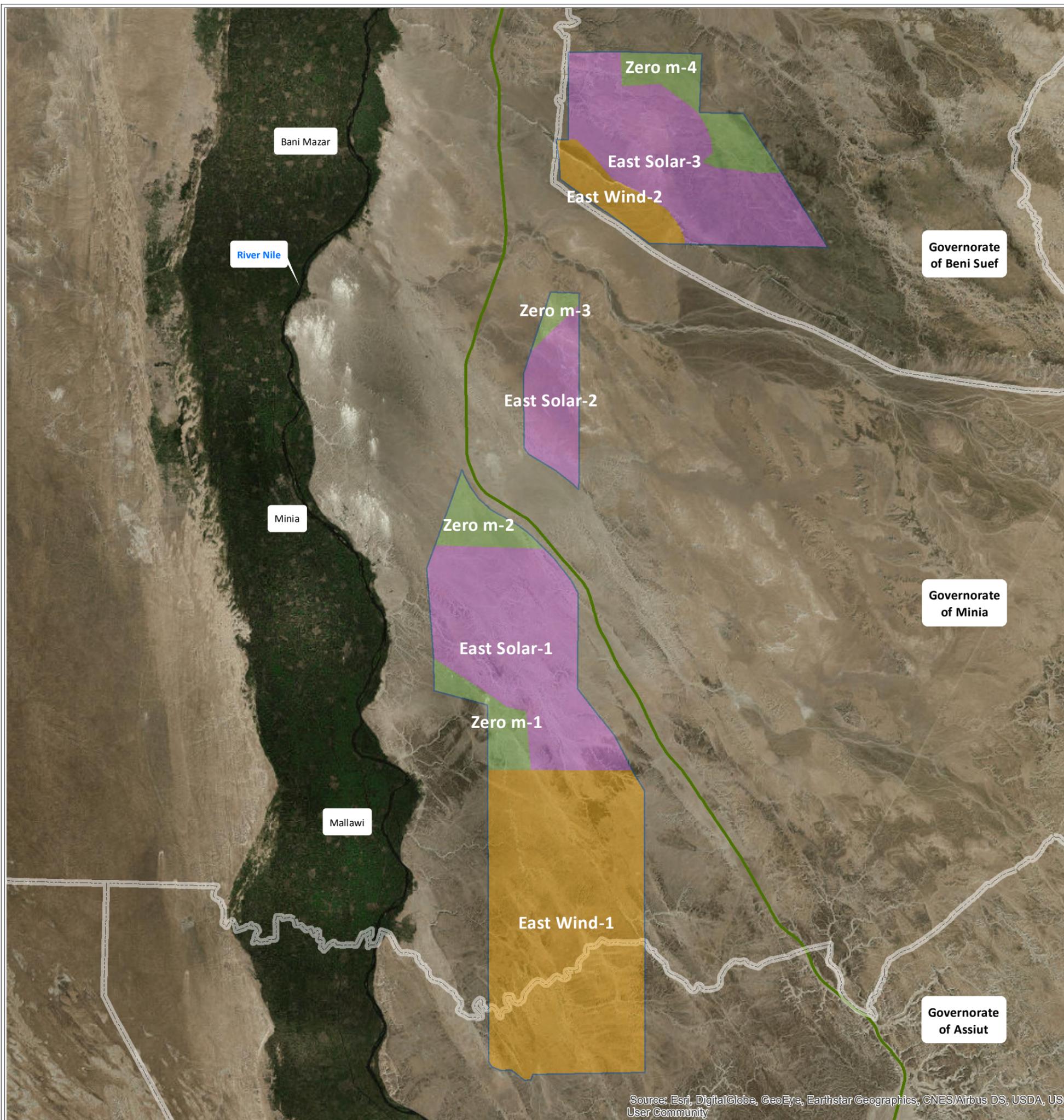
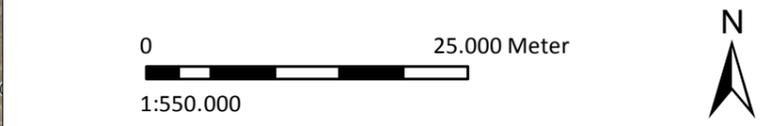
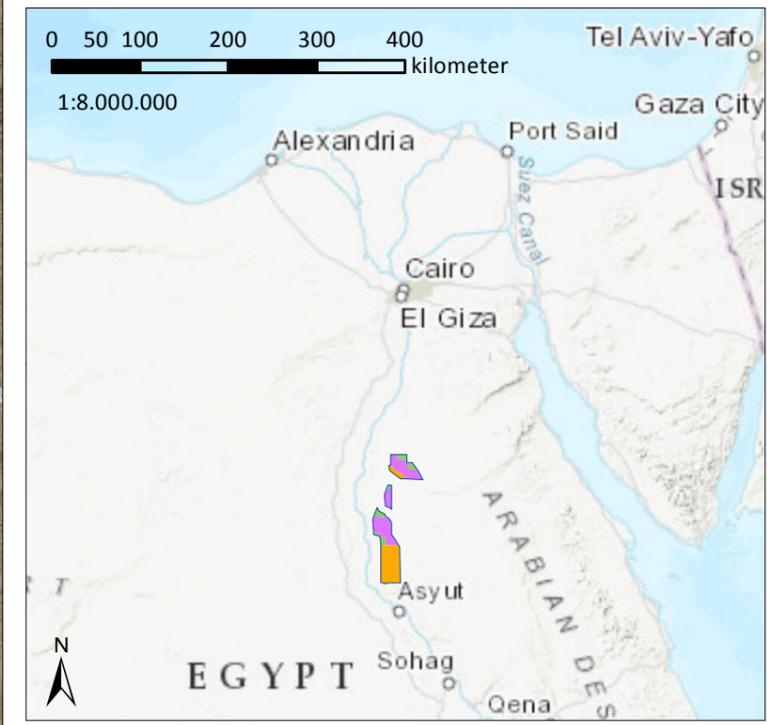
**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map NTS 2-1:**  
 Overview on the location and the extent of the Project Area and of different subareas based upon already prescribed height restrictions for RE developments

**Bordering of project area and subareas**

-  project area
-  subarea not useable for RE developments (due to height restrictions "Zero")
-  subarea usable for PV solar power projects (due to height restrictions "5 m")
-  subarea usable for wind power projects (due to height restrictions "150 m")
-  borders between governorates
-  Cairo – Asswan Highway



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, US User Community

### **3 Legislative Framework and International Environmental and Social Standards**

The SESA Solar has considered the Egyptian legal and regulatory framework (e.g. Guidelines developed by the Egyptian Environmental Affairs Agency (EEAA)), EBRD Performance Requirements and the Equator Principles. While compliance with Egyptian legal and regulatory requirements is obligatory, the SESA has adopted the strictest requirements, Egyptian or international – whichever is stricter. Thus, the conditions for later international project financing shall be fulfilled.

## 4 Description of a Typical Solar Power Project

Typical features of a solar photovoltaic (PV) plant are:

- Ground mounted PV plants are built ideally on flat terrain or slightly sloped (south-facing slope for terrain located in northern hemisphere (in which the project area is located), north-facing in the case of the southern hemisphere).
- PV modules are fixed to mounting structures distributed on rows (according to the planned layout) all over the suitable land. Mutual row-to-row distance depends on the module technology and site characteristics.
- Depending on the soil features, mounting structures are generally fixed into the ground through steel poles.
- PV modules are connected in series to make a string and then are combined in parallel in DC string combiner boxes through fuses, which protects the modules in case of over current or reverse flow. From DC combine boxes, strings are then connected to the inverters. Common PV plant configuration is to divide the PV field in several independent subfields "solar arrays". Every subfield will have inverter, MV transformers and MV switchgear.
- DC-AC Inverters for conversion of the DC electricity from the PV arrays (through LV cables) to AC electricity are located in each block.
- AC is further fed to the transformer before being evacuated through the transmission lines from the PV plant to the nearest substation. These lines can be either underground or overhead.
- Internal roads of about 5 m in width, which allow lorries transporting PV modules reducing the mechanical loads, are a mandatory condition.
- External access roads from the existing road network.
- Central service buildings such as a possibly control room, spare part stores, workshop and worker facilities for service personnel.

Initially, about 90 % of the PV area will be touched due to site levelling works, mounting structure foundation installation, as well as intensive transportation activities. Once the PV plant is operational, the PV modules will cover more than 65 % to 75 % of the PV plant area. However, the ground beyond the PV modules will not be impacted directly during the operation phase (see also section 6.5 of the Non-Technical Summary).

### 4.1 Construction Works

Construction works for a typical PV plant project consist of civil, mechanical and electrical works.

Major elements of civil works are ground levelling, foundation works for PV mounting structures, construction of concrete foundations for auxiliary buildings (e.g. service buildings, control room, substation, inverters), drainage works, excavation and backfilling of cable trenches and roads.

Major elements of mechanical works are installation and assembly of PV mounting structures and fence on the site. The mounting structures can be fixed tilted or tracking (monoaxial or biaxial) depending on the planned technical solution.

Major elements of electrical works are consists in installation of PV modules, inverters, transformers and cabling.

#### **4.2 Operation and Maintenance Works**

Operation and maintenance (O&M) activities comprise the regular control/operation of the PV plant as well as troubleshooting, repair and scheduled maintenance. Considering that PV plant operation can be done by remote control, relevant activities for a 50 MW PV plant are usually limited and do not require permanent presence of personnel at the site. Nevertheless, O&M personnel should be available within 24 hours for troubleshooting (e.g. change of fuses, replacement of sensors, restarting of inverters, opened protection) to avoid loss of generation.

One of the most important activities of maintenance is module cleaning by using water or air. It is a simple but important task, which can produce significant and immediate benefits in terms of production.

For the O&M a standard set of spare parts is stored near to site to reduce delay and loss of generation. Accordingly, a storage building needs to be maintained not too far away from the site.

#### **4.3 Decommissioning Works**

The design lifetime of a PV plant is generally 25 years. However, this time can be extended up to 40 years depending on the PV plant status. Decommissioning is the process for removing a PV plant with their foundation and the electrical infrastructure and restore the land to its original state.

Decommissioning means a large potential for recycling and recovery of valuable components and metals and thus corresponds to commercial interest.

## 5 Methodology and Approach

### 5.1 Stakeholder Engagement and Public Consultation

The SESA approach to stakeholder engagement and disclosure is captured in the Stakeholder Engagement Plan (SEP), which is attached to the Scoping Report (see Annex A1). The SEP is seen as a living document which will be implemented, and was and will be updated during SESA development, SESA disclosure and during RE project development in the Project Area, if necessary. In the SEP, the SESA stakeholders are identified, the various stages when stakeholders, including the public, are engaged and how, during and after the SESA process and the type of information to be disclosed.

As the first step in stakeholder engagement and information disclosure, the draft Scoping Report was issued, following submission to NREA on 27 June 2016, and circulated to various key stakeholders, including those in the three Governorates together with an invitation for the scoping meeting, held on 12 July 2016 at NREA offices in Cairo. The draft and final Scoping Report, which considered the comments from the stakeholders received during the scoping meeting, have been disclosed on the homepages of NREA and EBRD accordingly.

During various site reconnaissance missions of the Consultant's experts, people who have been accidentally encountered in the Project Area have been addressed and project information flyers in Arabic have been distributed (see Annex C). The results of all interviews were documented on interview forms (see Annex D). A summary of the received feedback can be found in section 5 and in section 5.3.1.7 in particular.

Furthermore, key stakeholders such as the regional Governorate of El Minya were visited on 4 October 2016 and 31 October 2016. In addition, Governorates were informed and asked to raise comments via fax, email or mail by NREA.

The scope of the SESA Solar and SESA Wind has been defined at an early stage in the SESA process through a scoping study (results were documented in a separate report, submitted in October 2016 as mentioned above). The scoping determined which impacts are likely to be significant and become the main focus of the SESA. Scoping also identified data availability and data gaps. The scoping process determined the appropriate spatial and temporal scopes for the assessment and suggests suitable survey methodologies.

The Final Draft SESA Wind Report as well as the Final Draft SESA Solar Report were disclosed to stakeholders and to the public and were discussed during a Public Hearing, following the local procedures and the EBRD's Environmental and Social Policy. Consequently, the Final Draft SESA Reports were disclosed on the websites of the EBRD and NREA, plus direct notification to registered stakeholders including public notification of report availability. For private sector projects, EBRD's Environmental and Social Policy requires a minimum disclosure period of 60 days, and 120 days for public sector projects. Given the fact that the SESA is the first assessment for subsequent privately financed projects, it has been accepted by the EBRD to apply the minimum disclosure period of 60 days.

The public consultation process aims to minimise potential negative environmental and social impacts, strengthen social acceptance of the project, informing the concerned parties that the environmental and social impacts will be minimised to levels that are low as reasonably practical and achieve the balance between legitimate requirements for development and environmental protection.

The public hearing was executed on 28 June 2018 at Horus Resort Hotel at El Minya, 28 days after the Final Draft SESA Reports have been made available which is considered as an appropriate period of time. The Public Hearing had been announced by advertisement in Al-Akhbar newspaper 24 days in advance.

The results of the Public Hearing were documented in a separate Public Hearing Report, submitted in September 2018. During the Public Hearing, no additional concerns or arguments with on environmental or social issues were raised that had not already been addressed in the draft SESA Report. Thus, there was no need of weighing of arguments and adjustments or additions. The Public Hearing was mainly dealing with clarifications and creation of a better understanding of limits defined in the SESA Report, especially regarding number of job opportunities and the involvement of government, utility and investors.

After the Public Hearing, the stakeholders were afforded a month to provide written comments. Similar as during the Public Hearing, no relevant additional concerns or arguments have been received. Likewise the Draft SESA Reports, the Final SESA Reports and the Final Recommendation Report will be disclosed again on the website of NREA and EBRD, following the same guideline.

## **5.2 Baseline Studies on Existing Physical, Biological and Social Environment**

Baseline data on the physical, biological and social environment of the Project Area was investigated by:

- Desk top studies, i.e. by a review of existing literature, an investigation on data officially available by the Egyptian Environmental Affairs Agency (EEAA) and on existing data available on the World Wide Web and on available satellite images,
- Approach of the administration of the Governorates for inquiry of data and information,
- Interviews with local people, and
- Several special field investigations inside and next to the Project Area between spring 2016 and spring 2017.

The focus of the investigation of the physical environment was on climate, geomorphology, hydrological conditions and water resources. To describe the biological environment of the Project Area baseline data on protected areas, habitats, flora and fauna was collected. The focus of the investigation of the social environment was on general and administrative issues, on existing infrastructure such as paved access roads and power grid, current land-use on and sociological conditions.

### **5.3 Technical and Land-Use Criteria for Classification of Area as preclusive of less favourable**

Based on the gathered information the East Solar-1, East Solar-2 and East Solar-3 subareas were screened with regards to constraints due to competing land-use and technical constraints, which impede solar power development or make it more difficult. This leads to areas defined to be preclusive, i.e. not usable for solar energy developments or to be less favourable. In this context, the relevant criteria were: accessibility/remoteness, geomorphology and competing land-use (e.g. farming).

#### 5.4 Basic Approach for the Impact Assessment

An impact is defined where project activity-receptor interactions occur. According to ISO14001:2004 an impact is defined as: “Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s environmental aspects (activities, products or services)”.

Once the impacts, either adverse or beneficial, are fully understood, it is necessary to judge the significance of each impact and to determine whether it is acceptable, requires mitigation or is unacceptable. Within the assessment process, impacts are ranked according to their “significance” which is a function of “event magnitude” and “receptor sensitivity”. Determining event magnitude requires the identification and quantification (as far as practical) of the sources of potential environmental and social effects from routine and non-routine project activities. Event magnitudes are classified according to the extent, frequency, duration and the intensity of an event as low, medium or high. Receptor sensitivity requires an understanding of the physical, biological and social environment. Criteria for the assessment of receptor sensitivity (low, medium, high) are for instance: area of influence, percentage of resource affected, persistence of effects, sensitivity of resources. Impact significance is obtained by superimposition of event magnitude and receptor sensitivity with an overall classification in four attributes: negligible, minor, moderate or major.

## 6 Existing Environment

### 6.1 Physical Environment

The Project Area and its surrounding area are characterised by a hyper-arid desert climate with high temperature differences between night and day of more than 15 °C. The average maxima vary between 19 °C (winter) and 37 °C (summer). The monthly means vary between 12 °C and 29 °C at the nearest met stations. Precipitation was measured sporadically (1 or 2 mm) during winter months only. However, that does not mean that uncommonly convective heavy rains of high intensities may occurred at rare intervals, such as in October 2016.

The underground of the Project Area is formed in the Eocene. It consist of thick marine limestone with chert and minor clay beds. It is overlain by layers of gravel and sand of limited depth in general varying from few centimetres to 1 or 2 metres at Wadi beds and hangs.

The East Solar-1, East Solar-2 and East Solar-3 subareas extend on desert ground well away from any village or other settlements. They are connected with few economic activities only.

Most of the East Solar-3 subarea has a complex relief with deep falls into Wadis. This is different in the East Solar-1 and East Solar-2 subareas, which are quite uniform, consisting mostly of slightly undulated land except for some cuts by major Wadis at some spots of the East Solar-1 subarea. The landscape does not contain any special features. All Wadis have a moderate slope and sandy underground. The Wadi beds were free from erosion marks (e.g. accumulation of stones) that indicate any major water flow that may have occurred at rare frequency.



**Figure NTS 6-1: Limestone Stratification at WP 60\_4 in the north of the East Solar-2 subarea (left) and pocketed weathered Limestone at WP 42\_3 (East Solar-3)**

In general, the areas show good foundation conditions. Soft soils or migrating sand dunes are not observed in the three East Solar subareas. However, due to the marine limestone underground the subsurface may contain caves.

An evaluation of the physical environment with regards to technical and land-use aspects according to the defined criteria leads to the following conclusions:

East Solar-1 subarea (see Map NTS 8–1)

- No preclusive zone was identified due to accessibility.
- No preclusive zone was identified due to geomorphology.
- Preclusive zones were identified with regards to land-use:
  - farming areas in the northwest along the El Minya - Assiut Road, inside the north-western part of the area;
  - gravel mining and screening plants in the southeast.

East Solar-2 subarea (see Map NTS 8–2)

- No preclusive zone was identified due to accessibility. This is under the assumption that the new highway El Minya to Ras Ghareb crossing the East Solar-2 subarea can be opened for access to the site.
- No preclusive zone was identified due to geomorphology.
- No preclusive zone was identified due to land-use.

East Solar-3 subarea (see Map NTS 8–3)

- A preclusive zone was identified on the cliff in the southeast of the subarea due to unstable foundation conditions.
- No preclusive zone was identified due to land-use, but it is expected that Bedouins have a claim on the land and agreements would have to be sought by individual investors.
- The accessibility of the subarea is classified as less favourable due to long distances to the existing highway and associated additional costs for road construction due to less favourable geomorphic conditions.

## **6.2 Biological Environment**

East Solar-1 subarea

The investigation reveals that there exists no legally protected site / area, no national park or important bird area and no internationally recognised area of biodiversity value in or near to the East Solar-1 subarea.

Due to the extreme aridity of the Eastern Desert the gravely and pebbly plains, the elevated areas and small hills within the East Solar-1 subarea do not serve as a suitable habitat for plants. Hence, large parts of the subarea have a very low to no importance as a habitat for plants and animals.

No Wadi within the East Solar-1 subarea was found to have a very high or high importance as a habitat for plants and animals. Wadi Ibadah and Wadi al-Birshawi provide appropriate living conditions for single plant and animal species, and thus, differ remarkably from the vast desert habitats dominating the East Solar-1 subarea. The aforementioned Wadi is important for plants and animals (see Map NTS 8–1). The importance of all other Wadis as a habitat for plants and animals was assessed to be low or very low.

As caves form particular structures in the desert offering important habitats for animals, caves in the East Solar-1 subarea, which can be particularly found at slopes, are important as a habitat for plants and animals.

Large parts of the East Solar-1 subarea are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. All species recorded in the Wadis of the East Solar-1 subarea are considered to be of “Least Concern” in the IUCN Red List of Threatened Species. Hence, besides Wadi Ibadah and Wadi al-Birshawi, the East Solar-1 subarea is not important for plants.

Wadi Ibadah and Wadi al-Birshawi form suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders). However, the obtained results of the investigation clearly show that the local fauna is poor in species and density is low. The species recorded in the East Solar-1 subarea are quite widespread and can be found in several desert habitats in Egypt. None of the recorded species is known to be endangered or threatened. Consequently, the East Solar-1 subarea is not an important habitat for animals.

As Wadi Ibadah and Wadi al-Birshawi comprise patches of vegetation which form a stopover habitat (mainly for a single day) for passerines during migration, it might be occasionally used by a low number of birds as a roosting site. All other parts of the East Solar-1 subarea have no significant importance as a roosting habitat for birds.

One can clearly derive from the results revealed in the East Wind subareas that the East Solar-1, which is located between the East Wind-1 and the East Wind-2 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.

To conclude, no preclusive zone was identified in the East Solar-1 subarea for solar PV plant developments with regards to the biological environment.

#### East Solar-2 subarea

There is no legally protected site / area, no national park or important bird area and no internationally recognised area of biodiversity value within the East Solar-2 subarea or its surrounding area.

The East Solar-2 subarea is very flat and homogenous comprising gravely and pebbly plains. No large Wadi exists in the subarea, and thus, it is nearly completely free of vegetation. Only two small vegetated spots have been found in the subarea. The recorded plant species are considered to be of “Least Concern” in the IUCN Red List of Threatened Species. To conclude, the East Solar-2 subarea is not an important habitat for plants.

Accordingly, the local fauna was found to be extremely poor in species and density was extremely low, too. None of the recorded species is known to be endangered or threatened. As there are no

cliffs or slopes, caves are extremely unlikely to occur. Hence, the East Solar-2 subarea is not an important habitat for animals.

To conclude, no preclusive zone was identified in the East Solar-2 subarea for solar PV plant developments with regards to the biological environment.

### East Solar-3 subarea

There is no legally protected site / area, no national park or important bird area and no internationally recognised area of biodiversity value within the East Solar-3 subarea or its surrounding area. The “Wadi Sannur Cave”, a rare geologic feature in Egypt, which is of interest for paleoclimatological records (EEAA 2015), is located at minimum distances of about 8 km northeast to the East Solar-3 subarea.

Due to the extreme aridity of the Eastern Desert, the gravely and pebbly plains, the elevated areas and small hills within the East Solar-3 subarea do not serve as a suitable habitat for plants. Hence, large parts of the subarea have a very low to no importance as a habitat for plants and animals.

No Wadi within the East Solar-3 subarea was found to have a very high or high importance as a habitat for plants and animals. Wadi ash-Shaykh complex provide appropriate living conditions for single plant and animal species, and thus, differ remarkably from the vast desert habitats dominating the East Solar-3 subarea. The aforementioned Wadi complex is important for plants and animals (see Map NTS 8–3). The importance of all other parts of the subarea as a habitat for plants and animals was assessed to be low or very low.

As caves form particular structures in the desert offering important habitats for animals, caves in the East Solar-3 subarea, which can be particularly found in the canyon-like Wadi ash-Shaykh in the northwest of the subarea and at slopes, are important as a habitat for plants and animals.

Large parts of the East Solar-3 subarea are completely without vegetation. Plants can only be found in Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. All species recorded in the East Solar-3 subarea are considered to be of “Least Concern” in the IUCN Red List of Threatened Species. Hence, besides the Wadi ash-Shaykh complex the East Solar-3 subarea is not important for plants.

The Wadi ash-Shaykh complex offers suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders). However, the obtained results of the investigation clearly show that the local fauna is poor in species and density is low. The species recorded in the East Solar-3 subarea are quite widespread and can be found in several desert habitats in Egypt. None of the recorded species is known to be endangered or threatened. Consequently, the East Solar-3 subarea is not an important habitat for animals.

As the Wadi ash-Shaykh complex comprises patches of vegetation which form a stopover habitat (mainly for a single day) for passerines during migration, it might be occasionally used by a low number of birds as a roosting site. All other parts of the East Solar-3 subarea have no significant importance as a roosting habitat for birds.

From the results obtained for the East Wind subareas it can be deduced that the East Solar-3 subarea, which is located north of the East Wind-2 subarea, is not of particular importance for migrating birds – neither in spring nor in autumn.

To conclude, no preclusive zone was identified in the East Solar-3 subarea for solar PV plant developments with regards to the biological environment.

### 6.3 Social and Economic Environment

The Project Area is located in the Governorates of Beni Suef and El Minya. Population is mainly located in the Nile Valley, whereas the Project Area indicates no permanent settlements.

#### General characteristics

- Land-use

The region consists of a vibrant mining industry. Many mines exist at desert areas near to El Minya but outside the Project Area. The white bricks extracted from the mines are used for construction. Mining is a very labour intensive industry and hosts a substantial number of workers at the areas. It is less likely that there will be an impact on mining activities since most mines are not permanent and almost no brick mines are located inside East Solar subareas. From discussion with mine owners, the potential to find good sources of extracting materials in the subareas selected for the project is very low.

- Cultural heritages

No cultural heritage sites are located in or in the zone of influence of the East Solar-1, East Solar-2 and East Solar-3 subareas.

- Roads and traffic

The Project Area is crossed by the El Minya - Assiut National Road and near to the Cairo - Aswan Highway. The road networks also connect the Project Area with the Red Sea ports (Ras Ghareb port and Safaga port) via the new Ras Ghareb - El Minya Highway. That allows project equipment to be transported from harbour to the East Solar-1, East Solar-2 and East Solar-3 subareas.

- Bedouin community near the Project Area

Although no Bedouin camp was identified during the site reconnaissance, the Consultant learned from discussions with the authorities and local Bedouin, many Bedouin are already impacted and influenced by other projects. Those impacts have modified their original structure and the consequence of that is that they have constructed settlements, meaning they are not nomads anymore and they are not performing activities such as roaming for resources within the area.

- Stakeholder interviews

In order to learn about general views and attitudes of local authorities and population towards the proposed project, meetings and discussion were conducted with the regional Governorates as described under section **Fehler! Verweisquelle konnte nicht gefunden werden.** and interviews were held with people encountered in the field. The overall knowledge about the project and its impacts was generally very limited in detail.

The following beneficial impacts of the proposed solar plant project were mentioned by the local authorities / population:

- Job opportunity for local people:

One of the advantages of big projects like proposed RE developments are the potential job opportunities for semi-skilled and unskilled workers. The proposed project will open job opportunities for the local people, especially during the construction phase. On top of that, local people get an opportunity to acquire new knowledge and skills that will benefit them.

- Land-use:  
The planning shall not interfere with the existing cultural heritages and shall also consider possessed land though customer land rights. Regarding the mining activities, there is low probability of negative impact since most mines are not permanent and nearly no mines are in the vicinity of the East Solar project. From discussion with mine owners, the potential to find good source of extracting materials into the areas selected for the East Solar subareas is very low.
- Cooperation with local Governorates:  
Officials on the local Governorate level feel excluded since they were not included in selection of the area. The presidential decree means they have no potential for future urban expansion in Eastern Desert.

#### East-Solar-1 subarea

- Land-use  
During the site reconnaissance in October 2016, it was noted that on the El Minya - Assuit National Road land reclamation activities in the East Solar-1 subarea are ongoing.  
  
Farmers which were interviewed indicated that the land reclamation activities in all the region of the project are coordinated by one family. They are responsible for dividing the plots and supporting the encroachment process until the person becomes officially the land owner. These identified plots were considered as preclusive areas.
- Roads and traffic  
The area is located more than 7 km away from the Nile Valley, but has good accessibility via well dimensioned asphalt or even crossing the area (El Minya - Assiut National Road) from El Minya (northwest), the Nile Valley (west) and from the East Wind-1 subarea (south). Furthermore, a connecting road between the El Minya - Assiut National Road and the Cairo – Aswan Highway (south) is crossing the East Solar-1 subarea.

No preclusive zones regarding accessibility were identified for the East Solar-1 subarea.

#### East-Solar-2 subarea

- Land-use  
No land reclamation activity was noted in this subarea.
- Roads and traffic  
The area is located more than 27 km away from the Nile Valley, but can be accessed from the El Minya - Assiut National Road and from the new Highway connecting El Minya and Ras Ghareb.

#### East-Solar-3 subarea

- Land-use  
No land reclamation activity was noted in this subarea.
- Roads and traffic  
The area is located more than 22 km away from the Nile Valley, but could be accessed through Cairo - Aswan Highway and a new to be built access road of minimum 11 km (linear distance).

## 7 Prediction of Impacts

### 7.1 Physical Environment

The expected impacts can be summarised as follows:

#### Air quality

During the construction phase, some emissions of exhaust gases of machinery and dust at individual construction places (road construction and excavation sites) may occur. During the operation phase, only occasional service visits will take place.

Thus, minor significance of impacts on the ambient air quality is assumed during the construction phase and is respectively negligible during the operation phase.

#### Water resources and wastewater

Water will have to be transported from the sources (wells) inside and next to the Nile Valley. These water sources / wells are fed by the River Nile having an average discharge of about 2,000 m<sup>3</sup>/s. Water supply will mainly be required for the construction phase, i.e. for concrete making, for anti-dust spraying and for sanitary purposes. Minor amounts of biodegradable low toxicity domestic (residential) wastewater from the sanitary facilities of the temporary construction yard offices will be treated by a two stage septic tank and percolation into the sandy subsurface for post-treatment. Wastewater will not get into contact with groundwater.

During the operation phase, from time to time, very little amount of water will be required for cleaning. The water consumption impact significance is assessed to be minor for the construction phase. During the other phases, the impact significance is negligible.

The impact significance is assessed to be minor during the construction phase. During the operation phase, the impact significance is negligible.

#### Domestic and Hazardous Waste

Considerable amounts of solid waste will be generated by solar PV plant construction projects. The waste essentially consists of packing material (paper, plastics, wood) for transport of the equipment components. The waste will occur mostly at the installation of the PV modules, the electrical infrastructure and in the construction yard. The waste can easily be spread by wind over the desert and transported over large distances.

The only possible source for hazardous waste caused during construction is spilt oil and grease originating from construction equipment (e.g. lorries, excavators, craned) and from handling and commissioning of deliveries (e.g. transformers). Both, the littering of waste and the spillage of hazards can easily be avoided by proper workmanship and strong supervision. Little domestic waste will be generated by personnel at the service facilities, if any, and the power substations. The experience with previous renewable energy projects in Egypt (e.g. Zafarana wind farm) shows that the domestic waste is small in quantities and mainly composed of biodegradable or burnable waste.

During the operating phase, waste generation is limited to the used consumables, when servicing the solar PV plant, and smaller defective parts. These are non-hazardous materials, most of them

valuable and fit for recycling. Larger defective parts such as inverters, or PV modules would anyhow be returned to the factory for repair or re-use of materials.

#### Noise and reflection

As potential human receptors, working personnel on the farms or mining areas in the East Solar-1 subarea was identified. For these receptors, standards for commercial or industrial properties apply. Relevant applicable ambient noise level standards are 70/70 dB (day/night time) according to IFC EHS Guidelines and 65/ 55 dB according to the Egyptian Law 4/1994, executive regulations, Annex 7. The more strict Egyptian standards are considered.

Human receptors in the neighbourhood of PV plants, such as workers or farmers, are not permanently living at the working place. Moreover, the working places are at least 300 m distant to the PV plant and thus the noise levels at receptors' place will be much lower than the limit of 65 dB during daytime during the construction phase. Accordingly, the receptor sensitivity is evaluated to be low during the construction phase. This applies also for the other phases, when no noise emission will take place. For the workers employed at the PV plants accepted occupational H&S standards will apply.

Considering that modern and efficient solar panels with high absorption capacity will be applied, the reflection of sunlight is marginal only. Therefore, the impact significance of reflection on human receptors will obviously be negligible.

#### Archaeological, historical and cultural heritage

The site investigation revealed that all the three East Solar subareas are free from archaeological, historical and cultural heritages. Moreover, this applies also for the surroundings, i.e. for distances from the border of more than 5 km. Accordingly, it is obvious that impact significance is negligible and no subject to detailed evaluation.

#### Land-use

The net area coverage rate of land-use/land-take for solar PV power development (roads, platforms, foundations, auxiliary installations) is about 70 % to 90 % during the construction and operation phase. These percentages will be lower in subareas containing Wadis (because of lower solar PV energy resources, the risk of occasional Wadi runoff, and stability of the Wadi bed and Wadi banks/hangs). Accordingly, the event magnitude is judged to be medium for all phases.

The land-use/land-take impact is evaluated against the different nature of the ground. As the soil (receptor) is of low value (non-vegetated desert sand or rocks) with a high resilience (little affected by construction measures only) the receptor sensitivity is evaluated to be low for all phases.

Because of a medium event magnitude and the low receptor sensitivity, the impact significance of land-use/land-take is evaluated to be minor for both, the construction and the operation phase.

#### Traffic and utility services and other infrastructure

The traffic load caused by solar power development can be estimated for the construction phase considering the safe assumption of parallel work on three solar PV farms as well as parallel delivery of PV and auxiliary equipment over a period of three months. Except for the power transformers of substations (e.g. one 125 MVA Transformer for two 50 MW plots) no heavy haulage transport is required.

Accordingly, the average expected additional traffic load per working day caused by solar farm development during the construction phase is about 45 large lorry transports and 25 transports by smaller vehicles including minibuses, pick-ups or small lorries. Distributed over a working day (10 hours), this corresponds to an additional traffic load of 4.5 lorries per hour and 2.5 smaller vehicles per hour.

For the East Solar-1 subarea, this may be compared to the current traffic load on the El Minya - Assiut Road, which is the most frequented road in the area. A rapid assessment revealed a number of 45 small vehicles (personal cars, minibuses, pick-ups) and 40 lorries per hour in one direction on this road. Assuming that all additional peak traffic loads will apply for the same road stretch, the current traffic load will be increased by about 10 %, resulting to a total traffic load of about 50 small vehicles and 45 lorries per hour and per direction. In case of East Solar-2 it may be compared with the very low traffic load compared to the capacity of the new El Minya - Ras Ghareb Highway. Even when considering the extra traffic load during the construction phase, the overall traffic on the asphalt roads in the area is still low. Moreover, the roads are well dimensioned and by far have not reached their capacity. During the operation phase, the additional traffic load is negligible.

Low event magnitude and low receptor sensitivity signify a negligible impact significance of traffic caused during all phases.

#### Run-off / flash flood risk

The region is hyper-arid with very minor precipitation during winter times. However, occasionally rains of high intensity can occur.

If such torrential rains fall on areas with mountainous character (i.e. larger hangs with of good gradients, narrow Wadis with high slopes) the resulting runoff can accumulate and develop to become dangerous flash floods.

Desktop studies and field inspection at the East Solar-1, East Solar-2 and East Solar-3 subareas revealed that the Wadis are not prone to such floods. Cross sections are wide, sloping is shallow and hills only exist with heights of 50 m only above Wadi beds. Moreover, the Wadis do not show large stones or rocks at the low areas of the Wadi beds.

Accordingly, no special risk from flash floods in the Wadis is expected in the East Solar-1, East Solar-2 and East Solar-3 subareas. In addition, as solar PV plants typically required flat surface for installation of the panels, installation in Wadi beds is considered not feasible from a technical point of view, thus minimising this risk in addition.

#### Seismicity Risks

Possible elevated earthquake risks due to geological fault lines were presumed during scoping. The strength of earthquakes at an exceedance probability of 10 % in 50 years is discussed in section **Fehler! Verweisquelle konnte nicht gefunden werden..** The strength for the areas is low to moderate, corresponding to a peak ground acceleration of 0.8 to 1.0 m/s<sup>2</sup>. Risks can be well-controlled by applying adequate earthquake codes as part of construction norms.

## 7.2 Biological Environment

The following assessment of likely impacts caused by multiple solar PV developments is valid for all subareas (East Solar-1, East Solar-2 and East Solar-3). Where impacts have to be assessed differently, this is explicitly mentioned in the text.

In the absence of any legally protected site or internationally recognised area of biodiversity value within or adjacent to the three East Solar subareas, construction and operation of multiple solar PV power projects in the three subareas will not affect any protected area.

### Construction

Construction of multiple solar PV power projects in the East Solar subareas might lead to:

- Loss of habitats for plants and animals and direct damage of plants

During construction of multiple solar PV plants, removal and partial destruction of the top soil surface and some deeper soil layers will occur. Consequently, installation of foundations of PV modules and auxiliaries, permanent access roads, trails for power lines, storage positions for heavy machines or other technical installations might directly impact (destroy) habitats for plants and animals and (damage) plants. Due to the extent of the affected area of a PV plant, event magnitude is assessed as high.

Receptor sensitivity can be regarded as low, because large parts of the East Solar subareas are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. Animal species recorded in the subareas are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the three subareas is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened. Furthermore, one can clearly derive from the results revealed in the East Wind subareas that the East Solar subareas are not of particular importance for migrating birds – neither in spring nor in autumn. Suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders) can only be found in Wadi Ibadah and Wadi al-Birshawi (East Solar-1 subarea) and in the Wadi ash-Shaykh complex (East Solar-3 subarea). Hence, besides Wadi Ibadah and Wadi al-Birshawi and the Wadi ash-Shaykh complex, the three subareas do not serve as an important habitat for animals.

To conclude, the effects caused by loss of habitats for plants and animals or direct damage of plants will lead to moderate impacts.

Siting of PV modules shall avoid vegetated areas and particular structures like caves or crevices. No PV panel shall be installed next to or inside Wadi Ibadah and Wadi al-Birshawi and the Wadi ash-Shaykh complex. Construction measures in these Wadis shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. In doing so, effects caused by construction of multiple solar PV plants can be reduced and the residual impacts are assessed as minor.

The important Wadis have to be assessed as less favourable for solar PV power projects (see Map NTS 8–1 and Map NTS 8–3).

- Disturbance by human activities with heavy machines, traffic, noise and dust emission

Animals might be affected by disturbance during the construction phase. However, disturbance effects are restricted to a rather small area. Moreover, constructional work is limited to a rather short period of time. Thus, animals can find alternative habitats for the time of constructional works. In addition, animals can reoccupy all areas after the construction phase.

Animal species recorded in the East Solar subareas are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low. Hence, the impact on animals caused by disturbance during construction is negligible.

- Compaction of soil due to land-use

Compaction of soil might lead to damage of local seed banks and a reduction of the suitability for plant growth. However, the potential for plant growth in this hyper-arid area is very limited and the subareas comprise no threatened species or plant communities of conservational concern. The impact due to the construction of multiple solar PV plants is assessed as moderate (high event magnitude and low receptor sensitivity). If construction works will avoid vegetated areas (in particular the important Wadis) and particular structures like caves or crevices, residual impacts can even be assessed as minor.

- Dust emissions

Dust emissions will be limited to a very small area and limited to rather brief periods. Only negligible impacts on habitats or flora are expected due to dust emissions (medium event magnitude and low receptor sensitivity).

- Waste

Waste resulting from constructional work will cause no significant impact on habitats, flora or fauna. However, it might pollute larger areas when drifted away by strong winds. Moreover, it will probably attract certain animals, however, especially feral species (dogs, cats, rodents, etc.). This might affect indigenous species. Thus, waste should be removed immediately from the site and should be stored at or near the site in appropriate ways.

- New species of urban and rural environments

New species of urban and rural environments can be imported into the area together with construction materials and containers. This should be avoided as much as possible, because new species often affect indigenous species.

To conclude, the residual impacts on habitats, flora and fauna caused by the construction of multiple solar PV power projects within the East Solar subareas are negligible to minor.

#### Operation and maintenance

In general (i.e. disregarding the existence/absence of sensitive receptors), operation and maintenance of multiple solar PV plants within the East Solar subareas might cause different effects:

- Modification of habitat suitability / quality due to changed abiotic habitat factors

- Disturbance of animals or indirect loss of habitat by visual effects (silhouette effects, dazzling effects)
- Disturbance of animals by light emissions (reflections)
- Attraction, irritation or disorientation of animals by artificial light emissions
- Disturbance by human activities related with maintenance of solar farms
- Barrier effects / habitat loss
- Collision risk for flying animals (bats, birds, insects)

In any case, receptor sensitivity can be regarded as low, because large parts of the East Solar sub-areas are completely without vegetation. Plants can only be found in the Wadis. Even there, the vegetation is neither rich in species, nor dense in populations. Animal species recorded in the East Solar subareas are quite widespread and can be found in several desert habitats in Egypt. None of the recorded species is known to be endangered or threatened. Suitable habitats for single animal species from different groups (mammals, birds, reptiles, insects, spiders) can only be found in Wadi Ibadah and Wadi al-Birshawi (East Solar-1 subarea) and in the Wadi ash-Shaykh complex (East Solar-3 subarea). Hence, besides Wadi Ibadah and Wadi al-Birshawi and the Wadi ash-Shaykh complex the three subareas do not offer important habitats for animals.

To conclude, operation and maintenance of multiple solar PV plants within the subareas will cause negligible to minor residual impacts on habitats, plants and animals. There are no other activities in the subareas that might contribute to increased impacts to significant levels. During periods of maintenance of PV plants, human activities will be restricted to the already existing roads and storage positions. Furthermore, it is assumed that an appropriate procedure will be applied and that the required amount of water will be minimised when cleaning solar PV panels.

### **7.3 Social and Economic Environment**

#### Workforce and jobs

With regards to job creation, the project will result in direct and indirect jobs. For each 50 MW project (a possibility of maximum 2 to 3 projects in parallel), the following numbers are assumed: unskilled workers 100 persons plus 20 skilled workers for project management and supervision tasks (duration 4-5 months).

If 2 or 3 projects start at the same time, this would require 250 to 400 workers. The local communities (El Minya and Beni Suef) could theoretically provide a proportion of this temporary labour force dependent on skills needed.

The project will permit to create some jobs (a limited number) and will be a source of income for those who will operate PV plants and work on permanent basis. Based on rough calculation for the direct jobs to be provided during operation, it will involve/engage about 5 to 10 people per PV plant for O&M and guarding. The permanent staff are likely to live locally.

Workers might be adversely impacted if fundamental principles and rights are not respected. Labour and working conditions defined in EBRD PR2 and IFC PS2 shall be maintained. This is also relevant for lodging in temporary facilities at the site.

#### Supply chain

The project will also result in positive opportunities for local companies that can work in importing/manufacturing of some components due to the need of the supply chain.

Vehicle drivers will benefit from the project through the provision of transportation to those who work in the project. As well, some of them might be contracted to transfer the workers to the Project Area.

Community members from the region and surrounding villages will benefit from some increase of the economic activities in order to serve the needs of the project developers and workers. Hotel, shops, restaurants will also see their turnover increase.

The project might result in development of the surrounding areas. Most future PV plants will require additional paved roads and enhanced basic infrastructure inside the selected zone.

Skilled and unskilled workers will get acquainted with modern technologies of wind and / or solar power, which will create more job opportunities for them in the future as other development will take place in Egypt for RE. Similar as for the workers, Labour and working conditions defined in EBRD PR 2 and IFC PS 2 shall be maintained.

#### New source of energy

The most important and positive impact is that the development of RE projects will result in a renewable source of electricity that will enrich the National Electricity Grid by:

- contributing to addressing a national energy shortage,
- reducing the use of fossil fuels in electricity generation, and
- displacing carbon-intensive sources of electricity.

#### Enhancement of the community

Some enhancement of the services and utilities in the areas due to the project implementation can be expected. Moreover, the project will offset emissions from thermal installations and thus contribute to the improvement of air quality, particularly by reducing the CO<sub>2</sub> emissions.

#### Economic benefits and investment

The project will result in economic benefits through the long-term improvement of power supply.

Typically, the following positive impacts are expected from the development of PV plants:

- Development of a solar power economy (development of related industries, development of commercial activities and management of such equipment).
- Provision of renewable source of energy will result in a reduction of subsidy allocated for the non-renewable fuel. As well, the new source of energy is considered clean energy.
- Additional tax income in case the projects will be implemented as IPP projects.

#### Bedouin community

The solar plant development areas are located in the desert, an area traditionally used, and traversed, by Bedouins. During SESA fieldwork, few Bedouins were encountered but nevertheless the development of solar projects will change the character of the Project area to a degree which may impact upon Bedouins. Furthermore, the influx of labour may also pose an impact to Bedouin communities, if present. Individual projects should seek engage with Bedouins about project developments, afford project benefits and opportunities to Bedouins and put in place measures to avoid influx related impacts.

To avoid the potential negative impacts associated with labour influx (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 for developers at the East Solar-1, East Solar-2 and East Solar-3 subareas should be developed. This impact is considered minor because the subareas are far from the villages at East Nile banks.

#### Impacts related to temporary inconvenience

Considering that the selected solar plant areas are in far distance to any community, no measurable inconvenience for local communities will arise.

#### Occupational Health and Safety

Major health and safety risks result from working on electrical systems and working with tools and machinery. Investors will be contractually required to keep the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) as a minimum standard. Besides keeping the general guidelines regarding environmental, occupational health and safety and community health and safety aspects of special relevance are the sector guidelines: IFC's general Environmental Health and Safety Guidelines and the Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution as well as EBRD's PR 4.

Moreover, future investors will be required to employ through their Contractors an H&S engineer/supervisor being fully authorised to sanction any wrongdoing. An H&S management plan will be established at the start of construction activities subject to approval of supervising authority NREA. Important elements are safety training (for workers, machine drivers), emergency measures in case of accidents and a reporting system.

With the implementation of such measures, residual health and safety impacts are expected to be minor.

## 8 Mitigation Measures

### 8.1 General Management and Mitigation - Best Practice

After having thoroughly assessed the impacts, the so-called mitigation hierarchy shall be applied as the general mitigation strategy. The first step in this process comprises measures to avoid environmental or social impacts of a plan/project, by changes in the project design or in project activities. If it is not possible to avoid an impact, additional measures should be implemented to minimise the identified effect. The remaining impacts have to be rectified, e.g. by restoration of habitats to their original state or by relocation of affected species or habitats. The last option in the mitigation hierarchy is to compensate for or to offset any residual, unavoidable loss or damage. Such biodiversity offsets generally take place in a different area and aim for securing a “no net loss” outcome.

The mitigation strategy shall be accompanied by a thorough risk management covering post-construction monitoring and adaptive management.

The following management and mitigation measures can be regarded as a best practice standard that shall be applied in all East Solar subareas under any condition and during any project phase (construction, operation, maintenance and decommission):

- All activities must be restricted to the boundaries of the construction areas, storage positions and access roads / tracks. Any use of the surroundings must be strictly avoided.
- Supplying or changing oil, lubricant or hydrocarbon to vehicles shall be done in gas stations and not on site. Strict control must be applied by a site supervisor. Contingency measures and plans for spill removal must always be ready on site.
- Waste has to be removed immediately and has to be safely stored at the site so that drifting is avoided.
- Awareness programmes to personnel shall be carried out. Behaviour and attitude of involved personnel during field activities shall be controlled by a site supervisor.
- Potential occupational health and safety hazards during the construction phase shall be controlled by appropriate measures.
- The contractor shall provide effective protection for land and vegetation resources at all times and shall be held responsible for any subsequent damage.
- The contractor shall be forced to good workmanship and housekeeping during construction by contractual stipulations and by assignment of supervising engineers in order to assure adequate disposal of solid waste and wastewater, to avoid or to collect spillages of used oils, greases, etc.
- The contractor shall be forced not to leave the construction site unless the area has been put into a tidy condition, excavations are backfilled, heaps of excavation material are levelled and waste is adequately disposed of.
- Ban killing, hurting and unnecessary disturbing (incl. relocation) of any wildlife elements in the Project Area.

## **8.2 Physical environment**

### **8.2.1 Land-use/Land-take**

Areas of current land-use or under development are designated to be preclusive for solar power development. This is to avoid social conflicts. The impact significance of land-take of the remaining portions (solar power plots) on land owned by the Government is minor. Compensation or offtake measures are not required as solar projects shall only be developed on land that is not subject to any claims. During the preparation of the ESIA for each individual project, a detailed review will be needed to assess whether there are areas in addition to the areas of economic activities already precluded for solar PV power development.

### **8.2.2 Landscape Character and Visual Impact**

Considering the vast character of the landscape and little presence of human receptors at some spots only inside or near to the area and the large distances of development projects to the next villages or settlements, no specific mitigation measures are required during planning and permitting process.

### **8.2.3 Water resources and wastewater**

To protect water resources and to keep the withdrawal of water from wells (feed by resources from the River Nile) at a moderate level during periods of high water demand (casting of foundations during the construction phase), equalisation water tanks shall be installed at all East Solar subareas, at the wells and at the concrete batching plant. The volume of the water tank at the batching plant shall at least correspond with the water demand for the part of the PV plant that requires the larger volume of uninterrupted concrete pouring, which depends on the specific design of the PV plant. The volume of the water tank at the source shall correspond to the volume of the biggest tanker lorry used during the construction phase.

Domestic wastewater treatment from the sanitary installations at the site during construction shall be collected and treated in a simple two-stage anaerobic treatment plant with rinsing of treated water into desert gravel for natural post-treatment. Sludge from domestic wastewater treatment shall be disposed regularly to keep the treatment plant well-functioning.

### **8.2.4 Domestic and hazardous waste**

The contractor shall be forced to carry out good workmanship and housekeeping during construction by contractual stipulations and by assignment of supervising engineers in order to assure adequate disposal or recycling of waste. This shall be carried out to the extent that potential packing material waste shall be returned to the delivery lorries.

To mitigate negative impacts during the construction phase, residual non-hazardous waste shall be collected and safely stored at the site so that drifting by wind is avoided. The recyclable or usable fraction (e.g. metals, reuse of wood) shall be separated and carried to the recovered substance cycle. The residual fraction of biodegradable or burnable waste will be collected in bags and in bins and disposed at designated waste treatment sites and landfills. In case of the absence of such sites, the waste shall be disposed at an environmentally safe waste disposal site (desert pits). To reduce volume, the waste is burnt and the residual waste will be covered by sand. The waste is inert and in absence of rain, there is no harm for the subsurface. Considering the small amounts of domestic waste (about 60 m<sup>3</sup> per year and a 50 MW plot of non-compacted waste equivalent to about 2 m<sup>3</sup>/a after incineration), this simple method is considered to be acceptable.

Spillage or dispersion of hazardous waste, such as spilt oil and grease originating from construction equipment or transformers, into the soils at the site shall be avoided by carefully handling and collecting in containers and subsequent recycling.

#### **8.2.5 Air Quality**

The impacts on the ambient air quality during the construction phase are caused by dust development at the working sites of machinery during road and foundation excavation works and shall be mitigated under occupational health and safety aspects.

Mitigation measures are:

- the spraying of water,
- workers to be assigned at the upwind side (the side of the dune facing the wind direction) from machinery; and
- the wearing of protective masks.

#### **8.2.6 Noise**

Mitigation of noise impacts on sites of economic activities within or next to the solar PV plant areas, where workers are employed or even reside for periods of time, shall be through keeping siting distances of at least 200 m to any existing economic activity in the area. This applies for the construction.

#### **8.2.7 Archaeological, historical and cultural heritage**

In the absence of archaeological, historical and cultural heritage inside or next to the project areas and having evaluated the impact significance on traffic to be negligible, no mitigation measures are required for these subjects.

### 8.2.8 Mitigation of impact on traffic

The effects of additional traffic load on the regional roads evaluated to be of minor significance during the construction phase shall be further reduced by shifting of heavy haulage transports to low traffic hours (such as late evening or night time hours).

Further investors shall make sure that the employed drivers of construction machinery (such as lorries and loaders) have received sensitisation/training on safety utilisation of their machines in order to minimise accidents risks. Heavy haulage transports shall be conveyed by safety cars.

## 8.3 Biological environment

### Construction and decommission phase

No significant impacts caused by construction/decommission activities requiring particular mitigation measures have been identified in the process of the assessment. Nevertheless applying general measures to avoid or, at least, minimise any impact on habitats, flora and fauna during construction and decommissioning is crucial. This covers:

- Restrict all activities to the boundaries of the construction areas, storage positions and access roads/tracks. Any use of the surroundings must be strictly avoided.
- Comply with the regulations defined in Article 28 of the Egyptian Law no. 4/1994 for the Protection of the Environment amended by Law 9/2009, i.e. mainly a ban of:
  - o hunting, killing, catching birds and wild animals or marine living organisms,
  - o cutting or damaging protected plant species,
  - o collecting, possessing, transporting, or offering to sell kinds of fauna and flora fossils or changing their features, and
  - o trading in all endangered living organisms of fauna and flora species.
- Large Wadis, which hold sparse vegetation, form specific elements in the desert and can be used as a habitat for certain animals and temporarily as foraging or hunting sites for local birds. Hence, important Wadis have to be assessed as less favourable for PV plant developments (see Map NTS 8–1 and Map NTS 8–3). An appropriate mitigation measure is to avoid construction works in these Wadis as much as possible.
- Avoid installing wire fences and steel cables that might pose a collision risk for birds. If wire fences or steel cables are required, these structures can be marked, if appropriate, to increase their perceptibility and to reduce the risk of collision for birds.
- Avoid lighting of PV plants to minimise attraction, irritation or disorientation of animals. If lighting is absolutely required, the minimum number of lights of lowest effective intensity shall be used. LED-lights or other light sources with wavelengths of more than 550 nm are known to have only limited effects on insects, and thus, shall be preferred.
- Build the grid within a solar PV power project and the grid between different PV projects by underground MT cables. If the use of overhead lines cannot be avoided, such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015) in order to avoid the risk of electrocution of large birds.

Except from considering and applying the aforementioned measures, no further management and mitigation is required with regards to habitats, flora and fauna, because no residual significant adverse impacts are expected by construction/decommission of multiple solar PV plants and associated infrastructure in the Project Area.

#### Operation and maintenance phase

In order to protect habitats, flora and fauna in the three subareas, in particular species protected by Egyptian legislation (e.g. Rüppell's Sand Fox), the regulations defined in Article 28 of the Egyptian Law no. 4/1994 amended by Law no. 9/2009 have to be followed and best practice procedures and general mitigation measures during operation and maintenance have to be applied.

When cleaning solar PV panels an appropriate procedure shall be applied and the required amount of water shall be minimised in order to save resources and to minimise the impact on the biological environment.

Beyond that, no additional management and mitigation is required with regards to habitats, flora and fauna. No residual significant adverse impacts are expected by operation/maintenance of multiple solar PV plants and associated infrastructure in the Project Area.

#### Need for Post-Construction Monitoring / Risk Management

The gathered baseline data clearly shows that the East Solar subareas do not serve as an important habitat for plants. Animal species recorded in the East Solar subareas are quite widespread and can be found in several desert habitats in Egypt. The local fauna of the subarea is poor in species and density is low. Moreover, none of the recorded species is known to be endangered or threatened. Consequently, the East Solar subareas are not an important habitat for animals.

Hence, there is no need for additional baseline studies on flora and fauna in the three subareas (neither before nor during nor after construction of PV plants).

## **8.4 Social environment**

#### Management of impacts related to health and safety

Potential impacts on workers and community health and safety during construction of a project are those associated with any construction project involving earthmoving, use of large equipment, transportation of overweight and oversized materials, and construction and installation of industrial facilities. Additionally, health and safety issues include working in trenches or electrical works.

#### Mitigation measures:

- Investors will be contractually required to force contractors to keep the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) as a minimum standard. Besides keeping to the general guidelines regarding environmental, occupational health and safety and community health and safety aspects, of special relevance are the sector guidelines: IFC's Environmental Health and Safety Guidelines and the Environmental, Health, and the Safety Guidelines for Electric Power Transmission and Distribution as well as EBRD'S PR 4.
- In accordance with the Labour laws related to occupational health and safety No. 12 of year 2003, workers shall be oriented about health and safety procedures.
- The contractor and subcontractors shall assign a health and safety supervisor fully authorised to sanction any non-observance of H&S procedures.
- The contractor shall establish a health and safety plan prior to the start of construction works. He shall make health and safety facilities (i.e. firefighting equipment, a surgery room for first aid treatment, first aid materials, protective tools, etc.) available in the project site and shall have equipment for emergency evacuation to the next hospital standby at the site.
- As mentioned before, all personnel shall undergo an initial safety training specifically tailored to the individual work tasks.

#### Mitigation of impacts on the Bedouin community

Bedouins are a special ethnic group with own special culture, who traditionally consider the desert to be Bedouin land, even though the economic value of such ground, as in the subject Project Area, might be minor. The interests of Bedouin groups need to be considered when developing and implementing solar PV power projects.

This was an issue of concern for various stakeholders living in the villages in the Nile Valley or on new farms at the boundaries of the Project Area as found out by the Consultant during the fieldwork. The fact that they have their own unique culture that distinguishes them should be respected and appreciated. The following are key relevant recommendations:

#### Mitigation Measures:

- Bedouins should be consulted during the planning for the individual projects to ensure that any proposed development plan does not conflict with their reasonable interests. Participatory consultation tools should be employed during project execution and operation.
- Affording potential benefits such as job opportunities should be considered.
- The absence of information and statistics is a real challenge. There is a need to start by developing a database that includes information about the Bedouins community. This is essential for monitoring benefits from the project and to ensure that Bedouins are not excluded.

### Labour influx and labour and working conditions

#### Mitigation measures:

- Minimising the number of workers from outside the Governorates close to the Project Area is highly recommended. The contractor should be advised to employ construction labour from the nearest villages in the Nile Valley. The incentives to contractors for such a measure include reducing the need for accommodation and transportation for workers.
- Community leaders could take part in the process of employment in terms of informing their local community about job opportunities. This will fall under the responsibility of the Social Development Officer.
- Fundamental principles and rights of workers need to be respected in line with EBRD PR2 and IFC PS2 and with special reference to national labour and employment laws.
- The temporary accommodation facilities at the site need to be appropriate for its location and be clean, safe and, at minimum, meet the basic needs of workers as per IFC and EBRD Workers' accommodation: processes and standards<sup>1</sup>.
- Involve stakeholders and the public, implement consequential information disclosure, establish a grievance process and redress mechanism by NREA.

#### Mirror effect

Unlike Concentrated Solar Power (CSP) plants, mirror effects caused by the modules of a modern PV Plant are negligible. Thus, no special protection measures are required.

## **8.5 Special Mitigation Features in the individual East Solar Subareas**

### East Solar-1 subarea

Areas in the East Solar-1 subarea currently used or being under development for economic activities have to be considered to be preclusive. In addition, special features were identified that require specific mitigation: The important Wadi Ibadah and Wadi al-Birshawi has to be assessed as less favourable for solar PV plants, and thus, construction works in this Wadi complex shall be avoided as much as possible (see Map NTS 8–1).

### East Solar-2 subarea

Besides general mitigation measures to be applied to all solar PV plants, no special features in the East Solar-2 subareas were identified that require specific mitigation (see Map NTS 8–2).

### East Solar-3 subarea

Besides general mitigation measures to be applied to all solar PV plants, special features in the East Solar-3 subarea were identified that require specific mitigation: the important Wadi ash-Shaykh complex has to be assessed as less favourable for solar PV power developments, and thus, construction works in this Wadi complex shall be avoided as much as possible (see Map NTS 8–3).

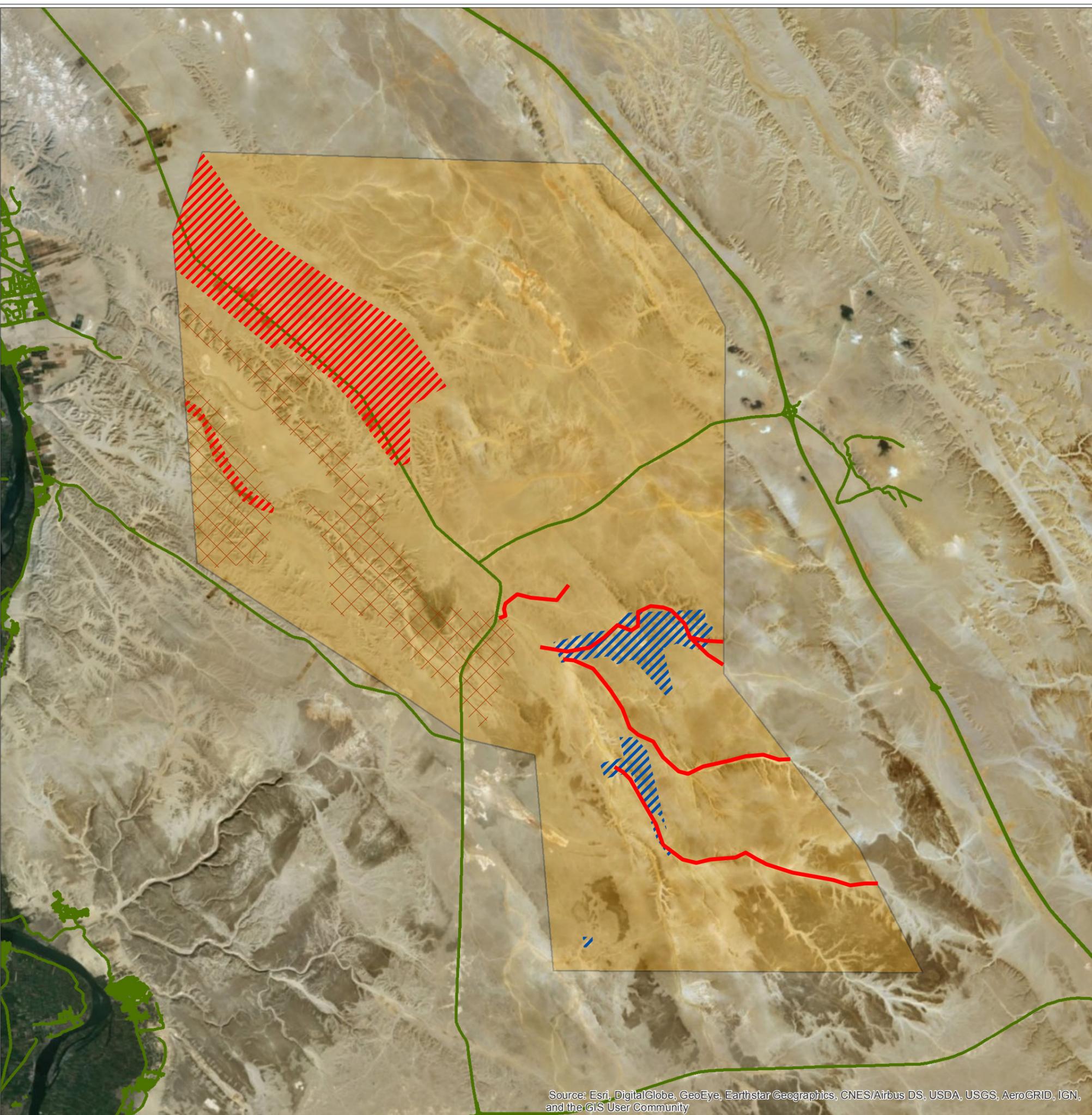
---

<sup>1</sup> <http://www.ebrd.com/downloads/about/history/workers.pdf>

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map NTS 8-1:**  
 Restrictions for solar power developments in the East Solar-1 subarea



**Bordering of East Solar-1 subarea**

 East Solar-1 subarea

**Roads**  
 road

**Zones preclusive for PV solar power development**

 due to economic activities (farming)  
 due to economic activities (mining)

**Zones unfavourable for PV solar power development**

 due to geomorphology  
 wadi of importance



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Strategic Environmental and Social Assessment of  
Renewable Energy Projects in the East Nile Region  
(Arab Republic of Egypt)  
SESA Solar Report**

client:  
New and Renewable Energy Authority (NREA),  
Ministry of Electricity and Renewable Energy

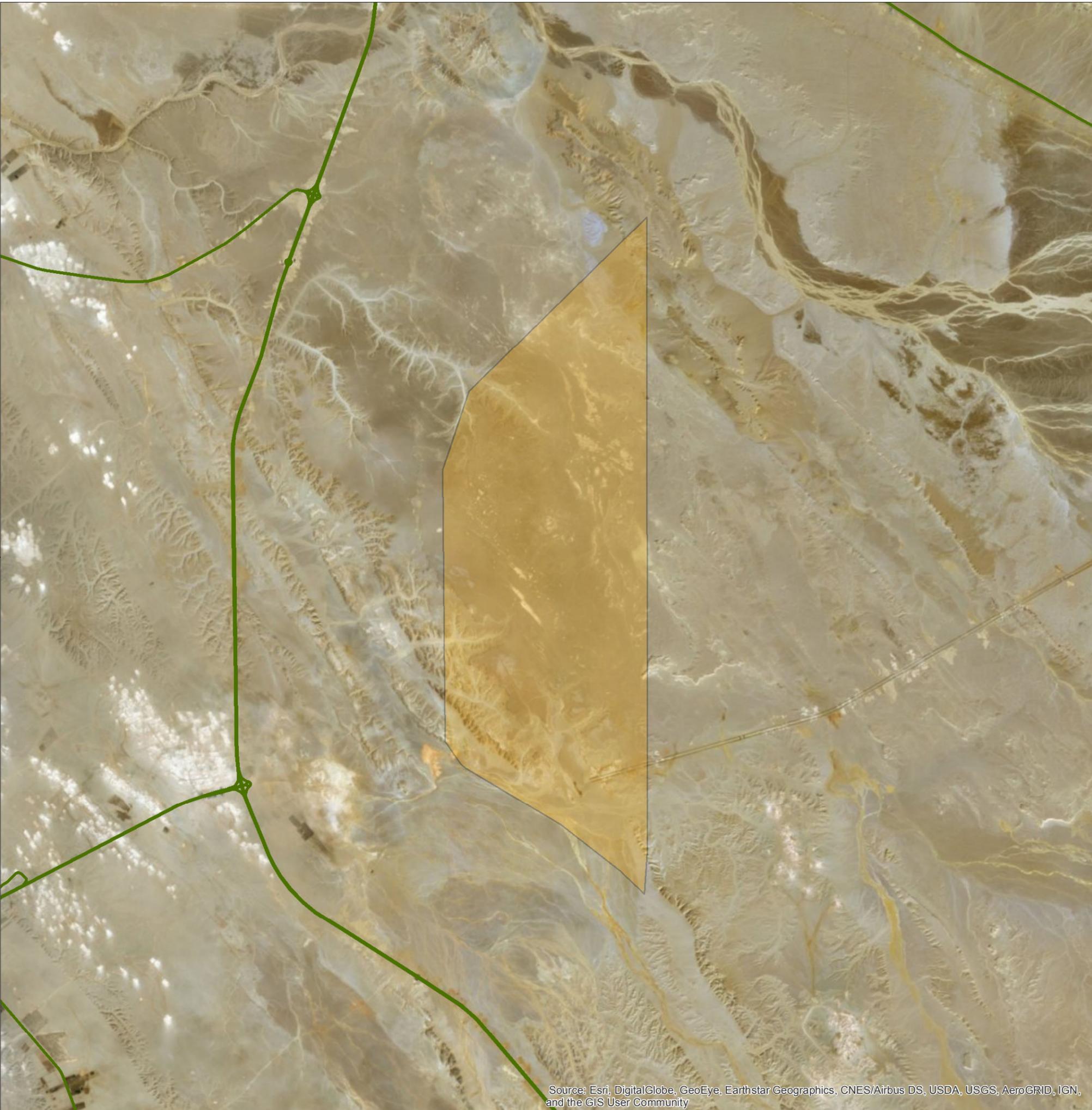
**Map NTS 8-2:**  
Restrictions for solar power developments  
in the East Solar-2 subarea

**Bordering of East Solar-2 subarea**

 East Solar-2 subarea

**Roads**  
 road

**No restrictions exists for PV solar power development  
in the East Solar-2 subarea!**



**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map NTS 8-3:**  
 Restrictions for solar power developments in the East Solar-3 subarea



**Bordering of East Solar-3 subarea**

 East Solar-3 subarea

**Roads**  
 road

**Zones preclusive for PV solar power development**  
 due to geomorphology

**Zones unfavourable for PV solar power development**  
 due to geomorphology  
 due to accessibility  
 wadi of importance



## 9 Environmental and Social Management and Monitoring Plan

It is understood that NREA will launch tenders for the selection of private investors for the individual 50 MW solar PV plant plots and will supervise the investors during the lifetime of the projects. It is essential that mitigation measures, i.e. the ESMP, become part of the tender documents and in the subsequent contract with investors. Moreover, thorough consideration/implementation of all requirements and measures needs to be supervised during planning, construction, operation and dismantling of each 50 MW solar PV plant. As part of this supervisory task NREA will also be the address and in charge of following up any grievance during the lifetime of each project.

The implementation of mitigation measures require actions during the bidding, planning, construction and post-construction phase for each individual solar PV plant that would be erected in the accepted area. This can be summarised in the following Environmental and Social Management Plan (ESMP). These actions will apply to all solar PV developments in the Project Area and where necessary will be supplemented with specific measures during individual project impact assessment and permission.

**Table NTS 9-1: Environmental and Social Management Plan**

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Environmental and Social Management
All Phases	<u>Grievance</u>	EBRD PR1 and PR 10, Best Practice	Introduce a grievance mechanism that applies through life cycle of the solar PV power development to be managed by the Egyptian Authority in charge.
Bidding and Planning Phase	<u>Health and safety risks</u>	EBRD PR1 and PR4, Voluntary and Best Practice	Make keeping standards as defined in the General IFC Environmental, Health and Safety Guidelines of April 2007 a minimum obligation in the Tender Documents for each individual plot.
			Make the assignment of a fully authorised health and safety engineer during the construction phase obligatory in the Tender Documents.
			Make a health and safety plan for each construction site obligatory in the Tender Documents.
			Make provision of safety tools & equipment as per accepted standards by the Contractor a bidding condition in the Tender Documents.
	<u>Keeping mitigation measures</u>	EBRD PR 1, Best Practice	Make keeping mitigation measures defined for the construction, operation and decommissioning phase in this study obligatory to investors as a minimum, when tendering the 50 MW plots.
	<u>Impact on habitats, flora and fauna</u>	EBRD PR 6, Best Practice	Avoid installing wire fences and steel cables or, if absolutely required, mark them in order to make them more perceivable. Avoid or minimise lighting of solar PV plants.

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Environmental and Social Management
			Avoid construction works in important Wadis systems. Avoid impacting on particular structures (like caves or crevices) that might form a suitable habitat for animals (to be considered in project-specific ESIA's).
		EBRD PR 6, Best Practice	Build the grid within a solar PV power project and the grid between different projects by underground cables. If the use of overhead lines cannot be avoided, such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015) in order to avoid the risk of electrocution of large birds.
<b>Construction phase</b>	<u>Health and safety risks</u>	EBRD PR4, EP3, Best Practice	Make Keeping the Equator Principle "EP3 - Applicable Environmental and Social Standards" as well as the IFC and EBRD Performance Standards (PS) respectively Performance Requirements (PR) as a minimum condition.
		EBRD PR4, Best Practice	Contractor and Subcontractor shall assign a health and safety engineer/supervisor fully authorised in giving health and safety instructions
		EBRD PR4, Best Practice	Establish an H&S plan prior to start of any construction measure.
		EBRD PR4, Best Practice	Make safety tools and equipment available and train in their proper utilisation.
		EBRD PR4, Best Practice	Construct and make available temporary hygienic sanitary facilities at the construction site.
		EBRD PR4, Best Practice	Assure stoppage of erection works during weather conditions beyond safety limits (e.g. sandstorms).
	<u>Protection of water resources</u>	EBRD PR3, Best Practice	Install water tanks to protect wells from over-utilisation: One tank at the batching plant with a minimum volume corresponding to the water demand for foundation pouring of one day. One tank at the water supply well with a minimum volume equal to the largest tank lorry. Minimise water consumption.
	<u>Traffic</u>	EBRD PR4, Best Practice	Carry out heavy haulage transports during hours of low traffic load (late evening or night times) and safeguard them with convoy cars.
	<u>Pollution</u>	EBRD PR3, Best Practice	Assure good workmanship and housekeeping supervised by skilled staff to assure minimise wastewater and solid waste generation and to assure adequate disposal of domestic, hazardous waste and wastewater
	<u>Non-hazardous waste disposal</u>	EBRD PR3, Best Practice	Collect and safely store, separate recyclable fraction, bury biodegradable fraction, ash and residual waste on an environmentally safe waste disposal site (treatment sites and landfills). If this is not practicable, desert pits with final soil coverage of at least 1.5 m).

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Environmental and Social Management
	<u>Hazardous waste disposal</u>	EBRD PR3, Best Practice	Avoid spillage of oil, diesel or grease into the soils, collect used oils or greases and bring it for recycling.
	<u>Domestic wastewater treatment</u>	EBRD PR3, Best Practice	Construct simple two-stage anaerobic treatment plant with rinsing of treated water into desert gravel for post-treatment at the sanitary facilities of each construction yard.
		EBRD PR3, Best Practice	At the end of construction works: Require the contractor to put the construction site into a tidy condition, excavations are to be backfilled, heaps of excavation material are to be levelled and waste is to be properly disposed of
	<u>Impact on habitats, flora and fauna</u>	EBRD PR 6, Best Practice	Restrict all activities to the boundaries of the construction areas, storage positions and access roads/tracks. Any use of the surroundings must be strictly avoided.
		EBRD PR 6, Best Practice	Avoid importing new species of urban and rural environments into the area (e.g. together with construction materials and containers).
		National Legislation	Comply with the regulations defined in Article 28 of the Egyptian Law no. 4/1994 for the Protection of the Environment amended by Law no. 9/2009.
	<u>Labour and working conditions</u>	EBRD PR 7, Best Practice	Employ as much construction labour as possible from near the areas where construction works will take place, i.e. from the nearest villages to the Nile Valley.
		EBRD PR 2 and PR 7, IFC PR2, Best Practice	Comply with the fundamental principles and rights of workers and accommodation standards fulfilling the requirements of EBRD (PR2) and IFC (PS2) and of the national labour and employment laws.
		EBRD PR 7, Best Practice	Any temporary accommodation facilities at the site need to be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers.
<b>Operation and maintenance phase</b>	<u>Health and safety risks</u>	EBRD PR4, Best Practice	Assure that O&M at the solar PV plant is only carried out by personnel who have passed a special safety training course.
	<u>Cultural Heritages</u>	EBRD PR 8, IFC PS 8, national Legislation	Develop a chance find procedure for use during construction. Train workers, contractors and sub-contractors in the implementation of the chance find procedure
<b>Decommissioning</b>	<u>Land-use and landscape</u>	EBRD PR 6, Best Practice	Remove solar PV installations at the end of the lifetime and bring the landscape into a tidy condition (levelling of heaps, backfilling of excavations)

## 10.8 Annex G: Non-Technical Summary – Arabic Version

# التقييم الاستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية في منطقة شرق النيل (جمهورية مصر العربية)

ملخص غير فني للتقرير النهائي للتقييم الاستراتيجي البيئي والاجتماعي  
لمشروعات الطاقة الشمسية



سبتمبر 2018

# التقييم الاستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية في منطقة شرق النيل – جمهورية مصر العربية

ملخص غير فني للتقرير النهائي للتقييم الاستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية

مقدم إلى:

هيئة الطاقة الجديدة والمتجددة

عناية المهندسة / نفيسة حسن

نسخة إلى: المهندسة / هالة – المهندسة / أسماء

J. Lea-Cox (EBRD), Y. Deghedi (EBRD)

إعداد:

JV Lahmeyer International GmbH & ecoda Environmental Consultants  
c/o Lahmeyer International GmbH  
Friedberger Str. 173  
61118 Bad Vilbel  
Germany

حالة التقرير: معتمد

تاريخ الإصدار:

الإصدار	التاريخ	إعداد	مراجعة	اعتماد	الوصف
01	8.11.2017	Dr. Frank Bergen Dr. Ernst Niemann Tony Moens de Hase Dr. Omneya Nour Eddin Matthias Drosch	Matthias Drosch	Matthias Drosch	ملخص غير فني لمسودة التقييم الإستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية
02	25.01.2018	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	ملخص غير فني للمسودة الثانية للتقييم الإستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية مع اعتبار ملاحظات هيئة الطاقة الجديدة والمتجددة
03	25.05.2018	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	ملخص غير فني لمسودة النهائية للتقييم البيئي والاجتماعي لمشروعات الطاقة الشمسية مع اعتبار ملاحظات هيئة الطاقة الجديدة والمتجددة
04	25.09.2018	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	ملخص غير فني للتقرير النهائي للتقييم البيئي والاجتماعي لمشروعات الطاقة الشمسية

## الفهرس

1.....	الأهداف والنطاق	1
1.....	1.1 أهداف ونطاق عملية التقييم الاستراتيجي البيئي والاجتماعي	1
2.....	1.2 أهداف ونهج تقرير التقييم الاستراتيجي البيئي والاجتماعي	2
3.....	2 منطقة المشروع	3
5.....	3 الإطار التشريعي والمواصفات الدولية البيئية والاجتماعية	5
6.....	4 وصف محطة طاقة شمسية نمطية في المنطقة	6
6.....	4.1 أعمال التشييد	6
7.....	4.2 أعمال التشغيل والصيانة	7
7.....	4.3 أعمال إنهاء التكليف	7
8.....	5 المنهجية والنهج	8
8.....	5.1 إشراك أصحاب المصلحة والتشاور الجماهيري	8
9.....	5.2 دراسات خط الأساس للبيئة الراهنة الفيزيائية والبيولوجية والاجتماعية	9
10.....	5.3 المعايير الفنية ومعايير استخدام الأراضي لتصنيف المناطق على أنها غير موائمة	10
10.....	5.4 النهج الأساسي لتقييم الأثر البيئي	10
11.....	6 البيئة الراهنة	11
11.....	6.1 البيئة الفيزيائية	11
15.....	6.2 البيئة البيولوجية	15
19.....	6.3 البيئة الاجتماعية والاقتصادية	19
22.....	7 توقع الآثار	22
22.....	7.1 البيئة الفيزيائية	22
25.....	7.2 البيئة البيولوجية	25
29.....	7.3 البيئة الاجتماعية والاقتصادية	29
32.....	8 اجراءات التخفيف	32
32.....	8.1 أساليب الإدارة والتخفيف العامة – أفضل الممارسات	32
33.....	8.2 البيئة الفيزيائية	33
35.....	8.3 البيئة البيولوجية	35
36.....	8.4 البيئة الاجتماعية	36
38.....	8.5 إجراءات التخفيف الخاصة في مناطق الرياح الشرقية الفرعية	38
40.....	9 الإدارة البيئية والاجتماعية وخطة المراقبة	40

## قائمة الأشكال

شكل 1-6- طبقات الحجر الجيري عند WP60\_4 في شمال المنطقة الشمسية الشرقية الفرعية 2 (على اليسار) وطبقات الحجر الجيري عند WP42\_3 (المنطقة الشمسية الشرقية 3)

## قائمة الجداول

جدول 1-9- خطة الإدارة البيئية والاجتماعية

## قائمة الخرائط

خريطة 1-2- منظر عام لموقع ومدى منطقة المشروع وللمناطق الفرعية استناد الى قيود الارتفاع الراهنة المتعلقة بمشروعات الطاقة المتجددة

خريطة 1-8- المناطق الغير موائمة لمشروعات الطاقة الشمسية في المنطقة الشمسية الشرقية الفرعية 1

خريطة 2-8- المناطق الغير موائمة لمشروعات الطاقة الشمسية في المنطقة الشمسية الشرقية الفرعية 2

خريطة 3-8- المناطق الغير موائمة لمشروعات الطاقة الشمسية في المنطقة الشمسية الشرقية الفرعية 3

## 1- الأهداف والنطاق:

### 1-1- أهداف ونطاق عملية التقييم الاستراتيجي البيئي والاجتماعي الشاملة:

حددت الحكومة المصرية ثلاث مناطق كبيرة مناسبة لتطوير مزارع الطاقة المتجددة لمشروعات طاقة الرياح والطاقة الشمسية في مصر، ومن بين هذه المناطق تم تخصيص مساحة تبلغ 2200 كيلومتر مربع بمساحة صالحة للاستعمال قدرها 1725 كيلومتر مربع (تم استبعاد 425 كيلومتر مربع بسبب قيود الارتفاع العسكرية - أنظر القسم 2) واقعة شرق نهر النيل عبر ثلاث محافظات هي بني سويف والمنيا وأسيوط وقد تم تحديدها استنادًا إلى البيانات الموجودة عن الطاقة الشمسية وطاقة الرياح واستخدام الأراضي الحالية ("منطقة المشروع" - انظر القسم 2). ولضمان إجراء تقييم على المستوى الاستراتيجي للأمور البيئية والاجتماعية المحتملة المرتبطة بتطوير هذه المشاريع وإخطار متخذي القرار لتطوير المشروع، فقد تم إجراء عمليتين للتقييم الاستراتيجي البيئي والاجتماعي. والتقييم الاستراتيجي البيئي الاجتماعي هو عملية منهجية منظمة لدعم اتخاذ القرار تساعد على ضمان اعتبار الجوانب البيئية والاجتماعية وغيرها من جوانب الاستدامة بشكل فعال في السياسة والتخطيط وصنع البرامج، وتتضمن عملية التقييم الاستراتيجي البيئي الاجتماعي لمنطقة المشروع الأهداف التالية:

- توفير مصدر موثوق للبيانات البيئية والاجتماعية لمنطقة المشروع تنفيذ خطط تنمية الطاقة المتجددة وللحصول على الموافقات البيئية وتمويل المشاريع المتعلقة.
- تحديد المناطق التي بها حاليا قيود تقنية أو اجتماعية لتطوير مشروعات الطاقة المتجددة داخل منطقة المشروع.

- تحديد وتقييم الآثار البيئية والاجتماعية المحتملة المرتبطة بتطوير وتشغيل مشروعات الطاقة المتجددة في منطقة المشروع وتحديد تدابير التخفيف والإدارة لمعالجة هذه الآثار المحتملة بما في ذلك التوصيات المتعلقة بترتيب قطع الأراضي لمشاريع طاقة الرياح أو الطاقة الشمسية.
- تحديد الأماكن في منطقة المشروع المناسبة لمحطات الطاقة المتجددة على أساس نتائج تقييم الأثر البيئي والاجتماعي.
- اشراك أصحاب المصلحة بما في ذلك الجمهور في التخطيط المزمع لمشاريع الطاقة المتجددة في منطقة المشروع.
- إنشاء قاعدة بيانات لنظام المعلومات الجغرافية (GIS) يتم استخدامها في اقامة مشاريع الطاقة المتجددة المستقبلية.
- تحديد التوزيع المكاني لمشاريع طاقة الرياح والطاقة الشمسية المحتملة للمنطقة.
- تحديد وتحديد أفضل المجالات الممكنة لتطوير طاقة الرياح والطاقة الشمسية مع الأخذ في الاعتبار الجوانب التقنية والبيئية والاجتماعية المحتملة لمشاريع الطاقة المتجددة.
- تحديد المتطلبات الإضافية الراهنة (الحصول على مزيد من البيانات / اجراء قياسات، دراسات، إدارة) لتنمية موارد الطاقة المتجددة في المناطق المحددة.
- وبالإضافة إلى ذلك ، خلال عملية التقييم الاستراتيجي البيئي الاجتماعي قام استشاري الدراسة بتدريب موظفي هيئة الطاقة الجديدة والمتجددة على عملية التقييم الاستراتيجي البيئي الاجتماعي وعلى عملية تقييم الأثر البيئي الاجتماعي وعلى نظام المعلومات الجغرافية.

## 2-1- أهداف ونهج تقرير التقييم الاستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح:

يركز تقرير التقييم الاستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية على التقييم الاجتماعي والبيئي لتحديد مدى ملاءمة مشروعات الطاقة الشمسية في المنطقة الشمسية الشرقية الفرعية 1 والمنطقة الشمسية الشرقية الفرعية 2 والمنطقة الشمسية الشرقية الفرعية 3 التي حددتها هيئة الطاقة الجديدة والمتجددة مع الأخذ في الاعتبار القيود الفنية أو الاجتماعية أو البيئية.

وباعتبار السمات البيئية والاجتماعية والتقنية وأهمية الآثار المتوقعة فقد حددت الدراسة:

- المناطق المواتية لمشروعات الطاقة الشمسية

- المناطق الأقل ملاءمة ، ولكن يمكن اقامة محطات طاقة شمسية بها بقيود ، و

- المناطق التي يتم فيها منع اقامة محطات للطاقة الشمسية.

والنتائج التي تم إدخالها أيضاً في قاعدة بيانات نظام المعلومات الجغرافي GIS قد تم ادراجها عن طريق تغطية المعايير الصارمة والآثار المتوقعة، وهكذا في إطار تقرير التقييم الاستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية فقد تم تصنيف المناطق من وجهة نظر المعايير الاجتماعية والبيئية فضلا عن القيود المادية المادية، وسيتم إجراء مزيد من التمايز داخل المناطق الفرعية ذات السمات الفنية والبيئية والاجتماعية المتساوية (مواتية أو أقل تفضيلاً) وفقاً لتوزيع الطاقة الشمسية المكاني الذي لا يشكل جزءاً من هذا التقرير وسيتم التعامل معه في تقرير التوصيات النهائي.

وهذا التقرير عن التقييم الاستراتيجي البيئي والاجتماعي لمشروعات الطاقة الشمسية مماثل لدراسة إقليمية لتقييم الأثر البيئي والاجتماعي (ESIA) للمناطق الشمسية الشرقية الفرعية 1، 2 & 3 ويجب

JV



أن ييسر في وقت لاحق الحصول على التصاريح البيئية لمحطات الطاقة الشمسية قدرة 50 ميغاوات التي سيقوم بها المستثمرين من القطاع الخاص.

## 2- منطقة المشروع:

تشير منطقة شرق النيل أصلاً إلى مساحة 2200 كيلومتر مربع مع منطقة صالحة للاستعمال تبلغ 1725 كيلومتر مربع ، وتقع بشكل أساسي في محافظة المنيا وتمتد الأجزاء الصغيرة إلى محافظة أسيوط في الجنوب وإلى محافظة بني سويف في الشمال (أنظر خريطة 1-2) ومع التعديل في عام 2016 تم استبعاد ثلاث مناطق فرعية بمساحة كلية 425 كم 2 من مشروعات طاقة الرياح بسبب قيود الارتفاع العسكرية ("أنظر خريطة 1-2) مما أدى إلى تحديد عدد 2 منطقة فرعية للرياح (منطقة الرياح الشرقية 1 و منطقة الرياح الشرقية الفرعية 2) وعدد 3 منطقة لمشروعات الطاقة الشمسية (المنطقة الشمسية الشرقية الفرعية 1، 2 & 3) التي حددتها هيئة الطاقة الجديدة والمتجددة ويناقش هذا التقرير المناطق الشمسية الشرقية الفرعية 1، 2 & 3

تقع منطقة المشروع في الصحراء الشرقية وتتكون من مرتفعات رملية متدرجة ترتفع فجأة من وادي النيل وتدمج على مسافة 80 - 137 كم شرق النيل في جبال البحر الأحمر.

### المنطقة الشمسية الشرقية الفرعية 1:

المنطقة الشمسية الشرقية الفرعية 1 هي أكبر منطقة (بمساحة 416 كم 2) والأكثر توجها للجنوب وأقصى طول لهذه المنطقة الفرعية هو حوالي 28 كم من الشمال للجنوب وعرضها 18 كم (من الغرب للشرق) في الشمال و 11 كم في الجنوب.

وهذه المنطقة تقع في محافظة المنيا والجزء الغربي منها على مسافة 5 كم من وادي النيل وهي تبدأ من مسافة 10 كم جنوب المنطقة الشمسية الشرقية الفرعية 3 وتتصل بالمنطقة الشمسية 2 في الجنوب.

### المنطقة الشمسية الشرقية الفرعية 2:

تبلغ مساحة المنطقة الشمسية الشرقية الفرعية 2 حوالي 179 كم2 وتقع شرق محافظة المنيا وتبدأ على مسافة 15 كم جنوب المنطقة الشمسية 3 ويعبر هذه المنطقة في الجنوب طريق المنيا – رأس غارب الجديد.

### المنطقة الشمسية الشرقية الفرعية 3:

تبلغ مساحة المنطقة الشمسية الشرقية الفرعية 3 حوالي 363 كم2 وتقع جنوب القاهرة على مسافة 160 كم منها وعلى مسافة 60 كم من بني سويف وهي تقع شمال شرق الجرف وجزئها الجنوبي الشرقي على حافة الجرف الذي يمتد لمسافة 70 كم إلى الشرق موازيا لطريق رأس غارب القديم ومعظم هذه المنطقة يتكون من أراضي معقدة بأودية عميقة.

وفي تقرير التقييم الاستراتيجي البيئي والاجتماعي يتم استخدام المصطلحات التالية للتمييز بين المناطق المختلفة:

- منطقة المشروع: المنطقة الكلية القابلة للاستخدام لمشروعات الطاقة المتجددة بمساحة 1725 كيلومتر مربع.
- المناطق الفرعية: المنطقة الشمسية الشرقية الفرعية 1 ، 2 ، 3
- المناطق: تصنيف المناطق من حيث الموالية، الأقل تفضيلاً، المستبعدة كما هو محدد في القسمين 5 و 6 من التقرير.

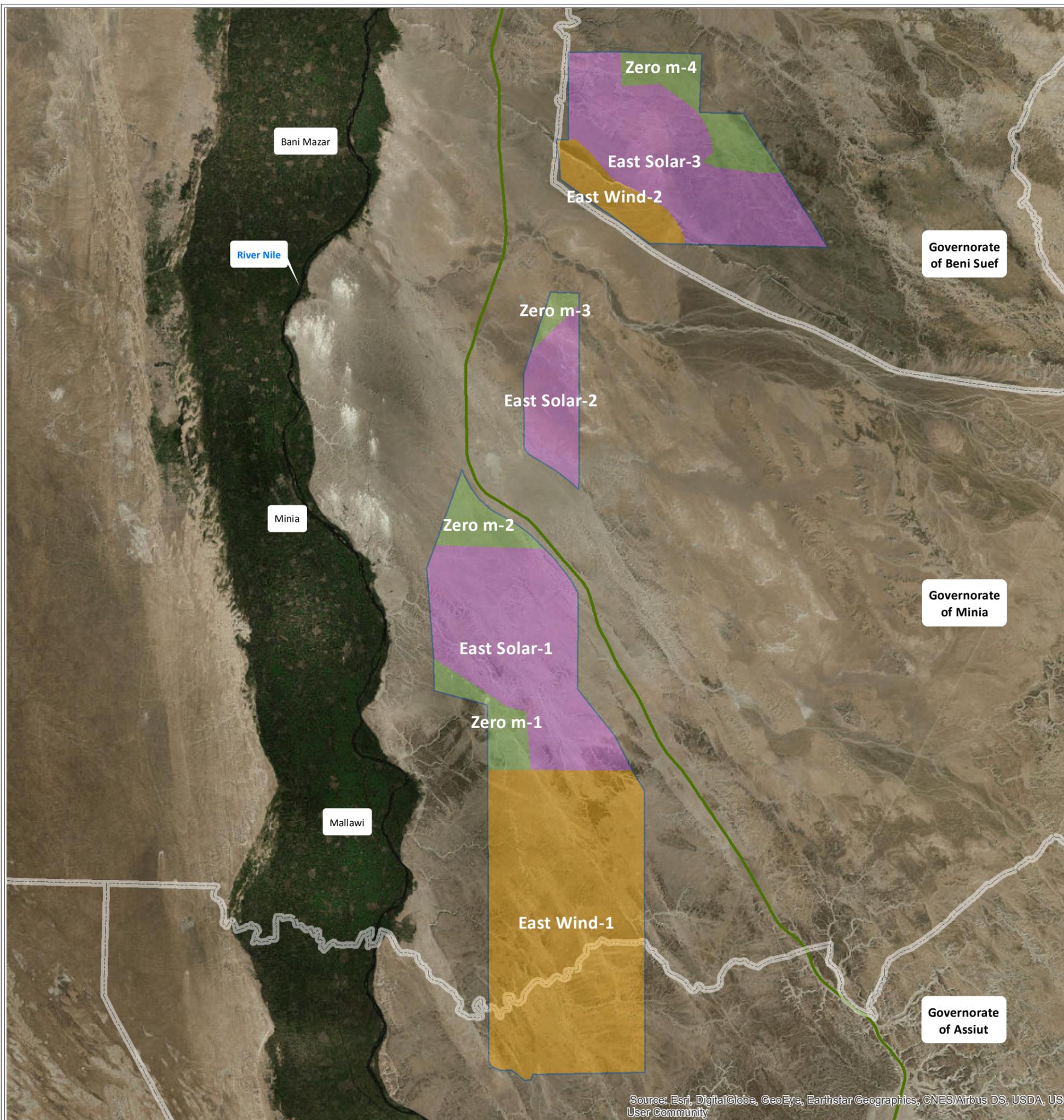
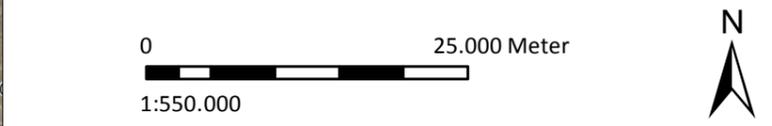
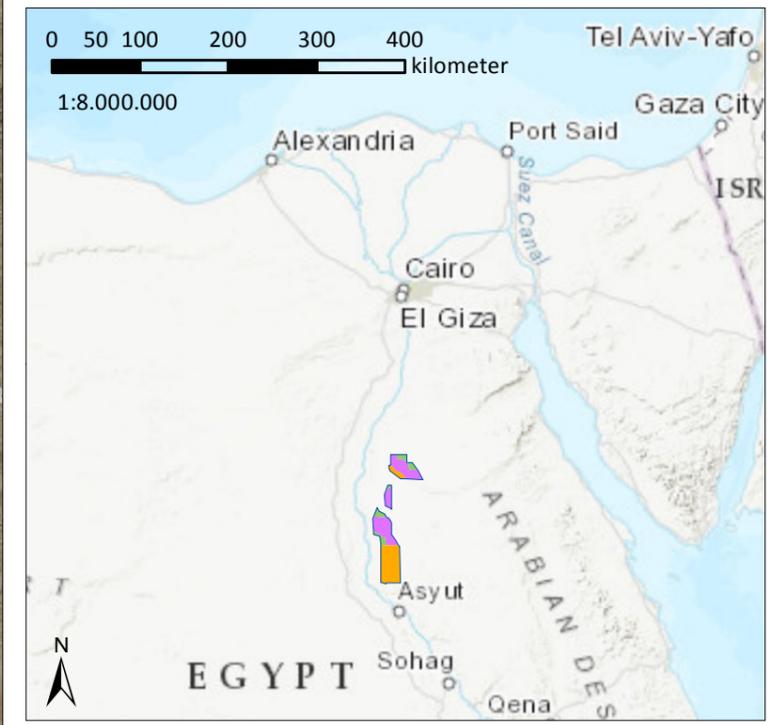
**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map NTS 2-1:**  
 Overview on the location and the extent of the Project Area and of different subareas based upon already prescribed height restrictions for RE developments

**Bordering of project area and subareas**

-  project area
-  subarea not useable for RE developments (due to height restrictions "Zero")
-  subarea usable for PV solar power projects (due to height restrictions "5 m")
-  subarea usable for wind power projects (due to height restrictions "150 m")
-  borders between governorates
-  Cairo – Asswan Highway



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, US User Community

### 3- الإطار التشريعي والمعايير البيئية والاجتماعية الدولية:

سيأخذ تقرير التقييم الاستراتيجي البيئي والاجتماعي في الاعتبار الإطار القانوني والتنظيمي المصري ومتطلبات البنك الأوروبي لاعادة التعمير والتنمية ومبادئ خط الإستواء، وفي حين أن الالتزام بالمتطلبات القانونية والتنظيمية المصرية هو أمر إلزامي ، فإن تقرير التقييم الاستراتيجي البيئي والاجتماعي سوف يعتمد على المتطلبات الأكثر صرامة سواء كانت مصرية أو دولية وفقا لأيهما أكثر صرامة، مما يضمن تحقق شروط تمويل المشروع الدولي في وقت لاحق.

#### 4- وصف لمحطة طاقة شمسية نمطية في المنطقة:

سمات محطة الطاقة الشمسية النمطية هي:

لسمات النمطية لمحطة طاقة شمسية هي:

- يتم اقامة محطات الطاقة الكهروضوئية على الأرض على أرض مستوية أو منحدره قليلاً (منحدرات مواجه للجنوب للأماكن الواقعة في الجزء الشمالي من الأرض (حيث تقع منطقة المشروع) وتواجه الشمال في حالة الجزء الجنوبي من الأرض.
- يتم تثبيت الوحدات الكهروضوئية على هياكل متدرجة موزعة على الصفوف (وفقاً للتصميم المخطط) في جميع أنحاء الأراضي المناسبة وتعتمد المسافة بين الصفوف على خصائص التقنية وخصائص الموقع.
- تبعاً لخصائص التربة يتم تثبيت هياكل التركيب بشكل عام بواسطة أعمدة من الصلب.
- يتم توصيل الوحدات الشمسية الكهروضوئية على التوالي ثم يتم توصيلها على التوازي في مربعات دمج تيار مستمر من خلال فيوزات تحمي الوحدات في حالة التيار المرتفع أو العكسي، ومن صناديق التوصيل يتم توصيل الوحدات بمحولات للتيار المتردد وتصبح مصفوفات شمسية يكون لكل حقل فرعي عاكس ومحولات جهد متوسط ومفاتيح كهربائية جهد متوسط.

- يوجد في كل مجموعة وحدات محولات لتحويل كهرباء التيار المستمر المتولد من المصفوفات الشمسية الكهروضوئية (من خلال كابلات الجهد المنخفض) إلى تيار متردد.
  - يتم تغذية التيار المتردد إلى المحولات قبل أن يتم نقله من خلال خطوط النقل من المحطة الشمسية الكهروضوئية إلى أقرب محطة فرعية ويمكن أن تكون هذه الخطوط إما تحت الأرض أو علوية.
  - ويجب اقامة طرق داخلية يبلغ عرضها حوالي 5 أمتار لكي تستخدمها الشاحنات التي تنقل الوحدات الكهروضوئية.
  - يتم اقامة طرق الوصول الخارجية من شبكة الطرق القائمة.
  - يتم اقامة مباني الخدمات المركزية مثل غرفة التحكم ومخازن قطع الغيار وورشه العمل ومرافق لموظفي الخدمة.
- وفي البداية سيتم تمهيد نحو 90% من منطقة المحطة الشمسية الكهروضوئية لتسوية الموقع وتركيب قواعد تركيب الألواح الشمسية بالإضافة إلى أنشطة النقل المكثفة وبعد تشغيل المحطة الشمسية ستغطي الوحدات الشمسية الكهروضوئية نحو 65% - 75% من منطقة المحطة الكهروضوئية. ومع ذلك فإن الأرض خارج الوحدات الكهروضوئية لن تتأثر مباشرة خلال مرحلة التشغيل (انظر أيضا القسم 5-6 من الملخص غير الفني).

#### 1-4 - أعمال التشييد:

تشمل أعمال التشييد لمشروع مزرعة الرياح النمطية أعمال مدنية وميكانيكية وكهربائية.

العناصر الرئيسية للأعمال المدنية هي تسوية وتمهيد التربة وصب الأساسات الخرسانية لتركيب الألواح الشمسية وصب أساسات المباني المتعلقة (مثل المباني الخدمية وغرفة التحكم والمحطات الفرعية) وأعمال حفر خنادق الكابلات وردمها وأعمال الطرق.

وتتلخص الأعمال الميكانيكية في تجميع وتركيب الألواح الشمسية واقامة سور حول الموقع ويمكن تركيب الألواح الشمسية بطريقة ثابتة مائلة أو بطريقة قابلة للتغير وفقا للتصميم المعتمد.

والعناصر الرئيسية للأعمال الكهربائية هي تركيب الألواح الشمسية وتوصيلها وأعمال الكابلات والمحولات.

#### 2-4 - أعمال التشغيل والصيانة:

تشتمل أنشطة التشغيل والصيانة على التحكم / التشغيل العادي لمحطة الطاقة الشمسية بالإضافة إلى استكشاف الأخطاء وإصلاحها والصيانة المقررة، وباعتبار أن عمليات التحكم في محطات الطاقة الشمسية يمكن أن تتم عن طريق التحكم عن بعد فإن الأنشطة المعنية لمحطة الطاقة الشمسية بقدرتها 50 ميغاوات تكون عادة محدودة ولا تتطلب وجود دائم للموظفين في الموقع، ومع ذلك فيجب أن يكون موظفي التشغيل والصيانة متاحين خلال 24 ساعة لإصلاح أي خلل (على سبيل المثال تغيير الفيوزات والمتحسسات وفحص وإعادة تشغيل المحطة لتجنب توقف توليد الطاقة الكهربائية.

ومن أهم أنشطة صيانة المحطات الشمسية تنظيف الألواح بالهواء أو الماء التي يجب أن تظل نظيفة حتى لا تتأثر الطاقة الكهربائية المتولدة.

وبالنسبة للتشغيل والصيانة يجب تخزين مجموعة محددة من قطع الغيار بالقرب من الموقع بحيث لا يحدث تأخير في الصيانة وتوقف لتوليد الطاقة الكهربائية، وبناءً على ذلك يجب ألا يكون مبنى تخزين قطع الغيار بعيداً عن الموقع.

#### 3-4 - أعمال إنهاء التكليف:

يتم تصميم التوربينات الهوائية لعمر تشغيل 25 سنة وقد يتم تشغيلها لمدة 40 سنة بالصيانة الصحيحة، وإنهاء التكليف يعني إزالة الألواح الشمسية وأساسها والبنية التحتية الكهربائية وإعادة الموقع لحالته الأصلية.

وإنهاء التكليف يفيد في عمليات إعادة التدوير والاستفادة بالمعادن الثمينة وبالتالي فهو ذو مصلحة تجارية.

## 5- المنهجية والنهج:

### 1-5- إشراك أصحاب المصلحة والتشاور الجماهيري:

يتضح منهج التقييم الاستراتيجي البيئي والاجتماعي لإشراك أصحاب المصلحة في خطة إشراك أصحاب المصلحة المرفقة بتقرير تحديد النطاق (راجع الملحق A1 من تقرير التقييم الاستراتيجي البيئي والاجتماعي) وتعتبر خطة إشراك أصحاب المصلحة وثيقة حية تم تنفيذها وتحديثها أثناء إعداد التقييم الإستراتيجي البيئي والاجتماعي وأثناء تنفيذ مشاريع الطاقة المتجددة في منطقة المشروع إذا لزم الأمر. وفي خطة إشراك أصحاب المصلحة يتم تحديد أصحاب المصلحة في المشروعات مع الأخذ في الاعتبار المراحل المختلفة عندما يتم إشراك أصحاب المصلحة ، بما في ذلك الجمهور ، وكيفية الإفصاح عن المعلومات أثناء وبعد عملية التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح.

وكخطوة أولى في إشراك أصحاب المصلحة والإفصاح عن المعلومات لهم تم إصدار مسودة تقرير تحديد النطاق بعد تقديمه إلى هيئة الطاقة الجديدة والمتجددة في 27 يونيو 2016 وتم تعميمه على مختلف أصحاب المصلحة الرئيسيين ، بما في ذلك في المحافظات الثلاث ، إلى جانب دعوة للإجتماع في ١٢ يوليو ٢٠١٦ في مقر هيئة الطاقة الجديدة والمتجددة في القاهرة. وقد تم الإفصاح عن المسودة وتقرير تحديد النطاق النهائي اللذان أخذا في اعتبارهما ملاحظات أصحاب المصلحة التي تم تلقيها خلال اجتماع تحديد النطاق ، على الصفحات الرئيسية لهيئة الطاقة المتجددة والبنك الأوروبي لاعادة التعمير والتنمية.

وخلال البعثات الاستطلاعية المختلفة للموقع للاستشاريين تم التحدث مع الأشخاص الذين تم مقابلتهم مصادفة في منطقة المشروع وتم توزيع نشرات معلومات المشروع باللغة العربية (انظر الملحق C لتقرير التقييم الإستراتيجي البيئي والاجتماعي) وتم توثيق نتائج جميع المقابلات في استمارات المقابلات (انظر الملحق D لتقرير التقييم الإستراتيجي البيئي والاجتماعي) ويمكن الاطلاع على ملخص للردود الواردة في تقرير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح، القسم 5 وفي القسم 5-3-1-7 خاصة.

كما تم زيارة أصحاب المصلحة الرئيسيين مثل محافظات المنيا وأسيوط في 4 أكتوبر 2016 و 31 أكتوبر 2016 (المنيا وأسيوط) وبالإضافة إلى ذلك فقد اخطرنا هذه المحافظات أن يرسلوا ملاحظاتهم من خلال الفاكس أو البريد الإلكتروني أو البريد العادي إلى هيئة الطاقة المتجددة.

تم تحديد نطاق تقرير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح ومحطات الطاقة الشمسية في مرحلة مبكرة منه من خلال دراسة نطاقية (تم توثيق النتائج في تقرير منفصل وتم تقديمها في أكتوبر 2016 كما هو مذكور أعلاه) وحدد النطاق نطاق الآثار المحتملة التي قد تكون كبيرة وستصبح المحور الرئيسي لتقرير التقييم الإستراتيجي البيئي والاجتماعي كما حدد أيضا توافر البيانات وثغرات البيانات والنطاقات المكانية والزمنية المناسبة للتقييم ومنهجيات مسح مناسبة.

وسيتم الإفصاح عن المسودة النهائية لتقرير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح بالإضافة إلى المسودة النهائية لتقرير التقييم الإستراتيجي البيئي والاجتماعي لمحطات الطاقة الشمسية لأصحاب المصلحة والجمهور وسيتم مناقشتها خلال جلسة استماع عامة باتباع الإجراءات المحلية والسياسة البيئية والاجتماعية للبنك الأوروبي لإعادة التعمير والتنمية، وبالتالي سيتم الإفصاح عن المسودة النهائية لتقارير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح والمحطات

الشمسية على الصفحات الرئيسية للبنك الأوروبي وهيئة الطاقة المتجددة بالإضافة إلى الإخطار المباشر لأصحاب المصلحة المسجلين بما في ذلك إخطار الجمهور بتوافر هذه التقارير، وبالنسبة لمشروعات القطاع الخاص تدعو السياسة البيئية والاجتماعية للبنك الأوروبي لإعادة التعمير لضرورة الإفصاح لمدة 60 يومًا و 120 يومًا لمشاريع القطاع العام، وباعتبار أن تقرير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح هو أول تقييم للمشاريع الخاصة الممولة من القطاع الخاص فقد قبل البنك الأوروبي لإعادة التعمير والتنمية تطبيق الحد الأدنى لمدة الإفصاح وهو 60 يومًا.

تهدف عملية المشورة الجماهيرية إلى التقليل من الآثار البيئية والاجتماعية السلبية المحتملة وتعزيز القبول الاجتماعي للمشروع وإخطار الأطراف المعنية بأن الآثار البيئية والاجتماعية سوف يتم تقليلها إلى مستويات منخفضة بقدر ما هو معقول وتحقيق التوازن بين المتطلبات المشروعة للتنمية وحماية البيئة.

تم عقد جلسة الاستماع العامة بتاريخ 28 يونيو 2018 في منتجع حورس السياحي في المنيا، بعد 28 يوم من توافر المسودة النهائية لتقرير التقييم الاستراتيجي البيئي والاجتماعي حيث وتعتبر فترة زمنية مناسبة. الإعلان عن جلسة الاستماع العامة تم عبر جريدة الأخبار وذلك 24 يوم قبل تاريخ الجلسة المحدد.

نتائج جلسة الاستماع تم توثيقها في تقرير منفصل والذي تم تقديمه في سبتمبر 2018. لم تثر أي مخاوف أو شكوك إضافية خلال جلسة الاستماع بشأن القضايا الاجتماعية أو البيئية والتي تم بالفعل تناولها في مسودة تقرير التقييم الاستراتيجي البيئي والاجتماعي. ولذلك، لم تكن هناك حاجة إلى وزن الحجج والتعديلات أو الإضافات. كانت جلسة الاستماع العامة تتعامل بشكل رئيسي مع

التوضيحات وخلق فهم أفضل للحدود في تقرير التقييم الاستراتيجي البيئي والاجتماعي؛ خصوصا فيما يتعلق بعدد فرص العمل ومشاركة الحكومة والمرافق والمستثمرين.

بعد جلسة الاستماع العامة تم منح أصحاب المصلحة مدة شهر كامل لتقديم ملاحظاتهم بشكل كتابي. وكما كان الحال في جلسة الاستماع العامة، لم يتم تلقي أي مخاوف أو حجج إضافية. وبالمثل، سيتم الإفصاح مرة أخرى عن مسودة تقارير والتقرير النهائي للتقييم الاستراتيجي البيئي والاجتماعي، وتقرير التوصيات الختامي على المواقع الالكترونية لهيئة الطاقة الجديدة والمتجددة والبنك الأوروبي لإعادة الإعمار والتنمية وفقا لنفس المبدأ التوجيهي.

#### 2-5- دراسات خط الأساس للبيئة الراهنة الفيزيائية والبيولوجية والاجتماعية:

تمت دراسة بيانات خط الأساس حول البيئة الفيزيائية والبيولوجية والاجتماعية لمنطقة المشروع من خلال:

- دراسات سطح المكتب أي من خلال مراجعة الدراسات السابقة المتاحة وبحث البيانات المتوفرة رسميا من قبل جهاز شئون البيئة المصري ومن البيانات الموجودة على شبكة الإنترنت العالمية وعبر صور الأقمار الصناعية المتاحة.
- الاتصال بالمحافظات للاستفسار عن البيانات والمعلومات.
- مقابلات مع السكان المحليين.

- عدة تحقيقات ميدانية خاصة داخل وبجوار منطقة المشروع بين ربيع عام 2016 و ربيع 2017.

وقد تركزت دراسة البيئة الطبيعية على المناخ والجيومورفولوجيا والظروف الهيدرولوجية وموارد المياه. ولوصف البيئة البيولوجية لمنطقة المشروع تم جمع بيانات خط الأساس عن المناطق المحمية والموائل والنباتات والحيوانات وقد كان تركيز الدراسة في البيئة الاجتماعية على القضايا العامة والإدارية والبنية التحتية القائمة مثل طرق الوصول المعبدة وشبكة الطاقة واستخدام الأراضي الحالية والظروف الاجتماعية.

### 3-5- المعايير الفنية ومعايير استخدام الأراضي لتصنيف المناطق على أنها غير موائمة:

استناداً إلى المعلومات التي تم جمعها تم فحص المناطق الشمسية الشرقية الفرعية 1 ، 2 & 3 فيما يتعلق بالقيود الناجمة عن التنافس في استخدام الأراضي والقيود الفنية مما يعوق إقامة محطات الطاقة الشمسية أو يجعل الأمر أكثر صعوبة وهذا يؤدي إلى تصنيف المناطق على أنها غير موائمة أي غير قابلة للاستخدام في مشاريع الطاقة الشمسية أو أقل ملاءمة، وفي هذا السياق كانت المعايير ذات الصلة هي: إمكانية الوصول / البعد ، والجيومورفولوجيا والتنافس على استخدام الأراضي (مثل الزراعة).

### 4-5- النهج الأساسي لتقييم الأثار البيئية:

تحدث الأثار البيئية عند وقوع تفاعلات بين أنشطة المشروع والمستقبلات في المنطقة المحيطة، ووفقا لمعيار ISO14001: 2004 ، يتم تعريف الأثر على أنه: "أي تغيير في البيئة ، سواء كان ضاراً أو مفيداً ، ناتجاً كلياً أو جزئياً عن الجوانب البيئية للمؤسسة (الأنشطة أو المنتجات أو الخدمات)".

وبعد تحديد الآثار البيئية بشكل كامل، سواء كانت سلبية أو مفيدة، يكون من الضروري الحكم على أهمية كل أثر وتحديد ما إذا كان مقبولاً أم لا، أو يتطلب التخفيف أو غير مقبول، وفي إطار عملية التقييم يتم تصنيف الآثار وفقاً لأهميتها والتي هي دالة في "حجم الحدث" و "حساسية المستقبل" ويتطلب تحديد حجم الحدث وتقدير مصادر الآثار البيئية والاجتماعية المحتملة من أنشطة المشاريع الروتينية وغير الروتينية، وتصنف مقادير الحدث وفقاً لمدى وتكرارية ومدّة وشدة حدث منخفض أو متوسط أو مرتفع، وتتطلب حساسية المستقبل فهماً للبيئة الفيزيائية والبيولوجية والاجتماعية، ومعايير تقييم حساسية المستقبل (منخفضة، متوسطة، عالية) هي على سبيل المثال: منطقة التأثير والنسبة المئوية من الموارد المتأثرة واستمرار التأثير وحساسية الموارد، ويتم الحصول على دلالة التأثير عن طريق زيادة حجم الحدث وحساسية المستقبل مع تصنيف شامل في أربعة درجات: أثر مهم، صغير، معتدل، كبير.

## 6- البيئة الراهنة:

### 1-6- البيئة الفيزيائية:

تتسم منطقة المشروع والمناطق المحيطة بها بمناخ صحراوي شديد الجفاف مع اختلاف كبير في درجة الحرارة بين الليل والنهار بأكثر من 15 درجة مئوية، ويتراوح متوسط الحد الأقصى لدرجة الحرارة بين 19 درجة مئوية (في الشتاء) و 37 درجة مئوية (في الصيف) وتتراوح المتوسطات الشهرية بين 12 درجة مئوية و 29 درجة مئوية ويبلغ معدل سقوط المطر 1-2 مم سنويا بشكل متقطع خلال أشهر الشتاء فقط، ومع ذلك فقد تهطل بعض الأمطار الغزيرة في فترات نادرة كما حدث في أكتوبر 2016.

والتكوينات تحت الأرضية في منطقة المشروع حدثت في العصر الأيوسيني وهي تتكون من الحجر الجيري البحري السميك وألواح الصلصال والطين الصغيرة تعلوها طبقة من الحصى والرمال ذات العمق المحدود بشكل عام تتراوح من بضعة سنتيمترات إلى متر واحد أو مترين في الوديان.

وتمتد المناطق الشمسية الشرقية الفرعية 1، 2 & 3 على أراضي صحراوية بعيدا عن أية قرى أو تجمعات سكنية وبها أنشطة اقتصادية محدودة.

ومعظم أراضي المنطقة الشمسية الشرقية الفرعية 3 بها تضاريس أرضية وتهبط بعمق في الأودية وهي تختلف عن المنطقة الشمسية الشرقية 1 & 2 وهي مستوية تقريبا بتضاريس متموجة ببساطة باستثناء بعض التقطعات مع الأودية في حالة المنطقة الشمسية الشرقية الفرعية 1، والأودية لها انحدار متوسط وأرض رملية، وقد تلاحظ أن أرضية الأودية كانت خالية من النحر أو تراكم الصخور.



شكل 1-6 - طبقات الحجر الجيري عند WP60\_4 في شمال المنطقة الشمسية الشرقية الفرعية 2  
(على اليسار) وطبقات الحجر الجيري عند WP42\_3 (المنطقة الشمسية 3)

وشكل عام تُظهر المناطق ظروف تربة جيدة ولا نجد تربة رطبة أو كثبان رملية متحركة في المناطق الشمسية الشرقية الثلاثة ومع ذلك وبسبب الحجر الجيري البحري تحت الأرض فقد تحت السطح بعض الفجوات.

وتقييم البيئة الفيزيائية فيما يتعلق بالجوانب الفنية واستخدامات الأراضي وفقًا للمعايير المحددة يؤدي إلى الاستنتاجات التالية:

#### المنطقة الشمسية الشرقية الفرعية 1 (راجع خريطة 1-8):

- لم يتم تحديد منطقة غير موائمة نتيجة لصعوبة الوصول.
- لم يتم تحديد منطقة غير موائمة بسبب عوامل جيومورفولوجية.
- فيما يتعلق باستخدام الأرض فإن المناطق التالية غير موائمة لمزارع الرياح:
  - مناطق زراعية في الشمال الغربي على طول طريق المنيا – أسيوط وبداخل الجزء الشمالي الغربي للمنطقة.

○ محاجر الزلط في الجنوب الشرقي.

### المنطقة الشمسية الشرقية الفرعية 2 (راجع خريطة 2-8):

- لم يتم تحديد منطقة غير موائمة نتيجة لصعوبة الوصول.
- لم يتم تحديد منطقة غير موائمة بسبب عوامل جيومورفولوجية.
- لم يتم تحديد منطقة غير موائمة فيما يتعلق باستخدام الأرض.

### المنطقة الشمسية الشرقية الفرعية 3 (راجع خريطة 3-8):

- تم تحديد منطقة غير موائمة نتيجة لصعوبة الوصول على التل في الجنوب الشرقي من المنطقة الفرعية.
- لم يتم تحديد منطقة غير موائمة بسبب استخدامات الأراضي ولكن من المفترض أن البدولهم مطالبات ويجب على المستثمرين تسويتها.
- امكانية الوصول أقل موائمة بسبب المسافات الطويلة حتى الطريق السريع وتكلفة انشاء طرق جديدة.

### 2-6- البيئة البيولوجية:

### المنطقة الشمسية الشرقية الفرعية 1:

توضح الدراسة أنه لا توجد أي منطقة محمية قانونًا ولا توجد حدائق وطنية أو منطقة طيور مهمة ولا توجد منطقة معترف بها دوليًا لقيمة التنوع البيولوجي في المنطقة الشمسية الشرقية الفرعية 1 أو في المنطقة المحيطة بها.

وبسبب الجفاف الشديد في الصحراء الشرقية ، فإن السهول الحصوية والمناطق المرتفعة والتلال الصغيرة داخل المنطقة الشمسية الشرقية الفرعية 1 غير مؤهلة لأن تكون من الموائل المناسبة للنباتات، وبالتالي فإن أجزاء كبيرة من هذه المنطقة الفرعية لها أهمية منخفضة للغاية أو بلا أي أهمية كموطن للنباتات والحيوانات.

لا توجد وديان ضمن المنطقة الشمسية الشرقية الفرعية 1 لها أهمية كبيرة كموئل للنباتات والحيوانات حيث نجد أن وادي عباداه ووادي البرحاوي تقدم ظروف معيشية المناسبة لبعض الأنواع النباتية والحيوانية مما يجعلها تختلف بشكل ملحوظ عن الموائل الصحراوية الشاسعة التي تسيطر على المنطقة الشمسية الشرقية الفرعية 1، والوديان المذكورة أعلاه مهمة للنباتات والحيوانات (انظر الخريطة 1-8) وقد تم تقييم أهمية جميع الأودية الأخرى كموطن للنباتات والحيوانات على أنها منخفضة أو منخفضة للغاية.

وبما أن الكهوف تمثل خاصية في الصحراء توفر موائل للحيوانات فإن الكهوف الموجودة في المنطقة الشمسية الشرقية الفرعية 1 التي يمكن العثور عليها بشكل خاص تحت المنحدرات مهمة كموئل للنباتات والحيوانات.

ومعظم أجزاء المنطقة الشمسية الشرقية الفرعية 1 خالية تمامًا من الغطاء النباتي ويمكن العثور على النباتات في الوديان فقط. ولكن حتى هناك فإن النباتات ليست غنية بالأنواع ولا كثيفة في التعداد، وتعتبر جميع الأنواع المسجلة في الوديان في المنطقة الشمسية الشرقية 1 "أقل أهمية" في القائمة الحمراء للأنواع المهددة بالانقراض ومن ثم وإلى جانب الأودية المذكورة أعلاه فإن المنطقة الشمسية الشرقية الفرعية 1 غير مهمة للنباتات.

وبما أن وادي عبادة ووادي البرشاوي يحتويان على بقع من النباتات التي تشكل موئل للتوقف (بشكل أساسي ليوم واحد) للطيور أثناء الهجرة فقد استخدمها عدد قليل من الطيور للراحة أما جميع الأجزاء الأخرى من المنطقة الشمسية الشرقية الفرعية 1 فليس لها أهمية كبيرة كموئل للطيور.

ويمكن أن نستنتج بوضوح من النتائج التي تم التوصل إليها في مناطق الرياح الشرقية الفرعية أن المنطقة الشمسية الشرقية 1 التي تقع بين منطقة الرياح الشرقية 1 ومنطقة الرياح الشرقية 2 ليس لها أهمية خاصة للطيور المهاجرة - لا في الربيع ولا في الخريف.

وكخلاصة فلم يتم تحديد منطقة غير موائمة في المنطقة الشمسية الشرقية الفرعية 1 المقترح إقامة محطات شمسية كهروضوئية بها فيما يتعلق بالبيئة البيولوجية.

### المنطقة الشمسية الشرقية الفرعية 2:

توضح الدراسة أنه لا توجد أي منطقة محمية قانوناً ولا توجد حدائق وطنية أو منطقة طيور مهمة ولا توجد منطقة معترف بها دولياً لقيمة التنوع البيولوجي في المنطقة الشمسية الشرقية الفرعية 2 أو في المنطقة المحيطة بها.

المنطقة الشمسية الشرقية 2 شبه مستوية ومتسقة للغاية وهي تضم سهولا حصوية ولا يوجد وادي كبير في هذه المنطقة الفرعية ، وبالتالي فهي خالية تماماً من الغطاء النباتي وقد تم العثور على اثنين فقط من بقع نباتية صغيرة في هذه المنطقة الفرعية وتعتبر الأنواع النباتية المسجلة ذات أهمية منخفضة في القائمة الحمراء للأنواع المهددة بالانقراض، وكخلاصة لا تعتبر المنطقة الشمسية الشرقية 2 بيئة مهمة للنباتات.

ووفقاً لذلك فإن الحيوانات المحلية فقيرة للغاية في الأنواع وبكثافة منخفضة للغاية أيضاً وليس بها أية أنواع مسجلة على أنها مهددة وبما أنه لا توجد أي منحدرات فمن غير المحتمل أن تكون هناك كهوف تحت سطح الأرض ومن ثم لا تعتبر المنطقة الشمسية الشرقية 2 موئلا هاما للحيوانات.

وكخلاصة، لم يتم تحديد منطقة غير موائمة في المنطقة الشمسية الشرقية الفرعية 2 من ناحية اقامة محطات الطاقة الشمسية الكهروضوئية فيما يتعلق بالبيئة البيولوجية.

### المنطقة الشمسية الشرقية الفرعية 2:

لا توجد أية أماكن محمية قانوناً أو حديقة وطنية أو منطقة طيور مهمة أو منطقة معترف بها دولياً لقيمة التنوع البيولوجي داخل المنطقة الشمسية الشرقية 3 أو المنطقة المحيطة بها، ويقع "كهف وادي سناور" وهو سمة جيولوجية نادرة في مصر تثير اهتمام السجلات المناخية القديمة (جهاز شؤون البيئة 2015) على مسافة لا تقل عن 8 كيلومترات شمال شرق المنطقة الشمسية الشرقية الفرعية 3.

وبسبب الجفاف الشديد للصحراء الشرقية والسهول الحصوية والمناطق المرتفعة والتلال الصغيرة داخل المنطقة الشمسية الشرقية الفرعية 3 فهي لا تمثل موئل مناسب للنباتات، وبالتالي فإن أجزاء كبيرة من هذه المنطقة الفرعية لها أهمية منخفضة للغاية أو بلا أي أهمية كموطن للنباتات والحيوانات.

ولم يتم العثور على أي وادي ضمن المنطقة الشمسية الشرقية الفرعية 3 له أهمية عالية كموئل للنباتات والحيوانات، ويوفر مجمع وادي الشيخ ظروف معيشية ملائمة لأنواع نباتية وحيوانية معينة وبالتالي يختلف بشكل ملحوظ عن الموائل الصحراوية الشاسعة التي تهيمن على المنطقة الشمسية الشرقية الفرعية 3 والوادي المذكور أعلاه مهم للنباتات والحيوانات (أنظر خريطة 3-8) ومن ثم تم

تقييم أهمية جميع الأجزاء الأخرى من هذه المنطقة الفرعية كموئل للنباتات والحيوانات على أنها منخفضة أو منخفضة للغاية.

وبما أن الكهوف تشكل موائل هامة في الصحراء للحيوانات فإن الكهوف الموجودة في المنطقة الشمسية الشرقية الفرعية 3 التي يمكن العثور عليها بشكل خاص في وادي الشيخ في الشمال الغربي من هذه المنطقة الفرعية وعلى المنحدرات تعتبر مهمة كموطن للنباتات والحيوانات.

وأجزاء كبيرة من المنطقة الشمسية الشرقية الفرعية 3 بدون غطاء نباتي ولا يمكن العثور على النباتات إلا في الوديان هناك والغطاء النباتي ليس غنيًا بالأنواع ولا كثيفًا وتعتبر جميع الأنواع المسجلة في هذه المنطقة الفرعية "أقل اهتمام" في قائمة IUCN الحمراء للأنواع المهددة، ومن ثم باستثناء وادي الشيخ لا تعتبر المنطقة الشمسية الشرقية الفرعية 3 مهمة للنباتات.

ويوفر وادي الشيخ أماكن مناسبة لبعض الحيوانات من مجموعات مختلفة (الثدييات والطيور والزواحف والحشرات والعناكب)، ومع ذلك فإن النتائج التي تم الحصول عليها من الدراسة تظهر بوضوح أن الحيوانات المحلية ضعيفة في الأنواع وكثافتها منخفضة، والأنواع المسجلة في المنطقة الشمسية الشرقية الفرعية 3 منتشرة على نطاق واسع ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر، ولا يعرف أي من الأنواع المسجلة أنها مهددة، وبالتالي لا تعتبر المنطقة الشمسية الشرقية الفرعية 3 موئلاً هاماً للحيوانات.

بما أن وادي الشيخ يضم بقعاً من النباتات تشكل موئل لتوقف الطيور المهاجرة (بشكل أساسي ليوم واحد) أثناء هجرتها، فقد يستخدمه عدد قليل من الطيور للراحة أما الأجزاء الأخرى من المنطقة الشمسية الشرقية الفرعية 3 فليس لها أهمية كبيرة كموئل للطيور.

ومن النتائج التي تم الحصول عليها في مناطق الرياح الشرقية الفرعية يمكن استنتاج أن المنطقة الشمسية الشرقية الفرعية 3 التي تقع شمال منطقة الرياح الشرقية 2 ليست ذات أهمية خاصة للطيور المهاجرة - لا في الربيع ولا في الخريف.

وكملخص فلم يتم تحديد أية مناطق غير موائمة في المنطقة الشمسية الشرقية الفرعية 3 لاقامة محطات الطاقة الشمسية الكهروضوئية فيما يتعلق بالبيئة البيولوجية.

### 3-6 - البيئة الاجتماعية والاقتصادية:

تقع منطقة المشروع في محافظات بني سويف والمنيا ويعيش السكان بشكل رئيسي في وادي النيل في حين أن منطقة المشروع لا يوجد بها مستوطنات دائمة.

#### الخصائص العامة:

#### - استخدام الأراضي:

تحوي المنطقة صناعة تعدين نابضة بالحياة وتوجد العديد من المناجم في المناطق الصحراوية بالقرب من المنيا ولكن خارج منطقة المشروع ويستخدم الطوب الأبيض المستخرج من المناجم في البناء والتعدين هو صناعة كثيفة العمالة تستخدم عددا كبيرا من العمال في المناجم ومن غير المحتمل أن يكون هناك تأثير على أنشطة التعدين حيث أن معظم المناجم ليست دائمة ولا توجد مناجم للطوب داخل المناطق الشمسية الشرقية الفرعية وقد تبين من النقاش مع أصحاب المناجم أن إمكانية العثور على مصدر جيد لاستخراج المواد من المناطق المختارة للمشروع منخفضة للغاية.

### - التراث الثقافي:

لا توجد مواقع تراث ثقافي في المناطق الشمسية الشرقية الفرعية 1 ، 2 & 3.

### - الطرق وحركة المرور:

يعبر منطقة المشروع طريق المنيا - أسيوط السريع بالقرب من طريق القاهرة - أسوان السريع كما تربط شبكات الطرق منطقة المشروع بموانئ البحر الأحمر (ميناء رأس غارب وميناء سفاجا) عبر الطريق السريع الجديد رأس غارب-المنيا ويسمح ذلك بنقل معدات المشروع من الميناء إلى المناطق الشمسية الشرقية الفرعية 1 ، 2 & 3.

### - مجتمع بدوي بالقرب من منطقة المشروع:

على الرغم من أنه لم يتم تحديد أي مخيم بدوي خلال استطلاع الموقع فقد علمنا من المناقشات مع السلطات والبدو المحليين أن العديد من البدو متأثرون بالفعل ويتأثرون بمشاريع أخرى وقد عدلت هذه الآثار من سلوكيات البدو وقاموا ببناء مستوطنات مما يعني أنهم لم يعدوا بدوًا ولم يعودوا يقوموا بأنشطة مثل التجوال للحصول على الموارد داخل المنطقة.

### - مقابلات مع اصحاب المصالح:

من أجل التعرف على الآراء والسلوك العام للسلطات المحلية والسكان نحو المشروع المقترح فقد تم اجراء لقاءات ومناقشات مع مسؤولي المحافظات كما هو موضح في القسم 4 من تقرير التقييم الاستراتيجي البيئي والاجتماعي وتم إجراء مقابلات مع بعض الأشخاص وقد كانت المعرفة العامة حول المشروع وآثاره محدودة للغاية بشكل عام.

وقد تبين من المقابلات مع السلطات المحلية / السكان توقع الآثار التالية لمشروع محطات الطاقة الشمسية المقترح:

- فرصة عمل للسكان المحليين:

من مزايا المشاريع الكبيرة مثل المشاريع المقترحة تقديم فرص العمل للعمال شبه المهرة وغير المهرة وسيوفر المشروع المقترح فرص عمل للسكان المحليين خاصة خلال مرحلة البناء وعلاوة على ذلك يحصل السكان المحليون على فرصة لاكتساب معارف ومهارات جديدة من شأنها أن تفيدهم.

- استخدام الأرض:

يجب ألا يتداخل تخطيط المشروع مع التراث الثقافي الموجود كما يجب أن يتم نزع ملكية أية أراضي من خلال حقوق ملكية الأراضي. وفيما يتعلق بأنشطة التعدين فقد تبين من الأشخاص الذين تمت مقابلتهم أنه لا يوجد أي تحفظ لأن مناطق التعدين ستنتقل إلى مواقع أخرى في حالة تركيب مزارع الرياح على أراضيهم كما أن العديد من مناطق التعدين غير قانونية لأن مالكي المناجم يفضلون عدم التقدم بطلب للحصول على تصريح رسمي لأنهم سيضطرون إلى دفع رسوم عالية جداً للحكومة.

- التعاون مع المحافظات المحلية:

يشعر المسؤولون على مستوى المحافظة بأنهم مستبعدون حيث لم يتم تضمينهم في اختيار المنطقة وتعني القرارات الرئاسية أنه ليست هناك أية إمكانية للتوسع العمراني في المستقبل في الصحراء الشرقية.

## المنطقة الشمسية الشرقية الفرعية 1:

### - استخدام الأراضي:

خلال استطلاع الموقع في أكتوبر 2016 لوحظ بعض الأنشطة الزراعية بالقرب من طريق المنيا – أسيوط في المنطقة الشمسية الشرقية الفرعية 1.

وقد أشار المزارعون الذين تمت مقابلتهم إلى أن أنشطة تنمية الأراضي تنسقها أسرة واحدة وهم مسؤولون عن تقسيم قطع الأراضي ودعم عملية وضع اليد حتى يصبح الشخص رسمياً مالك للأرض. وقد تم شرح عملية التعدي على الأرض خلال المقابلة وتبين أن معظم الأراضي على طول طريق المنيا تم التخطيط لها بالفعل لاستخدامها للزراعة من قبل العديد من الناس كما تم التأكيد على وجود بعض المشاريع المخطط لها في المنطقة.

### - الطرق وحركة المرور:

تقع هذه المنطقة على بعد أكثر من 7 كم من وادي النيل ولكنها تتمتع بإمكانية الوصول الجيد عبر طرق الإسفلت العريضة بجوار المنطقة من المنيا (شمال) ووادي النيل (غرب) كما أن هناك طريق يربط بين طريق المنيا – أسيوط وطريق القاهرة – أسوان يعبر المنطقة الشمسية الشرقية الفرعية 1

ولم يتم تحديد أية مواقع على أنها غير مواتمة لمشاريع الطاقة الشمسية بهذه المنطقة.

## المنطقة الشمسية الشرقية الفرعية 2:

- استخدام الأراضي:

لم نلاحظ أية أنشطة لاستصلاح الأراضي في هذه المنطقة.

- الطرق وحركة المرور:

تقع هذه المنطقة على مسافة 27 كم من وادي النيل ويمكن الوصول إليها من طريق المنيا – أسيوط ومن طريق المنيا – رأس غارب.

المنطقة الشمسية الشرقية الفرعية 3:

- استخدام الأراضي:

لم نلاحظ أية أنشطة لاستصلاح الأراضي في هذه المنطقة.

- الطرق وحركة المرور:

تقع هذه المنطقة على مسافة 27 كم من وادي النيل ويمكن الوصول إليها من طريق القاهرة – أسوان من خلال طريق جديد يتم تشييده بطول 11 كم.

## 7- توقع الآثار:

### 7-1- البيئة الفيزيائية:

يمكن تلخيص الآثار المتوقعة على النحو التالي:

#### جودة الهواء:

خلال مرحلة التشييد قد تحدث بعض انبعاثات غازات العادم من الآلات والغبار في أماكن العمل (إنشاء الطرق وحفر الأساسات) وخلال مرحلة التشغيل لن تتم سوى زيارات قليلة للخدمة ولن تنجم أي انبعاثات للغبار أو للغازات من محطات الطاقة الشمسية.

وبالتالي فإن أهمية الآثار البيئية صغيرة على جودة الهواء المحيط خلال مرحلة التشييد وغير هامة خلال مرحلة التشغيل.

#### الموارد المائية ومياه الصرف الصحي:

يجب نقل المياه من المصادر الموجودة جوار وادي النيل ويتم تغذية هذه المصادر المائية من نهر النيل بمتوسط تصريف يبلغ حوالي 2000 متر مكعب / ثانية وسوف تكون إمدادات المياه مطلوبة بشكل أساسي لمرحلة التشييد أي لخلط الخرسانة ولرش المياه لتثبيت الغبار وللأغراض المنزلية، وستتم معالجة مياه الصرف الصحي من المرافق الصحية لمكاتب البناء المؤقتة باستخدام خزان للصرف الصحي من مرحلتين مع ترشيح في الطبقة الرملية الجوفية لما بعد المعالجة، ومياه الصرف الصحي لن تتلامس مع المياه الجوفية.

أما خلال مرحلة التشغيل فسيتم استخدام كميات صغيرة من الماء لتنظيف الألواح الشمسية واستهلاك هذه المياه سيكون بأثر طفيف خلال التشييد والتشغيل.

ويتم تقييم أهمية أثر استهلاك الماء على أنه صغير في مرحلة التشييد ومهم لمرحلة التشغيل.

### النفايات المنزلية والخطرة:

سيتم توليد كميات كبيرة من النفايات الصلبة خلال مشاريع تشييد المحطات الشمسية وتتكون النفايات بشكل أساسي من مواد التعبئة (الورق والبلاستيك والخشب) لنقل مكونات الألواح الشمسية والمعدات المساعدة وتتراكم النفايات في معظمها في مواقع تركيب الألواح الشمسية وفي ساحة البناء ويمكن بسهولة أن تنتشر النفايات عن طريق الرياح على الصحراء وتنتقل عبر مسافات كبيرة.

والمصدر الوحيد الممكن للنفايات الخطرة الذي يحدث أثناء الإنشاء هو البترول المسكوب والشحوم الناجمة عن معدات البناء (مثل الشاحنات والحفارات والرافعات) ومن مناولة الشحنات (مثل زيت المحولات) ويمكن بسهولة تجنب النفايات المتناثرة والمخلفات الخطرة عن طريق الممارسة الجيدة والإشراف القوي وسيتم توليد القليل من النفايات المنزلية من قبل العاملين في مرافق الخدمة وتبين تجربة مزارع الزعفران أن النفايات المنزلية صغيرة وتتألف بشكل رئيسي من نفايات قابلة للتحلل أو قابلة للحرق.

وخلال مرحلة التشغيل يقتصر توليد النفايات على المواد الاستهلاكية المستخدمة عند صيانة محطات الطاقة الشمسية وهذه المواد غير خطرة ومعظمها من الأشياء الثمينة ومناسبة لإعادة التدوير وفي

حالات أخرى يتم إرجاع الأجزاء المعيبة الأكبر مثل المحولات إلى المصنع للإصلاح أو إعادة استخدام المواد.

### الضوضاء والانعكاسات:

بالنسبة لأجزاء الأراضي التي بها أنشطة اقتصادية في مناطق إقامة المحطات الشمسية تنطبق المعايير التجارية أو الصناعية ومعايير مستوى الضوضاء المحيطة ذات الصلة المعمول بها هي 70/70 ديسيبل (في النهار/ الليل) وفقا لتوجيهات IFC و55/65 ديسيبل (في النهار / الليل) وفقا للقانون المصري 1994/4 ولائحته التنفيذية والملحق 7 من تقرير التقييم الاستراتيجي البيئي الاجتماعي يستخدم المعايير المصرية الأكثر صرامة.

والمستقبلات البشرية القريبة من المحطات الشمسية المقترحة مثل العمال والفلاحين أو أفراد الخدمة على الطرق والعاملين في عدد قليل من الأماكن التجارية أو الصناعية المتفرقة لا يعيشون بشكل دائم في مكان العمل. وعلاوة على ذلك فإن أماكن العمل على مسافات كبيرة من مواقع مزارع الرياح المقترح وسيكون مستوى الضوضاء أقل بكثير من 65 ديسيبل (خلال النهار) و 55 ديسيبل (خلال مرحلة التشغيل الليلي) وبالتالي فمن المتوقع حدوث أثر صغير طفيف خلال مرحلة التشييد والتشغيل.

وباعتبار أن المحطات الشمسية سوف تستخدم ألواح شمسية حديثة بقدرة امتصاص مرتفعة لأشعة الشمس فلن يكون هناك انعكاسا كبيرا لأشعة الشمس وبالتالي سيكون الأثر طفيفا.

### التراث الأثري والتاريخي والثقافي:

توضح نتائج الدراسة أن المناطق الشمسية الشرقية الفرعية الثلاثة خالية من التراث الأثري والتاريخي والثقافي ولمسافات تزيد عن 5 كم منها وبالتالي سيكون الأثر مهملًا.

### استخدام الأراضي:

يبلغ معدل استخدام الأراضي لاقامة محطات الطاقة الشمسية (الطرق والمنصات والأساسات والمرافق المساعدة) حوالي 70% -90% خلال مرحلتي التشييد والتشغيل، وستكون هذه النسب المئوية أقل في المناطق الفرعية التي تحتوي على الأودية باعتبار أن محطات الطاقة الشمسية لن تمتد إلى الوديان وبالتالي فإن الأثر سيكون متوسط في كافة المراحل.

ويمكن أيضا تقييم الأثر على أساس القيمة المنخفضة للتربة هناك حيث لا توجد نباتات وهي تربة رملية حصوية وبالتالي تكون حساسية المستقبل منخفضة.

وبسبب انخفاض قيمة الأثر وحساسية المستقبلات يتم تقييم أهمية أثر استخدام الأراضي على أنه صغير أو طفيف في كل من مرحلة التشييد والتشغيل.

### خدمات المرور والمرافق والبنية التحتية الأخرى:

كن تقدير الحمل المروري الناجم عن اقامة محطات الطاقة الشمسية في مرحلة البناء مع الأخذ في الاعتبار افتراض العمل المتوازي في ثلاث محطات شمسية وكذلك التسليم المتوازي للألواح الشمسية والمعدات المساعدة على مدى ثلاثة أشهر، وباستثناء محولات الطاقة للمحطات الفرعية (مثل محول واحد قدرة 125 ميغا فولت أمبير) لمحطتين بقدرة 50 ميغاوات فلن يلزم نقل معدات ثقيلة على الطرق.

وبناءً على ذلك فإن متوسط الحمولة الإضافية المتوقعة لكل يوم عمل ناتجة عن إقامة المحطات الشمسية خلال مرحلة التشييد هو حوالي 45 شاحنة نقل كبيرة و 25 سيارة نقل صغيرة بما في ذلك الحافلات الصغيرة أو الميني باصات وسيتم توزيعها على مدار يوم عمل (10 ساعات) وهو ما يعادل حمولة إضافية تبلغ 4.5 شاحنة في الساعة و 2.5 سيارة صغيرة في الساعة.

بالنسبة إلى المنطقة الشمسية الشرقية الفرعية 1 يمكن مقارنة ذلك بحمولة المرور الحالية على طريق المنيا - أسيوط ، وهو الطريق الأكثر حركة في المنطقة وقد كشف التقييم عن حركة 45 مركبة صغيرة (سيارات شخصية وحافلات صغيرة وسيارات بيك أب) و 40 شاحنة كبيرة في الساعة في اتجاه واحد على هذا الطريق، ويمكن تقييم الحمل الإضافي على أنه نحو 10% بعدد 50 سيارة صغيرة و 45 شاحنة كبيرة في الساعة الواحدة في كل اتجاه، وفي حالة المنطقة الشمسية الشرقية الفرعية 2 يمكن مقارنته بحمل مرور منخفض مقارنة بسعة طريق المنيا - رأس غارب السريع، وحتى باعتبار الحمل الزائد أثناء مرحلة التشييد فإن الحركة العامة على الطرق الإسفلتية في المنطقة لا تزال منخفضة، وعلاوة على ذلك فإن الطرق ذات أبعاد جيدة ولم يصل بعد إلى طاقته الكلية، أما خلال مرحلة التشغيل فسيكون الحمل المروري الإضافي مهملاً.

وتدل أهمية حجم الحدث وانخفاض مستوى حساسية المستقبل على أثر ضئيل على حركة المرور التي تحدث في جميع المراحل.

### خطر الفيضانات والسيول:

المنطقة شديدة الجفاف مع سقوط طفيف للأمطار خلال فصل الشتاء. ومع ذلك ففي بعض الأحيان يمكن أن تحدث أمطار غزيرة.

وإذا هطلت أمطار غزيرة على مناطق ذات طبيعة جبلية (أي بتدرجات كبيرة وأودية ضيقة ذات منحدرات عالية) يمكن أن يتراكم الجريان السطحي ويتطور ليصبح فيضانات خطيرة.

وتشير دراسات سطح المكتب والتفتيش الميداني للمناطق الشمسية الشرقية الفرعية 1، 2 & 3 أن الأودية ليست عرضة لمثل هذه الفيضانات فهي ذات مقاطع عرضية واسعة والمنحدر منخفض والتلال موجودة فقط مع ارتفاعات تبلغ 50 متر فوق قاع الوادي، وعلاوة على ذلك لا توجد بالوديان صخور كبيرة في قاعها.

ووفقا لذلك فلا يتوقع أي خطر من الفيضانات المفاجئة في الأودية كما أنه يتم تركيب الأواح الشمسية على أرض مستوية ولن يتم تركيبها في الأودية.

### المخاطر الزلزالية:

تم افتراض احتمال حدوث مخاطر زلزال بسبب خطوط الصدع الجيولوجية وقد تمت مناقشة قوة الزلازل عند احتمال تجاوز 10% خلال 50 عامًا في القسم 5.1 من تقرير التقييم الاستراتيجي البيئي والاجتماعي وتكون قوة الزلازل من منخفضة إلى متوسطة وهي تساوي تسارعًا أرضيًا يتراوح من 0.8 إلى 1.0 متر / ثانية<sup>2</sup> ويمكن التحكم في المخاطر بشكل جيد من خلال تطبيق قوانين الزلازل كجزء من معايير البناء.

### 2-7- البيئية البيولوجية:

يعتبر التقييم التالي للآثار المحتملة التي تسببها محطات الطاقة الشمسية صالحا لكل من المناطق الشرقية الفرعية 1، 2 & 3 ، وفي حالة إذا كانت الآثار مختلفة فسيتم تحديد ذلك أدناه.

## مرحلة التشييد:

قد تؤدي أعمال التشييد (بما في ذلك إنهاء التكاليف) لمحطات الطاقة الشمسية إلى:

- فقدان الموائل للنباتات والحيوانات والأضرار المباشرة للنباتات.

أثناء إنشاء محطات الطاقة الشمسية الكهروضوئية سيتم إزالة وتدمير جزئي لسطح التربة العلوي وبعض طبقات التربة العميقة، وبالتالي فإن تركيب أساسات الوحدات الكهروضوئية والمرافق المساعدة وطرق الوصول ومسارات خطوط الطاقة ومواقع تخزين الآلات الثقيلة أو غيرها من المنشآت التقنية قد يدمر موائل النباتات والحيوانات، ونظرًا للمساحة الكبيرة للمحطات الشمسية يتم تقييم حجم الأثر على أنه مرتفع.

يمكن اعتبار حساسية المستقبلات منخفضة لأن أجزاء كبيرة من المناطق الشمسية الشرقية الفرعية الثلاثة خالية تمامًا من الغطاء النباتي ويمكن العثور على النباتات في الوديان فقط، وحتى هناك فإن الغطاء النباتي ليس غنيًا بالأنواع ولا كثيفًا من ناحية العدد، والأنواع الحيوانية المسجلة في المناطق الفرعية واسعة الانتشار ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر، والحيوانات المحلية في المناطق الفرعية الثلاثة ضعيفة في الأنواع ومنخفضة الكثافة، وعلاوة على ذلك فإن الأنواع المسجلة ليست مهددة، وعلاوة على ذلك يمكننا أن نستنتج بوضوح من النتائج التي حصلنا عليها في مناطق الرياح الشرقية الفرعية أن المناطق الشمسية الشرقية الفرعية ليست ذات أهمية خاصة للطيور المهاجرة - لا في الربيع ولا في الخريف، ولا يمكن العثور على موائل مناسبة لأنواع الحيوانات (الثدييات والطيور والزواحف والحشرات والعناكب) في وادي عبادة ووادي البرحاي (المنطقة الشمسية الشرقية

الفرعية 1) أو في وادي الشيخ (المنطقة الشمسية الشرقية الفرعية 3) ومن ثم وباستثناء وادي العبادية ووادي البرحاوي ووادي الشيخ لا تعتبر المناطق الفرعية الثلاثة موئلاً هاماً للحيوانات. وكخلاصة، فإن الآثار الناجمة عن فقدان الموائل للنباتات والحيوانات أو الضرر المباشر للنباتات سيؤدي إلى آثار متوسطة.

كما أن تركيب ألواح المحطات الشمسية لن يكون في المناطق التي بها نباتات أو كهوف كما لن يتم تركيبها في وادي عبادية ووادي البرحاوي ووادي الشيخ، ويجب أن تقتصر إجراءات التنشيد في هذه الأودية على عبور الطرق المعبدة بالحصى والخنادق الكبلية التي تتم في مناطق أقل حساسية، وهكذا يمكن تقليل الآثار الناتجة عن إنشاء محطات الطاقة الشمسية الكهروضوئية وتقييم الآثار المتبقية على أنها ثانوية.

يجب تقييم الأودية المهمة على أنها أقل ملاءمة لمشاريع الطاقة الشمسية الكهروضوئية (انظر خرائط 1-8 & 3-8).

- اضطراب الأنشطة البشرية بالآلات الثقيلة وحركة المرور والضوضاء وانبعاث الغبار:

قد تتأثر الحيوانات بالاضطراب خلال مرحلة التنشيد ومع ذلك تقتصر هذه الآثار على مساحة صغيرة إلى حد ما، وعلاوة على ذلك يقتصر العمل الإنشائي على فترة زمنية قصيرة نوعاً ما، وهكذا يمكن للحيوانات إيجاد موائل بديلة لوقت الأعمال الإنشائية وبالإضافة إلى ذلك يمكن للحيوانات إعادة احتلال جميع المناطق بعد مرحلة التنشيد.

والأنواع الحيوانية المسجلة في المناطق الشمسية الشرقية الفرعية الثلاثة منتشرة على نطاق واسع ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر وتعتبر الحيوانات المحلية في المنطقة الفرعية فقيرة في الأنواع ومنخفضة الكثافة، وبالتالي فإن الأثر على الحيوانات الناجم عن الاضطراب أثناء التشييد يكاد لا يذكر.

- دمك التربة بسبب استخدام الأرض:

قد يؤدي دمك التربة إلى تلف البذور المحلية وخفض ملاءمتها لنمو النباتات ومع ذلك فإن إمكانات نمو النباتات في هذه المنطقة القاحلة شديدة الجفاف محدودة للغاية ولا تشمل المناطق الفرعية على أي أنواع مهددة أو مجتمعات نباتية ذات أهمية، وقد تم تقييم الأثر الناتج عن إنشاء المحطات الشمسية الكهروضوئية على أنه متوسط (ارتفاع حجم الحدث وانخفاض حساسية المستقبل)، وإذا كانت أعمال البناء ستتجنب المناطق المزروعة بالنباتات (لا سيما الأودية الهامة) والكهوف أو الشقوق فيمكن تقييم الآثار المتبقية على أنها طفيفة.

- انبعاثات الغبار:

ستقتصر انبعاثات الغبار على منطقة صغيرة جدًا وتقتصر على فترات قصيرة إلى حد ما ومن المتوقع حدوث آثار قليلة جدًا على الموائل أو النباتات بسبب انبعاثات الغبار (حجم الحدث متوسط وحساسية الموائل منخفضة).

- المخلفات:

لن تسبب النفايات الناتجة عن الأعمال الإنشائية أي تأثير كبير على الموائل أو النباتات أو الحيوانات، ومع ذلك فقد تتسبب في تلوث مناطق أكبر عندما تجرفها الرياح القوية، وعلاوة على ذلك فمن المحتمل أن تجذب حيوانات معينة خاصة الأنواع الوحشية (الكلاب والقطط والقوارض) وهذا قد يؤثر على الأنواع الأصلية، وبالتالي يجب إزالة النفايات مباشرة من الموقع ويجب تخزينها في الموقع أو بالقرب منه بطرق مناسبة.

#### - أنواع جديدة من البيئات الحضرية والريفية:

يمكن نقل أنواع جديدة من البيئات الحضرية والريفية إلى المنطقة مع مواد البناء والحاويات وينبغي تجنب ذلك قدر الإمكان لأن الأنواع الجديدة غالباً ما تؤثر على الأنواع المحلية.

وكخلاصة، فإن الآثار المتبقية على الموائل والنباتات والحيوانات الناجمة عن بناء مشاريع الطاقة الشمسية الكهروضوئية داخل المناطق الشمسية الشرقية الفرعية لا تكاد يذكر.

#### مرحلة التشغيل والصيانة:

بشكل عام (بمعنى عدم وجود مستقبلات حساسة) فقد يؤدي تشغيل وصيانة المحطات الشمسية الكهروضوئية في المناطق الشمسية الشرقية الفرعية إلى آثار مختلفة:

- تعديل ملاءمة الموئل / جودته بسبب تغير الموائل.

- اضطراب الحيوانات أو فقدان الموائل بشكل غير مباشر من خلال الآثار المرئية.

- اضطراب الحيوانات من خلال انبعاثات الضوء (الانعكاسات)

- تهيج الحيوانات بسبب انبعاثات الضوء الاصطناعي.

- اضطراب الأنشطة البشرية المتعلقة بصيانة مجموعات الطاقة الشمسية.

- فقدان الموائل.

- خطر الاصطدام بالحيوانات الطائرة (الخفافيش والطيور والحشرات).

وعلى أي حال يمكن اعتبار حساسية المستقبل منخفضة لأن أجزاء كبيرة من المناطق الشمسية الشرقية الفرعية خالية تمامًا من الغطاء النباتي ويمكن العثور على النباتات في الوديان فقط وحتى هناك فإن الغطاء النباتي ليس غنيًا بالأنواع ولا كثيفًا بالسكان، والأنواع الحيوانية المسجلة في المناطق الشمسية الشرقية منتشرة على نطاق واسع ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر وليس بينها أي من الأنواع المهددة، ولا توجد موائل مناسبة للحيوانات (الثدييات والطيور والزواحف والحشرات والعناكب) إلا في وادي عبادة ووادي البرحاوي (المنطقة الشمسية الشرقية الفرعية 1) وفي مجمع وادي الشيخ (المنطقة الشمسية الشرقية الفرعية 3) ومن ثم وباستثناء وادي العبادية ووادي البرحاوي ومجمع وادي الشيخ لا تقدم المناطق الشمسية الشرقية الثلاثة موائل مهمة للحيوانات.

وكخلاصة فإن تشغيل وصيانة محطات الطاقة الشمسية الكهروضوئية داخل المناطق الفرعية سيؤدي إلى آثار طفيفة على الموائل والنباتات والحيوانات ولا توجد أنشطة أخرى في المناطق الثلاثة قد تساهم في زيادة الآثار إلى مستويات كبيرة، وخلال فترات الصيانة للمحطات الشمسية الكهروضوئية ستقتصر الأنشطة البشرية على الطرق وأماكن التخزين الموجودة بالفعل، وعلاوة على ذلك فمن

المفترض أنه سيتم تطبيق الإجراءات المناسبة وسيتم تقليل الكمية المطلوبة من الماء لتنظيف الألواح الضوئية الشمسية.

### 3-7- البيئة الاجتماعية والاقتصادية:

#### القوى العاملة وفرص العمل:

فيما يتعلق بتوفير فرص عمل جديدة سيؤدي المشروع إلى وظائف مباشرة وغير مباشرة، ويمكننا افتراض الأرقام التالية لكل مشروع قدرة 50 ميغاوات: فإن هناك حوالي 100 عامل غير مهني بالإضافة إلى 20 من العمال المهرة الذين يقومون بمهام إشرافية (مدة 4-5 أشهر).

وإذا تم تنفيذ ثلاثة مشاريع بالتوازي ، فإن هذا يتطلب حوالي 250-400 عامل، والمجتمعات المحلية في المنيا وبني سويف ستوفر نسبة أكبر من هذه القوة العاملة المؤقتة.

وسيقدم المشروع بعض الوظائف الدائمة لمزارع الرياح أثناء تشغيلها وصيانتها ومن المتوقع أن يكون مطلوباً 5-10 شخصاً للتشغيل والصيانة لكل محطة وسيعيش هؤلاء الأفراد محلياً.

ولابد من تطبيق المبادئ والحقوق الأساسية للعمال وفقاً للمحدد في توجيهات البنك الأوروبي لإعادة التعمير والتنمية المحددة في EBRD PR2 و IFC PS2 وهذا ينطبق أيضاً على مرافق الإقامة المؤقتة في الموقع.

#### الموردين:

كما سيؤدي المشروع إلى توفير فرص إيجابية للشركات المحلية التي ستشارك في توريد المواد أو قد تشارك أيضا في أعمال إصلاح الأجزاء المعيبة.

وسوف يستفيد سائقي المركبات من المشروع من خلال توفير وسائل النقل لأولئك الذين يعملون في المشروع، بالإضافة إلى ذلك قد يتم التعاقد على بعض منهم لنقل العمال إلى منطقة المشروع.

وسيستفيد أعضاء المجتمع المحلي من المنطقة والقرى المحيطة بها من الزيادة في الأنشطة الاقتصادية من أجل تلبية احتياجات المشروع والموظفين كما ستشهد الفنادق والمحلات التجارية والمطاعم زيادة في مبيعاتها.

وقد يؤدي المشروع إلى تطوير المناطق المحيطة وسوف تتطلب محطات الطاقة الشمسية المستقبلية طرق جديدة وبنية تحتية محسنة داخل المنطقة المختارة.

كما سوف يتعرف العمال المهرة وغير المهرة على التقنيات الحديثة للرياح والطاقة الشمسية مما سيخلق المزيد من فرص العمل لهم في المستقبل حيث سيحدث تطور آخر في مصر لتعلم هذه التقنيات هذا مه احترام التوجهات الخاصة بظروف العمل المحددة في EBRD PR2 و IFC PS2.

### مصدر جديد للطاقة:

أهم أثر إيجابي هو أن تطوير مشاريع الطاقة المتجددة سيؤدي إلى مصدر متجدد للكهرباء من شأنه أن يثرى الشبكة الوطنية للكهرباء عن طريق:

- المساهمة في معالجة نقص الطاقة الوطنية ،

- تقليل استخدام الوقود الأحفوري في توليد الكهرباء

- تشريد مصادر الكهرباء الكثيفة الكربون.

### تعزير المجتمع:

يمكن توقع بعض التحسينات في الخدمات والمرافق في المناطق بسبب تنفيذ المشروع، وعلاوة على ذلك سيعوض المشروع الانبعاثات من المنشآت الحرارية وبالتالي يسهم في تحسين نوعية الهواء لا سيما عن طريق خفض انبعاثات ثاني أكسيد الكربون.

### الفوائد الاقتصادية والاستثمار:

سيؤدي المشروع إلى فوائد اقتصادية من خلال التحسين طويل الأجل لإمدادات الطاقة.

ومن المتوقع حدوث الآثار الإيجابية التالية من تطوير محطات الطاقة الشمسية:

- تطوير اقتصاد الطاقة الشمسية (تطوير الصناعات ذات الصلة ، وتطوير الأنشطة التجارية وخدمات التشغيل والصيانة لهذه المعدات).

- سيؤدي توفير مصدر متجدد للطاقة إلى تخفيض أي دعم مخصص للوقود غير المتجدد وبالإضافة إلى ذلك يعتبر المصدر الجديد للطاقة نظيفة.

- دخل ضريبي إضافي لأن المشاريع ستنفذ كمشروعات IPP.

### المجتمع البدوي:

تقع مناطق محطات الطاقة الشمسية في الصحراء وهي منطقة تستخدم تقليدياً للبدو، وخلال العمل الميداني لم نواجه بدو، ومع ذلك فإن تطوير المحطات الشمسية سيغير طبيعة منطقة المشروع إلى درجة قد تؤثر على البدو، وعلاوة على ذلك فقد يؤدي تدفق العمالة المحتمل إلى إحداث تأثير على المجتمعات البدوية، ويجب أن تسعى المشاريع إلى إشراك البدو في تطورات المشروع وتقديم فوائد لهم.

ولتجنب الآثار السلبية المحتملة المرتبطة بتدفق العمالة (بما في ذلك على سبيل المثال لا الحصر قضايا مثل التمييز والاتجار بالأشخاص والعمل القسري وعمالة الأطفال والآثار الصحية على المجتمع من خلال تدفق العمال وتجنب التوترات المجتمعية) يجب اتباع سياسة منسقة وشاملة للمطورين في تطوير مزارع الرياح في المناطق الشمسية الشرقية الفرعية الثلاثة ويعتبر هذا الأثر طفيفاً نظراً لكون هذه المناطق بعيدة عن القرى في شرق النيل.

#### الآثار المتعلقة بالإزعاج المؤقت:

باعتبار أن أنشطة إقامة المحطات الشمسية بعيدة عن المناطق الأهلة بالسكان فلن يحدث أي إزعاج للمجتمعات المحلية.

#### الصحة والسلامة المهنية:

تنجم المخاطر الرئيسية المتعلقة بالصحة والسلامة عن العمل على الأنظمة الكهربائية والعمل بالأدوات والآلات، وسيكون المستثمرون مطالبين بالحفاظ على توجيهات البيئة والصحة والسلامة لمجموعة البنك الدولي كحد أدنى، وإلى جانب الإلتزام بالمبادئ التوجيهية العامة فيما يتعلق بالصحة والسلامة المهنية والبيئة فيجب أيضاً الإلتزام بتوجيهات مؤسسة التمويل الدولية: توجيهات السلامة والصحة والبيئة الخاصة بنقل الطاقة الكهربائية وتوزيعها.

وعلاوة على ذلك يتعين على المستثمرين المستقبلين، من خلال مقاوليهم، الاستعانة بمهندسين / مشرفين للصحة والسلامة والبيئة لمنع أي مخالفات، وسيتم وضع خطة لإدارة للصحة والسلامة والبيئة في بداية أنشطة البناء تخضع لموافقة هيئة الطاقة الجديدة والمتجددة للتدريب على أمور السلامة (للعمال ومشغلي الماكينات) ولإجراءات الطوارئ في حالة الحوادث ونظام الإخطار عنها.

ومع تطبيق هذه التدابير فمن المتوقع أن تكون آثار الصحة والسلامة المتبقية طفيفة.

## 8- إجراءات التخفيف:

### 1-8- أساليب الإدارة والتخفيف العامة - أفضل الممارسات:

بعد تقييم الآثار بدقة يجب تطبيق ما يسمى بالتسلسل الهرمي للتخفيف كاستراتيجية تخفيف عامة وتتضمن الخطوة الأولى في هذه العملية تدابير لتجنب الآثار البيئية أو الاجتماعية للمشروع من خلال تغييرات في تصميم المشروع أو في أنشطة المشروع، وإذا لم يكن من الممكن تجنب أي أثر فينبغي تنفيذ تدابير إضافية لتقليل الأثر المحدد، ويجب تصحيح الآثار المتبقية، على سبيل المثال عن طريق ترميم الموائل إلى حالتها الأصلية أو عن طريق نقل الأنواع أو الموائل المتأثرة، والخيار الأخير في التسلسل الهرمي للتخفيف هو تعويض أي خسائر أو أضرار متبقية لا يمكن تجنبها وتجري تعويضات التنوع البيولوجي هذه عادة في منطقة مختلفة وتهدف إلى تحقيق نتيجة "لا خسارة صافية".

ويجب أن تكون استراتيجية التخفيف مصحوبة بتقييم شامل لإدارة المخاطر يغطي مراقبة ما بعد التشييد والإدارة التكميلية.

ويمكن اعتبار تدابير الإدارة والتخفيف التالية كمعيار لأفضل الممارسات التي يجب تطبيقها في كل من المناطق الفرعية تحت أي ظرف وفي أي مرحلة من مراحل المشروع (التشييد والتشغيل والصيانة وإنهاء التكليف):

- يجب أن تقتصر جميع الأنشطة على حدود مناطق التشييد مواقع التخزين وطرق الوصول والمسارات ويجب تجنب أي استخدام للمناطق المحيطة بشكل صارم.

- يتم تغيير زيوت التشحيم أو الوقود للسيارات في محطات الوقود وليس في الموقع ويجب تطبيق الرقابة الصارمة من قبل مشرف الموقع ويجب أن تكون إجراءات الطوارئ وخطط إزالة الانسكاب جاهزة دائمًا في الموقع.

- يجب إزالة النفايات على الفور ويجب تخزينها بأمان في الموقع حتى يتم تجنب تبعثرتها.

- تنفذ برامج التوعية للموظفين ويتم السيطرة على سلوك الموظفين المعنيين خلال الأنشطة الميدانية من قبل مشرف الموقع.

- يتم التحكم في مخاطر الصحة والسلامة المهنية المحتملة خلال مرحلة التشييد بالتدابير المناسبة وفقا للمعايير المقبولة دوليا.

- يجب على المقاول توفير حماية فعالة للموارد والنباتات في جميع الأوقات ويكون مسؤولا عن أي ضرر لاحق.

- يُجبر على المقاول الحفاظ على نظافة الموقع أثناء التشييد وفقا للشروط التعاقدية ويقوم بتعيين مهندسين مشرفين لضمان التخلص من النفايات الصلبة والمخلفات السائلة بشكل ملائم وتجنب انسكابات الزيوت المستعملة والشحوم وغيرها.

- يجب إجبار المقاول على عدم مغادرة موقع البناء ما لم يكن قد قام بترتيبه وتنظيفه مع ردم الحفر ولاخنادق وتسوية أكوام الأتربة والتخلص من النفايات بشكل ملائم.

- يجب مراعاة اللوائح المحددة في المادة 28 من القانون المصري رقم. 1994/4 لحماية البيئة المعدل بالقانون رقم 2009/9 ، وبشكل رئيسي: حظر قتل الحياة البرية وإيذائها وإزعاجها غير الضروري في منطقة المشروع.

## 2-8- لبيئة الفيزيائية:

### 1-2-8- استخدام الأراضي:

الأراضي التي تستخدم حاليًا في أنشطة أخرى لن تكون موائمة لمشاريع الطاقة الشمسية لتجنب الصراعات الاجتماعية، وستكون هذه الأراضي مملوكة للحكومة ضئيلة وبالتالي فلن تكون هناك تدابير لنزع الملكية أو التعويض لأن مشاريع الطاقة الشمسية لن يتم تطويرها إلا في الأراضي التي لا تخضع لأي مطالبات، وأثناء إعداد تقييم الأثر البيئي والاجتماعي لكل مشروع على حدة ستكون هناك حاجة إلى مراجعة مفصلة لتقييم ما إذا كانت هناك مناطق أخرى يجب استبعادها لمشاريع الطاقة الشمسية الكهروضوئية.

### 2-2-8- الأثر على المنظر العام والتأثير البصري:

باعتبار الطبيعة الشاسعة للمنطقة وعدم تواجد لمستقبلات بشرية فلا يلزم اتخاذ تدابير تخفيف محددة أثناء التخطيط لمحطات الطاقة الشمسية.

### 3-2-8- الموارد المائية والمخلفات السائلة:

لحماية الموارد المائية والحفاظ عليها فيجب سحب المياه من الآبار بمستوى معتدل خلال فترات ارتفاع الطلب على المياه (صب الأساسات خلال مرحلة التشييد)، ويجب تركيب صهاريج المياه في كلا الموقعين ويجب أن يكون حجم خزان المياه في محطة خلط الخرسانة مساويا للطلب على المياه لصب أساسات محطة الطاقة الشمسية.

ويجب جمع ومعالجة مياه الصرف الصحي من المرافق الصحية في الموقع أثناء التشييد ومعالجتها في محطة معالجة لاهوائية بسيطة من مرحلتين مع توجيه المياه المعالجة إلى الحصى الصحراوي من أجل المعالجة الطبيعية بعد ذلك، ويجب أن يتم التخلص من الحمأة الناتجة عن معالجة مياه الصرف الصحي المنزلية بشكل منتظم للمحافظة على عمل محطة المعالجة بشكل جيد.

#### 4-2-8- النفايات المنزلية والخطرة:

يجب اجبار المقاولين على العمل بأسلوب نظيف منظم أثناء التشييد بموجب شروط تعاقدية وبتعيين عليهم تعيين مهندسين مشرفين لضمان التخلص من النفايات أو إعادة تدويرها ويتم تنفيذ ذلك بإعادة مواد التعبئة مع الشاحنات.

للتخفيف من الآثار السلبية خلال مرحلة التشييد يجب جمع النفايات غير الخطرة المتبقية وتخزينها بأمان في الموقع بحيث يتم تجنب انجرافها بواسطة الرياح ويجب فصل الجزء القابل لإعادة التدوير أو القابل للاستخدام (مثل المعادن والأخشاب) ونقله إلى محطات إعادة التدوير، ويجب أن يتم جمع الجزء المتبقي من النفايات القابلة للتحلل أو القابلة للحرق في أكياس أو في صناديق ويتم التخلص منها في المقالب المحددة، وفي حالة عدم وجود مثل هذه المواقع يتم التخلص من النفايات في موقع آمن للتخلص من النفايات بحرقها مع تغطية النفايات المتبقية بالرمل، وهذه النفايات خاملة وفي غياب

المطر لا يوجد أي ضرر على التربة، وباعتبار الكميات الصغيرة للنفايات المنزلية (حوالي 60 متر مكعب في السنة تعادل 2 متر مكعب بعد حرقها) تعتبر هذه الطريقة البسيطة مقبولة.

ويجب تجنب انسكاب النفايات الخطرة مثل الوقود والشحوم الناجمة عن معدات التشييد أو من صناديق التروس أو المحولات إلى التربة في الموقع وذلك عن طريق مناولة هذه النفايات وجمعها بعناية في حاويات وارسالها لإعادة التدوير اللاحق.

#### 5-2-8- جودة الهواء:

إن الآثار على جودة الهواء المحيط خلال مرحلة التشييد ينجم أساساً من تصاعد الغبار في مواقع العمل من جراء حركة المعدات والشاحنات أثناء أعمال الحفر ويجب تخفيفها وفقاً لتوجيهات الصحة والسلامة المهنية.

وتدابير التخفيف هي:

- رش التربة بالماء

- يتم وقوف العمال في أماكن مع اعتبار حركة الهواء

- ارتداء أقنعة واقية.

#### 6-2-8- الضوضاء:

يتم تخفيف آثار الضوضاء على المواقع التي يعمل فيها العمال عن طريق الحفاظ على مسافات لا تقل عن 200 متر من أي نشاط قائم في المنطقة وهذا ينطبق على كل من مرحلة التشييد والتشغيل.

## 8-2-7- التراث الأثري والتاريخي والثقافي:

في غياب أي تراث أثري أو تاريخي أو ثقافي فلا يتوجب اقتراح أية إجراءات تخفيف.

## 8-2-8- تخفيف الأثر على حركة المرور:

تم تقييم الأثر على حركة المرور الإضافية على الطرق الإقليمية على أنه أثر طفيفا على كل حال ومع ذلك يمكن النقل بالشاحنات الثقيلة خلال ساعات حركة المرور المنخفض (أثناء المساء والليل).

ويجب على المستثمرين المستقبلين كذلك التأكد من أن السائقين العاملين على معدات التشييد الثقيلة (مثل الشاحنات واللوادر) قد تلقوا تدريب على القيادة الآمنة لمعداتهم من أجل تقليل مخاطر الحوادث ويجب أن يكون نقل المعدات الثقيلة جدا مصحوبا بسيارات الأمان.

## 8-2- البيئة البيولوجية:

### مرحلة التشييد وإنهاء التكليف:

لم يتم تحديد أي آثار مهمة ناجمة عن أنشطة التشييد / إنهاء التكليف تتطلب اتخاذ تدابير تخفيف خاصة أثناء عملية التقييم، ومع ذلك فإن تطبيق تدابير عامة لتجنب أو لتقليل أية آثار على الموائل والنباتات والحيوانات أثناء التشييد أمرا بالغ الأهمية ومنها:

- تقييد جميع الأنشطة ضمن حدود مناطق التشييد ومواقع التخزين وطرق الوصول / المسارات ويجب تجنب أي استخدام للمناطق المحيطة بشكل صارم.

- الامتثال للأنظمة المحددة في المادة 28 من القانون المصري 1994/4 الخاص بحماية البيئة المعدل بالقانون رقم 2009/9 ، أي حظر:

\* الصيد وقتل الطيور والحيوانات البرية أو الكائنات الحية البحرية.

\* قطع أو إتلاف أنواع النباتات المحمية.

\* جمع أو حيازة أو نقل أو عرض بيع أنواع من الأحافير الحيوانية والنباتية أو تغيير خصائصها.

\* التجارة في جميع الكائنات الحية المهددة بالانقراض من أنواع الحيوانات والنباتات.

- الأودية الكبيرة التي تحتوي على نباتات متفرقة تشكل عناصر محددة في الصحراء ويمكن استخدامها كموئل لحيوانات معينة وبشكل مؤقت، ومن ثم يجب تقييم الأودية المهمة على أنها أقل ملاءمة لمشاريع الطاقة الشمسية الكهروضوئية (راجع الخريطة 1-8 & 3-8) وإجراء التخفيف المناسب هو تجنب أعمال البناء في هذه الأودية قدر الإمكان.

- تجنب تركيب الأسوار السلكية والكابلات الصلب التي قد يصطدم بها الطيور وإذا كانت هناك حاجة لذلك فيجب وضع علامات عليها للحد من خطر اصطدام الطيور بها.

- تجنب إضاءة المحطات الشمسية للحد من جاذبية الحيوانات أو تهيجها أو تشويشها وإذا كانت الإضاءة مطلوبة بشكل مطلق فيجب استخدام أقل عدد من الأضواء بأقل كثافة ممكنة ومن المعروف أن مصابيح الليد أو مصادر الضوء الأخرى ذات الأطوال الموجية التي يزيد طولها عن 550 مم ليس لها سوى آثار محدودة على الحشرات وبالتالي فهي مفضلة.

- يجب أن يتم بناء الشبكة الكهربائية لمشاريع المحطات الشمسية بواسطة كابلات تحت الأرض وإذا كان لا يمكن تجنب استخدام الخطوط الهوائية فيجب تصميمها وفقاً للإرشادات المتاحة (على سبيل المثال BirdLife International 2015) لتجنب خطر الصدمات الكهربائية للطيور الكبيرة.

باستثناء التدابير المذكورة أعلاه وتطبيقها فلا يلزم المزيد من إجراءات التخفيف فيما يتعلق بالموائل والنباتات والحيوانات لأنه لا يتوقع حدوث أي آثار سلبية كبيرة متبقية من خلال تشييد محطات الطاقة الشمسية الكهروضوئية والبنية التحتية المرتبطة بها في منطقة المشروع.

#### مرحلة التشغيل والصيانة:

من أجل حماية الموائل والنباتات والحيوانات في المناطق الشمسية الفرعية الثلاثة ولا سيما الأنواع التي تحميها التشريعات المصرية فإن اللوائح المحددة في المادة 28 من القانون 4 / 1994 المعدل بالقانون 2009/9 يجب اتباعها ويجب تطبيق إجراءات أفضل الممارسات وتدابير التخفيف العامة أثناء التشغيل والصيانة.

عند تنظيف الألواح الشمسية الكهروضوئية يتم تطبيق الإجراء المناسب ويتم تقليل الكمية المطلوبة من الماء من أجل توفير الموارد وتقليل التأثير على البيئة البيولوجية.

وبالإضافة إلى ذلك فلا يلزم أية إجراءات أخرى إضافية فيما يتعلق بالموائل والنباتات والحيوانات ولا يتوقع حدوث أي آثار سلبية كبيرة متبقية عن طريق تشغيل / صيانة محطات الطاقة الشمسية الكهروضوئية والبنية التحتية المرتبطة بها في منطقة المشروع.

#### الحاجة إلى مراقبة ما بعد التشييد/ إدارة المخاطر:

تُظهر بيانات خط الأساس بوضوح أن المناطق الشمسية الشرقية ليست موائل هامة للنباتات والأنواع الحيوانية المسجلة فيها منتشرة على نطاق واسع ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر وتعتبر الحيوانات المحلية في هذه المناطق الفرعية فقيرة في الأنواع ومنخفضة الكثافة، وعلاوة على ذلك فليست بها أي من الأنواع المهددة، وبالتالي لا تعتبر المناطق الشمسية الشرقية موئلاً هاماً للحيوانات.

ومن ثم لا توجد حاجة إلى مزيد من الدراسات الأساسية حول النباتات والحيوانات في المناطق الفرعية الثلاثة (لا قبل أو أثناء أو بعد إنشاء المحطات الشمسية الكهروضوئية).

#### 4-8- البيئة الاجتماعية:

##### إدارة الآثار المتعلقة بالصحة والسلامة:

الآثار المحتملة على صحة العمال وصحة المجتمع المحيط وأمنه أثناء تشييد المشروع هي تلك المرتبطة بأي مشروع تشييد آخر من جراء تحريك التربة واستخدام المعدات الكبيرة ونقل المواد ذات الوزن الزائد المتضخم وتشييد المنشآت الصناعية وتركيبها، وبالإضافة إلى ذلك تشمل قضايا الصحة والسلامة العمل في الأعمال الكهربائية أو في خنادق.

##### تدابير التخفيف:

- سيكون مطلوباً من المستثمرين المتعاقد معهم إجبار المقاولين على مراعاة توجيهات مجموعة الصحة والسلامة والبيئة الصادرة عن مجموعة البنك الدولي كحد أدنى إلى جانب مراعاة المبادئ التوجيهية العامة المتعلقة بالبيئة والصحة والسلامة المهنية والصحة المجتمعية وخاصة المبادئ التوجيهية

لمؤسسة التمويل الدولية: توجهات الصحة والسلامة والبيئة الخاصة بطاقة الرياح ومبادئ السلامة الخاصة بنقل وتوزيع الطاقة الكهربائية للبنك الأوروبي لإعادة التعمير والتنمية.

- وفقا لقوانين العمل المتعلقة بالصحة والسلامة المهنية رقم 12 لعام 2003 يجب تدريب العمال حول إجراءات الصحة والسلامة.

- يتعين على المقاول والمقاولين من الباطن تعيين مشرفين للصحة والسلامة مفوضا لمعاينة المخالفين لإجراءات الصحة والسلامة.

- يجب أن يضع المقاول خطة للصحة والسلامة قبل بدء أعمال التشييد ويجب عليه أن يجعل مرافق الصحة والسلامة (مثل معدات مكافحة الحرائق والإسعافات الأولية والأدوات الوقائية ، إلخ) متاحة في موقع المشروع ويجب أن يكون لديه معدات للإخلاء في حالات الطوارئ إلى المستشفى القريب من الموقع.

- كما ذكر من قبل يخضع جميع الموظفين لتدريب أولي للسلامة مصمم خصيصًا لمهام العمل.

#### تخفيف الآثار على المجتمع البدوي:

البدو هم مجموعة عرقية خاصة لهم ثقافتهم الخاصة وهم يعتبرون الصحراء أرض بدوية على الرغم من أن القيمة الاقتصادية لهذه الأرض منخفضة ويجب مراعاة مصالح مجموعات البدو عند تطوير وتنفيذ مشاريع طاقة الرياح.

كانت هذه مسألة مثيرة للقلق بالنسبة لأصحاب المصلحة المتعددين الذين يعيشون في القرى في وادي النيل أو في المزارع الجديدة على حدود منطقة المشروع كما تبين للاستشاري خلال العمل الميداني

وينبغي احترام وتقدير حقيقة أن لديهم ثقافتهم الفريدة الخاصة بهم التي تميزهم، وفيما يلي التوصيات الرئيسية ذات الصلة:

### إجراءات التخفيف:

- يجب استشارة البدو أثناء تخطيط مشروعات الطاقة المتجددة لضمان عدم تعارض أي منها مع مصالحهم المعقولة ويجب استخدام أدوات التشاور التشاركية أثناء تنفيذ المشروع وتشغيله.

- يجب اعتبار الفوائد المحتملة مثل فرص العمل.

- يمثل غياب المعلومات والإحصاءات تحديًا حقيقيًا وهناك حاجة للبدء بتطوير قاعدة بيانات تتضمن معلومات عن مجتمع البدو وهذا أمر ضروري لمراقبة فوائد المشروع وضمان عدم استبعاد البدو.

### التخفيف من آثار تدفق العمالة وظروف العمل:

### تدابير التخفيف:

- يوصى بشدة بتقليص عدد العمال من خارج المحافظات القريبة من منطقة المشروع ويجب إرشاد المقاولين بتوظيف عمال البناء من أقرب القرى في وادي النيل وتشمل المزايا للمقاولين من هذا الإجراء تقليل الحاجة إلى السكن والنقل للعمال.

- يمكن أن يشارك قادة المجتمع في عملية التوظيف من حيث إعلام مجتمعهم المحلي عن فرص العمل وسيقع هذا تحت مسؤولية موظف التنمية الاجتماعية.

- يجب مراعاة المبادئ الأساسية وحقوق العمال بما يتماشى مع توجيهات البنك الأوروبي لإعادة التعمير والتنمية EBRD PR2 و IFC PS2 ومع توجيهات قوانين العمل والعمالة الوطنية.

- يجب أن تكون مرافق الإقامة المؤقتة في الموقع ملائمة وأن تكون نظيفة وآمنة وعلى أقل تقدير تلي الاحتياجات الأساسية للعمال وفقاً لتوجيهات سكن العاملين في مؤسسة التمويل الدولية والبنك الأوروبي لإعادة التعمير.

- إشراك أصحاب المصلحة والجمهور والإفصاح عن المعلومات المتعلقة بإنشاء آلية التظلم وآلية التعويض عن طريق هيئة الطاقة الجديدة والمتجددة.

#### آثار انعكاس الضوء:

آثار الانعكاس الصادر من الألواح الشمسية الحديثة طفيف للغاية وبالتالي لا توجد أية تدابير مقترحة هنا.

#### 5-8- إجراءات التخفيف الخاصة في المناطق الشمسية الشرقية الفرعية:

#### المنطقة الشمسية الشرقية الفرعية 1:

يجب اعتبار المناطق الموجودة في المنطقة الشمسية الشرقية الفرعية 1 التي يتم استخدامها حالياً أو التي يجري تطويرها للأنشطة الاقتصادية مستبعدة من مشاريع الطاقة الشمسية بالإضافة إلى ذلك تم تحديد سمات خاصة تتطلب إجراءات تخفيف محددة: يجب تقييم أهمية وادي العبادية ووادي البرشاوي على أنهما أقل موائمة لمحطات الطاقة الشمسية وبالتالي يجب تجنب أعمال البناء في هذه الأودية قدر الإمكان (راجع خريطة 1-8).

### المنطقة الشمسية الشرقية الفرعية 2:

إلى جانب تدابير التخفيف العامة التي يجب تطبيقها على جميع محطات الطاقة الشمسية الكهروضوئية فليست هناك أية سمات خاصة في المنطقة الشمسية الشرقية الفرعية 2 تتطلب إجراءات تخفيف محددة (أنظر خريطة 2-8).

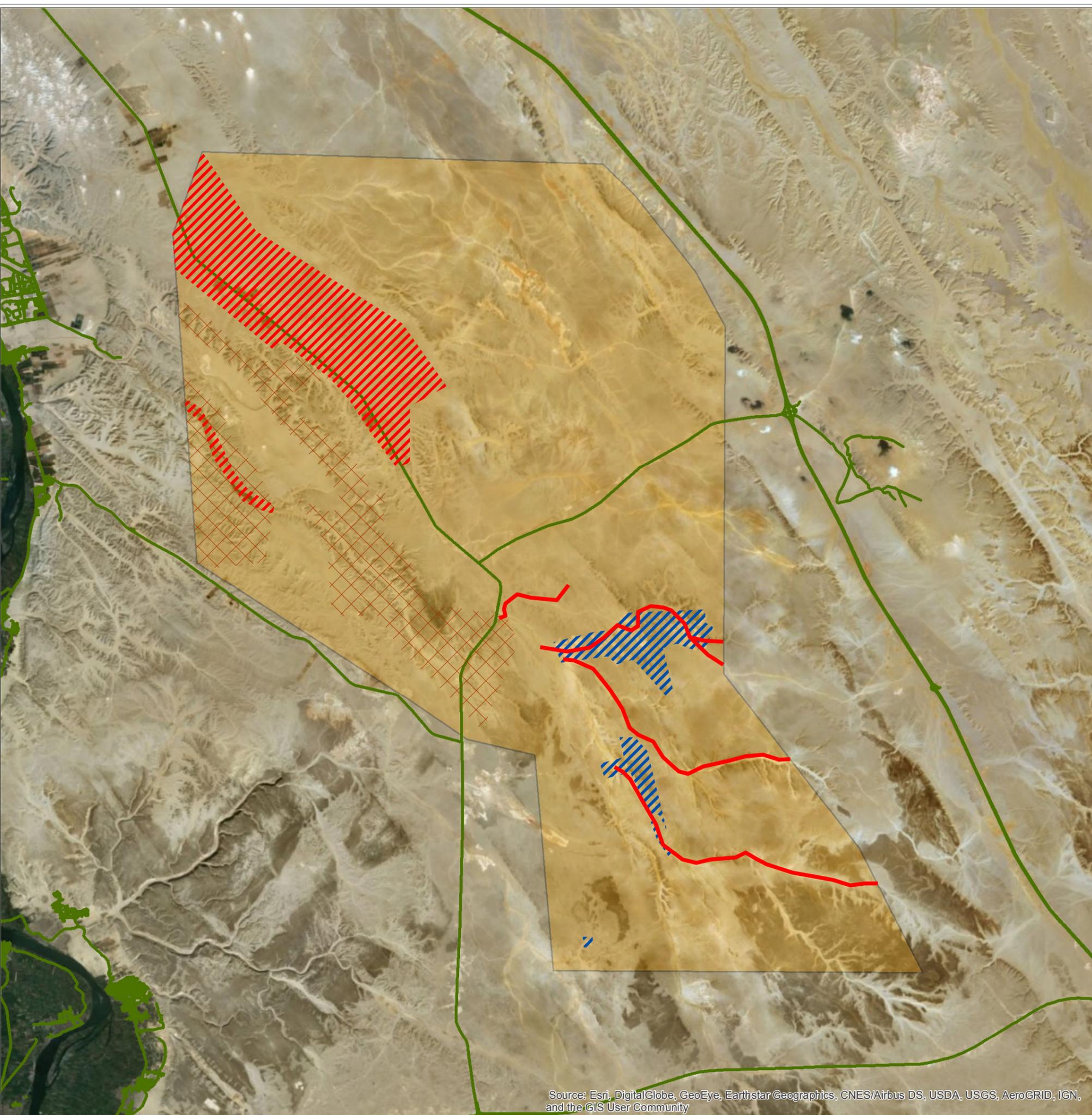
### المنطقة الشمسية الشرقية الفرعية 3:

إلى جانب تدابير التخفيف العامة التي يجب تطبيقها على جميع محطات الطاقة الشمسية الكهروضوئية فقد تم تحديد سمات خاصة في المنطقة الشمسية الشرقية الفرعية 3 تتطلب إجراءات تخفيف محددة: يجب تقييم مجمع وادي الشيخ المهم باعتباره أقل ملاءمة لمشاريع الطاقة الشمسية الكهروضوئية و بالتالي يجب تجنب أعمال التشييد في مجمع الوادي قدر الإمكان (أنظر خريطة 3-8).

**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map NTS 8-1:**  
 Restrictions for solar power developments in the East Solar-1 subarea



**Bordering of East Solar-1 subarea**

 East Solar-1 subarea

**Roads**  
 road

**Zones preclusive for PV solar power development**

 due to economic activities (farming)  
 due to economic activities (mining)

**Zones unfavourable for PV solar power development**

 due to geomorphology  
 wadi of importance



**Strategic Environmental and Social Assessment of  
Renewable Energy Projects in the East Nile Region  
(Arab Republic of Egypt)  
SESA Solar Report**

client:  
New and Renewable Energy Authority (NREA),  
Ministry of Electricity and Renewable Energy

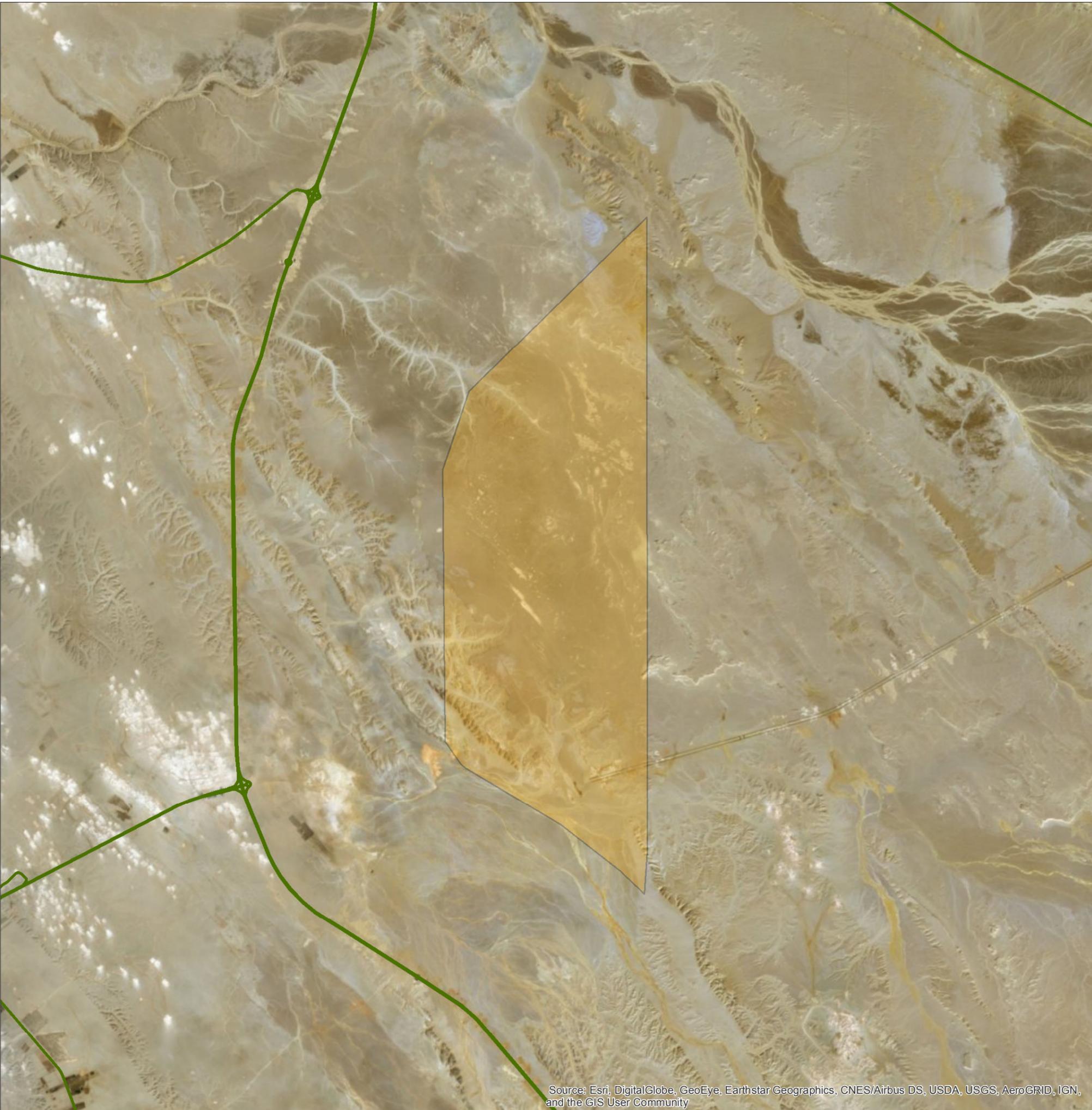
**Map NTS 8-2:**  
Restrictions for solar power developments  
in the East Solar-2 subarea

**Bordering of East Solar-2 subarea**

 East Solar-2 subarea

**Roads**  
 road

**No restrictions exists for PV solar power development  
in the East Solar-2 subarea!**



**Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)**  
**SESA Solar Report**

client:  
 New and Renewable Energy Authority (NREA),  
 Ministry of Electricity and Renewable Energy

**Map NTS 8-3:**  
 Restrictions for solar power developments in the East Solar-3 subarea



**Bordering of East Solar-3 subarea**

 East Solar-3 subarea

**Roads**  
 road

**Zones preclusive for PV solar power development**  
 due to geomorphology

**Zones unfavourable for PV solar power development**  
 due to geomorphology  
 due to accessibility  
 wadi of importance



## 9- الإدارة البيئية والاجتماعية وخط المراقبة:

من المفهوم أن هيئة الطاقة الجديدة والمتجددة أو هيئة مصرفية أخرى ستطرح مناقصة لاختيار مستثمرين من القطاع الخاص لمشروعات الطاقة الشمسية بقدرة 50 ميغا وات وستشرف على المستثمرين خلال فترة عمر المشروعات ويجب على هيئة الطاقة الجديدة والمتجددة أن تفكر في جعل خطة المراقبة البيئية والاجتماعية إلزامية في مستندات المناقصة وفي العقد اللاحق مع المستثمرين من القطاع الخاص، وكجزء من هذه المهمة الإشرافية ، ستقوم هيئة الطاقة الجديدة والمتجددة أيضاً بمتابعة أي تظلم خلال فترة عمر كل مشروع.

ويتطلب تنفيذ تدابير التخفيف اتخاذ إجراءات خلال مرحلة تقديم العطاءات والتخطيط والتشييد ومرحلة ما بعد التشييد لكل محطة طاقة شمسية سيتم إنشاؤها في المنطقة ويمكن تلخيص ذلك في خطة الإدارة البيئية والاجتماعية التالية وتنطبق هذه الإجراءات على جميع مشاريع الطاقة الشمسية في منطقة المشروع وسيتم استكمالها عند الضرورة بتدابير محددة أثناء تقييم آثار المشروع.

### جدول 9-1- خطة الإدارة البيئية والاجتماعية

إجراءات التخفيف	المتطلبات التربعية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
إعداد آلية تظلم تطبق خلال دورة حياة مشاريع مزارع الرياح تديرها السلطة المصرية المختصة.	توجيهات البنك الأوروبي PR1 & PR10 وأفضل الممارسات	التظلمات	كافة المراحل

إجراءات التخفيف	المتطلبات التوجيهية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
جعل المعايير المحددة في المبادئ التوجيهية العامة للبيئة والصحة والسلامة الصادرة عن مؤسسة التمويل الدولية في أبريل 2007 وفي إرشادات البيئة والصحة والسلامة المتعلقة بالطاقة الشمسية في أغسطس 2015 الحد الأدنى من الالتزام في مستندات المناقصة لكل مشروع.	توجيهات البنك الأوروبي PR1 & PR4 وأفضل الممارسات	مخاطر الصحة والسلامة	مرحلة المناقصة والتخطيط
جعل تعيين مهندس للصحة والسلامة والبيئة الزاميا خلال مرحلة التشييد من أحكام وشروط مستندات المناقصة.			
جعل تطبيق توجيهات الصحة والسلامة والبيئة شرطا في مستندات المناقصة.			
جعل ضرورة توفير معدات السلامة شرطا في مستندات المناقصة.			
جعل تحديد إجراءات التخفيف أثناء مرحلة التشييد والتشغيل إلزاميا للمقاولين عند تقديم عروض محطات الطاقة الشمسية قدرة 50 ميغاوات	توجيهات البنك الأوروبي PR1 وأفضل الممارسات	تطبيق إجراءات للتخفيف	
تجنب تركيب أسوار من السلك وكابلات	توجيهات البنك	الآثار على الموائل	

إجراءات التخفيف	المتطلبات التربعية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
<p>الصلب وفي حالة الضرورة القصوى يتم وضع علامات عليها.</p> <p>تجنب إضاءة الألواح الشمسية.</p> <p>تجنب أعمال التشييد في الأودية قدر الإمكان.</p> <p>تجنب التأثير على سمات معينة (مثل الكهوف أو الشقوق) التي قد تشكل موئلاً مناسباً للحيوانات (يجب أخذها في الاعتبار في تقييم الأثر البيئي والاجتماعي الخاص بالمشروع).</p>	<p>الأوروبي PR6</p> <p>وأفضل الممارسات</p>	<p>الطبيعية والنباتات والحيوانات</p>	
<p>يجب تشييد الشبكة الكهربائية داخل حدود محطة الطاقة الشمسية باستخدام كابلات تحت الأرض، وإذا كان لا يمكن تجنب استخدام الخطوط الهوائية فيجب تصميمها وفقاً للتوجيهات المتاحة (على سبيل المثال BirdLife International (2015).</p>			
<p>جعل مبادئ خط الاستواء EP3 المعايير البيئية والاجتماعية ومعايير أداء البنك</p>	<p>توجيهات البنك الأوروبي PR3</p>	<p>مخاطر الصحة والسلامة</p>	<p>مرحلة التشييد</p>

إجراءات التخفيف	المتطلبات التربعية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
الأوروبي لاعادة التعمير كحد أدنى للمتطلبات.	وأفضل الممارسات		
يجب على المقاول تعيين مهندس للصحة والسلامة والبيئة مفوض لاعطاء توجيهات الصحة والسلامة والبيئة.	توجيهات البنك الأوروبي PR4 وأفضل الممارسات		
إعداد خطة للصحة والسلامة والبيئة قبل البدء في أي نشاط.	توجيهات البنك الأوروبي PR4 وأفضل الممارسات		
توفير أدوات ومعدات الصحة والسلامة والبيئة وتدريب العاملين عليها.	توجيهات البنك الأوروبي PR4 وأفضل الممارسات		
إقامة مرافق صحية بالموقع.	توجيهات البنك الأوروبي PR4 وأفضل الممارسات		
إيقاف العمل في حالات الظروف الجوية الغير مواتية مثل العواصف الرملية.	توجيهات البنك الأوروبي PR4 وأفضل الممارسات		
تركيب خزانات المياه لحماية الآبار من الإفراط في الاستخدام:	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	حماية موارد المياه	

إجراءات التخفيف	المتطلبات التربعية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
<p>خزان واحد في محطة خلط الخرسانة بلحد أدنى من الحجم الذي يتوافق مع الطلب على المياه لصنع الخرسانة لأساس توربينات واحدة.</p> <p>خزان واحد عند بئر إمداد المياه بحد أدنى لحجم يعادل أكبر شاحنة صهريج.</p> <p>تقليل استهلاك المياه.</p>			
<p>يتم القيام بنقل المعدات ذات الأحجام والأوزان الكبيرة في ساعات الحركة المنخفضة للمرور (أثناء المساء أو الليل) مع مرافقة سيارات الأمن لها.</p>	<p>توجيهات البنك الأوروبي PR3 وأفضل الممارسات</p>	<p>حركة المرور</p>	
<p>ضمان العمل بنظام ونظافة مع مراقبة مشرفين لتقليل المخلفات السائلة والصلبة وللتخلص الصحيح منها.</p>	<p>توجيهات البنك الأوروبي PR3 وأفضل الممارسات</p>	<p>التلوث</p>	
<p>جمع المخلفات وتخزينها بأمان وفصل الجزء القابل لإعادة التدوير ودفن الجزء القابل للتحلل البيولوجي والرماد والمخلفات المتبقية (مواقع المعالجة ومدافن النفايات) وإذا كان ذلك غير ممكن عمليا فيجوز دغنها في الصحراء مع التغطية بالرمال بعمق لا يقل عن 1.5</p>	<p>توجيهات البنك الأوروبي PR3 وأفضل الممارسات</p>	<p>التخلص من المخلفات غير الخطرة</p>	

إجراءات التخفيف	المتطلبات التربةية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
	متراً).		
تجنب انسكاب الزيوت والوقود والشحوم على التربة ويجب جمعها وإعادة تدويرها.	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	التخلص من المخلفات الخطرة	
إنشاء محطة معالجة لاهوائية بسيطة من مرحلتين وتصريف المياه المعالجة إلى حصى صحراوي لمرحلة ما بعد المعالجة.	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	معالجة مياه الصرف الصحي	
في نهاية أعمال التشييد يجب أن يجعل المقاول الموقع في ظروف مرتبة ويجب أن يتم ردم الحفر وأن يتم تجميع أكوام مواد الحفر وأن يتم التخلص من النفايات بشكل صحيح	توجيهات البنك الأوروبي PR3 وأفضل الممارسات		
تقييد جميع الأنشطة في حدود مناطق التشييد ومواقع التخزين وطرق الوصول والمسارات ويجب تجنب أي استخدام للمناطق المحيطة بشكل صارم ويجب أن تتجنب الأعمال الإنشائية أي موائ حساسة إن وجدت (يتم تحديدها في تقييم الأثر البيئي والاجتماعي الخاص	توجيهات البنك الأوروبي PR6 وأفضل الممارسات	الأثار على الموائ والنباتات والحيوانات	

إجراءات التخفيف	المتطلبات التربعية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
(بالمشروع)			
تجنب احضار أنواع جديدة من البيئات الحضرية والريفية إلى المنطقة (على سبيل المثال مع مواد البناء والحاويات).	توجيهات البنك الأوروبي PR6 وأفضل الممارسات		
الالتزام بالأنظمة المحددة في المادة 28 من القانون المصري رقم. 1994/4 لحماية البيئة المعدل بالقانون رقم 2009/9.	التشريعات الوطنية		
يجب توظيف أكبر قدر ممكن من عمال البناء من أقرب المناطق أي من أقرب القرى في وادي النيل.	توجيهات البنك الأوروبي PR7 وأفضل الممارسات	العمالة وظروف العمل	
الامتثال للمبادئ والحقوق الأساسية للعاملين ومعايير الإقامة التي تلي متطلبات البنك الأوروبي لإعادة التعمير (PR2) ومؤسسة التمويل الدولية (PS2) وقوانين العمل والعمالة الوطنية.	توجيهات البنك الأوروبي PR2, PR7, PR2 وأفضل الممارسات		
يجب أن تكون أي مرافق إقامة مؤقتة في الموقع مناسبة وأن تكون نظيفة وأمنة مع تلبية الاحتياجات الأساسية للعمال.	توجيهات البنك الأوروبي PR7 وأفضل الممارسات		

إجراءات التخفيف	المتطلبات التربعية ومتطلبات البنك الأوروبي	السمات البيئية	مرحلة المشروع
التأكد من أن عمال تشغيل وصيانة المحطات الشمسية مؤهلين ومدربين على أمور الصحة والسلامة.	توجيهات البنك الأوروبي PR4 وأفضل الممارسات	مخاطر الصحة والسلامة	مرحلة التشغيل والصيانة
يجب تطبيق قواعد معينة بالنسبة للأثرية التي يتح اكتشافها أثناء أعمال الحفر. يجب تدريب المقاولين ومقاوليهم من الباطن على تطبيق هذه الإجراءات.	توجيهات البنك الأوروبي PR8, IFC PS8 والتشريعات الوطنية	التراث الثقافي	
يجب إزالة تركيبات المحطات الشمسية في نهاية عمرها وإعادة اللاندسكيب لحالته الأصلية وتسوية التربة وردم الخنادق.	توجيهات البنك الأوروبي PR6 وأفضل الممارسات	استخدام الأراضي والاندسكيب	مرحلة إنهاء التكليف