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

Final SESA Wind Report

September 2018

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

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

Final SESA Wind Report

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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 km² area (2,200 km² 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 Assiut, has been carried out by the Joint Venture of Lahmeyer International and ecoda Environmental Consultants on behalf of the New and Renewable Energy Authority (NREA) in Egypt.

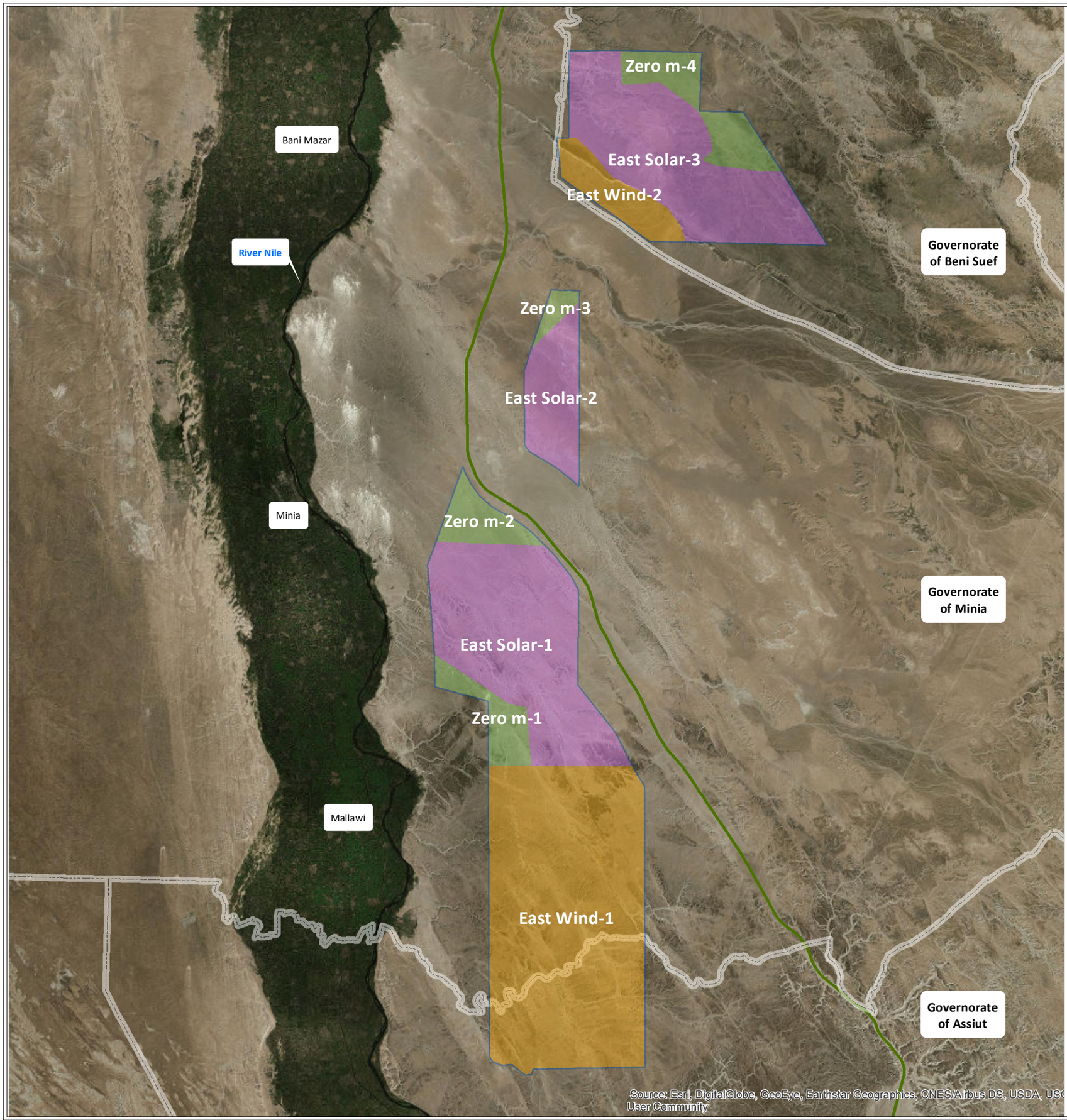
Following the issuance of the Renewable Energy (RE) Feed-in Tariff (FiT) presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (EBRD) has been engaged in a partnership with the Government of Egypt (GoE) to identify a portfolio of RE projects (from wind and solar 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 1,725 km² area (East Wind-1 and East Wind-2 with building height limit of 150 m and the 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, 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 focuses on the development of wind energy projects, whereas a separate report considers the development of solar (Photovoltaic) projects within the Project Area.

1.2 The Project Area

The East Nile Area of 2,200 km^2 with a useable area of 1,725 km² (East Wind-1 and East Wind-2 as well as East Solar-1, East Solar-2 and East Solar-3 areas) was allocated by Presidential Decree No. 456 of 2014, which was modified by Decree No. 116 of 2016 for the development of wind and solar energy 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^2 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 wind power development in the East Wind-1 and East Wind-2 subareas.



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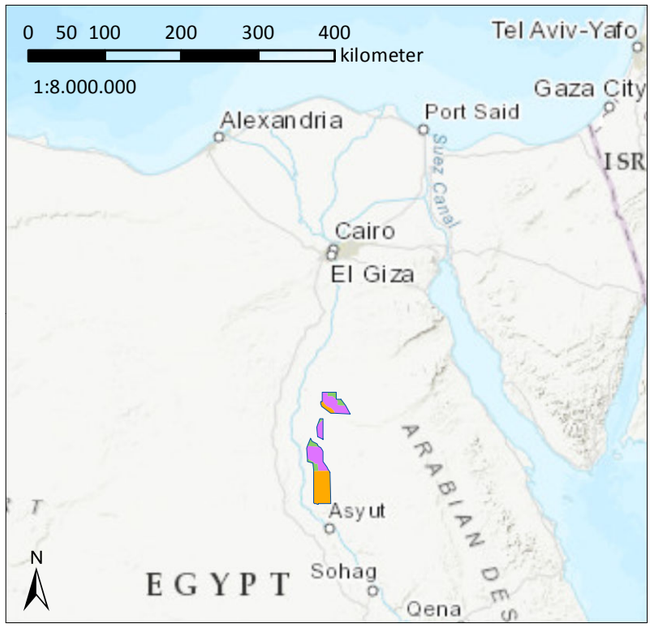
Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)
SESA Wind Report

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 "120 m")
- borders between governorates
- Assiut - Cairo Desert Road (motorway)



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The Project Area is located in the Eastern Desert (also called Arabian Desert; Al-Saḥrāʾ 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^2. 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 Shāʾib al-Banāt. The desert receives occasional rainfall and is extensively dissected by Wadis (dry beds with occasional streams).

The Project Area includes two wind subareas:

East-Wind 1

The East wind-1 subarea stretches over nearly 43 km from the north to the south at a minimum distance of 12 km east of the River Nile (see Map 1-1). The maximum width of this subarea is about 22 km (a total area of about 750 km²). It is mainly located in the area of the Governorate El Minya, whereas the very south is located in the Governorate Assiut. The El Minya-Assiut National Road runs in a southerly direction through this subarea (see Map 1-1).

East-Wind 2

The East Wind-2 subarea is located at a minimum distance of about 25 km east of the Nile Valley in the area of the Governorate Beni Suef.

In the Southwest, the El Shaikh Fadel - Ras Ghareb Road borders this subarea. At distances of about 8 km, the Cairo – Aswan Highway runs from south to north. The maximum extent of this subarea is about 20 km from the north-west to the south-east and about 4 km from the south-west to the north-east (a total area of about 79 km^2).

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 km²)
- subareas: East-Wind 1 or East-Wind 2 subarea
- zones: favourable, less favourable and preclusive zones as per definition under section 5 and 6.

1.3 Objectives of the SESA Process

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 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 zones in the Project Area, which are suitable for RE development based on the outcome of the environmental and social impact assessment.
- 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 SESA consultant provided training to the staff of the New and Renewable Energy Authority (NREA) on SESA, Environmental and Social Impact Assessment (ESIA) and GIS.

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

It includes the following key stages and reports:

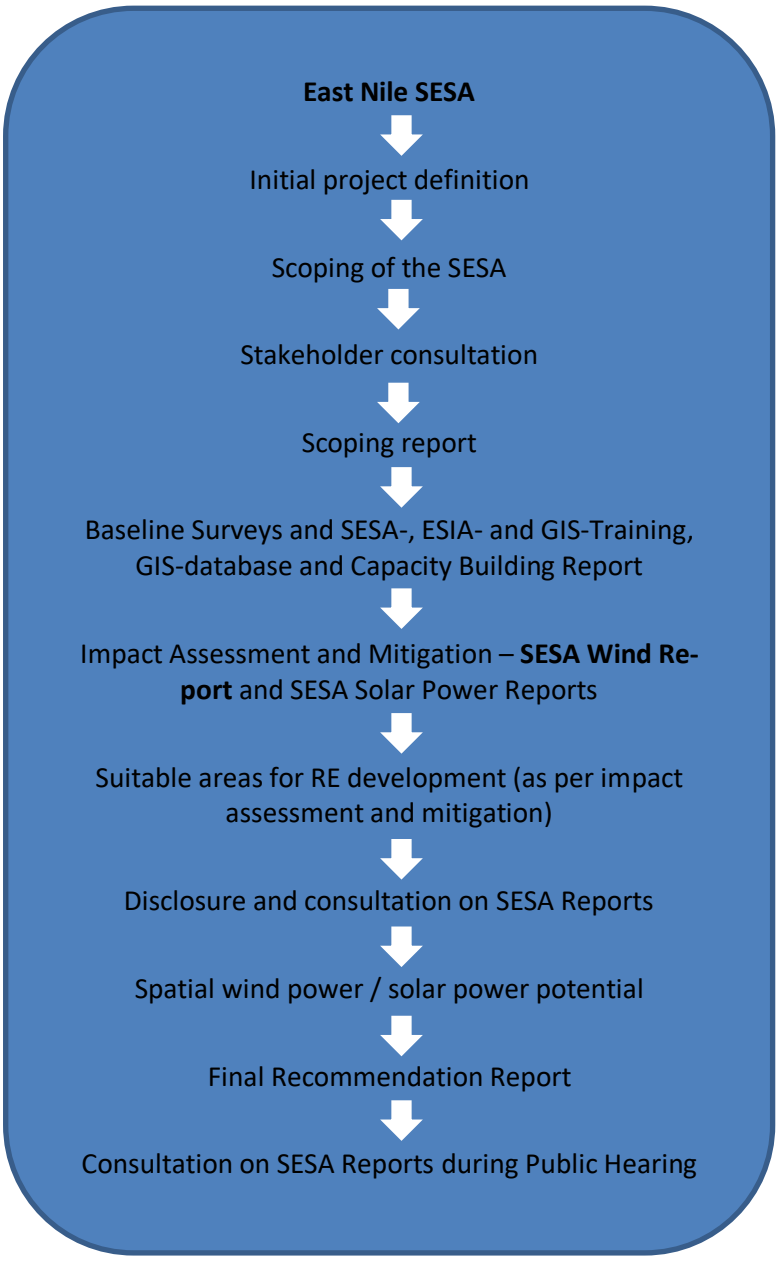


Figure 1-1: Overview of the SESA stages and reports

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 Objectives and Approach of the SESA Wind Report

This subject report, the SESA Wind Report, focuses on the social and environmental assessment to define the suitability for wind power development within the greater East Wind-1 and East Wind-2 subareas, taking into consideration technical, social or environmental constraints. The major elements of this report are:

- Legislative Framework and International Environmental and Social Standards
- Generic description of wind energy technology and wind farm implementation
- Baseline Assessment on Existing Physical, Biological and Social Environment
- Identification of physical (technical and land-use), environmental and social constraints – Areas to be precluded from wind power development according to hard criteria and areas that are less favourable for technical reasons
- Prediction and assessment of potential social and environmental impacts identified during scoping, taking into consideration typical features of a wind farm 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 wind power development,
- zones that are less favourable, but can be developed with restrictions, and
- zones in which wind power development is precluded.

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

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

1.5 Consideration of Alternatives and Justification of the Project

Egypt is characterised by a 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 the utilisation of renewable energy sources and the 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 wind energy is the best renewable energy choice in the case of Egypt. Hence, wind energy is targeting to contribute 60% of the renewable energy share.

The use of renewable energies is considered to be an environmentally compatible form of electricity supply. It saves CO_2 emissions and contributes to resource conservation such as the indigenous oil and gas reserves. Hence, in areas of good wind power potential like Upper Egypt, utilisation of wind energy is the best alternative 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 the 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 Wind-1 and East Wind-2 subareas. The driving criteria for selection of the subareas are as follows:

- the areas have been identified to be located in a region with likely promising wind power potential (besides the Red Sea region and the West Nile region),
- the areas mostly consist of vast desert grounds with only sparse vegetation being 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 wind power development, requiring limited construction and landscape modification measures, and

Wind farm 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 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_2 free renewable electricity generation would have to be mainly compensated by heavy fuel oil fired power plant generation with significant CO_2 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 wind power potential would deliver some firm generation capacity, which can be considered as a substitute to investments in conventional power generation capacity to meet future demands. Thus, the zero-alternative would imply adverse effects on CO_2 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 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. Wind power development is limited to the East Wind-1 and East Wind-2 subareas with building height limits of 150 m, i.e. the tip height of wind turbines. These two areas are the focus areas of this subject report.

The intended private investments into wind power development are likely to require financing by international lenders, requiring international standards to be met. Accordingly, 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.

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 Minister's Decree 338). According to these Regulations, the Egyptian Environmental Authority (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 the following:

- 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 are not 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 concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process for the social and environmental aspects, with the parties concerned minimising potential negative environmental and social impacts, strengthening 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 achieving 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 concerned 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 parties concerned.

The Egyptian Guidelines of Principles and Procedures for Environmental Impact Assessment (“EIA Guidelines”, 2nd edition (2009) contain a provision with regards to projects in development, for which an integrated EIA has been prepared (e.g. for a cluster of foundries or tourist centres, an 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 from 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 considers the requirements of these guidelines for EIA in Egypt. Moreover, the SESA wind report considers the assessment of the different potential impacts of wind power projects proposed by the “Environmental Impact Assessment Guidelines for Electricity Generating Wind Farms” issued by EEAA in December 2007.

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 / operational activities are socially and environmentally sustainable,

- A project / operational activities are respectful to the rights of affected workers and communities, and
- A project / operational activities are designed and carried out in compliance with applicable regulatory requirements and good international practice.

As the SESA is supported by the EBRD, the SESA must 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 50 MW, are generally categorised as Category 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 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, have been applied to the SESA to fulfil the conditions for 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 to the SESA is PR 1, with 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 has involved the following elements: stakeholder identification and analysis, stakeholder engagement planning, disclosure of information, consultation and participation, grievance process, 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 the 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% 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 process

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: Environmental Health and Safety Guidelines for Wind Energy and the Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, which are considered during impact assessment and mitigation in the SES.

3 Description of a typical Wind Power Project

3.1 Objective and Scope

This report assesses the potential and expected environmental and social impacts of wind 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.

Especially in areas with a predominant wind direction and quite homogenous terrain, wind farm development follows basic rules of WTG micro-siting (development in rows perpendicular to predominant wind direction with distance of about 10 x 3 rotor diameters). Moreover, potential environmental impacts resulting from wind power are well known. Accordingly, a typical wind farm layout with its typical potential impacts, the wind farm does anticipate the later environmental and social impacts of the intended 50 MW wind farm plots quite precisely already at this early study stage.

For this purpose, the different project components of a wind farm as well as the major works during the lifecycle of the project are described subsequently.

3.2 Typical Features and Scope of Works of Large-Scale Wind Farms

3.2.1 Typical layout and wind farm components

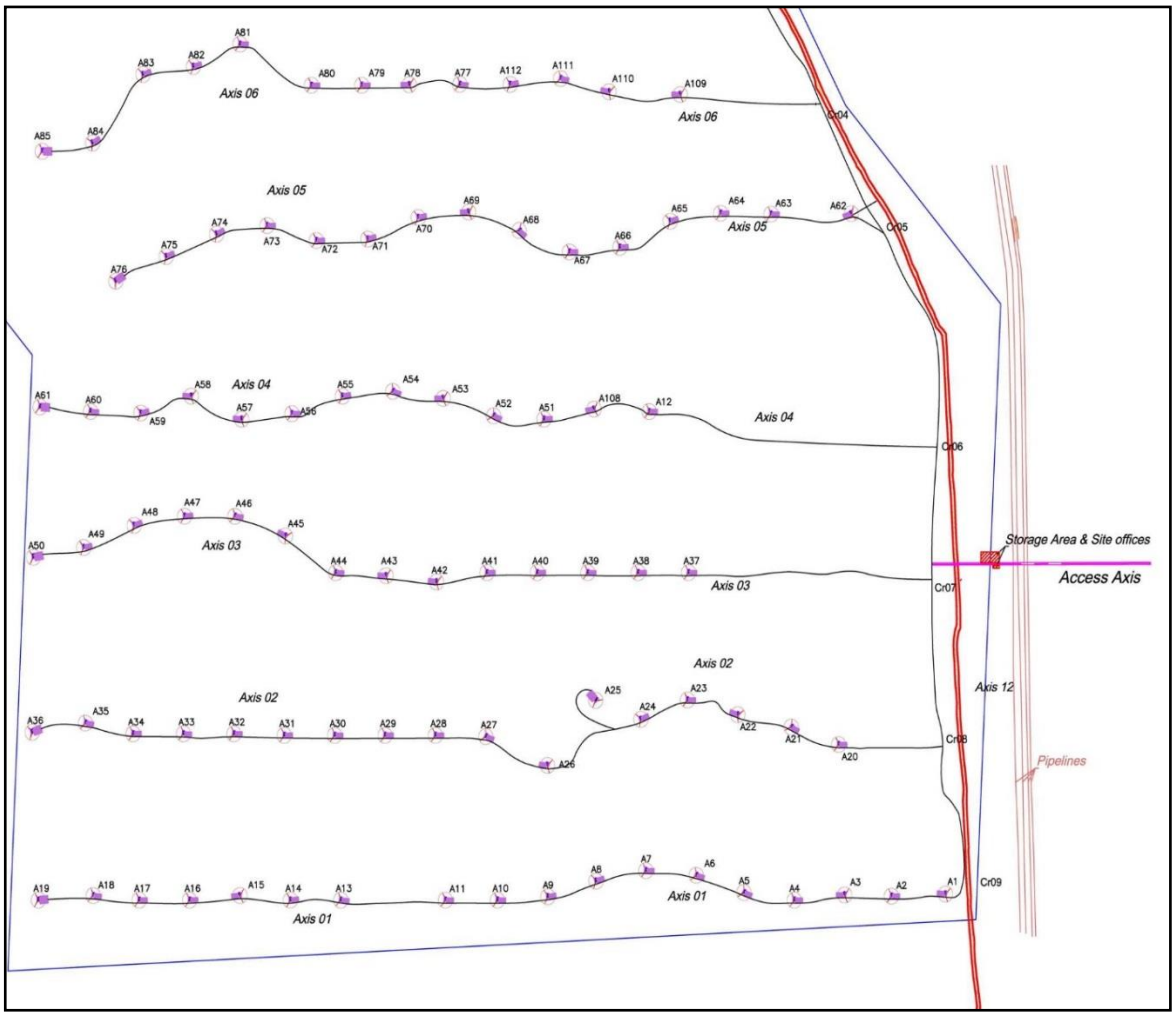
The typical features of a wind farm are as follows:

- Three bladed wind turbines (wind turbine generator or WTG) of the 3 MW Class with rotor diameters of about 100 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 in distance along the rows. The distance between rows will be about 800 m to 1,200 m.
- Medium voltage wind farm internal grid made by underground cable. Kiosks for ring main stations might be installed next to each WTG or inside the WTG tower.
- 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 involve 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 wind farm gravel roads of about 8 m in width as well as construction platforms of compacted gravel (hard stands) with dimensions in the order of 150 x 100 m mainly depending on the dimensions of the WTG blades.
- External access roads from existing road network.
- Central service buildings such as, possibly, a control room, spare part stores, workshops and worker facilities for service personnel.

Wind farm construction works typically extend across 6 to 8% of the overall wind farm plot, while this is reduced to about 5% of the land once the wind farm 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 be initiated in parallel to wind power utilisation.

A layout plan showing a typical wind farm configuration in a homogeneous desert area near to the Gulf of Suez with a predominant wind direction is presented below (see Figure 3-1).

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 3-1.



Legend:

- Axis, access roads
- Existing Transmission Line
- Existing Petrol Pipelines

Figure 3-1: Typical wind farm layout for a pre-dominant wind direction – example of Zafarana wind farm (Egypt)

Figure 3-2: Inside wind farm view

Figure 3-3: Remote wind farm view on desert ground

3.2.2 Construction works

The construction works for a typical wind farm project consist of civil, electrical, transport and installation works.

Major elements of civil works are the construction of concrete foundations, of cable trenches, roads and platforms as well as of auxiliary buildings (e.g. service buildings, control room, substation).

Foundation bodies for a 3 MW class WTG is usually a ring foundation with diameters of about 20 m and a depth of about 3 m. An example is given in Figure 3-4. This requires excavation of foundation pits, construction of formwork and reinforcement, concreting of about 500 m³ and backfilling of excavated materials, foundation needs to be continuously cast within one day, requiring adequate aggregate storage and batching plant and transport capacities. Aggregate water volume for one foundation is in the order of 200 m³.

Figure 3-4: Example of a WTG foundation

Wind farm roads will be gravel roads of a width of 5 to 8 m, mainly depending on transport requirements and with a two-layer road body of about 0.4 to 0.5 m depth. The road alignment need to consider maximum gradients of about 6 to 8 %, what in complex terrain requires thorough planning balancing cut and fill. Gravel can be collected from nearby gravel deposits. Gravel need to be compacted in layers by rollers and spraying water. For the erection platforms with dimensions of about 150 x 100 m next to each WTG, the same principles apply as for road construction.

Further civil works is the excavation and backfilling of cable trenches (depth of about 1 m and a width of 1 to 2 m), which are usually built in parallel to WTG rows and lead to a collector substation.

Service buildings for storage and control may be erected at the wind farm site. However, investors may prefer to keep permanent onsite buildings to a minimum (e.g. housing for guards only) and organise O&M activities from a site near the populated areas in the Nile Valley.

Major elements of electrical works are the construction of the wind farm internal Medium Voltage grid and of the collector substation. For WTGs of the 3 MW class, MV step-up transformers

are part of the WTG. Moreover, the WTG internal switchgears serve as well as the ring main station. Therefore, no external kiosks will be required.

While the typical wind farm layout can be anticipated, the interconnection with the Egyptian Power grid will require 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 wind power interconnection (e.g. voltage level). It is expected that collector substations shall serve for more than one wind power plot of 50 MW and will be located in the load centre of the wind farms 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 only extend over a smaller portion of the walled area. Wind farm construction of 3 MW class WTG requires special transport for parts of the WTG and the substation. Critical parts are the WTG blades with a length 50 to 60 m, the nacelle with a weight of 60 to 80 t and the power transformers with a weight of more than 100 t. The transportation of the blades in particular requires roads to be wide and with large curve radii.

For the installation of WTGs of the 3 MW class with maximum upper tip heights of 150 m, a large crane is required. This may either be a crawler crane (see Figure 3-5) or a telescopic crane with boom. To allow transport on public roads, both crane types require assembly at the site. When moving them around at the site, they will be only partly dismantled. In the case of the crawler crane, this requires extra-wide internal wind farm roads (e.g. 10 m width).

Figure 3-5: Installation by crawler crane

3.2.3 Operation and maintenance works

Operation and maintenance activities comprise the regular control/operation of the wind farm as well as troubleshooting, repair and scheduled maintenance. Considering that wind farm operation can be done by remote control, concerned activities for a 50 MW wind farm 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, checking and restart of WTGs) to avoid loss of generation.

Scheduled maintenance usually takes place every 6 months and comprises the inspection, change of weir parts and lubrication of moving parts according to defined periods. In the case of WTGs, for the gearbox, a periodical change of oil (e.g. once per year) is a major issue to be carried out in an environmentally compatible way.

Most repair work can be carried out on the WTG with small equipment not requiring a large crane, which do not have an impact on the environment. Only in the exceptional case that a major part of the WTG becomes defective (e.g. blade, or gearbox) would the use of a large crane be required. Such major work would need to be carried out by specialists and not by the team for regular O&M.

For the O&M, a standard set of weir and spare parts would need to be stored near the site for availability reasons and not to cause 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 WTGs is 20 years. Modern WTGs may be even operated over longer periods. The design lifetime of the other infrastructure (substation, buildings) is even longer. Decommissioning means the removal of the WTGs with their foundation and of the electrical infrastructure (the latter, in the case that no repowering would take place). Existing gravel roads fit the desert environment and do not need to be removed.

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 the 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 technology, the results of which were documented in a separate report, submitted in October 2016. This scoping stage of 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 the NREA and EBRD websites) and submission to the three Governorates.

The scoping determines which impacts are likely to be significant and will become the 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 from 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 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 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) PV solar power development, and
   c) establishment of a 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 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 under Annex A2 10.1.2.

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:

<u>Socio-economic impacts:</u>

- Additionally assess the number of people working on isolated business in the area
- Assessment of opportunities for manufacturing components locally
- 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 & wastewater:

- Identify appropriate source(s) of water supply and effects on the resources
- Assess the potential need of buffer tanks to avoid overstressing resources by fast-filling 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 for 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 additionally disclosed to the three Governorates in August 2017. This final version of the Scoping Report was also published on NREA's and EBRD's homepages in November 2016[1].

[1] http://www.nrea.gov.eg/download/FINAL%20SCOPING%20REPORT.pdf
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

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 an in-force 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 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, 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 encountered accidentally 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 10.4). The outcome of the interviews is described under section 5 and under section 5.3.1.8 in particular.

Furthermore, key stakeholders such as the regional Governorates of El Minya and Assiut were visited on 4 October 2016 and 31 October 2016 (El Minya and Assiut) and on 7 November 2016 (Assiut) respectively. The complete interaction with the Governorates is documented in the following section.

The draft SESA report was disclosed on the websites of NREA and EBRD[2] 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 and which were not reflected in the draft reports 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 the Existing Physical, Biological and Social Environment

4.3.1 Physical environment

The physical environment of the Project Area was investigated by

[2] 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

- Desktop studies to collect data and information on the Project Area such as from literature, internet sources or satellite images
- Approach by the Governorates' administration for investigation 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 recent 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 major Wadis. In addition, the availability of geological maps was investigated, identifying the Geologic Map of Egypt 1981. This official Map is 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-year climate norms) and Assiut Airport in the Nile Valley. As for the character of the hyper-arid area where it seldom rains and there is 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[3] database of the worldwide asphalt roads was identified and applied.

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

Furthermore, the satellite images were 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 towards the administration of the Governorates for data and information

A special effort was made to approach El Minya and Assiut Governorates on data and information regarding

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

Thus, the Consultant visited the Governorates on 31 October 2016 (El Minya Information Centre) and on 7 November 2016 (Assiut), as indicated in Annex E1.

[3] Global Administrative Areas (http://www.gadm.org/)

Field Investigation

A field investigation was carried out from 3–10 October 2016 by two experts to assess the physical condition with a special focus on restraints for wind 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 to

- design representative tracks to gain an overview of the whole wind power areas and to
- include all pre-identified activities for verification of details on the ground.

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 investigations inside the areas (three cases only), they were interviewed with regards to their activities, perspectives and special site conditions.

Data obtained during field investigations were to be entered to 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 a 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 involved in nature conservation activities in Egypt and with local people.

4.3.2.2 Habitats and flora

As the two subareas are 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, extensive 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 subarea 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 as well as during the bird monitoring periods in spring 2016, autumn 2016 and spring 2017). During the site visits, the expert drove slowly with a 4x4 Land Cruiser on certain tracks through the subareas 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 by taking photos and using GPS-coordinates. Due to the huge extent of the subareas, not every single location could be investigated in detail during the fieldwork. However, the used route (see Map 4-1 and Map 4-2) aimed to cover the whole areas and ensured that the most important spots of flora (mainly the existing Wadis) of the East Wind-1 and East Wind-2 subareas could be extensively surveyed. Hence, the obtained results present a representative sample of the existing vegetation of the two subareas. Obtained data (incl. GPS-coordinates) on existing flora and habitats were entered into 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 on physical and climatic conditions (e.g. soil, water). The importance of habitats found in the subareas is assessed using five categories: very low, low, important, high and very high.

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SESA Wind Report

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

Map 4.1:
Tracks and plots in the East Wind-1 subarea taken as a sample for the special survey on habitats, flora and fauna (incl. local and roosting birds)

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road

main road

Tracks and plots

tracks used for survey on habitats, flora and fauna

tracks used for survey on local and roosting birds

plots used for survey on habitats, flora and fauna

editor: S. Wernitz, August 22nd 2017

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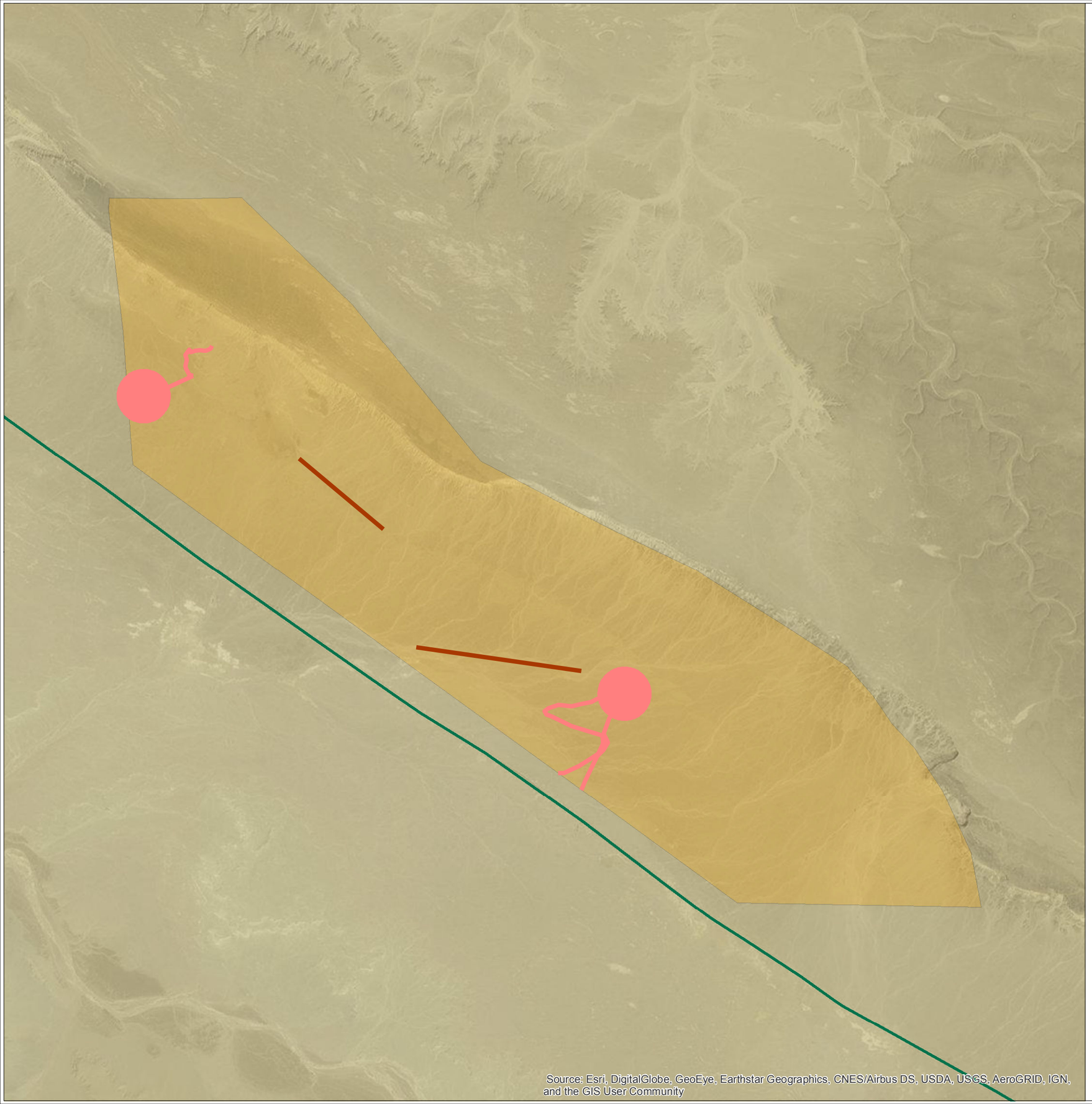

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Map 4.2:
Tracks and plots in the East Wind-2 subarea taken as a sample for the special survey on habitats, flora and fauna (incl. local and roosting birds)

Bordering of East Wind-2 subarea

East Wind-2 subarea

Main road

main road (Ras Ghareb-El Sheik Fadl road)

Tracks and plots

tracks used for survey on habitats, flora and fauna

tracks used for survey on local and roosting birds

plots used for survey on habitats, flora and fauna

editor: S. Wernitz, August 22nd 2017

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4.3.2.3 Fauna

4.3.2.3.1 Birds

Migrating birds

Bird migration between breeding grounds in Europe or Central Asia and wintering grounds in Central or South Africa is well known to concentrate in Egypt. One of the very few areas of utmost importance for bird migration is Gabal el Zayt on the Coast of the Red Sea. Twice a year, during spring and autumn, large numbers of birds migrate through this bottleneck. The Nile Valley might be another migration route, at least for some species, as it may function as a landmark for guiding birds northwards in spring and southwards to their wintering grounds in autumn. Furthermore, compared to the Egyptian deserts, migrants will find excellent conditions to refill fuel at the Nile Valley, enabling them to continue migration.

Moreover, it is known by satellite-tracking that also some species do not follow the Red Sea Coast to the South in autumn, but migrate further inland in south-westerly directions, thus, crossing the Nile Valley between Assiut and Cairo (e.g. Egyptian Vulture - *Neophron percnopterus*; see Figure 4-1). Such results indicated that the concern for threatened soaring migrants needs to be evaluated, even outside the well-defined Flyway at the Red Sea Coast.

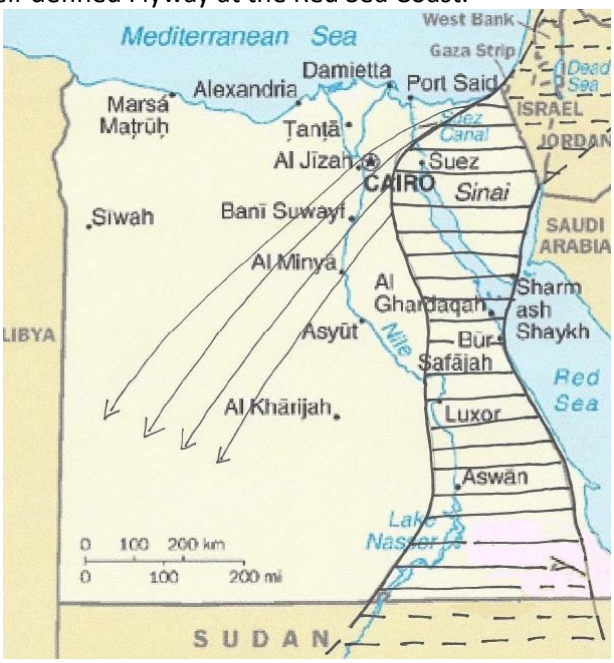


Figure 4-1: Schematic migration routes of the Egyptian Vulture
The arrows across the Western Desert show tracks of recorded (by satellite-tracking) Egyptian Vultures; taken from "EIA guidelines and monitoring protocols for wind power development projects" (Ministry of State for Environmental Affairs and the Egyptian Environmental Affairs Agency 2013, p. 57)

Against that background, a review on existing data on bird migration along the Nile Valley and extensive bird monitoring was undertaken in spring 2016 (1 April to 25 May, i.e. 2nd and 3rd third of spring season), autumn 2016 (20 August to 15 November) and spring 2017 (20 February to 31 March, i.e. 1st third of spring season). Hence, no full spring migration season was covered by the survey. However, the results gained in the two spring seasons are consistent (see section 5.2.1)

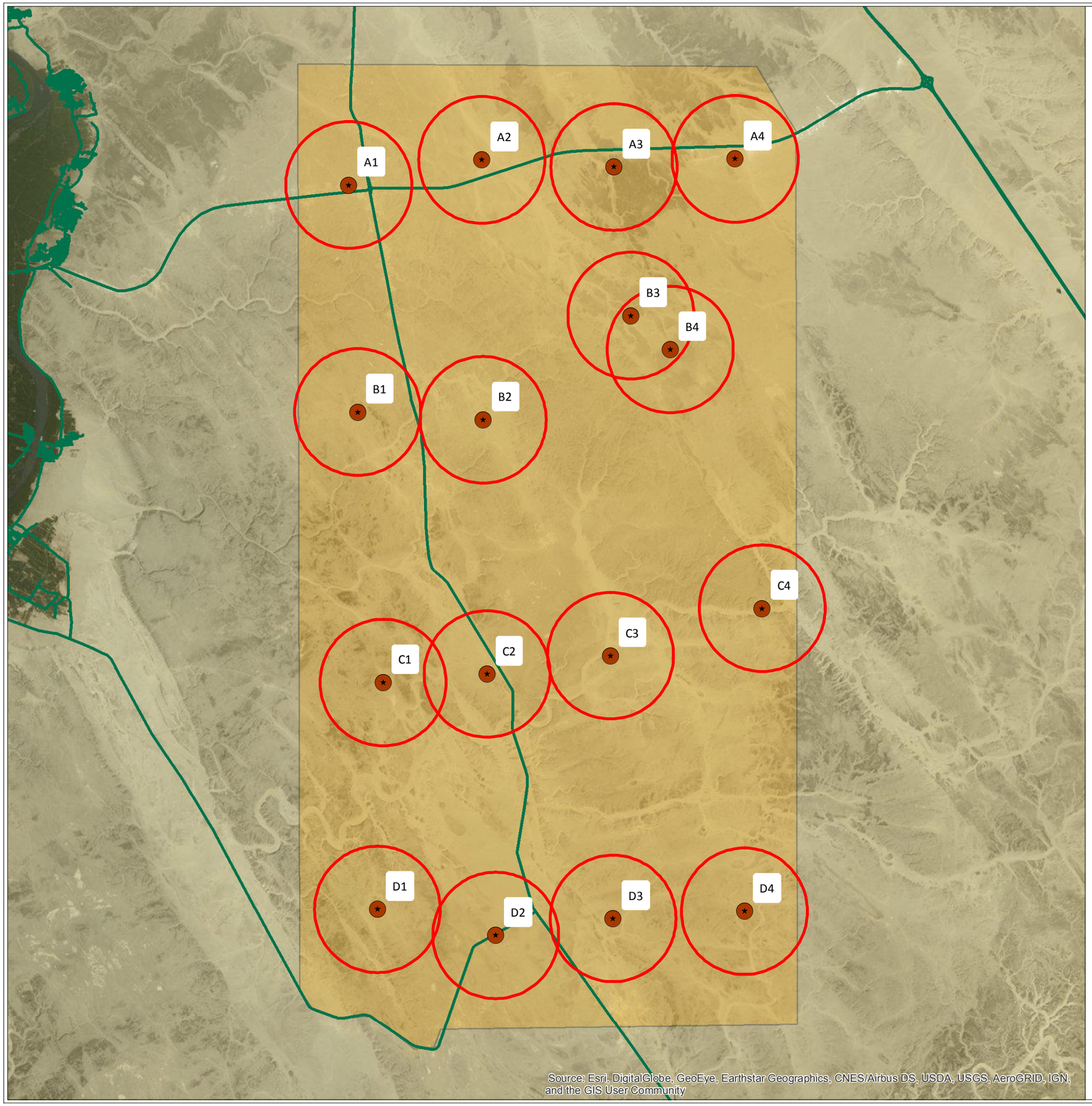
and it is very unlikely that a relevant part of bird migration in spring has been missed. Thus, there was no need to adjust the approach (e.g. by overlapping surveys) in order to increase the explanatory power of the data. The results and conclusions would have been the same if a full spring season in 2016 or 2017 had been covered (see section 5.2.1.4.1).

The main objectives of the standardised monitoring have been collecting significant baseline data on migrating birds (mainly soaring and gliding species migrating during the day) and describing migration patterns of relevant species in a quantitative way.

A total of 18 observation sites were selected in order to obtain a representative sample of migration within the Project Area. 16 observation sites were located in the East Wind-1 subarea within four rows from West to East (perpendicular to the expected main flight direction of migrating birds). These rows consisted of the observation sites A1 - A4 (row A), B1 - B4 (row B), C1 - C4 (row C) and D1 - D4 (row D) (see Map 4-3). Furthermore two observations sites were established in the East Wind-2 subarea (X1 and X2) (see Map 4-4). Standardised daytime field observations were conducted for twelve hours (six hours per team). For most days, eight different observation sites in the East Wind-1 subarea were visited for 1.5 hours each. When the East Wind-2 subarea was studied, observations lasted for three hours at the sites X1 and X2 (each) and four further different observation sites in the East Wind-1 subarea were visited for 1.5 hours each. The total observation time at each site is given in Table 4-1.

Data analysis focused on number of migrating birds and species composition, seasonal distribution of migratory activity, altitude of migrating birds and migratory rate as a measure for migratory activity. A precise description of the applied approach, the used methods for data collection and the way of data analysis is given in the three Interim Reports which can be found in Annex B.

The monitoring focused on long-living species with low reproductive rates, late maturity and an unfavourable conservation status (threatened species) that are known to be particularly prone to collisions with wind turbines and that use certain routes annually for migration. Those species that do not meet the aforementioned criteria are classified as of “minor relevance” for the impact assessment, because the majority of such species are non-threatened passerines that have only a rather short life span and a high reproduction rate. During migration, passerines do not concentrate in certain areas, but migrate on a broad front. In addition, passerines are not particularly prone to collide with onshore wind turbines. As a consequence, wind power projects in the Project Area will not have a significant effect on populations of those species. Hence, a detailed consideration of these species in the impact assessment is not appropriate.
As known from earlier studies, many birds or, at least, flocks of migrating birds, can be recorded and safely identified at larger distances. However, detection probability of birds decreases as distance to an observation site increases. In order to ensure a standardised recording and a safe identification of soaring and gliding birds, the main part of the analysis will be restricted to migrating birds at distances of up to 2.5 km from the observation sites (the study area of the survey on bird migration).



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SESA Wind Report

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Map 4.3:
Location of 16 observation sites selected for the monitoring on migrating birds in the East Wind-1 subarea

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road

main road

Observation sites

site used for standardized observation of bird migration (16 sites arranged in 4 rows (A to D), each with 4 sites (1 to 4))

buffer of 2.5 km to a single site (indicating the area which can be thoroughly monitored from a site)

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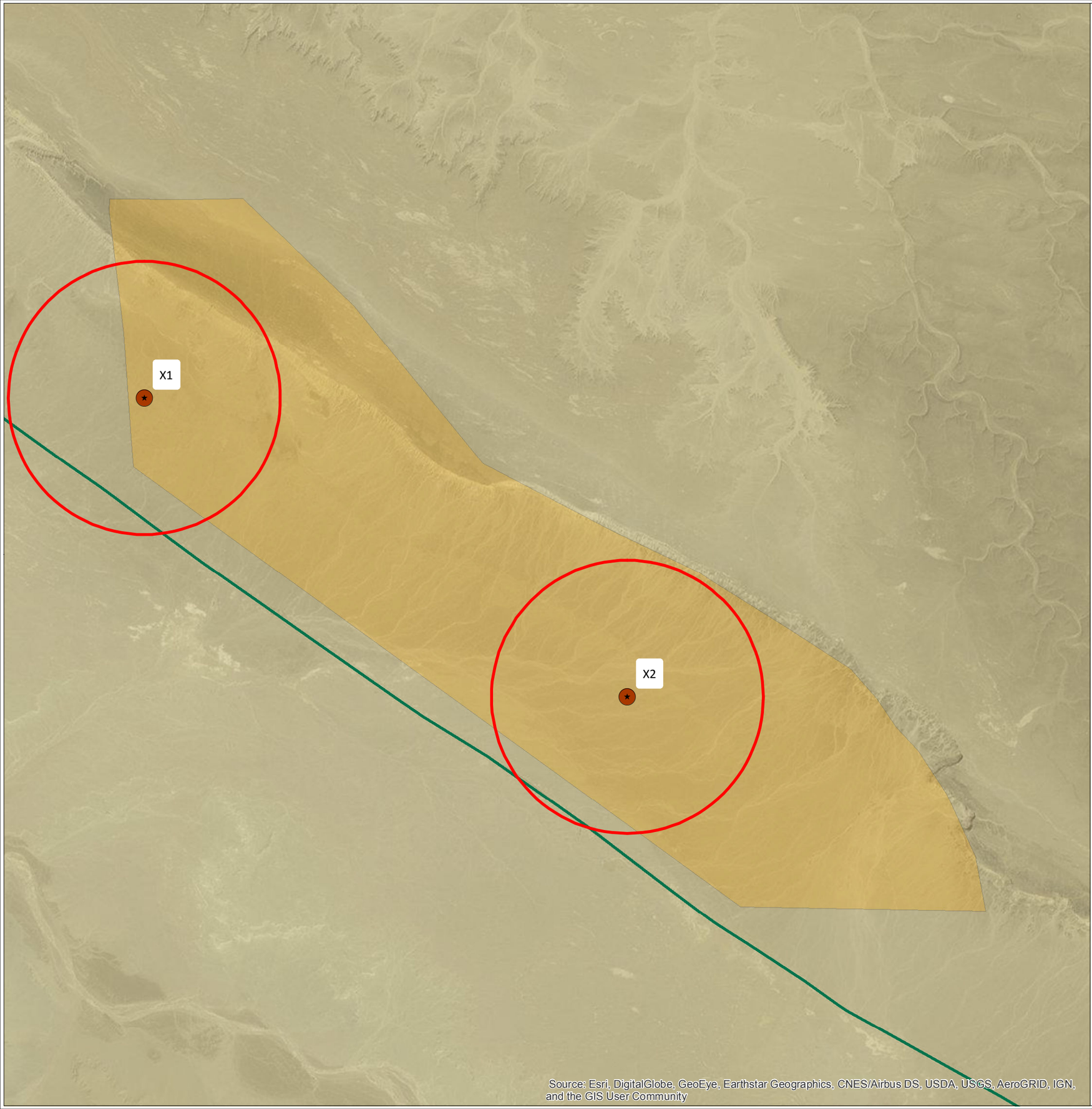

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SESA Wind Report

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

Map 4.4:
Location of 2 observation sites selected for the monitoring on migrating birds in the East Wind-2 subarea

Bordering of East Wind-2 subarea

East Wind-2 subarea

Main road

main road (Ras Ghareb-El Sheik Fadl road)

Observation Sites

site used for standardized observation of bird migration (1 site at the western border and 1 site in the eastern part of the subarea)

buffer of 2.5 km to a single site (indicating the area which can be thoroughly monitored from a site)

editor: S. Wernitz, August 22nd 2017

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Table 4-1: Total observation time at each of the 18 observation (obs.) sites in spring 2016, autumn 2016 and spring 2017

Observation site	2016		2017	total
	spring	autumn	spring	
A1	31.5	52.5	25.5	109.5
A2	31.5	52.5	25.5	109.5
A3	31.5	52.0	25.5	109.0
A4	31.5	52.5	25.5	109.5
B1	31.5	51.0	22.5	105.0
B2	31.5	51.0	22.5	105.0
B3	31.1	51.0	22.5	104.6
B4	29.1	51.0	22.5	102.6
C1	30.0	51.0	19.5	100.5
C2	31.5	51.0	19.5	102.0
C3	31.5	49.5	21.0	102.0
C4	30.0	48.6	19.5	98.1
D1	31.5	49.5	22.5	103.5
D2	31.5	48.7	21.2	101.4
D3	31.5	49.0	22.5	103.0
D4	30.0	49.5	22.5	102.0
X1	30.0	48.0	21.0	99.0
X2	30.0	47.2	18.0	95.2

Beside the data set obtained by standardised observation of birds migrating at distances of up to 2.5 km, a second data set was worked out, covering:

- migrating birds of relevant species, which were recorded by chance / randomly, e.g. before or after an observation unit or while driving through the Project Area,
- migrating birds of species of minor importance (see above), which were recorded either during an observation unit or by chance / randomly, e.g. before or after an observation unit or while driving through the Project Area, and
- local (sedentary) and roosting birds (either from relevant species or from species of minor importance), which were recorded either during an observation unit or by chance / randomly, e.g. before or after an observation unit or while driving through the Project Area.

Local and roosting birds

The approach for data collection on local and roosting birds was designed according to the characteristics and the extent of the Project Area and with the 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 carried out 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 Wadibeds. In addition, higher bird numbers can be expected in the Wadis, which 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 2 km in length, were finally selected as sampling plots for the Project Area, thereof 18 and 2 line transects in East Wind-1 and East Wind-2 subarea, respectively (see Map 4-1 and Map 4-2). The bird expert walked each transect at least three times using binoculars (8x magnified), GPS and site maps. One site visit was conducted in September 2016 and more took place in November 2016 and February 2017. 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.

4.3.2.3.2 Bats

Initial methods to collect baseline data on bats of Egypt have been a review of existing literature, an investigation on existing data available on the World Wide Web and, finally, interviews with people who are involved in nature conservation activities in Egypt and with local people.

In addition, a standardised monitoring of bat activity at selected sites in the Project Area was undertaken. The monitoring of bat activity was conducted for a period of about four weeks in spring 2016 and again in late summer / autumn 2016. The chosen effort seemed to be sufficient and no additional monitoring was scheduled for spring 2017, because the suitability of the desert area to serve as a relevant habitat for bats was assessed to be limited (very sparse vegetation, few appropriate roosting sites in the wider surrounding of the Project Area (if at all), high attractiveness of the Nile Valley as a feeding habitat).

To determine whether bats are present in the Project Area and to measure bat activity, a passive detection device was used. The measuring system consists of a 'batcorder' (bat detector) and a batbox extension from the company ecoObs©. The batbox extension includes an interfacial microphone, a GSM module and a rechargeable battery, which is connected to a solar panel. All components are installed within a box to protect them against weather conditions (see Figure 4-2).

Data collection in spring 2016 was conducted at a location close to observation site B3 (see Map 4-3) from 31 March to 5 May 2016. Data collection in autumn 2016 was conducted:

- at a location close to observation site C4 from 22 August to 9 September,
- in the Wadi near observation site A3 from 13 September to 10 October,
- at a location close to observation site B1 from 11 October to 26 October, and

- in the Wadi near observation site D1 from 27 October to 14 November (see Map 4-3).

However, in autumn 2016, for an unknown technical reason, the device was not working on a number of nights (about 50% of the total recording period).

A more detailed description of the applied approach is given in the Bird Survey Reports, which can be found in Annex B 10.2.

Figure 4-2: Passive detection device (batcorder) to record bat activity in the vicinity of observation site B3

4.3.2.3.3 Other fauna (excl. birds and bats)

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 low numbers of insect, reptile 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 Western 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 as well as during the bird monitoring periods in spring 2016, autumn 2016 and spring 2017). Due to the extent of the Project Area, it was not possible to survey the entire 2,200 km^2 in detail. Hence, based on an investigation of aerial images, appropriate routes were planned (see section 4.3.2.2). 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” for animals using binoculars (8x or 10x magnified) and studied in order to find burrows or scats, which might indicate the presence of an animal species. In doing so, it was possible to

obtain a representative sample of the existing fauna of the Project Area. Additional data on animals were gathered during other fieldwork (e.g. standardised observation units). Data (incl. GPS-coordinates) on recorded animals was entered in an Excel spreadsheet and transferred to the GIS-database later on.

4.3.3 Social and economic environment

The scope of the social study is limited to the two wind areas East-Wind-1 and East-Wind-2 subareas where the wind farm 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 which have been encountered in the Project Areas during the site reconnaissance, as already mentioned under section 4.3.1, to disclose information on the project, and the basic information on the project was summarised in a flyer, which was distributed to the interviewed people (see Annex D 10.4). The flyer was available in English and Arabic. Additional interviews were performed by the bird monitoring team with people accidently 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 10.4.2.

Further to the sample interviews, consultation meetings were held with the Governorates of El Minya (4 October and 31 October) and Assiut (31 October and 7 November 2016) respectively 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 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 of less favourable

Prior to the assessment of potential social and environmental impacts, the East Wind-1 and East Wind-2 subareas were screened with regards to constraints due to competing land-use and technical constraints which impede wind 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 wind power development is the accessibility of the areas considering that heavy haulage on roads with maximum slopes of about 10% will be required. The criteria reflects 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 is a toll road without any exit possibility except at toll gate exits.

The geomorphology can be adverse to wind power development. Criteria are the complexity of the terrain requiring high efforts for levelling construction platforms (and road construction), soft soils, migrating dunes. Possible effects of shadowing are not subject to this assessment, but will be considered in the assessment of the wind power potential (see recommendation report).

No plan 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 activity with fixed installed equipment such as agriculture, mining or an asphalt plant
- Schemes that are already obviously currently 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 on large areas) are not considered to be a competing land-use that hinders wind power development.

The criteria are summarised in Table 4-2.

Table 4-2: Criteria for the judgement of restrictions due to the physical environment

Parameter	Preclusive	Less Favourable	Favourable
Accessibility / Remoteness	Barriers of migrating dune or Steep unstable escarpments	Access from protected toll road only without regular exit and access roads to be built outside allocated area, length of external access roads more than 5 km or Complex terrain with deep Wadis	All the residual areas such as: Existing asphalt roads (other than protected toll roads without a normal exit) are near to or crossing the area or Flat or slightly undulating terrain allowing easy construction of gravel roads
Geomorphology	Steep slopes of >100%, 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. roadhouses) or Industrial areas (e.g. asphalt plant, gravel plants, marble or quartzite mining)	*N/A areas either usable or not*	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 wind power development were identified during the scoping phase. On this subject, SESA wind study anticipated impacts are assessed in more detail based of the findings of the baseline studies. The significance is determined as much as possible and quantitatively appropriate. 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 the 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 that are resilient to resources.

- Status of resources

  Effects of rare or limited resources are usually considered more significant than effects to common or abundant resources.

- Regulatory status

  Effects on resources that are protected (e.g. endangered species, wetlands, air quality, cultural resources, water quality) are typically considered to be more significant than the effects of 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 present, on accepted standards (e.g. ambient pollution limits, shadowing or flickering in case of wind power), international 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 intensity of an event, with each attribute valued as low (1), medium (2) or high (3). The high variety of kind of events does not allow the use of 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 the rankings as shown in Table 4-3.

Table 4-3: Event Magnitude Ranking

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

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

Determination of Receptor Sensitivity

Receptors are differentiated into:

- Human Receptors (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 4-4 and Table 4-5.

Table 4-4: Determination of Receptor Sensitivity

Receptor	Criteria	Score	Attribute
Human Receptor	Presence	1	People are very seldom present in the area of anticipated impact (sporadic activities or passing)
		2	People are present only some of the time (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
Ecological Receptor	Presence	1	Common habitats / plant or animal species that can be frequently found in Egypt and are not confined to the Project 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)
Physical Receptor	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
Soil, subsurface/surface water	Presence	1	Receptor has limited or no value

Receptor	Criteria	Score	Attribute
		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 the presence and resilience valuation scores.

Table 4-5: 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 4-6.

Table 4-6: 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 wind power development will not take place on zones identified to be preclusive for wind power development.

For given impacts that have been evaluated to be moderate or major, the next step is to identify and define appropriate mitigation measures applying the mitigation hierarchy, with the objective to mitigate 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 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 EBRS'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[4] 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.

[4] 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

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 G). 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 G). 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 which have not been already reflected in the SESA reports 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.

5 The Existing Physical, Biological and Social Environment

5.1 Physical environment

5.1.1 Project Area

The Project Area relevant for this SESA wind power report is composed of the East Wind-1 and East Wind-2 subareas (see Figure 5-1). The areas extend on desert ground well away from any village or other settlements. The northern border of the most northern East Wind-2 subarea of 79 km² is located to the south of Cairo at about 165 km by linear distance and at 65 km by linear distance to Beni Suef at a latitude of about 28.5° N. The East Wind-1 subarea amounts to 748 km². It commences about 70 km south of the East Wind-2 subarea and extends over 40 km further to the south.

The western borders of both areas are well away from populated Nile Valley. In the case of the East Wind-2 subarea, the distance is more than 20 km and, in the case of the southern East Wind-1 subarea, more than 7 km. The subareas 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 on the interconnection road between El Minya and Assiut near or even inside the East Nile Wind areas. All asphalt roads are of sufficient width and radii to allow heavy haulage.

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 being hyper-arid 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 have 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 El Minya – Assiut National Road, 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 (in the East Wind-1 subarea).

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 at their capacities. For the Gulf of Suez (Ras Ghareb), a large-scale wind power development, a new 500 kV line to Samalut is under construction passing about 5 km south of the East Wind-2 subarea. Another 500 kV line to Cairo along the Highway in the West of East-Wind-2 subarea 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.

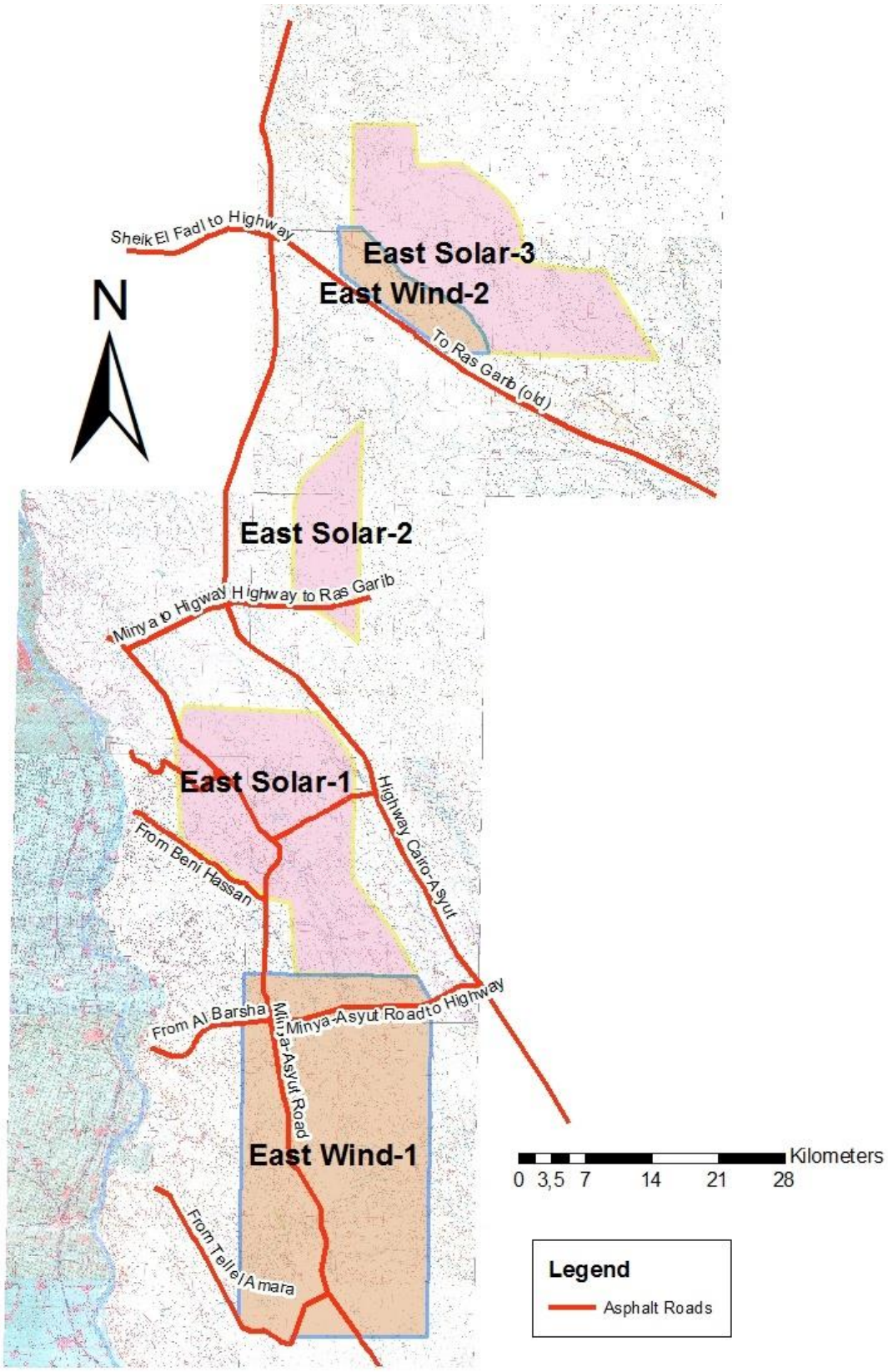


Figure 5-1: Overview of Areas and Asphalt Road System inside and next to the Project Area

Table 5-1: Climate of 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 of 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 to the GIS database (see Figure 5-2). Due to the scale and the geographic coordinate system of the map, the geo-referencing 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 a few centimetres to 1 or 2 metres at Wadibeds and hangs. In some subareas to the south of East Wind-1, the upper layers contain blocks and bombs (see Figure 5-3) of an unknown nature.

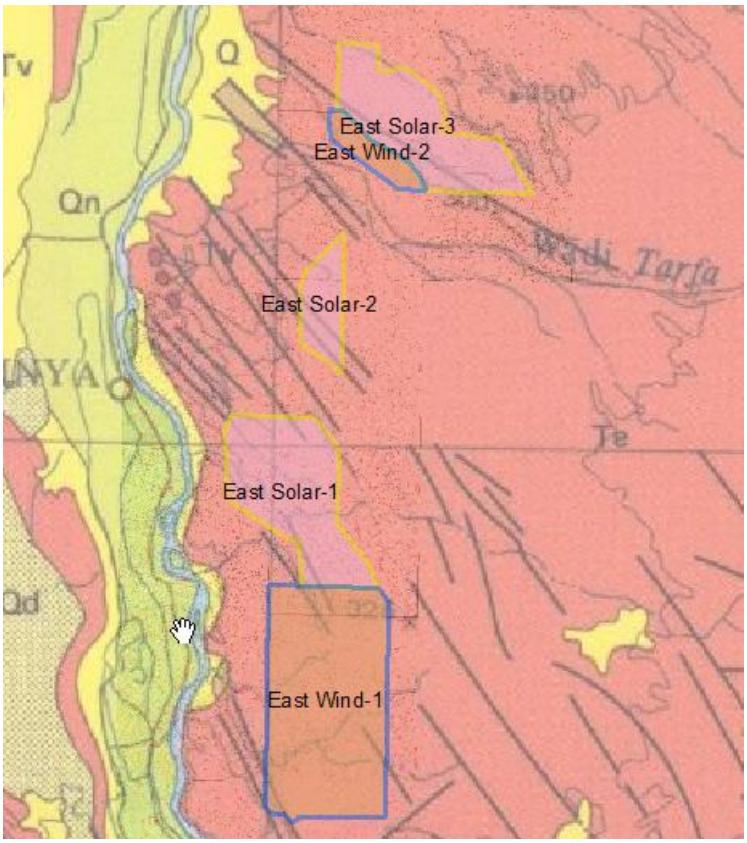


Figure 5-2: **Excerpts of the Geological Map of Egypt**

Figure 5-3: **Weathered Limestone with inclusions of round-shaped rocks partly dispersed at the surface due to erosion at WP 17_1 (East Wind-1 in the south)**

The geological map shows one major fault line forming an escarpment of more than 100 m height difference, which is partly inside the East Wind-2 subarea. Otherwise, the East Wind subareas are mostly uniform, consisting mostly of slightly undulating land, except for some cuts by major Wadis in the East Wind-1 subarea, especially in the southern and western part. The landscape does not contain any special features. All Wadis have a moderate slope and sandy underground. The Wadibeds were free from erosion marks (e.g. accumulation of stones) that indicate any major water flow that occurred at rare frequency.

In general, the areas show good foundation conditions (except the cliff at East Wind-2). Soft soils or migrating sand dunes are not observed in the two East Wind subareas. However, due to the marine limestone underground, the subsurface may contain caves. The lower underground (at about Nile level) may contain aquifers of high water yield of good quality. For the south-western part of the East Wind-2 subarea, where irrigated farming takes place, this could be evidenced.

The risk of seismic hazards for the area is low to moderate, with a peak ground acceleration of about 1 m/s² as established by the Global Seismic Hazard Assessment Program (GSHAP), a demonstration project of the UN/International Decade of Natural Disaster Reduction (see Figure 5-4). This is classified to be low to moderate.

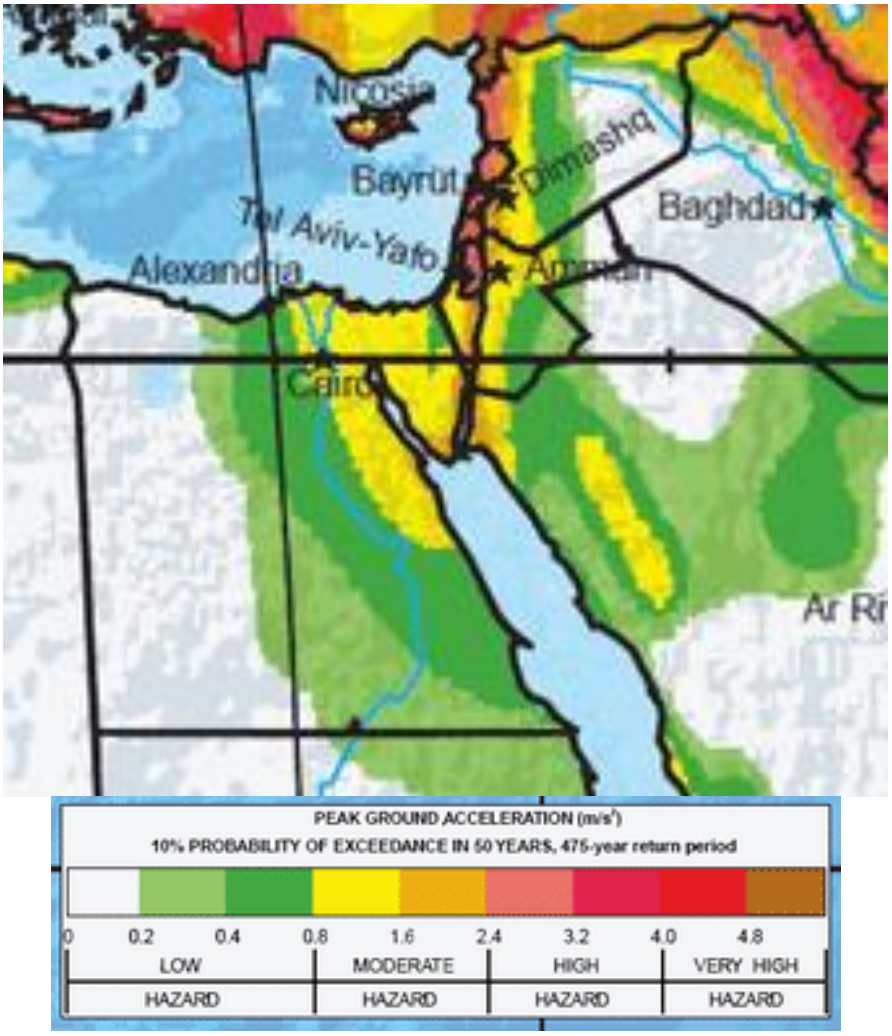


Figure 5-4: GSHAP Seismic Hazard Map for the Egypt Region

5.1.2 East Wind-1

5.1.2.1 Special Physical Environment Features of the East Wind-1 subarea

The East Wind-1 subarea has a rectangular shape with lateral lengths of about 20 km (West to East) and 38 km (North to South). Most of the area is located in the El Minya Governorate. The southern portion is part of the Assiut Governorate. The area is located more than 7 km away from the Nile Valley, but has good accessibility via well-dimensioned asphalt roads next to or even crossing the area from El Minya (north), the Nile Valley (west) and Assiut (south), next to or even crossing the area. The shape and the asphalt roads are shown in Figure 5-5, as well as 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 section 5.1.1, the Geology at the East Wind-1 subarea is quite homogeneous and, in general, offers stable underground conditions. Considering that wind turbines will be erected at exposed sites for the reason of high energy yield, i.e. not in valleys with possible accumulation of gravel in the surface layer, which is generally expected near surface rocky underground conditions of limestone. As for the character of the limestone, surface caverns close to the surface may exist at individual locations. A groundwater aquifer of high yield and good quality was evidenced at WP 27_1 (interview with drilling company). The groundwater level was about 160m below the surface, i.e. 50 m a.s.l. (i.e. the same as the River Nile level). The thickness of the aquifer was 80 m. According to the drilling specialist, conditions are similar in all of the surrounding area (i.e. the area designated as farmland in Figure 5-5).

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 the northern half of the East Wind-1 subarea in particular, the terrain is quite smooth. It is not disturbed by major Wadis. The landscape is mostly uniform, slightly undulating land without any special features. Typical landscape views are shown from Figure 5-8 to Figure 5-11.

The southern half of the East Wind-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 Wadibanks to the East of the El Minya - Assiut National Road (see Figure 5-9). This Wadi becomes more deeply indented in the west of the El-Minya – Assiut National Road where, together with its tributaries, it forms a zone of small steep valleys. To the Southeast of the East Wind-1 subarea, the terrain falls steeply towards Wadi Assiut (see Figure 5-11).

The inner part of the East Wind-1 subarea contains marks of prospection (excavations up to rocky underground) and property claims (rudimentary houses with 4 walls and without roof only or small earth walls which is the traditional Bedouin way of marking land). On some stretches, basic gravel roads or improved manmade car tracks are found. Examples for a provisional road and property claim are shown in Figure 5-12 and Figure 5-13.

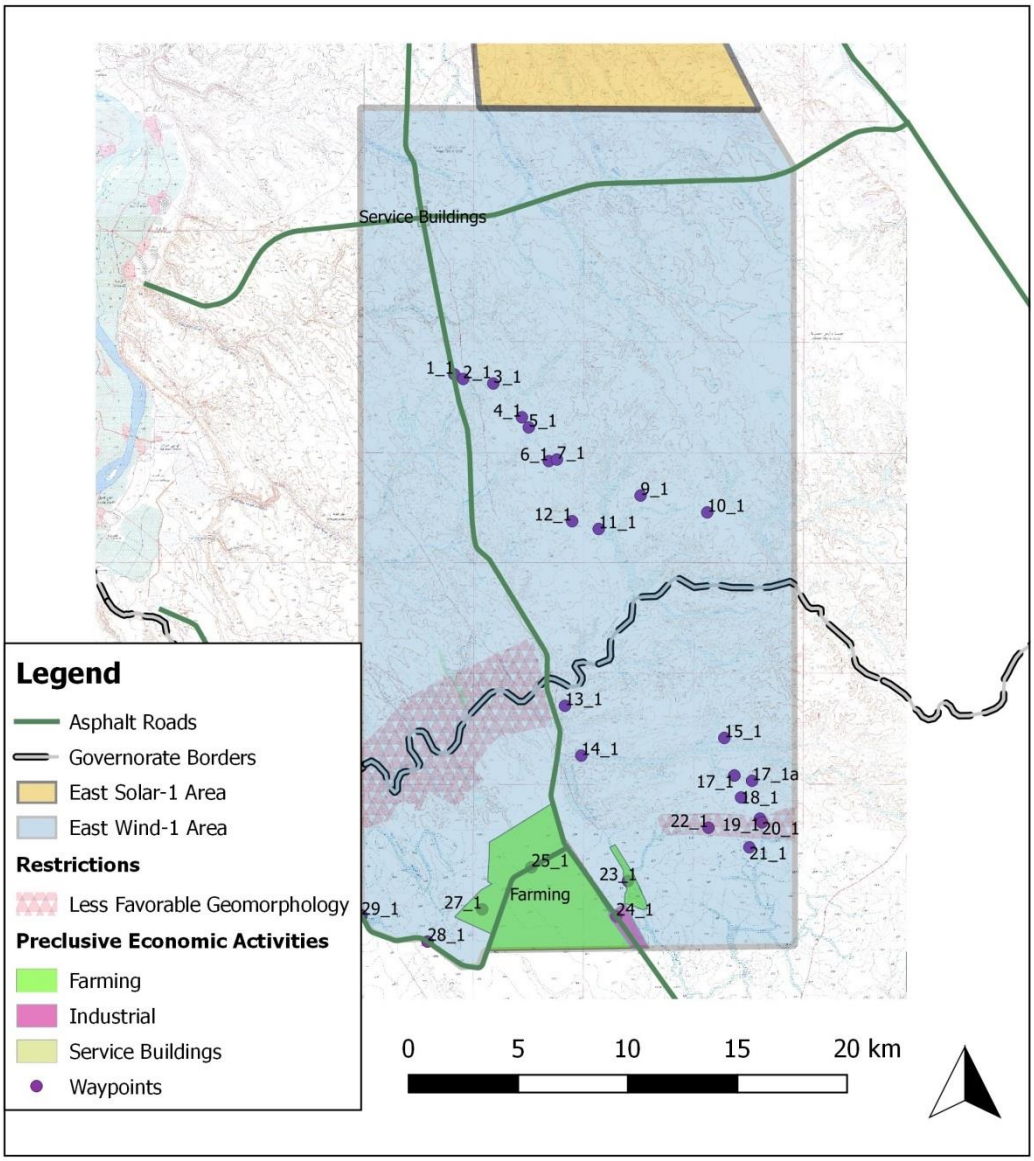


Figure 5-5: **East Wind-1 subarea preclusive or less favourable according to Technical and Land-use Criteria**

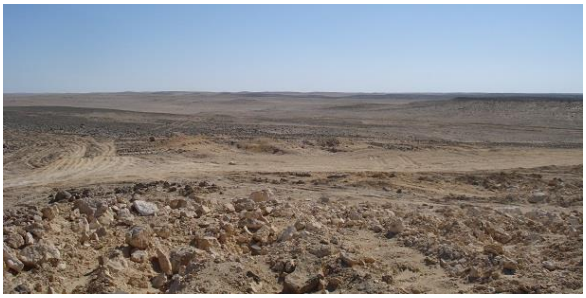


Figure 5-6: **View to the South at WP 74_1**

Figure 5-7: **View to the South at WP 75_1**

Figure 5-8: View to the South at WP 10_1

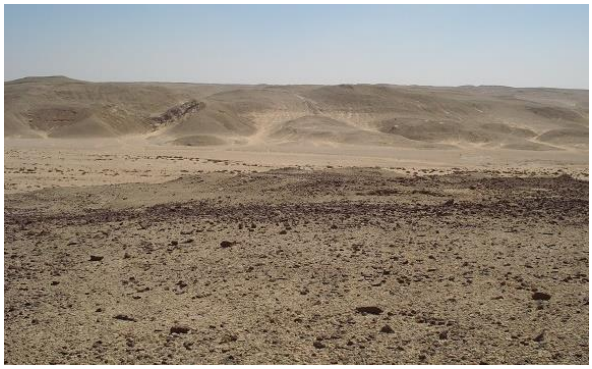


Figure 5-9: Wadi al 'Imrani al Quibli at WP 14_1

Figure 5-10: Wadi al 'Imrani al Quibli at WP 15_1

Figure 5-11: Steep fall of terrain towards the south to Wadi Assiut at WP 20_1

Figure 5-12: Provisional gravel road at WP 19_1

Figure 5-13: Property mark at WP 4_1

Figure 5-14: Roadhouses at WP 73_4

Figure 5-15: Street Lighting in the middle of the desert, MV Line and tele-communication masts WP 24_1

Figure 5-16: Asphalt Plant at WP 24_1

Figure 5-17: Farmland under preparation for irrigation at WP 27_1

Besides signs of prospection and land-use at many spots of the East Wind-1 subarea, it includes fixed installations and ongoing economic activities. This current land-use requires consideration for wind power development. The land-use identified during October 2017 is shown in Figure 5-5. It comprises:

- Public roads with safety corridors of 200 m to each side.
- Service area with roadhouses at the crossing between the El Minya – Assiut National Road and the road from El Barsha to the Highway (see Figure 5-14).
- Medium Voltage line and street lighting through the desert along the El Minya – Assiut National Road as well as Telecommunication Towers (WP 24_1 see Figure 5-15).
- Farming areas already existing or under development (near WP_27_1 and WP 24_1) and further south of that.
- One Asphalt plant near to WP 24_1 (see Figure 5-16).

5.1.2.2 Zones preclusive or less favourable for wind power development, according to Technical and Land-use Criteria

An evaluation of the physical environment with regards to technical and land-use aspects according to the criteria defined in section 4.4 for accessibility, geomorphology and competing land-use subareas that are preclusive or others that are less favourable for wind power development were identified.

Accessibility

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

Geomorphology

Two subareas were identified to be less favourable due to geomorphological conditions. These are a portion of land in the south-west with complex terrain including deep Wadis and limited plateau areas. Another area is the steep landfall towards the Wadi Assiut in the south-west. These areas are not favourable for WTG installation, requiring horizontal hardstands (assembly areas of about 100 x 150 m) and would require greater efforts for road construction.

Competing Land-use

Existing land-use that needs to be considered was identified at the road crossing in the north-west (small roadhouse subarea), in the south-west (farmland already exists, and is even connected to the MV line along the El Minya – Assiut National Road and other portions are currently developed) and in the south (asphalt plant and farmland partly exists, and is partly under development). The respective areas are preclusive for wind power development.

5.1.3 East Wind-2

5.1.3.1 Special Physical Environment Features of the East Wind-2 subarea

The East Wind-2 subarea comprises about 79 km² and is located north of the old Ras Ghareb – El Sheik Fadl Road (the border is about 500 m away from the road). The shape of the area and the asphalt road are shown in

Figure **5-18** as well as 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. The area is adjacent to the East Solar-3 area (yellow-coloured).

The area can be divided into two portions: The majority of East Wind-2 is located at the foot of a 100 m-high cliff with a mostly homogeneous relief that is slightly sloping towards the south. A smaller portion is located on a plateau on top of the cliff.

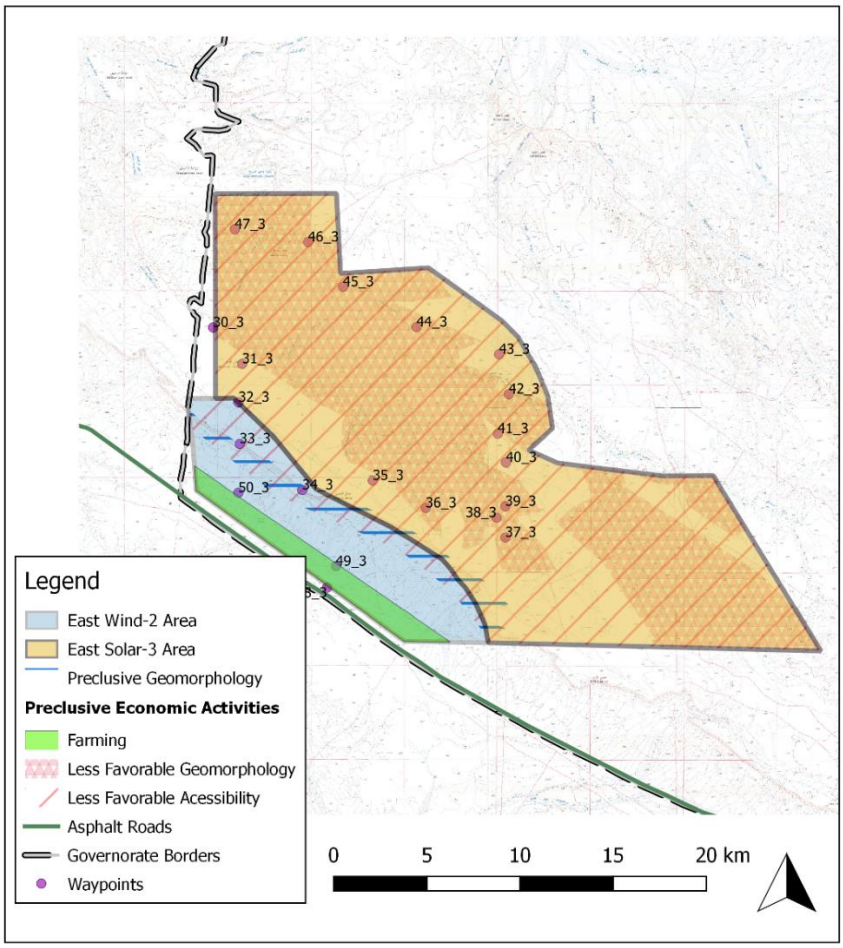


Figure 5-18: East Wind-2 subarea preclusive or less favourable according to Technical and Land-use Criteria

Figure 5-19: Surface Conditions at WP 33_3 on top of the cliff

Figure 5-20: Accumulated Erosion Material near WP 33_3

Figure 5-21: Cracks at the top of the cliff near WP 33_3

Figure 5-22: View towards the southern part of the East Wind-2 subarea near WP 33_3

The cliff, being a major geological fault line, extends about 40 km beyond the East Wind-2 subarea to the east. It forms a barrier between the two East Wind-2 portions. It is not possible to access the upper area from the south. The only option to access the upper portion of this subarea would be from the north. Provided that a special exit from the Cairo – Aswan Highway (see Figure 5-1) could be agreed with the toll collection company and then constructed, the distance of the access road to the East Wind-2 subarea would be 11 km over land not allocated by Presidential Decree. Otherwise, the distance to the next existing exit would be 40 km by linear distance.

The cliff is unstable and prone to continuous erosion (see Figure 5-20 and Figure 5-21), thus accumulating rock and gravel material at its footing. Moreover, the wind predominantly blows from the north, transporting sand towards the luv side of the cliff, causing the accumulation of fines at the footing. Occasional rains sometimes cause runoff over the rim of this escarpment, causing erosion by water flow.

Accordingly, the cliff area itself and its near environment (about 300 m of border zone on top and about a 1 km zone from the footing) are assessed not to be fit for wind power development.

The remaining lower part of the East Wind-2 subarea (2.0 to 2.5 km diameter) is flat and easy to develop (see Figure 5-23).

Figure 5-23: Low part of the East Wind-2 subarea – view from WP 50_3 to the North

The lower subarea shows areas of prospection and provisional gravel roads. Along the Ras Ghareb – El Sheik Fadl Road, two houses are located outside the East Wind-2 subarea. One farm has planted crops on fields reaching 700 m into the East Wind-2 subarea. Another farm was identified to the south of the old Ras Ghareb – El Sheik Fadl Road. This is evidence of access to groundwater in the area. Accordingly, it must be expected that farmland development will continue over all the area identified to be under prospection.

5.1.3.2 Zones preclusive or less favourable for wind power development according to Technical and Land-use Criteria

An evaluation of the physical environment with regards to technical and land-use aspects, according to the criteria defined in section 4.4 for accessibility, geomorphology and competing land-use, identified subareas that are preclusive or others that are less favourable for wind power development. The subareas of East Wind-2 are shown in

Figure **5-18**.

<u>Accessibility</u>

The accessibility of the north-western part of the East Wind-2 subarea on top of the cliff (11 km by linear distance from the toll-controlled highway Cairo - Aswan), or 40 km from the next regular exit of this highway, all on land not allocated by presidential decree) is judged to be less favourable. Access to the cliff area, including a zone of 300 m on top and 500 m from the foot, is preclusive. The accessibility of the residual lower area in the south is favourable (see

Figure **5-18** and Map 5-4).

Geomorphology

The cliff area (100 m high steep escarpment), which divides the East Wind-2 subarea into an upper northern part and lower southern part) includes an unstable zone of 300 m on top and 1,000 m from the foot is unsuitable for wind power development, and is therefore classified to be preclusive (see

Figure **5-18** and Map 5-4).

Competing Land-use

Farming and farmland development was identified in the lowlands of the East Wind-2 subarea. This area was classified to be preclusive for wind power development (see Map 5-4).

5.2 Biological environment

5.2.1 Project Area

The Project Area and, thus, the subareas East Wind-1 and East Wind-2 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 south-east, to Wadi Habib and Wadi El Assiuti, which finally lead into the Nile as well. The Wadis have the potential to host some vegetation, with sporadic growth of plants in the rare case of rainfall. However, the Project Area is characterised by the exceeding aridity of the desert climate and a relief, basically 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 there no longer exists any legally protected site / area, no national park or important bird area and no internationally recognised area of biodiversity value in the Project Area (e.g. Fouda 2016, Baha El Din 1999).

A protected site, though located at minimum distances of about 30 km to the south-east of the Project Area (East Wind-1 subarea), called “Wadi El Assiuti”, was designated in 1989 by Minister Decree No. 942. It covers an area of 35.5 km^2 and is a small example of a desert Wadi ecosystem in the limestone portion of the Egyptian Desert. The Wadi is mainly undisturbed and is still in its natural state (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 5 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 "Highland", "Plain Land", "Lowland" and "Caves" (see Table 5-3). Scarps and high areas with an elevation between 200 and 500 m can only be found at individual places in the northern section and southern section (East Wind-1 subarea) of the Project Area. In fact, a huge scarp (fault line) runs along the northern border of the East Wind-2 subarea (see Figure 5-24). 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 "Lowland". Finally, special habitats, "Caves and Karsts", are known to occur in the Project Area too, to a minor extent.

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	Highland	Mountains	*not found in the Project Area*
		Hills and Plateaus	*not found in the Project Area*
		Scarps and High Areas	Elevation from 200 to 500 m a.s.l.
	Plain Land	Desert Sand Dunes, Sand Sheets and Sand Mounds	*not found in the Project Area*
		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	*not found in the Project Area*
	Lowland	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	*not found in the Project Area*
		Sabkhat	*not found in the Project Area*
	Caves	Caves and Karsts	Underground spaces produced naturally by the weathering of rock. Can extend deep underground or can be much smaller rock.

Figure 5-24: A cliff of nearly 100 m runs adjacent to the northern border of the East Wind-2 subarea (left), typical image of Hamada Desert in the East Wind-1 subarea (right)

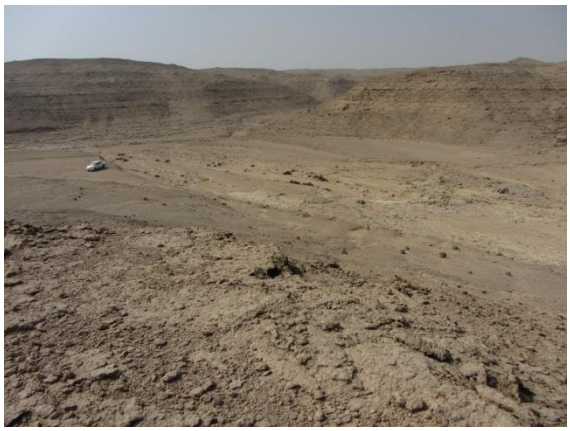


Figure 5-25: The vast majority of the Project Area is completely without vegetation

Due to the extreme aridity of the Eastern Desert, the gravely and pebbly plains, 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 5-25).

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 (Figure 5-26). Consequently, the importance of Wadis as a habitat for plants and animals can differ.

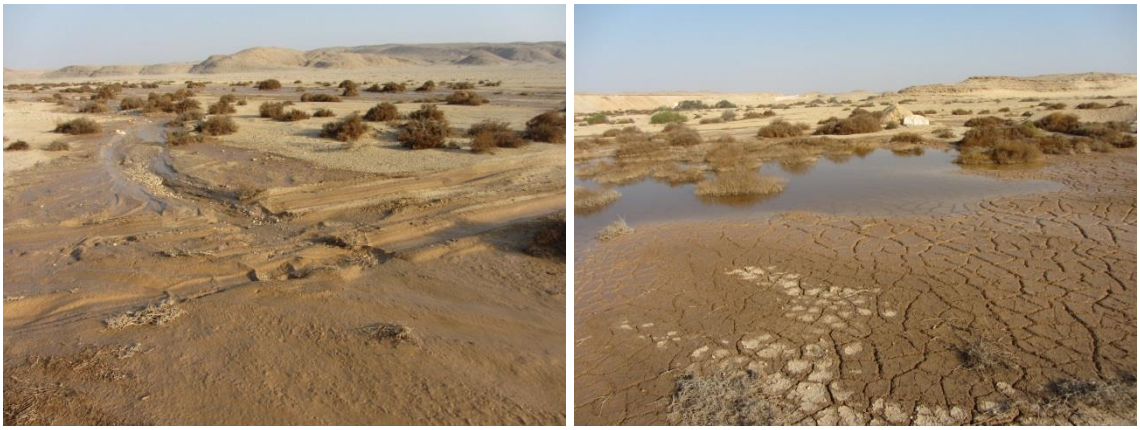
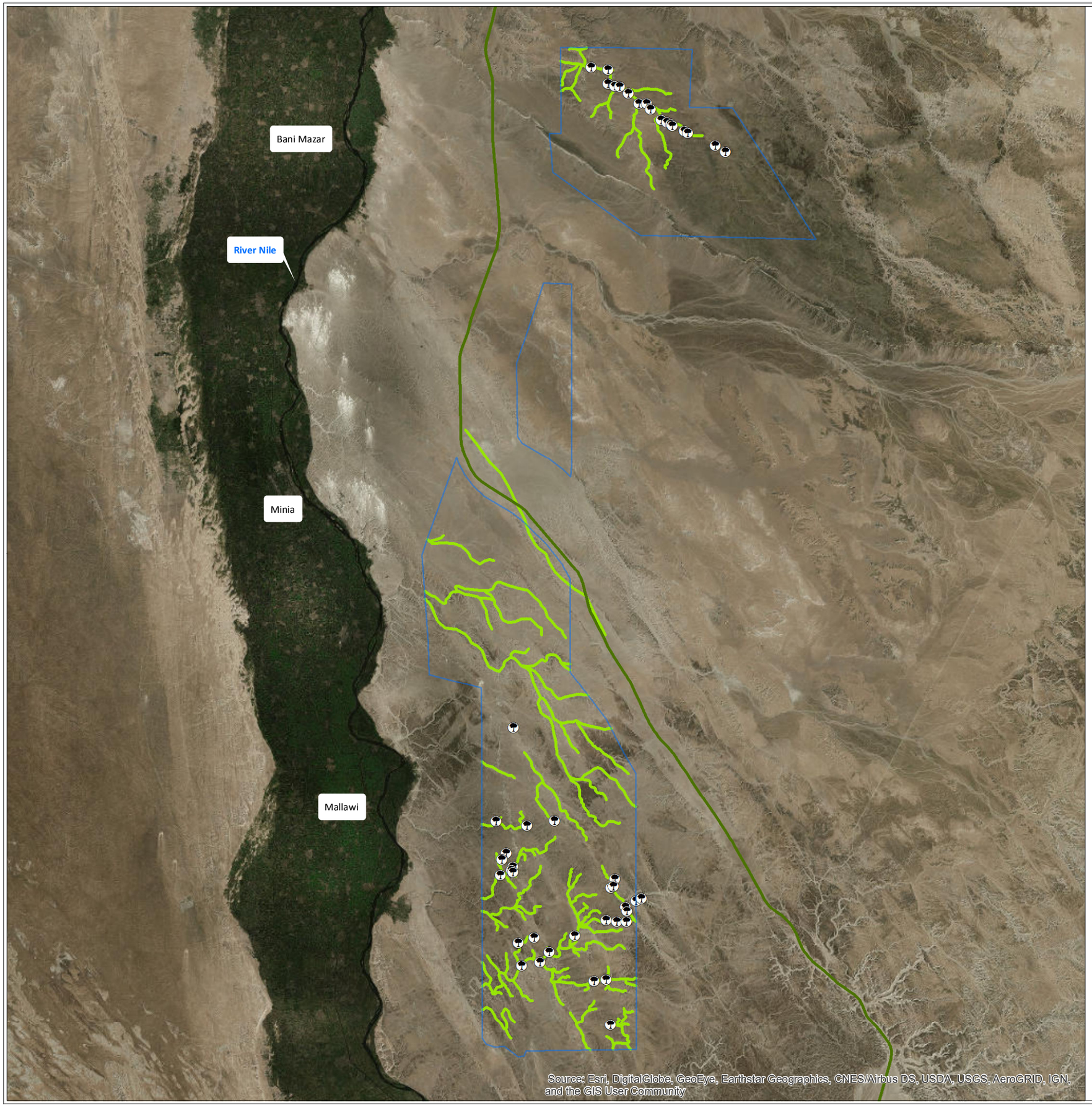


Figure 5-26: Rainfalls in autumn 2016 caused runoff in some Wadis (photos show Wadi al-'Imrani, see below)

The Project Area is trenched by about 14 Wadis or Wadi complexes (from north to south, see also Map 5-1):

1. Wadi ash-Shaykh (together with Wad i Abu Ritaymah and Wadi umm Awashiz) can be found in the northern section of the Project Area. It runs north of the East Wind-2 subarea (at distances of about 10 km) in a north-westerly direction to the Nile Valley. Several plant species and a number of stands of Acacia tortilis ssp. raddiana populate this Wadi (see Figure 5-27). At some places, the Wadi is accompanied by steep slopes, resulting in 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 southern sections, mainly outside the Project Area. The Cairo-Assiut highway follows the Wadi for about 100 km from the north to the south-east. 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.



JV LAHMEYER INTERNATIONAL ecoda

Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)
SESA Wind 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 project area and subareas

project area

Wadis and Acacia trees

main wadis

stand of Acacia tree

Assiut - Cairo Desert Road (motorway)

editor: S. Wernitz, August 22nd 2017

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Figure 5-27: The Wadiash-Shaykh complex holds several stands of Acacia trees and has, in its north-eastern part, a canyon-like character.

3. Wadi Mushaqqaq undulates across the desert north of the East Wind-1 subarea to the Nile Valley in the west. It is a wide Wadi with only a few vegetated spots (mainly shrubs and herbs, see Figure 5-27). Its importance to serve as a habitat for animals and plants is assessed to be low.
4. Wadi al Tahaawi begins in the northern part of the East Solar-1 subarea and stretches in parallel to the National Road in a north-westerly direction. It is a wide Wadi, as its surroundings are flat with only a little vegetation. The Wadi has a very low importance as a habitat for plants and animals.
5. Wadi al-Mashj is a branch or a northern extension of Wadi Ibadah. It starts west of the National Road and stretches further to the north-east to the Nile Valley. It is accompanied by elevated areas and hills, partly building a canyon-like Wadi. Only few 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 Figure 5-30).
6. Wadi Ibadah and Wadi al-Birshawi originate in the north-western part of the East Wind-1 subarea near observation sites A2, A3 and A4 (see Map 4-3 and Map 5-1) respectively. Both Wadis run more than 20 km to the north-west. Vegetation cover, such as shrubs and herbs, is comparably high in these Wadis (Figure 5-30) and thus the Wadis seem to be important as a habitat for plants and animals.

Figure 5-28: The view from an elevated point located near the fault line that is partly located in the East Wind-2 subarea (left) and the view from East Wind-2 subarea in a northerly direction at the fault line (right).

Figure 5-29: Images of Wadi Mushaqqaq

7. At the western border of the East Wind-1 subarea (between rows of observation sites A and B, see Map 4-3 and Map 5-1), another Wadi is named Wadi al-Birshawi (in the following: Wadi al-Birshawi_II). It runs in westerly direction to the Nile Valley. After crossing the National Road, the Wadi becomes rather narrow. It is assessed to have a very low importance as a habitat for plants and animals.
8. An unnamed Wadi originates in the north-western part of East Wind-1 subarea (north of observation site A1, see Map 4-3 and Map 5-1). Only a small part of this narrow Wadi is located in the Project Area. It comprises only very few spots of vegetation and thus has a very low importance as a habitat.
9. Wadi Abu Hasah al-Bahari and Wadi Abu al-Qibli originate near observation site B2 (see Map 4-3 and Map 5-1), cross the National Road that runs south to Assiut and continue to the south-west. Spots of vegetation were found in some places. However, most parts of these Wadis are more or less without any vegetation (Figure 5-32). The importance of these Wadis to serve as a habitat for animals and plants is assessed to be low.

Figure 5-30: **A 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)**

Figure 5-31: **A typical image of Wadi Ibadah at the northern border of the East Wind-1 subarea**

Figure 5-32: Typical images of Wadi Abu Hasah al-Bahari and Wadi Abu al-Qibli

10. The “Wadi al-’Imrani complex” is a huge Wadi system stretching between the two rows of observation sites C and D (see Map 4-3 and Map 5-1) and meandering further to the West to the Nile Valley: Wadi al-‘Imrani al-Bahari (site C3), Wadi al-‘Imrani al-Qibl (between rows C and D) and the northern branch of Wadi Umm Timmam (see Map 5-1). The Wadi complex is occasionally bordered by elevated areas, resulting in a canyon-like shape. Small bushes are widely spread in this Wadi complex. In some places, stands of Acacia can be found. Hence, 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. The Wadi complex forms an important habitat in the Project Area.
11. Near the eastern border of the East Wind-1 subarea, an unnamed Wadi runs from the north to the south-east. This Wadi which inhabits a few bushes and herbs is connected to the Wadi al-’Imrani complex in the west, but continues to the south-east as well. It is bordered by steep slopes (see Figure 5-34) with caves offering shelter for animals (see below). The Wadi complex forms an important habitat in the Project Area.
12. Wadi al-Farrujah meanders in the south-western corner of the East Wind-1 subarea. It is a rather narrow Wadi with only very few spots of vegetation which has no particular importance as a habitat.
13. Wadi Umm Timmam (the southern branch) originates near observation site D3 (see Map 4-3 and Map 5-1) and runs in a south-easterly direction in parallel to the National Road. It is a wide Wadi with few bushes and herbs, which has no particular importance as a habitat (see Figure 5-35).
14. A few kilometres outside the Project Area, Wadi Umm Timmam discharges into Wadi al-Mijallid (see below) which heads directly in a south-westerly direction to the Nile Valley.

Figure 5-33: **Images from the eastern (top), central (middle) and western part (bottom) of the Wadi al-'Imrani complex with spots of vegetation and single Acacia stands**

Figure 5-34: **An unnamed Wadi, east of the Wadi al-'Imrani complex**

Figure 5-35: **Images of the southern branch of Wadi Umm Timmam at the southern border of the East Wind-1 subarea**

Figure 5-36: **Typical image of the wide Wadi al-Mijallid at the southern border of the East Wind-1 subarea**

Table 5-4: Assessment of the importance of the main Wadis 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
7	Wadi al-Birshawi_II	East Wind-1	very low
8	unnamed Wadi	East Wind-1	very low
9	Wadi Abu Hasah al-Bahari and Wadi Abu al-Qibli	East Wind-1	low
10	The Wadi al-'Imrani complex	East Wind-1	important
11	unnamed Wadi east of 'Imrani complex	East Wind-1	important
12	Wadi al-Farrujah	East Wind-1	low
13	Wadi Umm Timmam (the southern branch)	East Wind-1	low
14	Wadi al-Mijallid	East Wind-1	important

Caves, mainly dissolution caves, form particular structures in the desert that offer 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-3 subarea (and along the fault line), in the East Wind-1 subarea and, but to a much lower degree, in the East Solar-1 subarea. Those areas are assessed to be important as a habitat for plants and animals. Some caves found in the Project Area are exemplarily presented in Figure 5-37. As the East Wind-2 subarea is rather flat and homogenous, occurrence of caves in these areas is believed to be unlikely.

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), were identified in the Project Area.

No critical habitat, mainly comprising of 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), were identified in the Project Area.

Figure 5-37: Caves offering shelter for mammals, birds and other animals
(Top: caves in Wadi al-Mashj at the western border of the southern section of the Project Area. Middle: caves on slopes in an unnamed Wadi near the eastern border of the East Wind-1 subarea. Bottom left: cave in Wadi Abu Hasah al-Bahari near the National Nile Road. Bottom right: cave near observation site A1 in the north-eastern part of the East Wind-1 subarea).

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 comprises 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 5-38). The growth of *O. baccatus* helps the 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 to be important as a habitat for plants and animals (see Table 5-5).

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

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

- Succulent half shrub (*Zygophyllum coccineum*) community

  Zygophyllum coccineum is a leaf and stem succulent xerophyte that remain green all through the year (see Figure 5-38). 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 5-39) 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 5-38) 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 important for people and their domesticated animals, it 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 catchment areas on 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 Wadiash-Shaykh (together with Wadi Abu Ritaymah and Wadi umm Awashiz) north of East Wind-2 subarea and in the Wadi al-'Imrani complex in the East Wind-1 subarea. 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 found in the Project Area.

Figure 5-38: ***Ochradinus baccatus*** **(top left),** ***Zygophyllum coccineum*** **(top right) found in the Project Area and stands of** ***A. tortilis spp. raddiana*** **found in the East Wind-1 subarea**

Figure 5-39: ***Anastacia hierochuntica*** **(to left),** ***Panicum turgidum*** **(top right),** ***Launaea nudicaulis*** **(bottom left) and** ***Farsetia aegyptia*** **(bottom right)**

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. Herbs and grass can be found on currently disused farmland (see Figure 5-40).

Figure 5-40: **Vegetation on currently disused farmland**

5.2.1.4 Fauna

5.2.1.4.1 Birds

Migrating birds

Results on spring migration (2016 and 2017) of large soaring birds (relevant species)

Overall, 15 different relevant species appeared in the study area during standardised observations in both study periods in spring 2016 and spring 2017 (see Table 5-6). According to the IUCN Red List of Threatened Species, the Pallid Harrier and Sooty Falcon are considered to be "Near-threatened", whereas all other species are regarded as of "least concern" (see Annex B1). Hence, no endangered species were recorded during spring migration. Considering that most species appeared in the study area very rarely (e.g. five species have been observed only once in spring 2016; see Table 5-7, and, for more details, Interim Reports on Bird Migration Surveys in Annex B2 10.2.2 to Annex B4 10.2.4), where the number of recorded species and species composition is comparable in both years (13 and 9 species in 2016 and 2017, respectively).

During the study periods in spring 2016 and in spring 2017, a total of 57 and 52 birds respectively were recorded within distances of up to 2.5 km from the observation sites (see Table 5-6). These birds referred to 38 records in spring 2016 and in spring 2017 (see Table 5-7). In addition, very few migrating birds from relevant species were recorded out of the range of standardised observations (i.e. before or after an observation unit or while driving through the study area): one migrating Pallid Harrier, ten Common Kestrels (probably some resident birds) and two Sooty Falcons in 2016, compared to three migrating Pallid Harriers and seven Common Kestrels (probably some resident birds) in 2017. All birds usually migrated alone or in small flocks. No larger flock of migrants occurred during the two study periods.

The average migration rate over all observation sites was 0.10 birds/hour in spring 2016 and 0.13 birds/hour in spring 2017. When considering the number of records per hour, the average migration rate was 0.07 records/hour in spring 2016 and 0.10 records/hour in spring 2017. In other words, within a period of 10.0 hours (in spring 2016) and 7.7 hours (in spring 2017) only a single bird passes the observation site at distances of up to 2.5 km or within a period of 14.0 hours (in spring 2016) and 10.0 hours (in spring 2017) over the same distance. These periods are nearly equivalent to the daylight time (duration between sunrise and sunset). To conclude, in an area of about 20 km^2 (equivalent to the 2.5 km plot around a single observation site), the expected migratory activity is one record per day and one to two birds per day. These results clearly show that bird migration of relevant species in the Project Area (the results obtained in the selected study area form a representative sample for the whole Project Area) is extremely low in spring.

When analysing bird migration of relevant species at the different observation sites, it becomes evident that there are no spatial differences between different sites. Migratory activity was extremely low at each of the 18 observation sites (for detailed data see Annex B5 10.2.5). In spring 2016, the total number of birds obtained at a single site varies from 0 to 17 and the number of records from 0 to 9. In spring 2017, the range was 0 to 9 birds per site and 0 to 6 records per site.

Table 5-6: Number of birds obtained during standardised observations at rows A, B, C, D and X at distances of up to 2.5 km to the observation sites in spring 2016 and 2017 (relevant species only)

species	scientific name	total		row A		row B		row C		row D		row X	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Black Stork	*Ciconia nigra*	1	.	1	.	.	.	.	.	.	.	.	.
White Stork	*Ciconia ciconia*	16	.	.	.	.	.	.	.	16	.	.	.
Osprey	*Pandion haliaetus*	1	1	.	.	1	.	.	.	.	1	.	.
European Honey Buzzard	*Pernis apivorus*	8	.	3	.	1	.	3	.	.	.	1	.
Black Kite	*Milvus migrans*	1	4	.	.	.	.	.	.	1	4	.	.
Short-toed Snake Eagle	*Circaetus gallicus*	4	13	.	10	1	2	3	1	.	.	.	.
Marsh Harrier	*Circus aeruginosus*	3	5	1	2	.	1	.	.	2	2	.	.
Pallid Harrier	*Circus macrourus*	5	7	2	3	.	1	.	1	3	1	.	1
Montagu's Harrier	*Circus pygargus*	1	.	1	.	.	.	.	.	.	.	.	.
unidentified Harrier	*Circus spec.*	1	1	1	.	.	.	.	.	.	1	.	.
Steppe Buzzard	*Buteo buteo vulpinus*	3	7	.	4	.	2	1	1	2	.	.	.
unidentified Buzzard	*Buteo spec.*	1	.	1	.	.	.	.	.	.	.	.	.
Booted Eagle	*Aquila pennata*	2	.	1	.	.	.	.	.	.	.	1	.
unindentified Eagle	-	1	.	.	.	.	.	.	.	.	.	1	.
Lesser Kestrel	*Falco naumanni*	.	4		.		2		.		2		.
Common Kestrel	*Falco tinnunculus*	4	3	1	.	2	.	.	2	1	1	.	.
Sooty Falcon	*Falco concolor*	1	.	.	.	.	.	1	.	.	.	.	.
unidentified Falcon	*Falco spec.*	3	.	2	.	.	.	.	.	1	.	.	.
unidenified Raptor	-	1	.	.	.	1	.	.	.	.	.	.	.
Common Crane	*Grus grus*	.	7	.	.	.	.	.	7	.	.	.	.
total		**57**	**52**	**14**	**19**	**6**	**8**	**8**	**12**	**26**	**12**	**3**	**1**

Table 5-7: Number of records obtained during standardised observations at rows A, B, C, D and X at distances of up to 2.5 km to the observation sites in spring 2016 and 2017 (relevant species only)

species	scientific name	total		row A		row B		row C		row D		row X	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Black Stork	*Ciconia nigra*	1	.	1	.	.	.	.	.	.	.	.	.
White Stork	*Ciconia ciconia*	1	.	.	.	.	.	.	.	1	.	.	.
Osprey	*Pandion haliaetus*	1	1	.	.	1	.	.	.	.	1	.	.
European Honey Buzzard	*Pernis apivorus*	4	.	1	.	1	.	1	.	.	.	1	.
Black Kite	*Milvus migrans*	1	2	.	.	.	.	.	.	1	2	.	.
Short-toed Snake Eagle	*Circaetus gallicus*	4	9	.	6	1	2	3	1	.	.	.	.
Marsh Harrier	*Circus aeruginosus*	3	5	1	2	.	1	.	.	2	2	.	.
Pallid Harrier	*Circus macrourus*	5	7	2	3	.	1	.	1	3	1	.	1
Montagu's Harrier	*Circus pygargus*	1	.	1	.	.	.	.	.	.	.	.	.
unidentified Harrier	*Circus spec.*	1	1	1	.	.	.	.	.	.	1	.	.
Steppe Buzzard	*Buteo buteo vulpinus*	3	5	.	2	.	2	1	1	2	.	.	.
unidentified Buzzard	*Buteo spec.*	1	.	1	.	.	.	.	.	.	.	.	.
Booted Eagle	*Aquila pennata*	2	.	1	.	.	.	.	.	.	.	1	.
unindentified Eagle	-	1	.	.	.	.	.	.	.	.	.	1	.
Lesser Kestrel	*Falco naumanni*	.	4	.	.	.	2		.	.	2	.	.
Common Kestrel	*Falco tinnunculus*	4	3	1	.	2	.	.	2	1	1	.	.
Sooty Falcon	*Falco concolor*	1	.	.	.	.	.	1	.	.	.	.	.
unidentified Falcon	*Falco spec.*	3	.	2	.	.	.	.	.	1	.	.	.
unidenified Raptor	-	1	.	.	.	1	.	.	.	.	.	.	.
Common Crane	*Grus grus*	.	1	.	.	.	.	.	.	.	1	.	.
total		**38**	**38**	**12**	**13**	**6**	**8**	**6**	**5**	**11**	**11**	**3**	**1**

Due to the very low migratory activity, the seasonal distribution of migration differed only a little throughout the study periods in spring 2016 and spring 2017 (see also Interim Reports for spring 2016 and spring 2017 in Annex B2 10.2.2 and Annex B4 10.2.4, respectively).

In spring 2016 and 2017, less than 20% of all registered birds were recorded at altitudes of less than 50 m above ground. In spring 2016, most birds (51%) were registered at altitudes of 50 to 150 m, whereas in spring 2017, the majority of birds (48%) migrated at altitudes above 150 m (see also – Interim Reports for spring 2016 and spring 2017 in Annex B2 10.2.2 and Annex B4 10.2.4, respectively). However, due to the very low migratory activity, differences between the three altitude classes can be regarded as negligible.

To conclude, the results gained in spring 2016 (starting from 1 April) and in spring 2017 (ending on 31 March) are very consistent. Hence, one can conclude that the approach of dividing the survey on spring migration up into two phases in different years was appropriate. Spring migration in the area was fully covered by this approach. The split of the survey did not affect the main findings on bird migration in spring and hence there was no need for any adjustments to the approach (e.g. overlapping of survey periods in 2016 and 2017) in order to increase the explanatory power of the data. The results clearly show that bird migration of the relevant species in the Project Area is extremely low in spring.

Results on spring migration of species of minor relevance (2016 and 2017)

A total of 41 different species of minor relevance were recorded migrating through or roosting in the Project Area during both study periods in spring 2016 and spring 2017 (see Table 5-8). Most observed species belong to the Passeriformes taxonomic order, including:

- Small songbirds typically migrating at night and spending one or two days roosting in the desert (e.g. Warblers, Wheatears), before continuing migration. These birds can be found in small numbers in the whole Project Area, mainly in the Wadis where herbs and bushes offer shelter against the sun, and
- Larks and Swallows actively migrating through the Project Area during daytime in nameable numbers. The Greater Short-toed Lark was the most abundant species of minor relevance in spring 2017 (see Table 5-8).

The aforementioned species migrate on a broad front through the Project Area and did not use certain areas as preferred migration paths. The same is valid for the Great Cormorant, Swifts and European Bee-eater, which do not belong to the Passeriformes order. The European Bee-eater was the most abundant species in spring 2016.

One of the 41 recorded species is regarded as “vulnerable” according to the IUCN Red List of Threatened Birds: the European Turtle Dove (of which only one bird was registered in spring 2016). All other species have been classified as of “least concern”.

Table 5-8: Numbers of birds from species of minor relevance recorded in the Project Area in spring 2016 and spring 2017

Species	*Scientific name*	2016	2017
Great Cormorant	*Phalacrocorax carbo*	.	509
Grey Heron	*Ardea cinerea*	6	3
Dunlin	*Calidris alpina*	.	3
Common Pigeon	*Columba livia*	3	.
European Turtle Dove	*Streptopelia turtur*	1	.
Great Spotted Cuckoo	*Clamator glandarius*	.	1
Common Cuckoo	*Cuculus canorus*	.	1
Alpine Swift	*Tachymarptis melba*	1	.
Common Swift	*Apus apus*	91	4
Pallid Swift	*Apus pallidus*	37	4
Blue-cheeked Bee-eater	*Merops persicus*	.	33
European Bee-eater	*Merops apiaster*	1,279	459
Eurasian Hoopoe	*Upupa epops*	.	1
Masked Shrike	*Lanius nubicus*	1	.
Great Grey Shrike	*Lanius excubitor*	.	1
Woodchat Shrike	*Lanius senator*	2	1
Greater Short-toed Lark	*Calandrella brachydactyla*	10	1,124
Lesser Short-toed Lark	*Calandrella rufescens*	.	1
Lark spec.	-	3	.
Sand Martin	*Riparia riparia*	7	3
Barn Swallow	*Hirundo rustica*	133	39
Common House Martin	*Delichon urbica*	29	10
Swallow spec.	-	6	.
Common Chiffchaff	*Phylloscopus collybita*	.	10
Eastern Bonelli's Warbler	*Phylloscopus orientalis*	.	2
Garden Warbler	*Sylvia borin*	1	.
Lesser Whitethroat	*Sylvia curruca*	.	37
Common Whitethroat	*Sylvia communis*	1	.
Asian Desert Warbler	*Sylvia nana*	.	15
Rüppell's Warbler	*Sylvia rueppelli*	.	6
Subalpine Warbler	*Sylvia cantillans*	.	1
Sardinian Warbler	*Sylvia melanocephala*	.	7
Spotted Flycatcher	*Muscicapa striata*	1	.
European Pied Flycatcher	*Ficedula hypoleuca*	1	.
Rufous-tailed Scrub Robin	*Cercotrichas galactotes*	2	.
Northern Wheatear	*Oenanthe oenanthe*	.	4
Black-eared Wheatear	*Oenanthe hispanica*	1	2
Desert Wheatear	*Oenanthe deserti*	.	8
Isabelline Wheatear	*Oenanthe isabellina*	.	2
Wheater spec.	*Oenanthe spec.*	3	.
White Wagtail	*Motacilla alba*	9	21
Tree Pipit	*Anthus trivialis*	.	1
Spanish Sparrow	*Passer hispaniolensis*	.	2
Passerine	-	.	13

Results on autumn migration (2016) of large soaring birds (relevant species)

During the study period in autumn 2016, a total of 573 birds (382 records) from 21 relevant species were observed within distances of up to 2.5 km from the observation sites (Table 5-9). The Short-toed Snake Eagle was the most numerous species (209 birds amounting to 36% of all recorded birds). The European Honey Buzzard, Black Kite and Steppe Buzzard each represented about 10% of all recorded birds. Hence, these four birds form about two thirds of all migrating birds.

Table 5-9: Number of birds / records obtained during standardised observations at the observation sites at row A, B, C, D and X at distances of up to 2.5 km to each sites (b= number of birds, r= number of records)

Species	*Scientific name*	row A		row B		row C		row D		row X	
		b	r	b	r	b	r	b	r	b	r
White Stork	*Ciconia ciconia*	.	.	.	.	1	1	.	.	.	.
European Honey Buzzard	*Pernis apivorus*	1	1	4	4	4	2	47	13	.	.
Black Kite	*Milvus migrans*	39	5	6	5	3	2	4	3	3	3
Egyptian Vulture	*Neophron percnopterus*	.	.	2	1	.	.	3	1	.	.
Short-toed Snake Eagle	*Circaetus gallicus*	57	35	50	43	36	32	37	31	29	21
Marsh Harrier	*Circus aeruginosus*	7	7	9	9	16	11	18	13	.	.
Pallid Harrier	*Circus macrourus*	4	3	1	1	3	3	.	.	.	.
Montagu's Harrier	*Circus pygargus*	.	.	2	2	.	.	5	5	.	.
Pallid / Montagu's Harrier	*Circus macrourus /pygargus*	1	1	1	1	1	1	3	3	.	.
Harrier	*Circus spec.*	1	1	2	2	.	.	.	.	.	.
Levant Sparrowhawk	*Accipiter brevipes*	.	.	2	1	.	.	2	2	.	.
Eurasian Sparrowhawk	*Accipiter nisus*	1	1	.	.	.	.	.	.	.	.
Steppe Buzzard	*Buteo buteo vulpinus*	6	5	20	8	18	5	6	4	2	2
Long-legged Buzzard	*Buteo rufinus*	1	1	3	2	.	.	1	1	.	.
Buzzard	*Buteo spec.*	4	2	.	.	.	.	.	.	.	.
Lesser Spotted Eagle	*Aquila pomarina*	.	.	3	2	.	.	.	.	.	.
Steppe Eagle	*Aquila nipalensis*	4	4	3	3	5	5	10	4	2	2
Booted Eagle	*Aquila pennata*	2	2	3	3	2	2	.	.	.	.
Eagle	-	3	1	1	1	2	1	3	2	.	.
Lesser Kest,rel	*Falco naumanni*	1	1	1	1	2	2	.	.	.	.
Common Kestrel	*Falco tinnunculus*	2	2	1	1	.	.	3	3	.	.
Lesser / Common Kestrel	*Falco naumanni / tinnunculus*	1	1	.	.	.	.	1	1	.	.
Red-footed Falcon	*Falco vespertinus*	.	.	.	.	.	.	3	3	.	.
Sooty Falcon	*Falco concolor*	.	.	4	2	2	1	1	1	.	.
Eurasian Hobby	*Falco subbuteo*	.	.	1	1	.	.	.	.	.	.
Lanner Falcon	*Falco biarmicus*	.	.	.	.	2	1	1	1	.	.
Falcon	*Falco spec.*	4	4	1	1	.	.	1	1	2	2
Raptor spec.	-	7	5	6	4	13	9	2	1	2	1
sum		**146**	**82**	**126**	**98**	**110**	**78**	**151**	**93**	**40**	**31**

In addition, 22 migrating birds from relevant species were recorded out of the range of standardised observations (i.e. before or after an observation unit or while driving through the study area) – (see Table 5-10). The most numerous species was Common Kestrel with ten birds (probably some resident birds).

Table 5-10: Numbers of birds from relevant species, which were recorded by chance / accidentally in autumn 2016 within the Project Area (relevant species only)

Species	*Scientific name*	number of birds
European Honey Buzzard	*Pernis apivorus*	1
Short-toed Snake Eagle	*Circaetus gallicus*	4
Marsh Harrier	*Circus aeruginosus*	1
Montagu's Harrier	*Circus pygargus*	1
Steppe Eagle	*Aquila nipalensis*	1
Common Kestrel	*Falco tinnunculus*	10
Sooty Falcon	*Falco concolor*	3
Falcon	*Falco spec.*	1

Species of special interest (according to the IUCN Red List of Threatened Species) occurred in low numbers:

- The Egyptian Vulture (5 birds) and Steppe Eagle (24 birds) have been assessed as “threatened”, and
- The Pallid Harrier (8 birds) and Sooty Falcon (7 birds) have been regarded as “near-threatened”.

All other 19 species which are particularly relevant for study have been classified as of “least concern” according to the IUCN Red List (see Annex B1 10.2.1).

The observed birds migrated alone (52% of all birds and 78% of all records) or in small flocks of 2 to 10 individuals (39% of all birds and 21% of all records). No larger flock of migrants occurred during the study period in autumn 2016.

Average migration rate over all observation sites was 0.63 birds/hour and 0.42 records/hour in autumn 2016. In other words, within a period of 1.6 hours, a single bird passes the observation site at distances of up to 2.5 km or within a period of 2.4 hours, a single record was obtained at distances of up to 2.5 km. Assuming a daylight time (duration between sunrise and sunset) of about 10 to 12 hours, the expected migratory activity in an area of about 20 km^2 (equivalent to the 2.5 km plot around a single observation site) is 6.25 to 7.50 birds per day and 4 to 5 records per day. These results clearly show that bird migration of relevant species in the Project Area is low in autumn.

The overall migratory activity at the 18 observation sites varies from 0.37 to 1.01 birds/hour, and migratory activity of the most numerous species (the Short-toed Snake Eagle) varies from 0.06 to 0.43 birds/hour. To conclude, the analysis of bird migration of relevant species at the 18 observation sites revealed no remarkable spatial differences between sites. Migratory activity was low at every observation site (for detailed data see Annex B5 10.2.5).

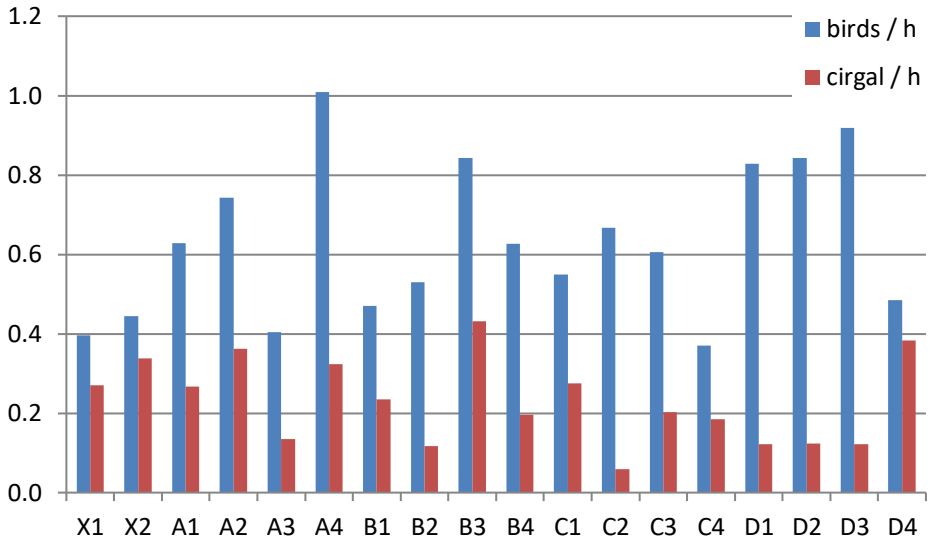


Figure 5-41: Migratory activity of all recorded species (birds/hour) and of the Short-toed Snake Eagle (cirgal/hour) at each observation site

During the study period, the number of birds / records per hour increased within the first weeks and peaked in week seven (i.e. 1 October to 6 October). Migratory activity was very low from week nine (see Interim Report for autumn 2016 in Annex B2 10.2.2). About 80% of all birds were recorded in the period from 10 September to 20 October. This pattern was mainly caused by the phenology of the most numerous species: the Short-toed Snake Eagle.

In autumn 2016, nearly 50% of all recorded birds migrated at altitudes above 150 m, whereas about 40% of all birds were registered at altitudes of between 50 and 150 m.

Results on autumn migration (2016) of species of minor relevance

A total of 33 species of minor relevance were recorded migrating through or roosting in the Project Area during both study periods in autumn 2016 (see Table 5-11). Most observed species belong to the Passeriformes taxonomic order, including:

- Small songbirds typically migrating at night and spending one or two days roosting in the desert (e.g. Shrikes, Warblers, Wheatears), before continuing migration. These birds can be regularly found in small numbers in the whole Project Area, mainly in the Wadis where herbs and bushes offer shelter against the sun, and
- Larks and Swallows actively migrating through the Project Area during daytime in nameable numbers.

The mentioned species migrate on a broad front through the Project Area and did not use certain areas as preferred migration paths. The same is valid for the Great Cormorant and European Bee-eater, which do not belong to the Passeriformes order. The European Bee-eater was the most abundant species in autumn 2016.

None of the recorded species is regarded as “threatened” or “vulnerable” according to the IUCN Red List of Threatened Birds. All other species have been classified as of “least concern”.

Table 5-11: Numbers of birds from species of minor relevance, which were recorded by chance / randomly in autumn 2016

Species	Scientific name	Number of birds
Great Cormorant	*Phalacrocorax carbo*	196
Namaqua Dove	*Oena capensis*	1
European Bee-eater	*Merops apiaster*	531
Red-backed Shrike	*Lanius collurio*	91
Lesser Grey Shrike	*Lanius minor*	1
Masked Shrike	*Lanius nubicus*	20
Woodchat Shrike	*Lanius senator*	4
Greater Short-toed Lark	*Calandrella brachydactyla*	21
Lark spec.	-	1
Sand Martin	*Riparia riparia*	9
Barn Swallow	*Hirundo rustica*	227
Red-rumped Swallow	*Cecropis daurica*	2
Common House Martin	*Delichon urbica*	19
Swallow spec.	-	12
Eastern Olivaceous Warbler	*Hippolais pallida*	1
Willow Warbler	*Phylloscopus trochilus*	32
Common Chiffchaff	*Phylloscopus collybita*	54
Wood Warbler	*Phylloscopus sibilatrix*	1
Warbler spec. (Phylloscopus)	*Phylloscopus spec.*	2
Common Whitethroat	*Sylvia communis*	1
Lesser Whitethroat	*Sylvia curruca*	35
Rüppell's Warbler	*Sylvia rueppelli*	1
Thrush Nightingale	*Luscinia luscinia*	1
Bluethroat	*Luscinia svecica*	2
Common Redstart	*Phoenicurus phoenicurus*	2
Whinchat	*Saxicola rubetra*	3
Northern Wheatear	*Oenanthe oenanthe*	7
Black-eared Wheatear	*Oenanthe hispanica*	1
Desert Wheatear	*Oenanthe deserti*	7
Isabelline Wheatear	*Oenanthe isabellina*	2
Wheater spec.	*Oenanthe spec.*	4
Eurasian Golden Oriole	*Oriolus oriolus*	1
White Wagtail	*Motacilla alba*	190
Western Yellow Wagtail	*Motacilla flava*	1
Wagtail spec.	*Motacilla spec.*	1
Red-throated Pipit	*Anthus cervinus*	5
Water Pipit	*Anthus spinoletta*	1
Pipit spec.	*Anthus spec.*	4
Spanish Sparrow	*Passer hispaniolensis*	4
Passerine	-	67

Assessment of the Importance of the Project Area for bird migration (spring and autumn)

Commonly, the importance of an area is assessed by two criteria:

1. Number of birds of a recorded species (sometimes in relation to the population of each species), and
2. Conservational status of a species (according to IUCN-Red List).

As a result of this process, species that are exposed to a higher threat are of special interest.

As mentioned above, no threatened species was recorded during spring migration (both in 2016 and 2017).

The Pallid Harrier and Sooty Falcon (amongst those species of particular relevance) have been regarded by IUCN as "near-threatened" and the European Turtle Dove (amongst species of minor relevance) has been assessed as "vulnerable". The numbers of these three species recorded within the Project Area were very low: the Pallid Harrier (6 birds in 2016 and 10 birds in 2017), Sooty Falcon (3 birds in 2016 and none in 2017) and European Turtle Dove (1 bird in 2016 and none in 2017). All other registered species have been assessed by IUCN to be of "least concern", and are in low numbers too.

As shown above, the results obtained in spring 2016 and 2017 consistently reveal that bird migration of relevant species is extremely low in the Project Area in spring. As a consequence, there are no spatial differences of the intensity of bird migration within the Project Area. These findings are in accordance with a study conducted in an area west of the Nile Valley (about 50 km west of the Project Area) in spring 2012. The average migration rate was 0.06 birds/hour and 0.05 records/hour in this area, and is thus comparable to what was found in the Project Area east of the Nile Valley.

To sum up, considering the two aforementioned criteria, the investigation clearly reveals that the Project Area is not important for migrating birds in spring. This is valid for species of particular relevance and for species of minor relevance that mainly migrated on a broad front.

The fact that the survey on spring migration was split into two different seasons had apparently no effect on the main outcome and conclusions. The results gained in the two spring seasons are consistent and clearly show that migratory activity in spring was very low at any time and for every species.

In autumn 2016, two threatened species were recorded in the Project Area in low numbers:

A total of 5 Egyptian Vultures were observed during standardised observations on two occasions (a small group of three and two birds on 5 and 15 September, respectively). From a strict statistical point of view, it is not feasible to calculate the total number of Egyptian Vultures that might have passed the Project Area in autumn 2016 based on only two records of this species. Apparently, Egyptian Vulture very rarely occur in the Project Area which forms a huge part of the Eastern Desert with an extent of about 20 km from west to east and about 100 km from north to south.

A total of 24 Steppe Eagles, the second threatened species, has been encountered 19 times from early October to mid-November. Again, an extrapolation of the total number of this species is difficult for statistical reasons. However, a rough estimate can be given under the following assumptions:

- Migration of Steppe Eagle is equally distributed across the Project Area (this is most probably the case). Thus, a total of 1.33 birds per observation site (24 birds at 18 sites) were recorded in autumn 2016.
- Migration of the Steppe Eagle is equally distributed over time (this is definitely not the case, because migration is known to peak in the second half of October and is much lower at the beginning and end of this period. In the Project Area, about 60% of all birds were recorded on only 12 days from 23 October to 3 November).
- The overall migration period of the Steppe Eagle in autumn lasts from 1 October to 15 November, i.e. 46 days (this is a very conservative approach, because this period clearly exceeds the main migration period which covers the second half of October (see above).
- The daily migration period is 10 hours, and hence the total time of autumn migration is 460 hours. (Again, this is a conservative approach, because migratory activity of large soaring birds, depending on thermal uplifts, is very low in the early morning and late afternoon. In fact, all 24 Steppe Eagles were recorded between 10:57 and 15:38, i.e. within a period of less than 5 hours). Consequently, overall observation time at each observation site (about 50 hours, see Table 4-1) was about 15% of the total time of autumn migration.

Based on the given assumptions, a total of 12.27 birds per observation site, i.e. on an area of about 20 km^2 (roughly the area required for a 50 MW wind farm) can be expected during a full autumn season. This amounts to about 0.03% of the total flyway population of this species, which was assumed to be 37,500 birds, according to Carl Bro (2009), whereas Leshem & Yom-Tov (1996) estimated the population to be between 11,000 and 75,000 birds. Considering that this figure likely overestimates the total number of Steppe Eagles due to the conservative approaches mentioned above, it becomes evident that the importance of a single plot of 20 km^2 for autumn migration of this species is very low. Even the whole Project Area, which covers a huge part of the Eastern Desert, extending about 20 km from west to east and about 100 km from north to south, is not located within or near an important migration path for this species where migrating Steppe Eagles aggregate. Such a bottleneck during autumn migration is known to exist around Suez, where Steppe Eagles accumulate due to the small land bridge between the Mediterranean Sea and the Red Sea (see Figure 5-42). After having passed the Suez, Steppe Eagles disperse over Egypt and migrate on a broad front further south, heading for their wintering habitats in East Africa (Meyburg et al. 2003).

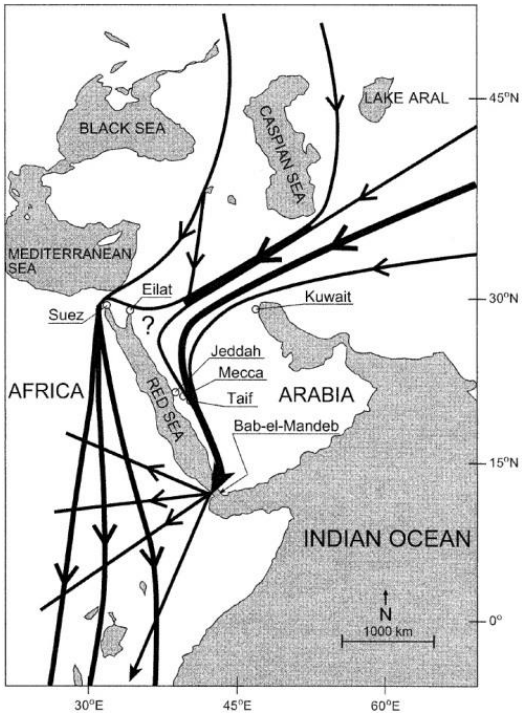


Figure 5-42: **Schematic illustration of the spatial distribution of autumn migration of the Steppe Eagle** (based on 16 satellite-tracked individuals and other studies; taken from Meyburg et al. 2003).

In autumn 2016, two species classified by IUCN as "near-threatened" were recorded during standardised observations in the Project Area:

Like all Harriers, the Pallid Harrier (8 birds) mainly migrate actively (by flapping flight) and hence do not depend on thermal uplifts. Harriers are even known to cross large bodies of waters (e.g. the Mediterranean Sea). As a consequence, Pallid Harriers do not aggregate at certain spots, but migrate on a broad front from their breeding territories (primarily in the steppes of Asiatic Russia, Kazakhstan and north-west China) to their wintering habitats in Africa. The results obtained in autumn 2016 clearly reveal that the Pallid Harrier can be both a rare and regular migrant in the Project Area, and that the Project Area is not of particular importance for the migration of this species.

According to IUCN (2017) the Sooty Falcon (7 birds), a long-distance migrant, wintering in east Africa and south to Madagascar and north-eastern South Africa, is listed as a Migratory Soaring Bird Species. Considering that this species breeds on islands and coastal or desert cliffs from Libya to Pakistan, it is difficult to specify the status of the Sooty Falcons recorded in the Project Area precisely. The Project Area is located within the breeding range of this species and appropriate nesting sites (desert cliffs) might exist in the wider surrounding (e.g. at the edge of the Nile Valley). The fact that three of the four recordings (all from October) each refer to two birds indicate that these birds might have been a pair moving around after the breeding season and before starting migration in November. If so, they have to be attributed as sedentary birds of the wider surrounding (as no breeding site was found in the Project Area). In any case, the results obtained in autumn 2016 clearly reveal that the Sooty Falcon rarely occurs in the Project Area and that the Project Area is not of particular importance for migration or reproduction for this species.

The Short-toed Snake Eagle was the most numerous species of special interest in autumn 2016. A total of 209 birds (on average, 11.6 birds per observation site) were recorded in autumn 2009,

representing about 2.4% of the assumed flyway-population, estimated by Carl Bro (2009) to be 8,783 birds. Considering that observation times could cover only a fraction of the total migration time, it is obvious that the overall number of Short-toed Snake Eagles that migrated through the Project Area in autumn 2016 was even higher. In summary, a relevant portion of the eastern flyway population of this species cross the Project Area in autumn. On the other hand, one has to acknowledge that the Project Area covers a huge part of the Eastern Desert, extending about 20 km from west to east and about 100 km from north to south and that there is no indication of a concentration of migrating Short-toed Snake Eagles in the Project Area. Even within the Project Area, no remarkable spatial difference in migration of Short-toed Snake Eagles was found (see Figure 5-41). To conclude, the species is a regular migrant in the Project Area, but the Project Area is not of particular importance for migration of this species. In addition, Short-toed Snake Eagle is assessed by IUCN as of "least concern" and is thus not a threatened species.

All other species of special interest (all assessed as of "least concern") occurred very rarely and in small numbers (on average: every 1.6 hours a single bird and every 2.4 hours a single record). The analysis of overall migration at the 18 observation sites revealed no remarkable spatial differences. Hence, neither the Project Area on the whole nor parts of the Project Area is of particular importance for the migration of species of special interest. These findings are in accordance with a study conducted in an area to the west of the Nile Valley (about 50 km west of the Project Area) in autumn 2011, where the average migration rate was comparably low to what was obtained in the Eastern desert (ecoda 2012).

In summary, considering the two aforementioned criteria (number of birds and conservational status of species), the investigation clearly reveals that the Project Area is not of particular importance for migrating birds in autumn. This is valid for species of special interest and for species of minor relevance that mainly migrated on a broad front.

Synopsis – spring and autumn migration

Two extensive bird-monitoring studies have been conducted in the wider region of El Minya west and east of the Nile Valley. The main conclusion of both investigations was that the desert located at minimum distances of 10 km west and east of 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.

<u>Local birds</u>

A total of 45 species have been recorded in the Project Area during standardised fieldwork (i.e. during transect walks, see section 4.3.2.3.1). In autumn 2016, the number of species (42) was higher than in spring (16) (see Table 5-12), and this might be partly related to a higher amount of 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 5-12). The most abundant species that could be found in nearly every larger Wadi was the Spotted Sandgrouse (290 birds, but note that double counts are possible). Rock Doves appeared regularly near the National Road in the vicinity of a cafeteria. The Desert Lark, Desert Warbler, Desert Wheatear and, to a lesser de-

gree, Isabilline Wheatear were regularly recorded in the Project Area, but only in very low numbers. All other species were rarely observed. In addition, the 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.

Figure 5-43: A Lesser Whitethroat roosting in the Wadi al-'Imrani complex (top left), a Trumpeter Finch (*Bucanetes githagineus*) at the National Road (top left), two Spotted Sandgrouses in Wadi Mushaqqaq (bottom left) and a Desert Warbler (*Sylvia nana/deserti*) in Wadi Ibadah (bottom right).

During standardised observations on bird migration in spring 2016, six sedentary species, which belong to the typical desert fauna, were recorded in the Project Area (see Interim Report in Annex B2 10.2.2):

The Brown-necked Raven, Spotted Sandgrouse and Desert Lark (regular recordings)

- The Greater Hoopoe Lark (several recordings)
- The Crowned Sandgrouse (*Pterocles coronatus*) and the Egyptian Nightjar (*Caprimulgus aegyptius*) (one recording each)

Some species were supposed to breed in the Project Area because they were observed regularly, showed territorial behaviour or reared chicks (but in very low number). For other species, the status is not clear.

During bird migration monitoring in autumn 2016, single sedentary species again occurred in the Project Area (see Interim Report in Annex B2 10.2.2):

- The Brown-necked Raven, the Common Pigeon (*Columba livia f. domestica*), the Spotted Sandgrouse and the Desert Lark (regular recordings)
- The Greater Hoopoe Lark (several recordings)
- The Cream-coloured Cursor (two recordings) and the Sand Partridge (*Ammoperdix heyi*) (one recording)

Finally, during the survey in spring 2017, the following sedentary species were observed (see Interim Report in Annex B4 10.2.4):

- The Common Pigeon, Spotted Sandgrouse and Desert Lark (regular recordings)
- The Desert Lark (several recordings)
- The Cream-coloured Cursor, Brown-necked Raven, Greater Hoopoe Lark and Trumpeter Finch (single recordings)

In addition, the Hooded Crow (*Corvus cornix*) and House Sparrow (*Passer domesticus*) were observed, which are sedentary bird species. These species settle at populated or cultivated areas, but are not part of the typical desert fauna.

Table 5-12: List of birds recorded during transect walks in the Project Area (given as the total number of recorded birds of a species (as a measure for abundance) and 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	*Falco pelegrinoides*	local	1/1	-
2	European Bee-eater	*Merops apiaster*	migrating	10/1	-
3	Black Kite	*Milvus migrans*	migrating	1/1	-
4	Bluethroat	*Luscinia svecica*	roosting	2/2	
5	Booted Eagle	*Hieraaetus pennatus*	migrating	1/1	-
6	Brown-necked Raven	*Corvus ruficollis*	local	55/13	3/2
7	Chiffchaff	*Phylloscopus collybeta*	roosting	161/20	4/3
8	Common Snipe	*Gallinago gallinago*	roosting	10/1	-
9	Common Whitethroat	*Sylvia communis*	roosting	7/7	-
10	Desert Lark	*Ammomanes deserti*	local	48/13	9/5
11	Desert Warbler	*Sylvia nana/deserti*	local	-	16/13

Nº	Species		Status	number of birds / transects 2016	2017
12	Desert Wheatear	*Oenanthe deserti*	local	9/5	7/4
13	Great Grey Shrike	*Lanius excubitor*	roosting	-	1/1
14	Golden Oriole	*Oriolus oriolus*	roosting	1/1	-
15	Greater Hoopoe Lark	*Alaemon alaudipes*	local	13/9	6/2
16	Honey Buzzard	*Pernis apivorus*	migrating	5/3	-
17	Hooded Wheatear	*Oenanthe monacha*	local	2/1	1/1
18	Isabelline Shrike	*Lanius isabellinus*	roosting	1/1	-
19	Isabelline Wheatear	*Oenanthe isabellina*	local	3/2	6/5
20	Lesser Whitethroat	*Sylvia curruca*	roosting	25/9	29/9
21	Levant Sparrohawk	*Accipiter brevipes*	migrating	-	1/1
22	Masked Shrike	*Lanius nubicus*	roosting	7/5	-
23	Meadow Pipit	*Anthus pratensis*	roosting	3/2	-
24	Montagus Harrier	*Circus pygargus*	migrating	1/1	-
	Harrier spec.	*Circus spec.*	migrating	1/1	-
25	Mourning Wheatear	*Oenanthe lugens*	local	8/6	-
26	Northern Lapwing	*Vanellus vanellus*	migrating	11/1	-
27	Northern Wheatear	*Oenanthe oenanthe*	local	2/2	-
28	Red-breasted Flycatcher	*Ficedula parva*	roosting	1/1	-
29	Reed Warbler	*Acrocephalus scirpaceus*	roosting	9/3	-
30	Rock Dove	*Columba livia*	local	17/3	-
31	Rock Pipit	*Anthus petrosus*	local	2/2	-
32	Ruppell's Warbler	*Sylvia ruppeli*	roosting	1/1	10/5
33	Sardenian Warbler	*Sylvia melanocephala*	roosting	14/4	4/2
34	Sedge Warbler	*Acrocephalus schoenobaenus*	roosting	2/1	-
35	Short-toed Eagle	*Circaetus gallicus*	migrating	1/1	-
36	Spotted Sandgrouse	*Pterocles senegallus*	local	290/13	58/4
37	Steppe Buzzard	*Buteo vulpinus*	migrating	1/1	-
38	Steppe Eagle	*Aquila nipalensis*	migrating	3/2	-
39	Tawny Pipit	*Anthus campestris*	roosting	1/1	1/1
40	Tree Pipit	*Anthus trivialis*	roosting	4/2	-
41	Trumpeter Finch	*Bucanetes githagineus*	local	1/1	-
42	Whinchat	*Saxicola rubetra*	roosting	1/1	-
43	White Wagtail	*Motacilla alba*	roosting	7/2	-
44	Willow Warbler	*Phylloscopus trochilus*	roosting	41/13	-
45	Woodchat Shrike	*Lanius senator*	roosting	-	1/1

To conclude, the Wadis made up of 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 to be endangered or threatened. Consequently, the Project Area is not an important habitat for local birds.

Roosting birds

A total of 21 species used the area as a roosting site, with 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 to migrate during the following night. The most abundant species were the Chaffinch, Willow Warbler, Lesser Whitethorat (see Figure 5-43) and Sardenian Warbler (see Table 5-12). These species are quite common in their breeding areas in Europe and are listed as of "least concern" on 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 spring 2016, autumn 2016 and spring 2017 (see Interim Reports in Annex B2 10.2.2 to B4 10.2.4). 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.

5.2.1.4.2 Bats

According to Hoath (2009) the occurrence of most bat species in Egypt is restricted to vegetated areas, namely the Nile Valley. Desert areas with only very limited or no vegetation are usually not populated by bats.

A total of 25 bat echolocation calls were recorded by the device (batcorder) in six of the total 37 nights in spring 2016. Thus, taking into consideration all nights, about 0.06 bat echolocation calls/hour were recorded. Most of the recorded bat echolocation calls (19) probably belonged to the Botta's Serotine (*Eptesicus bottae*). The other (6) bat echolocation calls could not be determined to a specific species.

The Botta's Serotine can be found in a wide range of semi-arid habitats including Mediterranean vegetation, lowland farmland and rocky mountain. It is a crevice-dwelling species, inhabiting buildings, ruins (including tombs) and natural rock crevices throughout the year. The Botta's Serotine is described as locally common in at least part of the range (e.g. in Egypt). As no major threats are known to this species, it is listed in the IUCN Red List of Threatened Species as of "least concern".

During the survey in autumn 2016, no bat echolocation call was recorded by the batcorder.

Based on the obtained results, the 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 a few structures (e.g. buildings, crevices) that 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, lack of open bodies of water and 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.

The results and the derived conclusion verify the assumption that the suitability of the desert area to serve as a relevant habitat for bats is limited (see section 4.3.2.3.2). Hence, the chosen effort can be assessed as appropriate and sufficient.

5.2.1.4.3 Other animals

Mammals (excl. bats)

Few mammals have been documented in the Project Area during the fieldwork, 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 among several rodent species.

The Desert Red Fox (*Vulpes vulpes pusilla*) and Rüppell's Sand Fox (*Vulpes ruepelli*), when searching for carrion and other food sources, were rarely observed near the National Road in larger Wadis, e.g. Wadi Mushaqqaq and the Wadi al-'Imrani complex. Tracks and excrements of foxes have been found at observation sites A3 (autumn 2016), B2, B3, B4, D1 and D4 (all in spring 2017). Individuals active during night-time were recorded by an automatic camera installed near an Acacia tree in the Wadi al-'Imrani complex. A burrow was encountered at observation site B3. In addition, caves and other structures found in the larger Wadis are generally suitable as fox dens.

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

Table 5-13: List of mammal species recorded in the Project Area

No.	Species		Family	Location
1	Domestic Camels	*Camelus dromedarius*	Camelidae	Wadi Ibadah and Wadi al-Mashj
2	Desert Red Fox / Rüppell's Sand Fox	*Vulpes vulpes pusilla / Vulpes ruepelli*	Canidae	Wadi Mushaqqaq, Wadi Ibadah, Wadi al-Birshawi, the Wadi al-'Imrani complex
3	Wildcat / Domestic Cat	*Felis silvestris catus*	Felidae	Wadi al-Birshawi
4	Lesser Egyptian Jerboa	*Jaculus jaculus*	Dipodidae	Wadi Mushaqqaq, Wadi Ibadah and Wadi Mashj
5	Lesser Egyptian Gerbil	*Gerbillus gerbillus*	Muridae	Wadi al-Mashj, Wadi al-Birshawi, Wadi Abu Hasah al-Bahari
	Gerbillus spec.		Muridae	Wadi Mushaqqaq, Wadi al-Mashj
6	Sundevall's Jird	*Meriones crassus*	Muridae	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, 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 have settled in the Project Area in numbers. The existence of Sun-

devall's jird (*Meriones crassus*) was proved at one place in Wadi al-Birshawi. Droppings were found that might refer to the Rock Hrax (*Procavia capensis*), a species commonly found in an arid land habitat including deserts and savannas. Based on the literature, it is also suspected that the wolf-like Egyptian Jackal (*Canis anthus lupaster*) crosses through the Project Area.

To sum up, 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, there is a very low number of mammals. Hence, the Project Area does not form an important habitat for mammals.

Reptiles

During site visits, at least ten species of reptiles were detected within the Project Area (see Table 5-14). Two of the five species were snakes: single Sahara Sand Snakes occurred regularly in the Wadi al-'Imrani complex (East Wind-1, recorded near observation sites C1, C2, C3 and C4), in Wadi Mushaqqaq and Wadi Mashj (both East Solar-1). The Horned Viper was rarely found in the Wadi al-'Imrani complex (East Wind-1, mostly near observation site C4). 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 the Wadi al-'Imrani complex (East Wind-1). An individual of the genus Tarentola was recorded once at observation site D4. However, other members of the family Gekkonidae can be expected to occur in the Project Area, too.

Bosc's Fringe-toed Lizard and the Nidua Fringe-fingered Lizard appeared quite common at different locations in the East Wind-1 (e.g. at observation sites A1, A4, B3, B3, C3, C4, D4 and X2) and East Solar-1 subarea. Single specimens of the Red Spotted Lizard were observed in Wadi Mushaqqaq (East Sole-1), Wadi Umm Timmam (the southern branch) and Wadi al-Mijalid (both East Wind-1). Moreover, other members of the Lacertidae family might also inhabit the Project Area.

In the East Wind-1 subarea (at observation sites B3 and B4), a Sinai Agame appeared twice. This species inhabits the Eastern Desert and can be found on vertical rocky surfaces, boulders, under ledges and in caves. In addition, a single Agame of the Genus Trapelus was recorded at B4, too.

Table 5-14: List of reptiles recorded in the Project Area

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

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

Figure 5-44: Reptiles found in the Project Area: Sinai Agame near site B4, the Saharan Fan-toed Gecko near site C4 (top right), the Sahara Sand Snake near site C1 (bottom left) and Bosc's Fringe-toed Lizard (bottom right).

Figure 5-45: Exemplary tracks of animals found in the Project Area.

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 and examinations prior to, during or after bird observations did reveal that insects can 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 near observation sites A3, A4, B2, B3, B4, C1 and X1 was the Desert Pebble Mantis (*Eremiaphila zetterstedti*). Occasional recordings were made of the Heart and Dart (*Agrotis exclamationis*), a moth of the Noctuidae family. Some other specimens from the Carabidae and Vespidae families 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 individual days, up to 10 specimens of the Painted Lady Butterfly were found foraging at the flowers of an Acacia tree near site C3. Migrating Dragonflies, like the 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, the Desert Locust (*Schistocerca gregaria*) and Migratory Locust (*Locusta migratoria*) (see Figure 5-46), 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 specimens 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 5-46: The Migratory Locust (left) and Camel Spider (right)

Spiders

Camel Spiders (*Galeodes arabs*) occurred regularly at observation sites A2, A4, C1, D2, X1 and can probably be found in the entire Project Area (see Figure 5-46). Moreover, single specimens of the Salticidae family might inhabit the area too.

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

5.2.2 East Wind-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 or important bird area and no internationally recognised area of biodiversity value in the East Wind-1 subarea or its surroundings (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, elevated areas and small hills within the East Wind-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 Wind-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 in the very north, the Wadi al-'Imrani complex and the unnamed Wadi east of 'Imrani complex and, finally, Wadi al-Mijallid in the south provide appropriate living conditions for single plant and animal species, and thus differ remarkably from the vast desert habitats dominating the East Wind-1 subarea. The aforementioned Wadis are important for plants and animals (see Table 5-4 and Map 5-2). The importance of all other Wadis as a valuable 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 habitats for animals, caves in the East Wind-1 subarea, which can be particularly found in canyon-like Wadis and on slopes, are important as a habitat for plants and animals.

5.2.2.3 Flora

Large parts of the East Wind-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 Wind-1 subarea are considered to be of “least concern” in the IUCN Red List of Threatened Species. Hence, besides the Wadis mentioned in section 5.2.2.2, the East Wind-1 subarea is not important for plants.

5.2.2.4 Fauna

5.2.2.4.1 Birds

Migrating birds

As given in section 4.3.2.3.1, a comprehensive investigation on bird migration in the East Wind-1 subarea was conducted in spring 2016, autumn 2016 and spring 2017. Observations on migrating birds were undertaken at 16 sites, more or less equally distributed over the whole subarea.

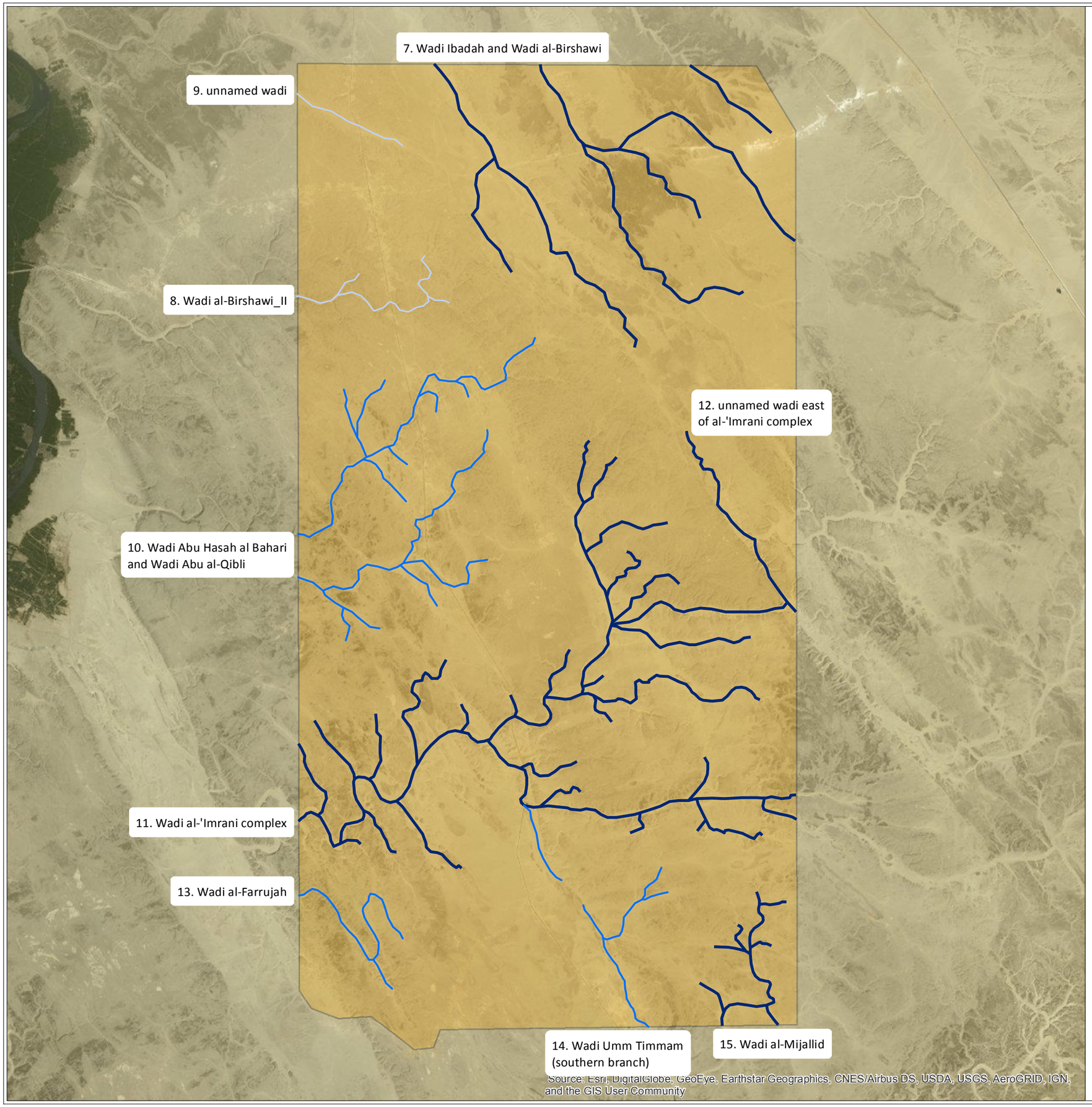
Bird migration of relevant species at the 16 observation sites revealed no remarkable spatial differences between sites. Migratory activity was low at every observation sites (for detailed data see Annex B5). No threatened species was recorded during spring migration (both in 2016 and 2017). In autumn 2016, two species of special interest (according to the IUCN Red List of Threatened Species) occurred in low numbers: the Egyptian Vulture (5 birds), Steppe Eagle (22 birds, both species assessed by IUCN as “threatened”), Pallid Harrier (8 birds) and Sooty Falcon (7 birds, both species assessed as “near-threatened”). All other species which are particularly relevant for study have been classified by IUCN as of “least concern”.

A relevant portion of the eastern flyway population of the Short-toed Snake Eagles crossed the East Wind-1 subarea in autumn. However, one has to acknowledge that the subarea covers a huge part of the Eastern Desert, extending about 20 km from west to east and about 40 km from north to south, and that there is no indication of a concentration of migrating Short-toed Snake Eagles in the subarea. The species can be regarded as a regular migrant, but the subarea is not of particular importance for migration of this species. In addition, the Short-toed Snake Eagle is assessed by IUCN as of “least concern” and is thus not a threatened species.

To summarise, the results clearly reveal that the East Wind-1 subarea is not of particular importance for migrating birds, neither in spring nor in autumn. This is valid for species of special interest and for species of minor relevance that mainly migrated on a broad front.

Local birds

The larger Wadis in the East Wind-1 subarea, in particular, WadiI Badah and Wadi al-Birshawi, the Wadi al-’Imrani complex and the unnamed Wadi east of 'Imrani complex and Wadi al-Mijallid comprise patches of vegetation and 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 East Wind-1 subarea are quite widespread and can be found in several desert habitats in Egypt. According to the IUCN Red List of Threatened Species, none of the species is assessed to be endangered or threatened. Consequently, the East Wind-1 subarea is not an important habitat for local birds.



JV LAHMEYER INTERNATIONAL ecoda

Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)
SESA Wind 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 Wind-1 subarea as a habitat for plants and animals

Bordering of East Wind-1 subarea

East Wind-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

editor: S. Wernitz, August 22nd 2017

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Roosting birds

The larger Wadis in the East Wind-1 subarea, in particular Wadi Ibadah and Wadi al-Birshawi, the Wadi al-'Imrani complex and the unnamed Wadi east of 'Imrani complex and Wadi al-Mijallid, comprise patches of vegetation which form a stopover habitat (mainly for a single day) for passerines during migration. However, according to the low numbers of roosting birds, the East Wind-1 subarea has no significant importance as a roosting habitat.

5.2.2.4.2 Bats

The review of secondary data revealed that desert areas, like the East Wind-1 subarea, are usually not populated by bats (Hoath 2009). Consistently, the activity of bats within the East Wind-1 subarea was found to be very low during the conducted bat monitoring. The subarea apparently does not serve as a significant habitat for bats.

5.2.2.4.3 Other animals

The larger Wadis in the East Wind-1 subarea, in particular Wadi Ibadah and Wadi al-Birshawi, the Wadi al-'Imrani complex and the unnamed Wadi east of 'Imrani complex and Wadi al-Mijallid form suitable habitats for single animals species from different groups (mammals, 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 Wind-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 Wind-1 subarea is not an important habitat for other animals.

5.2.2.5 Zones preclusive or less favourable for wind power development, according to the biological environment

Regarding the biological environment, the East Wind-1 subarea does not appear to be particularly sensitive to the development of wind power projects (a detailed assessment of likely impacts, considering the typical effects of wind 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 parts that differ remarkably from the vast desert habitats dominating the subarea are the larger Wadis, i.e. Wadi Ibadah and Wadi al-Birshawi, the Wadi al-'Imrani complex and the unnamed Wadi east of 'Imrani complex and, finally, Wadi al-Mijallid. Theses Wadis provide appropriate living conditions for single plant and animal species and are thus of general importance. This should be considered accordingly when developing wind power projects in the East Wind-1 subarea (see section 6.2.1.2). To conclude, in the East Wind-1 subarea, no zones preclusive for wind power development with regards to the biological environment were identified.

As already mentioned, caves form particular structures in the desert, offering habitats for animals. These structures can be found in the East Wind-1 subarea, particularly in canyon-like Wadis and on slopes, where elevated areas decline into the Wadi. As these structures are only small, 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, 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 ESIAs.

5.2.3 East Wind-2

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

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

5.2.3.2 Habitats

Due to the extreme aridity of the Eastern Desert, the gravely and pebbly plains and the huge cliff within the East Wind-2 subarea do not serve as a suitable habitat for plants. No larger Wadi in the subarea exists, and thus it is nearly completely free of vegetation. The East Wind-2 subarea has a very low to no importance as a habitat for plants and animals.

Caves likely to be found at the huge scarp (fault line) might form particular structures in the desert, offering habitats for animals. Hence, such caves are important as a habitat for plants and animals.

5.2.3.3 Flora

No larger Wadi exists in the subarea, and thus it is nearly completely free of vegetation. A single specimen of a very small number of plant species (e.g. *Senecio glaucus*; see Figure 5-47) were found on the gravely and pebbly plains. The single species recorded in the East Wind-2 subarea are considered to be of “least concern” in the IUCN Red List of Threatened Species. Hence, the East Wind-2 subarea is not an important habitat for plants.

Figure 5-47: A specimen of *Senecio glaucus* found near site X2 in the East Wind-2 subarea

5.2.3.4 Fauna

5.2.3.4.1 Birds

Migrating birds

As given in section 4.3.2.3.1, a comprehensive investigation on bird migration in the East Wind-2 subarea was conducted in spring 2016, autumn 2016 and spring 2017. Observations on migrating birds were undertaken from two sites.

Bird migration of relevant species revealed no remarkable spatial differences between sites. Migratory activity was low at both observation sites (for detailed data see Annex B5 10.2.5). No threatened species was recorded during spring migration (neither in 2016 nor 2017). In autumn 2016, only one species of special interest (according to the IUCN Red List of Threatened Species) occurred in very low numbers (2 individuals): the Steppe Eagle (assessed by IUCN as "threatened"). All other species which are particularly relevant for study have been classified by IUCN as of "least concern".

A total of 29 Short-toed Snake Eagles were recorded at the observation sites X1 and X2, i.e. 0.3% of the eastern flyway population. This species can be regarded as a regular migrant, but the subarea is not of particular importance for migration of this species. In addition, the Short-toed Snake Eagle is assessed by IUCN as of "least concern" and is thus not a threatened species.

To summarise, the results clearly reveal that the East Wind-2 subarea is not of particular importance for migrating birds – neither in spring nor in autumn. This is valid for species of special interest and for species of minor relevance, which mainly migrated on a broad front.

Local birds

No larger Wadi exists in the subarea, and thus it is nearly completely free of vegetation. Accordingly, the local bird community is very poor in species and bird density is very low. The species (namely the Spotted Sandgrouse, Greater Hoopoe-Lark, Brown-necked Raven) recorded in the East Wind-2 subarea 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 to be endangered or threatened. Consequently, the East Wind-2 subarea is not an important habitat for local birds.

Roosting birds

No larger Wadi exists in the subarea, and thus it is nearly completely free of vegetation. Accordingly, only very few roosting birds (e.g. a single White Wagtail) were recorded in the subarea. Most roosting birds (especially most passerines) need at least small patches of vegetation, which form a stopover habitat (mainly for a single day) during migration. Due to the lack of vegetation, the East Wind-2 subarea has no importance as a roosting habitat.

5.2.3.4.2 Bats

The review of secondary data revealed that desert areas, like the East Wind-2 subarea, are usually not populated by bats (Hoath 2009). It is reasonable to assume that the activity of bats in the subarea is very low, as verified for the East Wind-1 subarea during a bat monitoring study in spring and autumn 2016. The subarea apparently does not serve as a significant habitat for bats.

5.2.3.4.3 Other animals

No larger Wadi exists in the East Wind-2 subarea, and thus it is nearly completely free of vegetation. Accordingly, the local fauna was found to be very poor in species and density was very low too. Single recordings refer to Desert Pebble Mantis and Camel Spiders (local animals) as well as migrating dragonflies (*Sympetrum fonscolombii*), butterflies (*Vanessa cardui*) and grasshoppers (Migratory Locust). None of the recorded species is known to be endangered or threatened. Consequently, the East Wind-2 subarea is not an important habitat for other animals.

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

Regarding the biological environment, the East Wind-2 subarea does not appear to be particularly sensitive to the development of wind power projects (a detailed assessment of likely impacts considering the typical effects of wind power projects can be found in section 6.2). The subarea has no significant importance with regards to the biological environment. No Wadis or other particular features exist that differ remarkably from the vast desert habitats dominating the subarea. Hence, in the East Wind-2 subarea, no zones preclusive for wind power development with regards to the biological environment were identified.

As already mentioned, caves form particular structures in the desert, offering habitats for animals. These structures can be found in the East Wind-2 subarea near the huge cliff (fault line). As these structures are only small, they cannot be considered by 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 ESIAs.

5.3 Social and economic environment

5.3.1 Project Area

5.3.1.1 General and administrative consideration

The two East-Wind subareas are located to the east of the Nile Valley in a desert area adjacent to three Governorates of Beni Suef, El Minya and Assiut.

The larger subarea (East-Wind-1) is located closer to El Minya and Assiut Governorates, while the smaller subarea (East Wind-2) is located closer to the El Minya and Beni Suef Governorates, 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 the Giza Governorate in the north, the Cairo Governorate and Red Sea Governorate in the east, the El Minya Governorate in the south, and the Fayoum Governorate in the west. 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^2 and the populated area is about 1,369.41 Km^2, according to CAPMAS 2017[5].

<u>Population</u>

The Beni Suef Governorate population reached 2,953,149 inhabitants who reside in 544,271 households, according to the Beni Suef electronic gate[6]. The natural growth rate in the 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 the Beni Suef description of information in 2010. The following table illustrates the population distribution according to sex and rural and urban areas within the Governorate, according to the Beni Suef electronic gate.

Table 5-15: 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)

[5] http://www.capmas.gov.eg/
[6] http://www.benisuef.gov.eg/Default.aspx

Education

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

Table 5-16: Population distribution by education status at Beni Suef Governorate

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

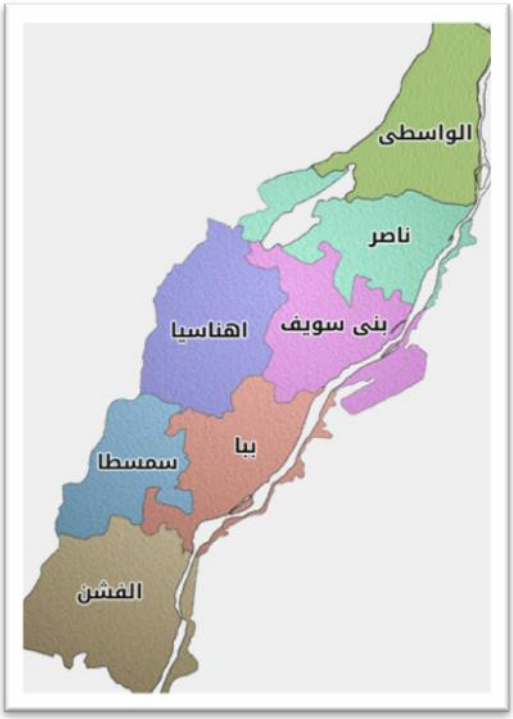


Figure 5-48: Administrative Division of Beni Suef Governorate

Socio-economic activities

I. Agriculture

According to the Beni Suef description of information in 2010, Beni Suef is an agricultural Governorate, and the total area of cultivated land is about 289,900 feddans. The total cropped area is 569,410 feddans. The most important crops produced in the Governorate include wheat, cotton and 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 1160 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
- Industrial zone 1/31
- Industrial zone 2/31
- Industrial zone 3/31
- 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 vegetable-processing and medical and aromatic plant-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 the two sides of the River Nile. It borders Beni Suef to the north, Assiut in the south, the Red Sea in the east, and the Western Desert Governorate in the west.

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

The total area of El Minya is about 32,279.00 km², while the populated area is about 2,411.65 km², 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 El 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 the El Minya description of information in 2010, developed by the Information and Decision Support Centre.

Table 5-17: Population distribution in 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 the El Minya population (10 years and over) by educational status, according to the 2016 statistical yearbook (CAPMAS):

Table 5-18: Population distribution by education status at El Minya Governorate

Illiteracy rate	Reading & writing 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 and Mattay), nine cities, 61 rural local units, 299 affiliated villages and 1741 hamlets, according to the El Minya description of information in 2010.

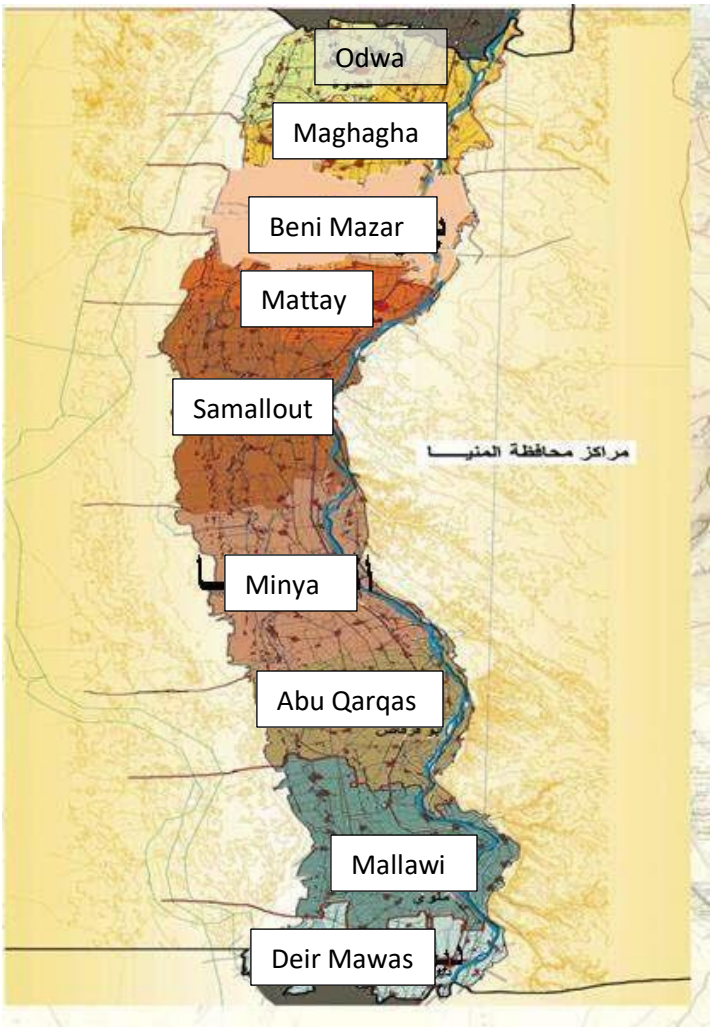


Figure 5-49: Administrative Division of El Minya Governorate

Socio-economic activities

I. Agriculture

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

The Governorate produces more than half a million tonnes of wheat, 1.7 million tonnes of sugar cane that is used for producing sugar and molasses and about 154,000 tonnes of sugar beet that is used in producing sugar. The Governorate also produces large amounts of fruit and vegetables for exporting. The Governorate produces 27.1% of the total medical and aromatic plants in the country.

The area of land applicable for reclamation reached about 200,000 feddans. The area is supposed to be reclaimed until 2022, according to the strategy of horizontal expansion (18,000 feddans west of Beni Mazar, 6,000 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 70,000 feddans (3,300 in addition to those excluded). Accordingly, these are a problem in terms of encroachment upon the water share in the region.

II. Industrial activities

El Minya Governorate has many industrial activities such as food industries, wood and furniture, textiles and ready-made garments, printing and publishing papers, medical products, engineering industries, building materials, refractories and metal and chemical and leather industries. In addition, El Minya has sub-centres for small-scale industries and service centres where the number of existing establishments registered by the Industrial Development Authority reached 348, with estimated investment costs of LE1463 million, employing about 8,984 workers distributed to 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 the 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 1,516 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 land-use. 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 independent. In addition, there is a central services centre and a compound for small industries on an area of 43 feddans, which contains about 390 units. The area of each unit is 190 m^3 (142 m^2 of which is covered and 48 m^2 is opened). The cells were also divided into pieces suitable for the type of industry and the expected size of demand, provided that the region can take on 600 projects with 55 thousand 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 subareas of the industrial zone:

- Food industry
- Furniture industry
- Textile and readymade garments industry
- Paper and printing industry
- Medical products industry

- Engineering industry
- Construction materials industry
- Metal industry

5.3.1.4 Assiut Governorate

Assiut Governorate lies at the two sides of the River Nile, bordered in the north by El Minya Governorate, in the east by the Red Sea Governorate, in the south by the Government of Sauhadsch and in the west by the New Valley Governorate. The capital Assiut is situated about 315 km from Cairo, 530 km from Aswan, 100 km from Suhag and 220 km from the New Valley Governorate. The total area of Assiut is about 25,926.00 km^2, while the populated area is about 1,574.00 km^2, which represent 6.1 % of the Governorate total area, according to CAPMAS 2017.

Population

The Assiut Governorate population reached 4,482,464 inhabitants who reside in 814,777 households. The following table shows the population distribution of the Assiut Governorate including both rural and urban areas, according to CAPMAS 2017.

Table 5-19: Population distribution at Assiut Governorate

Male	Female	Urban	Rural	Total
2,285,619	2,196,845	1,205,172	3,277,292	4,482,464

Education

The following table shows the distribution of the Assiut population (10 years and over), by educational status, according to final results of the 2006 Census, SYB (CAPMAS) 2016.

Table 5-20: Population distribution by education status at Assiut Governorate

Illiteracy rate	Reading & writing rate	Illiteracy Erasure rate	Below Intermediate	Intermediate rate	Above Intermediate	University	Post graduate degree
39.1 %	12.7 %	0.9 %	18.3 %	21.7 %	1.8 %	5.4 %	0.2 %

Administrative Division

The Assiut Governorate is composed of eleven Markazes – (Abnub, Abu tig, Assiut, Dairut, El Badari, El Ghanayem, Manfalout, El Qusiya, Sahel Selim, Sodfa and El Fath), eleven cities, two districts, 55 rural local units, 235 affiliated villages and 980 hamlets according to the Assiut electronic gate.

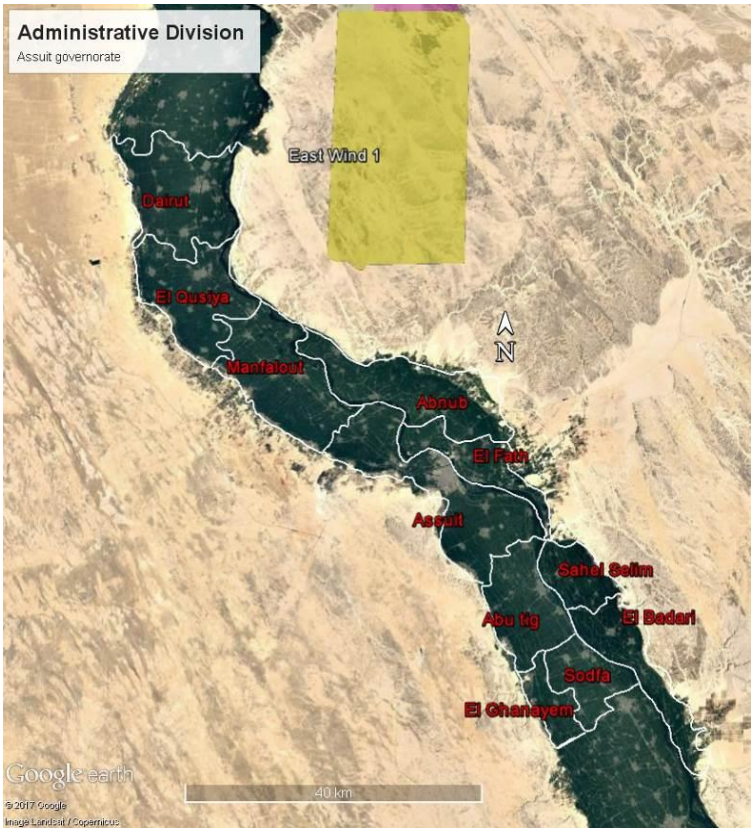


Figure 5-50: Administrative Division of the Assiut Governorate

Socio-economic activities

I. Agriculture

The Assiut Governorate goes to great efforts to promote investment in the Agricultural field, whether by reclaiming and cultivating lands or allocating land for the sector, investors and graduates, as well as plans to gain the maximum production of the agricultural and food products and achieve food security for the Governorate.

According to the Assiut description of information in 2010, the total area of cultivated land is 342,030 feddans and the total area for crops is 649,390 thousand feddans.

II. Industrial activities

According to the industrial development authority, the Assiut Governorate adds to the industrial activities by hosting big industries such as: fertilisers, pharmaceuticals, cement and petrol, as well as small industries such as kleem, carpets and wood embellished with shells and ivory products. Furthermore, seven industrial zones in the Governorate's markaz were also established.

There are six industrial zones in Assiut:

- Al Awamer Abnoub industrial zone
- Al Zarabi industrial zone in Abu Tig
- Al Safa industrial zone (Beni Ghaleb)
- Sahel Selim industrial zone
- Dashlout industrial zone in Dairout
- Badari industrial zone

First: Al Awamer Abnoub industrial zone

It is located on the Eastern Cairo-Assiut desert road. The nearest ports are Suez Port (550 km) and Safaga Port (460 km). The nearest airports are Assiut Airport (40 km) and Cairo International Airport (350 km). The nearest railway station is Assiut Railway Station (16 km) and 12 km from the Nile. The total area of Al Awamer Abnoub industrial zone is 614 feddans (2,578,800 m^2).

Second: Al Zarabi industrial zone in Abu Tig

Al Zarabi village is located on the Assiut-Al Ghanayem Road. The nearest ports are Suez Port (495 km) and Safaga Port (400 km). The nearest airports are Assiut Airport (45km) and Cairo International Airport (390 km). The nearest railway station is Al Zarabi Railway Station in Abu Tig (10 km) and 8 km from the Nile. The total area of Al Zarabi industrial zone is 35 feddans (147,000 m^2).

Third: Al Safa industrial zone (Beni Ghaleb)

It is located 12 km from the Assiut-The New Valley Road. The nearest ports are Suez Port (520 km) and Safaga Port (480 km). The nearest airport is Assiut Airport (15 km). The nearest railway station is Assiut Railway Station (15 km). The total area of Al Safa industrial zone is 424 feddans (1,780,800 m^2).

Forth: Sahel Selim industrial zone

It has been planned, divided and carried out as small-scale industrial complex on an area of 55 feddans that is capable of containing 498 industrial units.

Fifth: Dashlout industrial zone in Dairout

It is located near to Dashlout in Dairout. The nearest ports are Suez Port (650 km) and Safaga Port (550 km). The nearest airports are Assiut Airport (60 km) and Cairo International Airport (260 km). The nearest railway station is Dairout Railway Station (35 km) and 30 km from the Nile. The total area of Dashlout industrial zone is 108 feddans (457,380 m^2).

There are many small-scale proposed projects that are based on the economic resources, such as manufacturing handicrafts of natural and artificial marble, manufacturing alabaster and on-

ion dehydration in addition to dried fruit packaging. Moreover, there are many proposed industries that are based on industrial waste such as the feeding industry, plastic containers for chemical industries, in addition to producing plastic feeding bags. Accordingly, this study will cover in detail the industry in Assiut Governorate, followed by an overview about the Governorate, besides the available resources.

5.3.1.5 Land-use

5.3.1.5.1 Mining

The region also consists of a vibrant mining industry. Many mines exist at desert areas to the west of El Minya. 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 is less likely that there will be an impact on mining activities, since most mines are not permanent and no brick mines are located inside the East-Wind-1 and East Wind-2 subareas. 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 Cairo-Aswan Highway. He mentioned that there is a total number of 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 5-51: White bricks used for construction

Figure 5-52: Mining areas

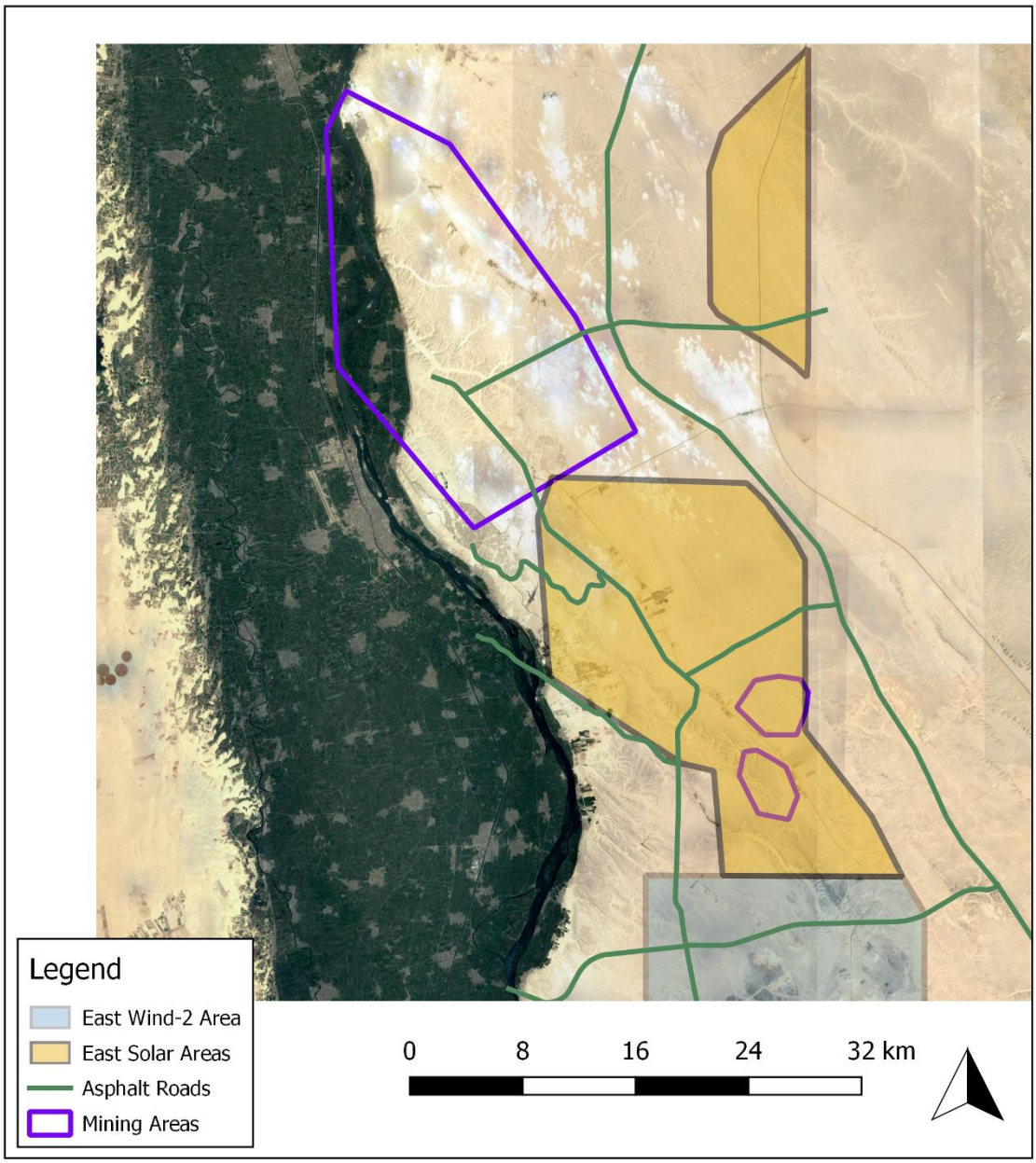


Figure 5-53: Extension of Mining Areas (violet lines) - Google Maps

5.3.1.5.2 Cultural heritage and antiquities

Many archaeological sites are present on the banks of the River Nile, mainly on the east bank (see Figure 5-54). The most famous sites in the region are in the Beni Hassan and Tal El Amarna areas.

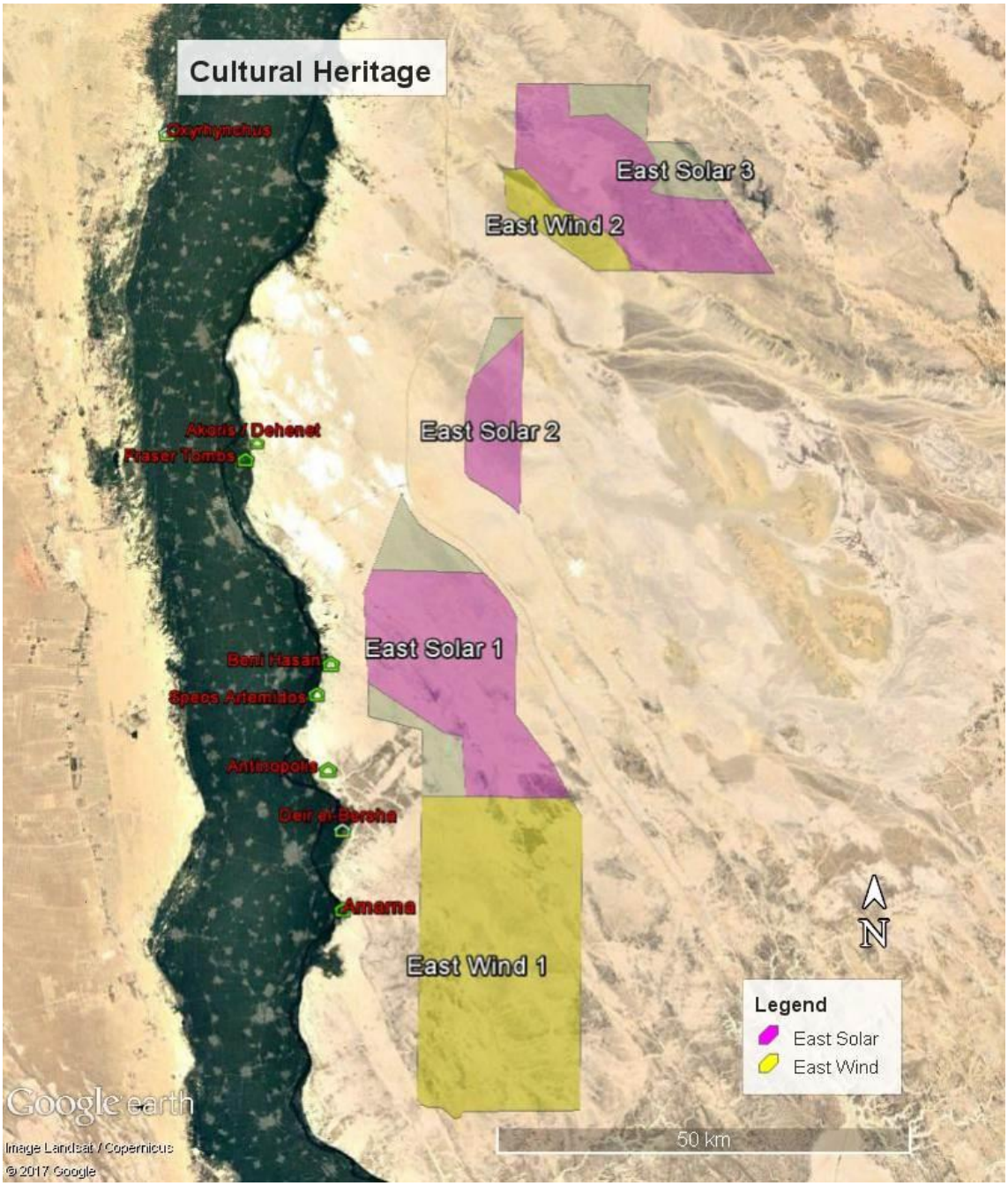


Figure 5-54: Archeological sites

Beni Hasan is a small village, south of El Minya, where an important group of rock-cut tombs date mostly to Dynasties XI and XII, and are carved into the high limestone cliffs on the east bank of the Nile. The site can be 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 of 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 King Akhenaten to become his new capital. This old city on the east bank of the Nile once had a surface area of 15 square kilometres and has many temples, palaces, and fortified walls. Today, few structures remain and only few items can be seen. Tal El Amarna also includes two groups of cliff tombs located at the entrance to its southern and northern parts.

All these cultural heritages are well away from the Project Area except the Akhenaten tomb, which is one of the Tal El Amarna graves (see also section 6.1.8). This tomb is located in the Darb al-Malikin, the so-called “Kings Wadi, at a distance of 1.5 km from the western border of the East Wind-1 area. To protect such an historical and tourist-attracting place from landscape pollution or any other nuisance, by law, a 3 km buffer zone needs to kept free from wind power installations.

Figure 5-55: The Beni Hassan Tombs in the Nile Valley

Figure 5-56: Access to the Beni Hassan tombs

Figure 5-57: Access to the Akhenaten tomb located in the Kings Valley

Opposite Mallawi on the east bank of the Nile (8 km from East Wind-1 subarea) lies the Coptic village of Deir El-Bersha with an old church. To the East of the village, at a copic cemetery, is the mouth of a ravine running from north-west to south-east, the Nakhla or Deir El Bersha Wadi. In this Wadi, there are many quarries and ancient tombs. This valley is known for the tombs of the Middle Kingdom belonging to monarchs of the 15th Nome of Upper Egypt, the Hare Nome.

5.3.1.6 Roads and Traffic

The East Wind-1 area is crossed by the El Minya –Assiut National Road. Moreover, the Cairo–Aswan and El Minya–Ras Ghareb–Safaga Highways pass near to the Project Area, facilitating the transportation of equipment from Alexandria or the Red Sea Ports.

Figure 5-58: El Minya–Assiut National Road at the end of the East Wind-1 subarea

All the roads are in good condition and the traffic does not seem heavy on the main roads.

5.3.1.7 Bedouin community near the Project Area

Although no Bedouin camp was identified during the site reconnaissance in the Project Area, the Consultant learnt from discussions with the authorities and local Bedouins that many Bedouins 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.

5.3.1.8 Results of Stakeholder Interviews

In order to learn about general views and attitudes of the local authorities and population towards the proposed project, meetings and discussions were conducted with the regional Governorates as already described under section 4, and interviews were held with people encountered near the Project Area. The overall knowledge about the project and its impacts was generally very limited.

The following benefits of the proposed wind farm project were mentioned by the local authorities / population:

Job opportunities for local people
One of the advantages of big projects like the proposed East Wind subareas is the for potential job opportunities for semi-skilled and unskilled workers. The proposed project will open up 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
Planning shall not interfere with any cultural heritages and shall also take into consideration illegally-claimed houses. Regarding mining activities, many statements obtained from the interviewed people concluded that there is no reservation as the mining areas would move to other sites in the case that wind power was installed on "their land". Many mining areas were deemed to be illegal, as the mine owners prefer not to apply for a formal permit, since they would have to pay very high fees to the government.

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

5.3.2 East-Wind 1

5.3.2.1 Land-use in the East Wind-1 subarea

In addition to the land-use aspects already discussed under section 5.1.1, it was noted during the site reconnaissance in October 2016 that farmland development to the south-west of the East-Wind 1 subarea are ongoing.

The social experts discussed those activities with farmers. It was indicated that deep groundwater is available and it is possible to drill a deep well to extract water of good quality. Then they start planting the plot by irrigation.

On each farm, four or five workers are employed. Only men arrive first for working on the farms without their families, since it is still labour intensive to farm and not possible to host families. One farm is already interconnected to the 10 kV line for the street lighting along the El Minya–Assiut National Road.

Figure 5-59 shows existing farms in the south part of the East Wind-1 area, which were visited by the social experts.

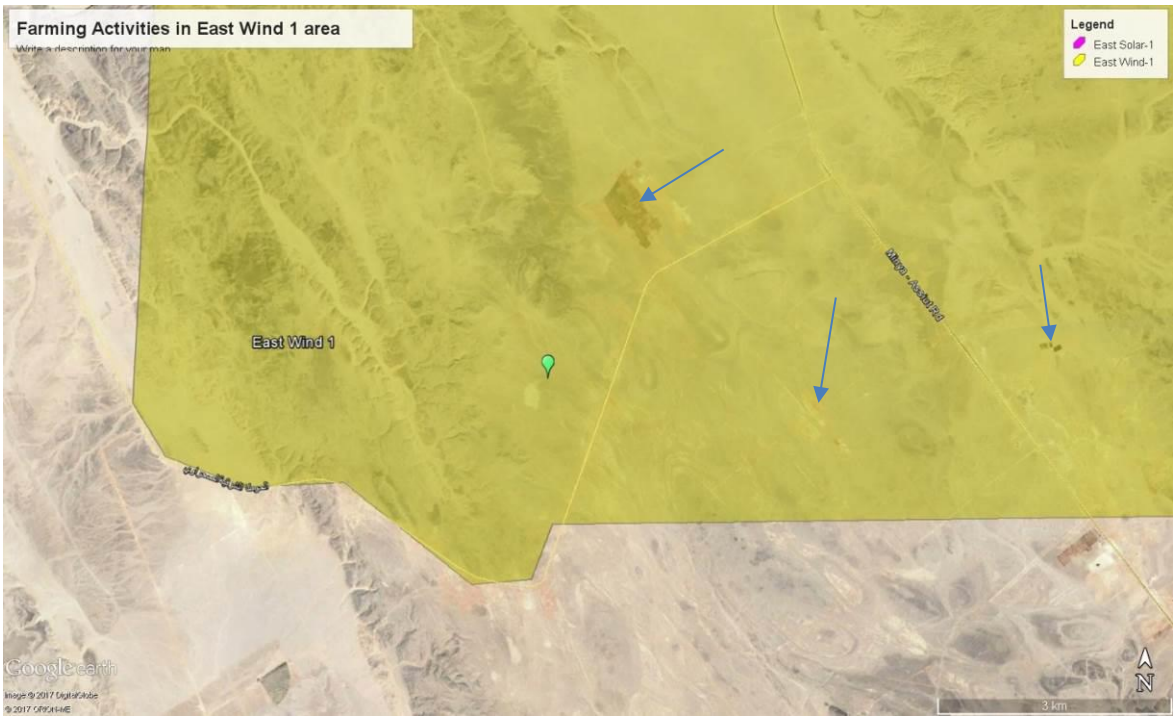


Figure 5-59: Google Maps showing the farming activities in East Wind-1 subarea

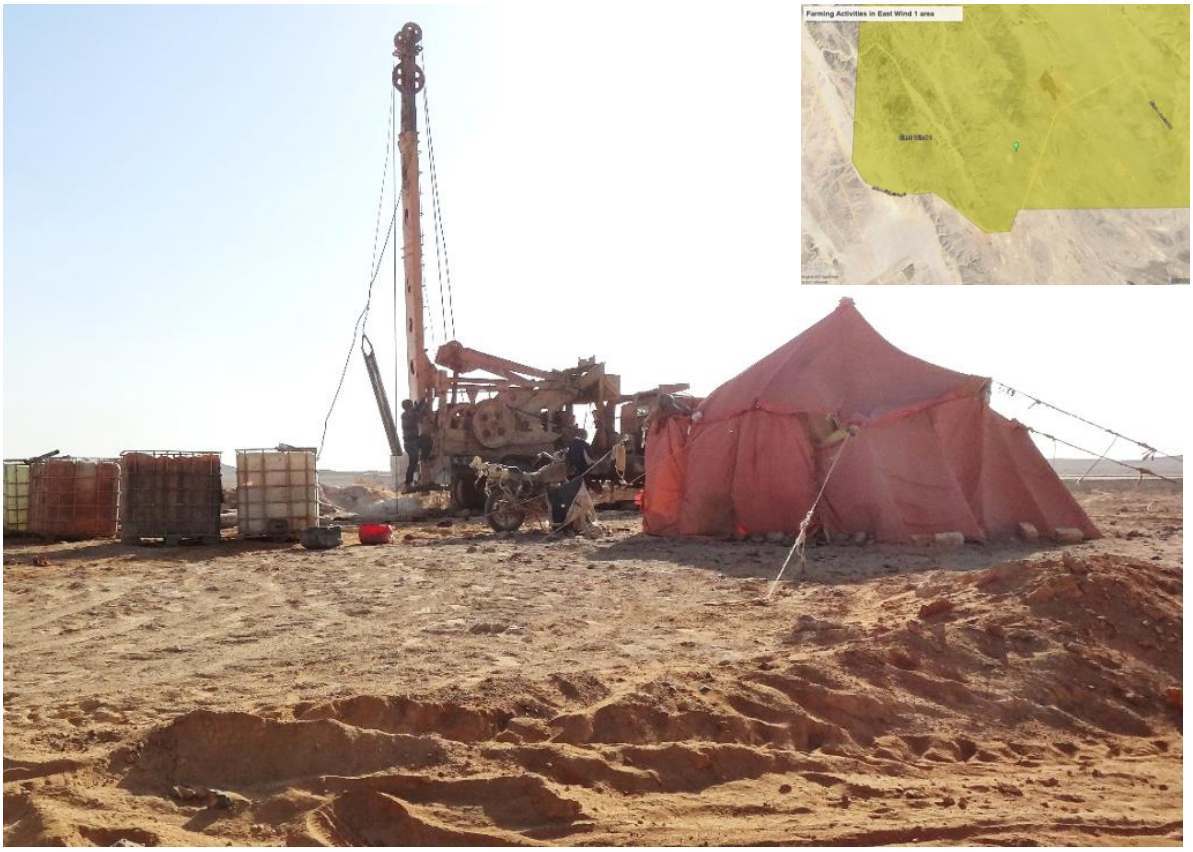


Figure 5-60: Water drilling to the South-west of East Wind-1 (farm under development)

Figure 5-61: Farming activities in the East Wind-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 landowner.

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

Figure 5-62: Farm sign "Ba'gar family"

Figure 5-63: 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 area) are already planned to be used for farming by many people. He mentioned that there are even some projects that are planned to take place in the area, including an electricity project and other farming investments.

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

He suggested that as 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 at the area in addition to any job opportunities for unskilled labour. Usually such arrangements are agreed upon with the local community before the start of any developmental projects.

Besides some farming, the East Wind-1 area accommodates an asphalt plant in the south and a service station with a roadhouse on the El Minya-Assiut National Road.

5.3.2.2 Roads and Traffic

The area is located more than 7 km away from the settlements at the Nile Valley, but has good accessibility via well-dimensioned asphalt roads next or even crossing the area from El Minya (north), the Nile Valley (west) and Assiut (south).

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

An evaluation of the socio-economic environment identified areas of competing land-use such as farm areas, an asphalt plant and a roadhouse area, which are declared to be preclusive for wind power development. For details, see section 0 and Figure 5-5.

5.3.3 East-Wind 2

5.3.3.1 Land-use in the East Wind-2 subarea

In the East-Wind 2 subarea, only one farm was observed as indicated in the following figure. However, all along the old Ras Ghareb–El Sheik Fadl Road, land development was ongoing. No other economic activities were identified in this area.

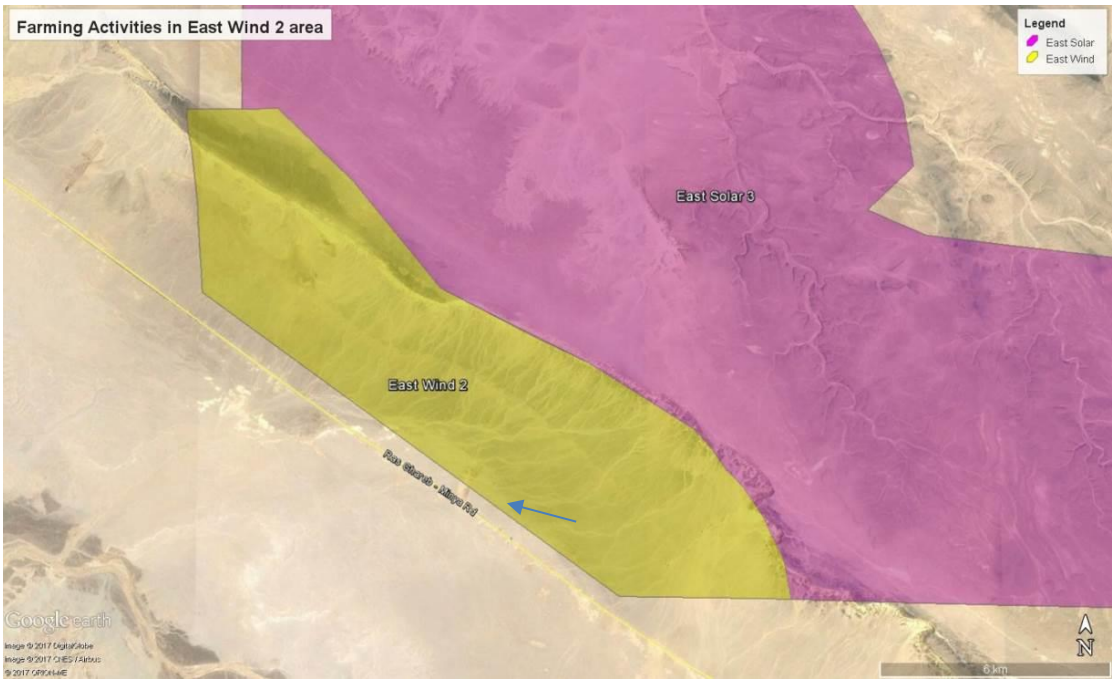


Figure 5-64: Google Maps showing one existing farm in the East Wind-2 subarea

5.3.3.2 Roads and Traffic

The southern portion of the East Wind-2 subarea, which is separate from the smaller northern portion of the area on top of the cliff of about 100 m in height can be reached via the Cairo-Aswan Highway (toll road) and the old Ras Ghareb–El Sheik Fadl Road. The smaller northern part of the East Wind-2 subarea on top of the cliff is very difficult to access. A complete new long access road would have to be built up to the highway over external land.

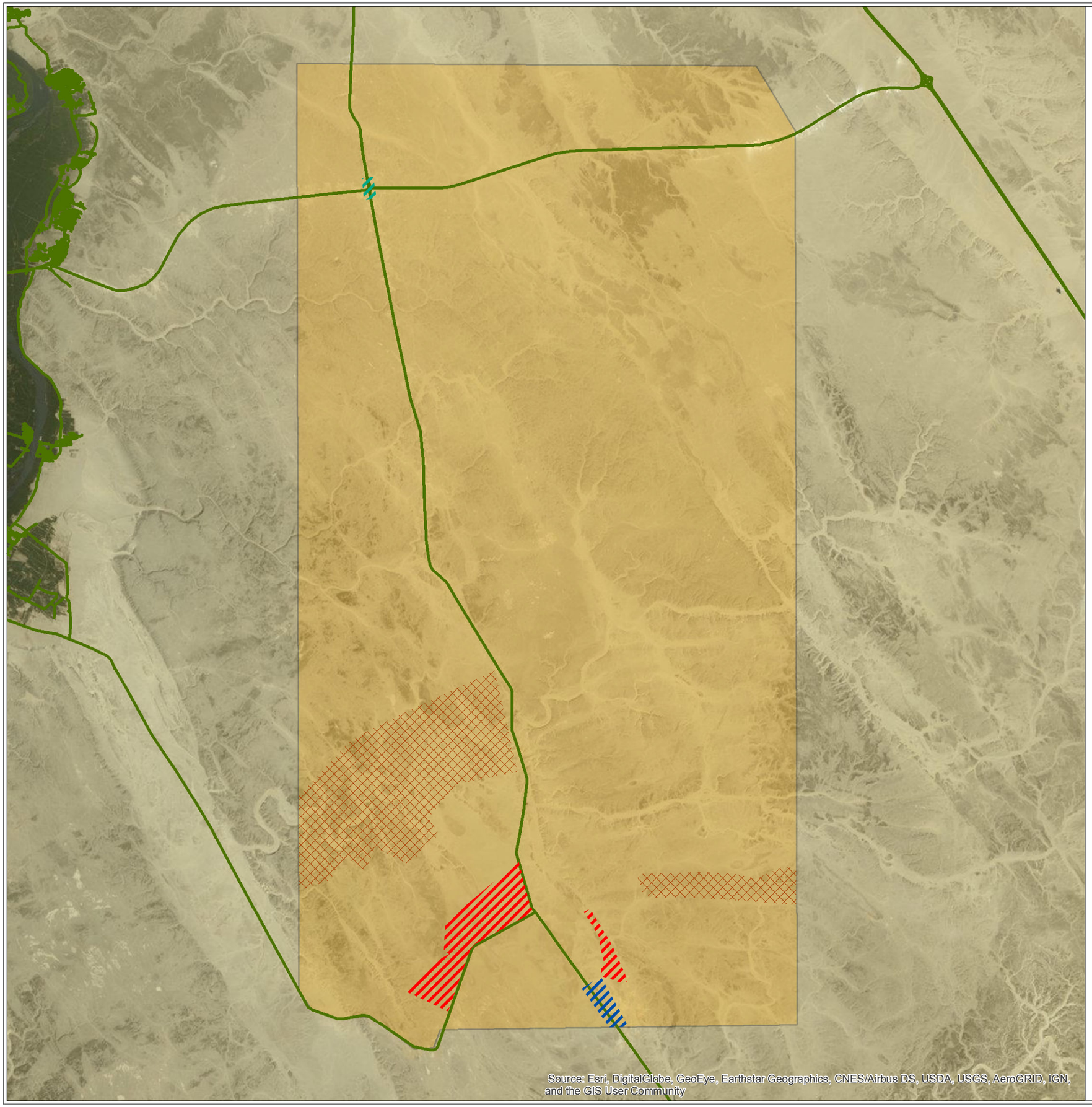
5.3.3.3 Zones preclusive or less favourable for wind power development according to socio-economic criteria

An evaluation of the socio-economic environment identified areas of competing use that have to be precluded from wind power development. This is a zone parallel to the old Ras Ghareb–El Sheik Fadl Road, where farmland is already existing or under development. For details, see section 5.1.3.2 and

Figure **5-18**.

5.4 Conclusion

The following Map 5-3 and Map 5-4 indicate the preclusive and less favourable areas identified in the previous sections.



JV LAHMEYER INTERNATIONAL ecoda

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

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

Map 5.3:
Zones preclusive or less favourable
for wind power development in the East Wind-1 subarea

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road

main road

Zones preclusive for wind power development

due to farming area

due to industrial area

due to service buildings

Zones unfavourable for wind power development

due to geomorphology

editor: S. Wernitz, August 22nd 2017

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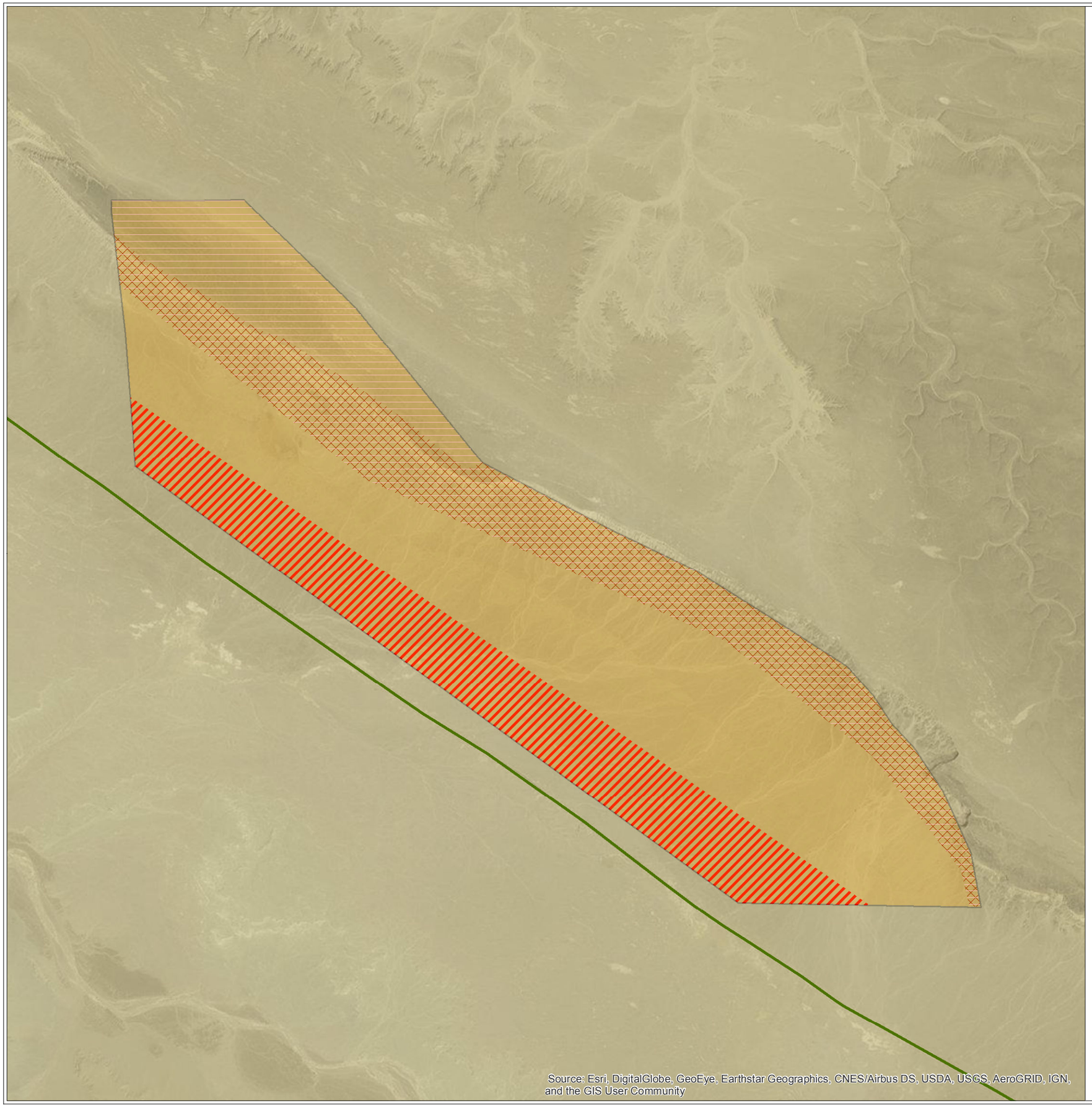

JV LAHMEYER INTERNATIONAL ecoda

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

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

Map 5.4:
Zones preclusive or less favourable
for wind power development in the East Wind-2 subarea

Bordering of East Wind-2 subarea

East Wind-2 subarea

Main road

main road (Ras Ghareb-El Sheik Fadl road)

Zones preclusive for wind power development

due to farming area

due to geomorphology

Zones unfavourable for wind power development

due to acess accessibility

editor: S. Wernitz, August 22nd 2017

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6 Prediction and Evaluation of Impacts on the Physical, Biological and Socio-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 wind 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 wind farms will be constructed in parallel in each of the East Wind subareas, and

- The construction period for an individual 50 MW wind farm is 5 to 6 months.

Operation Phase:

- As a safe scenario, it is supposed that the East Wind subareas, except areas that are defined to be preclusive, will be used by wind farms, installed according to rules of thumb, keeping sufficient distances for avoidance of energy losses due to shading and avoiding Wadis or other difficult areas. It is estimated that up to 40 wind farms with a total installed capacity of 2.0 GW will be operated in parallel in the East Wind-1 subarea. For the East Wind-2 subarea, two wind farms will be considered feasible.

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

Typical potential impacts on the physical environment resulting from wind power development in the East Wind-1 and East Wind-2 subareas were identified during 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, through field investigations in particular, the earlier identified potential impacts are subsequently predicted and evaluated, always bearing in mind that subareas identified to be preclusive (see sections 5.1.3 and 5.1.5) for wind power develop-

ment are excluded. Impact significance is carried out for both the construction phase and the operation phase. For decommissioning, essentially the same impact significance applies as for the construction phase.

6.1.2 Land-use/Land-take

Wind power development shall take place in areas only that are free of any existing land-use. Accordingly, the impacts of planned wind power development represent the total impact. The net area coverage rate of land-use/land-take for wind power development (roads, platforms, foundations, auxiliary installations) is about 6 to 8% during the construction phase and 5% during the operation phase. These percentages will be even lower in subareas containing Wadis, considering that wind power development will not extend into Wadis (because of lower wind energy resources) 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	Low	Area coverage rate 6 to 8% only	Low	Area coverage rate about 5% only
Frequency	Low	Once	Low	Almost no effects on soils
Duration	Medium	Construction period 6 to 9 months for a plot	High	Permanent
Intensity	Low	Moving individual construction places spread over the wind farm plots	Low	Almost no effects on soils

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 high resilience (only a little affected by construction measures), 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

Wind power development is the only planned measure for the East Wind subareas. Impacts on the landscape discussed hereafter are cumulative impacts. A potential deterioration of landscape due to the wind power installations (especially the wind turbines with up to 150 m tip height) has

an impact of about 10 km in case of an unhindered view. The visual impact is evaluated against the view towards the undisturbed desert.

Table 6-2: Event magnitude of visual impact

Attribute	Value (construction period)	Remark (Construction Period)	Value (operation period)	Remark (Operation Period)
Extent	Low	Individual WTGs at distances of about 400 m to 800 m to each other	Low	Individual WTGs at distances of about 400 m to 800 m to each other
Frequency	High	Continuously	High	Continuously
Duration	High	Permanent	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 low number of people working at gravel plants or farms). Considering that places of current human activities as well as a zone around national heritage sites are already excluded from potential wind 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 on the landscape is assessed to be minor during all phases.

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^3/s (averaged between Aswan and Cairo gauge). Water supply will mainly be required for the construction phase, i.e. for concrete making, for anti-dust spraying and for sanitary purposes. Considering a typical WTG of 3 MW with a foundation volume of 400 m^3 and the specific water requirement of 0.15 m^3 per m^3 of concrete, the overall consumption for each foundation will be 60 m^3 + 10% surplus water for losses and cleaning. Further safe assumptions are that no more than two foundations per week can realistically be constructed on a 50 MW Plot and no more than three 50 MW plots will carry out foundation construction in parallel. In addition, sanitary water consumption of 10 litres/day per worker for up to 150 workers per 50 MW plot and water spraying for dust pro-

tection of 10 m³ per day are considered. Accordingly, the cumulative average total daily water consumption during peak construction periods in the wind power development areas East Wind-1 is about 110 m³/working day, equivalent to about 1 litre/second. During operation, no measurable amount of water will be required.

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	Non-measurable extra water consumption or wastewater
Frequency	Low	Temporary	Low	n/a
Duration	Low	During construction phase only	Low	n/a
Intensity	Low	1 litre/second water total consumption compared to 2,000,000 litre/second resources Estimated total of 4,5 m³/day of well biodegradable domestic wastewater in the overall wind power development area	Low	Non-measurable extra water consumption

If water is withdrawn from existing groundwater wells, there is the risk that wells might be destroyed by over pumping beyond the design yield of such a well.

Water Consumption: Considering the large water resources in the Nile Valley, the abstraction of water during the construction phase in the East Wind areas is marginal (0.0001% of resources). 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 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 total amount of 4.5 m³/day of biodegradable wastewater at the construction sites of three 50 MW wind farm plots in parallel requires treatment for hygiene reasons. 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 non-hazardous waste will be generated by wind power construction projects, which is the only source of waste generation within the Project Area. The waste essentially consists of packing material (paper, wood, plastics), for transport of the turbine, and of auxiliary equipment components. The waste will occur mostly at the individual turbine erection sites and in the construction yard. Most of this waste has a value. Under good wind conditions, the lightweight fraction of the waste can easily be spread over the desert and transported over large distances. Most of this packing material is considered to be still valuable for energetic use, recycling, or to be used for other purposes. A quantification or estimate of the amount of waste originating from the construction works of three 50 MW plots in parallel is not reasonably possible at this stage of the projects. Accordingly, the assessment is semi-quantitative.

Little domestic waste will be generated by personnel during construction. Experiences with the Zafarana project show that such domestic waste is small in quantity and mainly composed of biodegradable or burnable waste. The estimated volume originating from site personnel working at three 50 MW projects in parallel is in the order of 600 x 1 to 2 litres/day. I.e. domestic waste of an order of only 1 m³ per working day is generated in total at the sites.

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

Operating phase

Waste generation is limited to the used consumables, when servicing the machines, and smaller defective parts. These are non-hazardous materials, most of them valuables and fit for recycling. Larger defective parts such as a gearbox or generator would anyhow be returned to the factory for repair or reuse of materials.

In case of non-gearless wind turbines, hazardous used oil will be collected once per year or once every two years and sent for recycling. The practice in other Egyptian wind farms shows that this

works without any problems. The volume of used oils will depend on the type of wind turbine selected and on the service intervals requested by the selected contractor.

Very minor domestic waste will be generated by personnel when servicing the wind farm facilities and at the power substations. The Zafarana experience shows that such domestic waste is small in quantity and mainly composed of biodegradable or burnable waste. The estimated volume originating from such activities in the overall area during operation of the wind farms is marginally small, but still subject to proper treatment.

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

Attribute	Value (construction period)	Remark (Construction Period)	Value (operation period)	Remark (Operation Period)
Extent	Medium	Waste generation at individual WTG construction site and construction yard only.	Low	Marginally small
Frequency	Low	Temporary	Low	Occasionally, only during service activities
Duration	Low	Coherent periods of estimated about 6 months	Low	n/a
Intensity	Medium	On average, over the ongoing construction areas, still small	Low	Very small amounts that are not recycled

Accordingly, the event magnitude is evaluated to be 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. Thus, 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 working places (road construction and foundation excavation sites) may occur. During the operation phase, only occasional service visits will take place.

Accordingly, the event magnitude is evaluated to be low to medium during the construction phase and low during the operation phase (see Table 6–5).

Depending on the locations, receptors (external people) are either not present or very seldom present at or near the site (e.g. passing on roads or a very small number of people working at

gravel plants or farms). Considering that places of current human activities are already excluded from potential wind power development (preclusive areas), for the remaining subareas, human receptors are affected marginally only well below standards during all phases. Therefore, receptor sensitivity is assessed to be low for all phases.

The event magnitude of emissions is evaluated as follows:

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

Attribute	Value (construction period)	Remark (Construction Period)	Value (operation period)	Remark (Operation Period)
Extent	Low	At working sites and along gravel roads only	Low	Marginally small
Frequency	Low	Temporary	Low	Occasionally, during service visits only
Duration	Low	During working hours of machinery and transportation only	Low	Very short
Intensity	Low to medium	Dust generation mainly depending on wind speeds	Low	Very small emissions

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 cumulative impact significance on air pollution is negligible.

6.1.7 Noise, shadowing, vibrations and electromagnetic interferences

Noise emissions from sporadic economic activities (farming, gravel screening, asphalt plant, roadhouses) in the Project Area are low or even zero. As such, areas are precluded from wind power development and are distant from wind power development. Noise emissions from wind power development will only marginally add to the noise level at such places of economic activities. Accordingly, cumulative effects of different sources of noise (wind power development and economic activities) are negligible.

The event magnitude of noise is classified as per Table 6-6.

For the portions of land with economic activities near to the wind power development areas, 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.

Table 6-6: Event magnitude for noise, shadowing, vibrations and electromagnetic interferences

Attribute	Value (construction period)	Remark (Construction Period)	Value (operation period)	Remark (Operation Period)
Extent	Low	Noise from working sites only,	Low	50 dB only next to wind turbine, shadowing
Frequency	Low	Occasional noise emissions from construction works during the daytime	Medium	WTG operation (noise emissions) during medium to high wind speeds
Duration	Low	Noise emissions during working times of machinery and quite limited amount of transportation only, not during the night-time	Medium	WTG operation (noise emissions) during medium to high wind speeds
Intensity	Medium	Noise emissions by jack hammering in the case of excavating foundation pits in rocky underground areas	Low	50 db in the immediate vicinity of operating wind turbines only, within safety distance.

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

Human receptors in the neighbourhood of some wind power development plots such as workers, farmers or service personnel at roadhouses, i.e. personnel in a few dispersed commercial or industrial properties, are not living permanently at the place of work. Moreover, the places of work are distant from the wind farm plots (in addition to border safety, distances of individual wind turbines added up to a minimum total distance to a WTG of 500 m) and noise levels at receptor places will be well below the ambient noise level limit of 65 dB (construction works during the daytime only) and 55 dB (during the night-time, operation phase). Accordingly, also the receptor sensitivity is evaluated to be low for the construction phase and the operation phase. Medium event magnitude and low receptor sensitivity signify a minor noise cumulative impact significance during all phases.

For the workers employed to do noise-intensive work at the construction sites, it is assumed that generally accepted occupational H&S standards will apply.

Regarding **shadowing**, accepted standards of 30 hours per year and 30 minutes per day for residential areas during the operation phase of a wind farm apply. This can be achieved at places near to wind turbines only, where the observed transition time of the sun through the rotor area can achieve such durations. At 28° N latitude, sun movement during morning or evening hours is fast. Moreover, as there are only commercial and industrial activities at large distances outside the wind farm areas, it is obvious that there is no impact from flickering beyond an acceptable level.

Vibrations result from wind turbine operation. However, wind turbines working under regular conditions with the blades correctly balanced and the main shaft correctly adjusted show very little vibration. The propagation of the vibration is dampened by the foundation body and there is very little transmission into the underground, especially in the case of soft rocks (like limestone in most of the area). Thus, vibration effects will not be measurable in the underground near the wind turbines. Moreover, vibrations or very low-frequency "infrasound" produced by wind turbines are the same as those produced by vehicular traffic and home appliances and are similar to the beating frequency of people's hearts. Such “infrasound” is not special and convey no special risk factors, as there is an absence of human receptors (only seldom presence) inside the wind farm areas.

Wind turbines could potentially cause **electromagnetic interference** with aviation radar and telecommunication systems (e.g. microwave, television, and radio). This interference could be caused by three main mechanisms, namely near-field effects, diffraction, and reflection or scattering. The nature of the potential impacts depends primarily on the location of the wind turbine relative to the transmitter and receiver, characteristics of the rotor blades, signal frequency receiver, characteristics, and radio wave propagation characteristics in the local atmosphere (see IFC, Environmental and Health and Safety Guidelines, WIND ENERGY).

There was no radar observed inside or near the East Wind subareas. However, the area accommodates both mobile phone masts and radio link/telecommunication repeater masts. It is obvious that wind power development impact on this infrastructure could be significant. Any wind farm shall not block any signal from any directional transmitters and shall not adversely affect the mobile phone signal transmission. Ample corridors between directional transmitters (300 m directly to each side) need to be kept free and mobile phone masts shall not be affected by nearby wind turbines.

6.1.8 Archaeological, historical and cultural heritage

The site investigation revealed that the wind power development areas are free from archaeological, historical and cultural heritages. A site of great national historical and archaeological value are the 3,500 year-old ruins and tombs of the Akhetaton city next to Tal El Amarna, about 10 km to the south-west of Mallawi. The ruins are the former Residence City of Akhenaten and located at the eastern side of the Nile Valley, 10 km from the western Border of the East Wind-1 subarea. Many historical tombs are at the East Nile cliff at 6 km distance from the western border of East Wind-1, except the Akhenaten Tomb, which is located in the Darb al-Malik, i.e. the so-called “Kings Wadi”. The distance of this tomb is 1.5 km to the western border of East Wind-1 only.

Assuming that the road to the Akhenaten tomb is blocked for access to the subarea, there could still be the visual impact of 150 m-high wind turbines at the western border of the East Wind-1 subarea at distances of less than 2 km. This is taken care of by a preclusive zone for wind power development of 3 km around this tomb, which corresponds also to the legal requirements in Egypt. Considering that the tomb is located in a Wadi steeply sloping to the Nile Valley, the wind turbines would not be visible if erected at 3 km distance to the east. Accordingly, no archaeological, historical and cultural heritage will be impacted by wind power development in the East Wind areas. 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 developed by the project developers and integrated in the Contractors environmental management plan, considering local laws as well as in accordance with EBRD PR 8 and IFC PS 8.

6.1.9 Impact on traffic, utility services

The wind power development will be independent from existing utility services as are the water supply, wastewater treatment and electricity supply. Water will be provided by tankers from high yield sources at the Nile Valley (see the part about water resources and wastewater).

The wind farms will have to be interconnected to the national power grid, which requires expansion before commissioning. This also requires in-depth national load flow analysis studies and power grid expansion planning and implementation.

The traffic load caused by wind power development can be roughly estimated for the construction phase considering the safe assumption of parallel implementation of three 50 MW wind farms with parallel delivery of wind turbines and foundation materials, e.g. for the East Wind-1 area, and using the same asphalt road.

Table 6-7: Estimated traffic impact

Estimate of additional traffic caused by wind power development	No. per working day
Estimate of traffic caused by wind power development	No. per working day
3 x 2 wind turbines per week, heavy haulage of 3 tower segments + nacelle + blades	5
Auxiliary equipment wind turbine equipment, e.g. transformers, control unit, etc.	1
3 x 3 water supply tankers for water supply – each 30 m³	9
Sand + gravel materials of 400 m³ per day, 20 lorries of 20 m³ each	20
120 tonnes of cement, 6 x 20 tonne lorries	6
Other materials such as MV cables, tools, equipment, construction materials	3
Construction and installation materials for substation, 3 x 2 lorries	6
Small cars (incl. minibuses, pick-ups, small lorries)	60

Accordingly, the average expected additional traffic load per working day caused by wind farm development during the construction phase is about five heavy haulage vehicles, 45 large transportation lorries and 60 smaller transportation vehicles including mini buses, 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 6.0 smaller vehicles per hour. This may be compared to the current traffic load on the El Minya-Assiut National Road (see Figure 5-1), which is the most frequented road in the area.

A rapid assessment revealed that 45 small cars (personal cars, minibuses, pick-ups) and 40 lorries per hour pass in one direction on this road. Assuming that all additional traffic load will apply for the same road stretch, the current traffic load will be increased by about 10 to 15%, resulting in a total traffic load of about 55 small vehicles and 45 lorries per hour and per direction. With such a cumulative traffic load during the construction phase, the El Minya–Assiut National Road, like other asphalt roads in the area, which are all well-dimensioned, by far has not reached its capacity. During the operation phase, the additional traffic load is very small and not quantifiable.

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 occasional service cars
Frequency	Low	On average, 0.5 heavy haulage transports, 4.5 lorries and 3 smaller vehicles per hour for the overall wind power development areas	Low	Very seldom
Duration	Low	Only passing	Low	Only passing
Intensity	medium	Some heavy haulage transportation vehicles	Low	No noise emissions

Accordingly, the event magnitude is evaluated to be low to medium during the construction phase and low during the operation phase. 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 anywhere near their capacity. During operation, the additional traffic load is not quantifiable. Medium event magnitude and low receptor sensitivity signify a minor cumulative impact significance of traffic caused during the construction phase and a negligible impact significance during the other phases.

6.1.10 Run-off / flash flood risk

The region is hyper-arid with very little precipitation during wintertime. 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 in distance to the west, such events were observed only twice at different measurement locations, causing damages to sensors (lightning strike) and a sudden large temperature drop.

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

Desktop studies and field inspection to the East Wind-1 and East Wind-2 subareas revealed that the Wadis are not prone to such floods. Cross sections are wide, slopes are gentle and hills over 50 m in height only exist above Wadibeds. Moreover, the Wadis do not show large stones or rocks at the low areas of the Wadibed. However, this does not mean that occasionally some runoff caused by precipitation may occur inside the Wadis, but are not dangerous in nature like flash floods. 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 and impact from flash floods in the Wadis is expected. However, occasionally some discharge may occur.

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 “Physical Environment”. The strength for the areas is low to moderate, corresponding to a peak ground acceleration of 0.8 to 1.0 m/s². Risks can be well controlled by applying adequate earthquake codes as part of applicable construction norms.

6.2 Biological environment

6.2.1 East Wind-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 Wind-1 subarea, installation / construction and operation of multiple wind farms (e.g. 40 wind farms, as given above) in this subarea will not affect any designated site.

6.2.1.2 Habitats and flora

Construction phase

Construction of multiple wind farms in the East Wind-1 zone might lead to:

- Direct damage of plants and modification or direct loss of habitat by using areas for foundations of turbines and of auxiliaries, permanent access roads, construction platforms, trails for the power line, storage positions for heavy machinery, or other technical installations.

  During construction of multiple wind farms, which includes mobilisation and demobilisation, the removal and partial destruction of the top soil surface and some deeper soil layers will occur. However, the land-use by wind farm construction is limited (usually about 5% of the overall area of a wind farm during the operation phase), leaving most of the area free from any interventions. Consequently, the affected area will cover only a small fraction of the subarea (medium event magnitude).

  Though the precise locations of turbines are not yet known, siting of the wind turbines shall avoid vegetation areas and particular structures like caves or crevices. No turbine shall be installed next or inside important Wadi beds, namely Wadi Ibadah and Wadi al-Birshawi in the very north, the Wadi al-'Imrani complex and the unnamed Wadi east of 'Imrani complex and, finally, Wadi al-Mijallid in the south. Construction measures in the Wadis shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. In doing so, receptor sensitivity can be kept at a low stage. Hence, important Wadis have to be assessed as less favourable for wind power developments (see Map 5-2).

  Hence, the residual effects caused by direct damage to plants or direct loss of habitat due to the construction of multiple wind farms will lead to minor impacts if the aforementioned mitigation measures are considered.

- Compacting of soil due to land-use

  The compacting of soil might lead to the damage of local seed banks and a reduction of the suitability for plant growth. As stated above, the affected area is limited (usually about 5 % of the overall area of a wind farm during the operation phase), leaving most of the area free from any interventions. Furthermore, the subarea comprises no threatened species or plant communities of conservational concern. Finally, the potential for plant growth in this hyper-arid area is very limited. To sum up, the residual effects due to the construction of multiple wind farms in the subarea are assessed as a minor impact (medium event magnitude and low receptor sensitivity).

- 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, the 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 wind farms within the subarea will cause minor residual impacts on habitats, vegetation or plant communities.

Operation and Maintenance Phase

Though the precise locations of wind turbines are not yet known, it can be assumed that no important area (i.e. the larger Wadis with spots of vegetation) will be affected. Moreover, operating wind turbines is not known to affect plants or plant growth. Also, slight changes in wind speed (turbulences) or in microclimate at ground level will have no effects on plants.

During periods of wind farm maintenance, human activities will be restricted to the already existing roads and storage positions.

In conclusion, operation and maintenance of multiple wind farms 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.

6.2.1.3 Fauna

6.2.1.3.1 Birds

Construction phase

Migrating birds

Birds in active flight will not be affected during the construction phase. Noise and dust emission at distinct construction sites might cause migrating birds to alter their flight path. This can be regarded as a negligible impact (low event magnitude and low receptor sensitivity).

Local birds

Construction of multiple wind farms within the East Wind-1 subarea might lead to:

- Modification or a loss of habitat for local birds by using areas for turbine foundations, permanent access roads, trails for power lines, storage positions for heavy machinery, other technical installations, etc.

  As given in section 5.2, the local bird community in the East Wind-1 subarea is very poor in species and, moreover, bird density is very low (low receptor sensitivity). The area required for the infrastructural elements for multiple wind farms is rather small compared to the whole subarea (medium event magnitude). Thus, even after construction of turbines, there will be enough appropriate habitats available for local birds. To conclude, modification or a loss of habitat will lead to minor impacts on local birds. However, the larger Wadis that have small patches of vegetation form specific elements in the desert and might be used as foraging and hunting sites for local birds (e.g. the Spotted Sandgrouse). In order to minimise impacts on local birds, constructional works in the important Wadis shall be minimised. Hence, important Wadis have to be assessed as less favourable for wind power developments (see Map 5-2).
- Disturbance by human activities with heavy machinery, traffic, noise and dust emission

  Local birds, such as Sandgrouse, Larks or Falcons, might be affected by disturbance during the construction phase. However, disturbance effects are restricted to a rather small area. Thus, local birds can find alternative habitats for the time of constructional works. Moreover, con-

structional work is limited to a rather short period of time. Local birds can reoccupy all areas after the construction phase. To conclude, the impact on local birds caused by disturbance during construction of multiple wind farms is assessed to be negligible.

To conclude, the effects on local birds caused by the construction of multiple wind farms within the East Wind-1 subarea will lead to minor residual impacts.

Roosting birds

Construction of multiple wind farms within the East Wind-1 subarea might lead to:

- Modification or a loss of habitat for roosting birds by using areas for foundations of turbines, permanent access roads, trails for power lines, storage positions for heavy machinery, other technical installations etc.

  The area required for the infrastructural elements for multiple wind farms is comparatively small in relation to the whole East Wind-1 subarea (medium event magnitude). Thus, even after construction of turbines, birds can find roosting sites in the subarea. However, the vast majority of the subarea has no significant importance as a roosting habitat at all (see section 5.2.2.4.1, low receptor sensitivity). Only the larger Wadis form specific sites in the desert and are known to be used for roosting by passerines. Therefore, construction works in the important Wadis shall be minimised. Hence, important Wadis have to be assessed as less favourable for wind power developments (see Map 5-2).

  The effects caused by modification or a loss of habitat for roosting birds due to the construction of multiple wind farms will lead to minor residual impacts.

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

  Roosting birds mostly spend only one day / night in the desert. Thus, roosting birds might temporarily be affected by disturbance during the construction phase of multiple wind farms (low receptor sensitivity). Disturbance effects are restricted to a rather small area. Roosting birds can choose alternative habitats during construction phases. Hence, the impact on roosting birds caused by disturbance is assessed as negligible.

To conclude, the residual effects on roosting birds caused by the construction of multiple wind farms within the East Wind-1 subarea will lead to minor impacts.

<u>Operation and maintenance phase</u>

Migrating birds

Migrating birds might be affected by collision or barrier effects during the operation and maintenance phases of multiple wind farms.

1. Collision risk

   As laid out in Annex B6 10.2.6, collision risk depends on several factors and until now the cause-and-effect chain of collision is poorly understood. Very little is known about collision risk for migrating birds.

During spring 2016, autumn 2016 and spring 2017, migratory activity of relevant species was low at every observation sites (for detailed data see Annex B5 10.2.5). No threatened species was recorded during spring migration (both in 2016 and 2017) and only two threatened species occurred in low numbers in the subarea in autumn 2016. Though there is not always a strict correlation between abundance of birds and collision rate (see Annex B6 10.2.6), it is reasonable to assume that collision risk is low in areas with low migratory activity (low receptor sensitivity). Thus, collision risk for migrating soaring birds by operational wind turbines is not assumed to pose a major threat because migratory activity of relevant species in the East Wind-1 subarea was low in spring and in autumn. Rare collisions at wind turbines within the subarea might occur (low event magnitude), but the expected collision rate will not cause significant effects on populations. Hence, collision risk at multiple wind farms in the subarea is assessed to be a negligible impact for migrating birds.

This assessment is also valid for species of minor relevance, because

- the subarea is not of particular importance for those species (section 5.2.1.4.1),
- those species mainly migrate on a broad front, and
- those species are not particularly prone to colliding with wind turbines.

An analysis of the spatial distribution of bird migration (relevant species and species of minor relevance) within the study area revealed no distinctive patterns. Migratory activity was low at all observation sites. Moreover, there are no particular structures in the subarea, e.g. mountain chains, which may serve as landmarks, may be important for orientation of migrating birds or which may offer good thermal uplifts. Thus, the aforementioned assessment is valid for the whole East Wind-1 subarea. Areas in which wind turbines might lead to a relevant collision risk for migrating birds do not exist.

To conclude, establishing multiple wind farms in the Project Area will not cause notable risk potential for the populations of the examined species.

2. Barrier effects

In order to avoid a wind power plant, birds might change horizontal flight direction, which leads to additional expenditure of energy. Such large-scale avoidance does not, however, automatically mean an enormous loss of time and energy (Hötker 2017). Assuming there is a 5 km-long string of wind turbines (a single wind power project) located perpendicular to a bird's flight path, one can suggest that the additional flight path (of a few km) seems unlikely to have a relevant impact on an individual bird (considering that large soaring birds migrate about 200 km or even more per day, e.g. Mellone et al 2012, Meyburg et al 2012). Moreover, due to the low migratory activity, only few birds will be affected even if multiple wind farms are considered. Hence, possible horizontal avoidance behaviour will not cause notable risk potential for populations.

Another option for a bird to avoid a wind power plant is to change altitude (mostly by rising) and subsequently to migrate above the critical zone of wind turbines. Thermals are not believed to be a limiting factor within the subarea. There should be a number of vertical air currents allowing birds to gain altitude.

Since weather conditions (especially wind speed and direction) should be nearly the same within the whole subarea, birds will not face additional headwinds or other less favourable conditions as a consequence of avoiding a row of wind turbines.

To conclude, although the degree of additional energy expenditure cannot be estimated precisely, a possible barrier effect of multiple wind farms will not cause notable risk potential for the populations of relevant species. Due to the low migratory activity, only very few birds might be affected and the possible effects are assessed as a negligible impact.

Local birds

Operation and maintenance of multiple wind farms within the East Wind-1 subarea might lead to:

- Disturbance by operation of turbines leading to a decrease in habitat quality or a total habitat loss

  Local birds, such as Sandgrouse, Larks or Falcons, might be affected by disturbance during the operational phase of wind farms. However, most species (as resident birds) are known to be unsusceptible to the nearly constant acoustic and visual stimuli of wind turbines. Moreover, disturbance effects are restricted to a rather small distance and cover most the area up to 300 m from a turbine (Hötker 2017) (low receptor sensitivity). Hence, the effects on local birds caused by disturbance related to operating turbines are assessed as negligible impacts.

- Disturbance by human activities related to the maintenance of multiple wind farms

  Local birds, such as Sandgrouse, Larks or Falcons, might be affected by disturbances from human activities during the operational phases of multiple wind farms. However, human activity is expected to be rather limited in time and space (low event magnitude). As stated in section 5.2.2.4.1, the local bird community is very poor in species and bird density is very low (low receptor sensitivity). In conclusion, effects on local birds caused by disturbances related to maintenance of multiple wind farms are assessed as negligible impacts.

- Collision risk

  Local birds will also face the risk of collision at operating turbines. However, resident birds are aware of them and their behaviour might be better adapted to the presence of turbines. As stated in section 5.2.2.4.1, the local bird community is very poor in species, bird density is very low and no threatened species was found in the subarea. Therefore, collision risk for local birds is rather low and even multiple wind farms will not lead to significant impacts on local populations (negligible impact).

To conclude, the effects on local birds caused by the operation and maintenance of multiple wind farms within the East Wind-1 subarea will lead to negligible impacts.

Roosting birds

Operation and maintenance of multiple wind farms within the East Wind-1 subarea might lead to:

- Disturbance by operation of turbines, leading to a decrease in habitat quality or a total habitat loss

  Roosting birds might be affected by disturbance during the operational phase of multiple wind farms in the subarea. It is well known that species that tend to roost in larger flocks avoid operational wind farms. Other species roosting in small flocks or even singularly, e.g. birds of prey or smaller birds (passerines), are not known to avoid wind turbines. Consequently, these species may use wind farms areas for roosting as they did before the construction of the turbines.

As given in section 5.2.2.4.1, the number of roosting birds in the East Wind-1 subarea was low and the subarea has no significant importance as a roosting habitat. Hence, operation of multiple wind farms will not lead to significant habitat loss for roosting birds (negligible impact).

- Disturbance by human activities relating to the maintenance of multiple wind farms

  Roosting birds might be affected by the disturbance of human activities during the operational phase of multiple wind farms. However, such human activity is expected to be rather limited in time and space (low event magnitude). Moreover, birds do not stay for a longer period in the area (birds usually spend a single day / night in the desert) (low receptor sensitivity). Consequently, the impact on roosting birds caused by disturbances related to the maintenance of multiple wind farms is assessed to be negligible.

- Collision risk

  Roosting birds face the risk of colliding with operating turbines. Collision risk might be high in situations when larger flocks of migratory soaring birds i) stop migrating in the afternoon to look for a place to spend the night and ii) start migrating in the morning after having spent the night in the desert. However, no larger flocks have been recorded in the East Wind-1 subarea during the extensive monitoring on bird migration. As given in section 5.2.2.4.1, the number of roosting birds in the East Wind-1 subarea was low and the subarea has no significant importance as a roosting habitat. To conclude, multiple wind farms within the subarea will not pose a significant collision risk to roosting birds (negligible impact).

To conclude, the effects on roosting birds caused by the operation and maintenance of multiple wind farms within the East Wind-1 subarea will lead to negligible impacts.

6.2.1.3.2 Bats

<u>Construction Phase</u>

Activity of bats within the East Wind-1 subarea was found to be very low during bat monitoring (see section 5.2.1.4.2, low receptor sensitivity). The subarea apparently does not serve as a significant habitat for bats. Hence, it can be excluded that construction of multiple wind farms will cause a modification or a loss of habitat for bats. Nevertheless, the siting of wind turbines shall avoid particular structures like caves or crevices (to be considered in the scope of project-specific ESIAs).

Construction activities for wind farms will occur during the daytime, but not during night-time when bats are active. Thus, it can be excluded that construction activities will lead to significant disturbance in hunting, flying or roosting bats.

To conclude, the effects on bats caused by the construction of multiple wind farms within the East Wind-1 subarea will lead to negligible residual impacts.

Operation and Maintenance Phase

On the basis of the obtained results (very low bat activity, low receptor sensitivity) it is assumed that collisions with wind turbines within the East Wind-1 subarea will not have a significant impact on bat populations, even if multiple wind farms are established.

According to recent knowledge, bats are not displaced by wind turbines (e.g. Brinkmann et al. 2011), and thus disturbance effects are negligible.

To conclude, the effects on bats caused by the operation and maintenance of multiple wind farms within the East Wind-1 subarea will lead to negligible impacts.

6.2.1.3.3 Other animals

As the results given in section 5.2.2.4.3 clearly show, the importance of the East Wind-1 subarea as a habitat for animals is rather limited. Only a few mammal species have been found, of which none are threatened or particularly in conflict with human activities. The herpetofauna of the subarea is poor in species and density is low. The species recorded are quite widespread and can be found in several desert habitats in Egypt. None of the recorded reptile species is known to be endangered or threatened. Some other vertebrate and invertebrates occur in the area, however the area is not of particular importance for these species. Hence, receptor sensitivity has to be assessed as low.

Construction Phase

Construction of multiple wind farms within the East Wind-1 subarea might lead to:

- A loss of habitat for local animals by using areas for foundations of turbines, permanent access roads, trails for the power line, storage positions for heavy machinery, other technical installations, etc.

  As stated in section 5.2.2.4.3, local animal communities have few species, moreover, density is low. Compared to the whole subarea, the area required for multiple wind farm structures is rather small (medium event magnitude). Thus, even after construction the turbine, there will be appropriate habitats available for local animals. In summary, the impact on animals caused by the construction of multiple wind farms within the subarea is assessed to be minor.

  However, siting of wind turbines shall be avoided in vegetation areas and next to particular structures like caves or crevices. No turbine shall be installed next to or inside important Wadibeds, namely Wadi Ibadah and Wadi al-Birshawi in the very north, Wadi al-’Imrani complex and the unnamed Wadi east of 'Imrani complex and, finally, Wadi al-Mijallid in the south. Construction measures in the important Wadis shall be limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots. Hence, important Wadis have to be assessed as less favourable for wind power developments (see Map 5-2).

- Disturbances by human activities from heavy machinery, traffic, noise and dust emission

  Local animals might be affected by disturbances during the construction phase. Large native mammals (e.g. Desert Red Fox, Rüppell's Sand Fox) that were found in the subarea will most likely abandon the site because of the disturbance from the constructional work. However, dis-

turbance effects are limited to a rather small area compared to the whole East Wind-1 subarea. Thus, local animals can find alternative habitats during the construction phase. Moreover, constructional work is limited to a rather short period of time (low event magnitude). Local animals can repopulate all areas after construction. In summary, the impact on animals caused by disturbance by human activities during the construction phase is assessed to be negligible.

- 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 effects on other animals caused by the construction of multiple wind farms within the East Wind-1 subarea will lead to minor impacts.

Operation and Maintenance Phase

Noise and shade resulting from operating wind turbines is limited in space and time. The local animal communities have very few species. Moreover, animal density is very low. Hence, operating wind farms are not expected to affect animal wildlife significantly. As turbines will not be erected next to or inside the important Wadis, noise occurring from turbines will not affect animals inhabiting or using these areas.

There might be a risk of disturbance of species by site personnel, by waste from used spare parts or by hazards from non-sufficiently isolated cables during maintenance activities. Disturbance will cause no significant impact on animal wildlife, as maintenance activities are restricted to the area close to the wind turbines.

To conclude, the effects on other animals caused by the operation and maintenance of multiple wind farms within the East Wind-1 subarea will lead to negligible residual impacts.

6.2.2 East Wind-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 Wind-2 subarea, installation / construction and operation of multiple wind farms in this subarea will not affect any designated site.

6.2.2.2 Habitats and flora

Construction phase

Construction of multiple wind farms in the East Wind-2 zone might lead to:

- Direct damage of plants and modification or direct loss of habitat by using areas for foundations of turbines and of auxiliaries, permanent access roads, construction platforms, trails for the power line, storage positions for heavy machinery and other technical installations

  During construction of multiple wind farms, which includes mobilisation and demobilisation, the removal and partial destruction of the top soil surface and some deeper soil layers will occur. However, the land-use by wind farm construction is limited (usually about 5% of the overall area of a wind farm during the operation phase), leaving most of the area free from any interventions. Consequently, the affected area will cover only a small fraction of the subarea (medium event magnitude).

  Hence, the effects caused by direct damage of plants or direct loss of habitat due to the construction of multiple wind farms will lead to minor impacts.

- Compacting of soil due to land-use

  Compacting of soil might lead to the damage of local seed banks and a reduction in suitability for plant growth. As stated above, the affected area is limited (usually about 5% of the overall area of a wind farm during the operation phase), leaving most of the area free from any interventions. Furthermore, the subarea does not comprises any threatened species or plant communities of conservational concern. Finally, the potential for plant growth in this hyper-arid area is very limited. To sum up, the effects due to the construction of multiple wind farms in the subarea are assessed as a minor impact (medium event magnitude and low receptor sensitivity).

- Dust emissions

  Dust emissions will be limited to a very small area and rather brief periods. Only negligible impacts on habitats or on 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, the 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 wind farms within the subarea will cause minor residual impacts on habitats, vegetation or plant communities.

Operation and Maintenance Phase

In the absence of valuable habitats, it can be assumed that no important area will be affected. Moreover, operating wind turbines are not known to affect plants or plant growth. Also, slight changes in wind speed (turbulences) or in microclimate at ground level will have no effects on plants.

During periods of wind farm maintenance, human activities will be restricted to already existing roads and storage positions.

In conclusion, operation and maintenance of multiple wind farms within the subarea will only cause negligible impacts on habitats, vegetation or plant communities. There are also no other activities in the subarea that might contribute to increased impacts at significant levels.

6.2.2.3 Fauna

6.2.2.3.1 Birds

Construction phase

Migrating birds

Birds in active flight will not be affected during the construction phase. Noise and dust emission at distinct construction sites might bring migrating birds to alter their flight path. This cannot be regarded as a significant impact (low event magnitude and low receptor sensitivity).

Local birds

Construction of multiple wind farms within the East Wind-2 subarea might lead to:

- Modification or a loss of habitat for local birds by using areas for foundation of turbines, permanent access roads, trails for the power line, storage positions for heavy machinery, other technical installations etc.

  As given in section 5.2.3.4.1, the local bird community in the East Wind-2 subarea is very poor in species (no threatened species were found) and, moreover, bird density is very low (low receptor sensitivity). The area required for the infrastructural elements for multiple wind farms is rather small compared to the whole subarea (medium event magnitude). Thus, even after the construction of turbines, there will be enough appropriate habitats available for local birds. To conclude, modification or a loss of habitat due to construction of multiple wind farms will lead to minor impacts on local birds.

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

  Local birds, such as Sandgrouse, Larks or Falcons might be affected by disturbance during the construction phase. However, disturbance effects are restricted to a rather small area. Thus, local birds can find alternative habitats for the time of constructional works. Moreover, constructional work is limited to a rather short period of time. Local birds can reoccupy all areas after the construction phase. To conclude, the impact on local birds caused by disturbance during construction is assessed to be negligible.

To conclude, the effects on local birds caused by the construction of multiple wind farms within the East Wind-2 subarea will lead to minor impacts.

Roosting birds

Due to the lack of vegetation, the East Wind-2 subarea has no importance as a roosting habitat (see section 5.2.3.4.1). Consequently, construction of wind farms within the subarea will not cause relevant adverse effects on roosting birds (negligible impact).

Operation and maintenance phase

Migrating birds

Migrating birds might be affected by collision or barrier effects during the operation and maintenance phase of multiple wind farms.

1. Collision risk

As laid out in Annex B6 10.2.6, collision risk depends on several factors and until now the cause-and-effect chain of collision is poorly understood. Very little is known about collision risk for migrating birds.

During spring 2016, autumn 2016 and spring 2017, migratory activity of relevant species was low at the two observation sites (for detailed data, see Annex B5 10.2.5). No threatened species was recorded during spring migration (both in 2016 and 2017), and only one threatened species occurred in very low numbers in the subarea in autumn 2016. Though there is not always a strict correlation between number of birds and collision rate (see Annex B6 10.2.6), it is reasonable to assume that collision risk is low in areas with low migratory activity (low receptor sensitivity). Thus, collision risk for migrating soaring birds by operational wind turbines is not assumed to pose a major threat because migratory activity of relevant species in the East Wind-2 subarea was low in spring and autumn. Rare collisions at wind turbines within the subarea might occur (low event magnitude), but the expected collision rate will not cause significant effects on populations. Hence, collision risk at multiple wind farms in the subarea is assessed to have a negligible impact on migrating birds.

This assessment is also valid for species of minor relevance, because

- the subarea is not of particular importance for those species (section 5.2.1.4.1),
- those species mainly migrate on a broad front, and
- those species are not particularly prone to collision with wind turbines.

An analysis of spatial distribution of bird migration (relevant species and species of minor relevance) within the study area revealed no distinctive patterns. Migratory activity was low at both observation sites. Thus, the aforementioned assessment is valid for the whole East Wind-2 subarea. Areas in which wind turbines might lead to a significant collision risk for migrating birds do not exist.

To conclude, establishing multiple wind farms in the Project Area will not cause notable risk potential for the populations of the examined species.

2. Barrier effects

In order to avoid a wind power plant, birds might change horizontal flight direction, which obviously leads to additional expenditure of energy. Such large-scale avoidance does not, however, automatically mean an enormous loss of time and energy (Hötker 2017). Assuming a 5 km long string of wind turbines (a single wind power project) is located perpendicular to a bird's flight path, one can suggest that the additional flight path (of a few km) seems unlikely to have a relevant impact on an individual bird (considering that large soaring birds migrate about 200 km or even more per day; e.g. Mellone et al 2012, Meyburg, et al 2012). Moreover, due to the low migratory activity, only few birds will be affected, even if multiple wind farms are considered. Hence, possible horizontal avoidance behaviour will not cause notable risk potential for populations.

Another option for a bird to avoid a wind power plant is to change altitude (mostly by rising) and subsequently to migrate above the critical zone of wind turbines. Thermals are not believed to be a limiting factor within the subarea. There should be a number of vertical air currents allowing birds to gain altitude.

Since weather conditions (especially wind speed and direction) should be nearly the same within the whole subarea, birds will not face additional headwinds or other less favourable conditions as a consequence of avoiding a row of wind turbines.

To conclude, although the degree of additional energy expenditure cannot be estimated precisely, a possible barrier effect of multiple wind farms will not cause notable risk potential for the populations of relevant species. Due to the low migratory activity, only very few birds might be affected and possible effects are assessed as a negligible impact.

Local birds

Operation and maintenance of multiple wind farms within the East Wind-2 subarea might lead to:

- Disturbance by operation of turbines, leading to a decrease in habitat quality or a total habitat loss

  Local birds, such as Sandgrouse, Larks or Falcons, might be affected by disturbance during the operational phase of wind farms. However, most species (as resident birds) are known to be unsusceptible to the nearly constant acoustic and visual stimuli of wind turbines. Moreover, disturbance effects are restricted to a rather small distance and cover, at most, the area up to 300 m to a turbine (Hötker 2017) (low receptor sensitivity). Hence, the effects on local birds caused by disturbance related to operating turbines are assessed as negligible impacts.

- Disturbance by human activities related with the maintenance of multiple wind farms

  Local birds, such as Sandgrouse, Larks or Falcons, might be affected by disturbances from human activities during the operational phases of wind farms. However, human activity is expected to be rather limited in time and space (low event magnitude). As stated in section 5.2.3.4.1, local bird community is very poor in species, bird density is very low and no threatened species was found (low receptor sensitivity). In conclusion, effects on local birds caused by disturbances related to maintenance of multiple wind farms are assessed as negligible impacts.

- Collision risk

  Local birds will also face the risk of collision at operating turbines. However, resident birds are aware of turbines and their behaviour might be better adapted to the presence of turbines. As stated in section 5.2.3.4.1, the local bird community is very poor in species, bird density is very low and no threatened species was found. Therefore, collision risk for local birds is rather low and even multiple wind farms will not lead to significant impacts on local populations (negligible impact).

To conclude, the effects on local birds caused by the operation and maintenance of multiple wind farms within the East Wind-2 subarea will lead to negligible impacts.

Roosting birds

Due to the lack of vegetation, the East Wind-2 subarea has no importance as a roosting habitat (see section 5.2.3.4.1). Consequently, operation of multiple wind farms within the subarea will not cause a significant impact on roosting birds (neither by disturbance nor by collision risk).

To conclude, the effects on roosting birds caused by the operation and maintenance of multiple wind farms within the East Wind-2 subarea will lead to negligible impacts.

6.2.2.3.2 Bats

Construction Phase

Activity of bats within the East Wind-2 subarea was assumed to be very low (see Section 5.2.3.4.2, low receptor sensitivity). The subarea apparently does not serve as a significant habitat for bats. Hence, it can be excluded that construction of multiple wind farms will cause a modification or a loss of habitat for bats. Nevertheless, siting of wind turbines shall avoid particular structures like caves or crevices that can only be found at the huge cliff (fault line).

Construction activities for multiple wind farms will occur during the daytime, but not during the night-time when bats are active. Thus, it can be excluded that construction activities will lead to significant disturbance of hunting, flying or roosting bats.

To conclude, the effects on bats caused by the construction of multiple wind farms within the East Wind-2 subarea will lead to negligible impacts.

Operation and Maintenance Phase

On the basis of the low bat activity (low receptor sensitivity), it is assumed that collisions at wind turbines within the East Wind-2 subarea will not have a significant impact on bat populations.

According to recent knowledge, bats are not displaced by wind turbines (e. g. Brinkmann et al. 2011) and thus disturbance effects are negligible.

To conclude, the effects on bats caused by the operation and maintenance of multiple wind farms within the East Wind-2 subarea will lead to negligible impacts.

6.2.2.3.3 Other animals

As given in section 5.2.3.4.3, no larger Wadi exists in the East Wind-2 subarea and thus, it is nearly completely free of vegetation. Accordingly, the local fauna was found to be very poor in species and density was very low. None of the recorded species is known to be endangered or threatened. Hence, receptor sensitivity has to be assessed as low.

Construction Phase

Construction of multiple wind farms within the East Wind-2 subarea might lead to:

- A loss of habitat for local animals by using areas for foundations of turbines, permanent access roads, trails for the power line, storage positions for heavy machinery, other technical installations, etc.

  As stated in section 5.2.2.4.3, local animal communities have very few species. Moreover, animal density is very low. Compared to the whole subarea, the area required for infrastructural elements for multiple wind farms is rather small (medium event magnitude). Thus, even after turbine construction, there will be appropriate habitats available for local animals. In summary, the impact on animals caused by the construction of multiple wind farms within the subarea is assessed to be minor.

- Disturbances by human activities from heavy machinery, traffic, noise and dust emission

  Local animals might be affected by disturbances during the construction phase and will most likely abandon the site because of the disturbance from the constructional work. However, disturbance effects are limited to a rather small area compared to the whole East Wind-2 subarea. Thus, local animals can find alternative habitats during the construction phase. Moreover, constructional work is limited to a rather short period of time (low event magnitude). Local animals can repopulate all areas after construction. In summary, the impact on animals caused by disturbance is assessed to be negligible.

- 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 effects on other animals caused by the construction of multiple wind farms within the East Wind-2 subarea will lead to minor impacts.

Operation and Maintenance Phase

Noise and shade resulting from operating turbines is limited in space and time. The local animal communities have very few species. Moreover, animal density is very low. Hence, operating wind farms are not expected to affect animal wildlife significantly.

There might be a risk of disturbance of species by site personnel, by waste from used spare parts or by hazards from non-sufficiently isolated cables during maintenance activities. Disturbance will cause no significant impact on animal wildlife, as maintenance activities are restricted to the area close to the wind turbines.

To conclude, the effects on other animals caused by the operation and maintenance of multiple wind farms within the East Wind-2 subarea will lead to negligible 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 projects related to Wind Energy, the following is a summary of the potential jobs that could be created:

For each 50 MW project: for electrical and civil works including transportation/delivery – about 140 unskilled workers and 30 skilled personnel for supervisory tasks (duration 4-6 months) and for turbine construction – 20 semi-skilled workers and 20 skilled specialists (duration 5-6 months). In addition, assuming there is a common collector substation for eight 50 MW projects, the share per 50 MW project would be 10 unskilled workers and 10 skilled specialists for a period of about 8 months.

If three projects were carried out in parallel, this would require about 700 workers. The local communities at the Nile Valley could provide a larger proportion of this temporary labour force, depending 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 to import / manufacture some components, due to the need of the supply chain that will be involved in supplying materials (e.g. cement, river sand and gravel, reinforcement, formwork, cables, construction equipment) and will occasionally carry out repair works on defective parts.

Vehicle drivers will benefit from the project through the provision of transportation to those who work on the project. In addition, 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 Contractor’s personnel. Hotel, shops and restaurants will also see their turnover increase.

The project might result in the development of the surrounding areas. Most future wind farms will require additional new 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.

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 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.

6.3.2.2 Job creation and income generation

The project will allow the creation of some permanent jobs for wind farm O&M. It is expected that about two to five people will be required for O&M and about four people as guards per 50 MW wind farm. This will be equivalent to about 300 working personnel once, e.g., the East Wind-1 area is fully developed. The permanent staff are likely to live locally. In addition, provision of transportation and freight, accommodation, etc., will be provided to the projects and generate local incomes.

The project is likely to contribute to a new (power) industry, e.g. by establishing facilities for manufacturing towers for wind turbines and enhance renewables as part of the Egyptian energy mix.

It will improve the capacity of community and scholars with regards to production of components for solar and wind power plants, as well as to the servicing and operation of RE facilities.

6.3.2.3 Enhancement of 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 supply.

Typically, the following positive impacts are expected from the development of wind farms:

- Development of a wind power economy (development of related industries, development of commercial activities and O&M services of such equipment). This will be a new field that will attract investors and 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. In addition, the new source of energy is considered to be clean.
- Additional tax income because the projects will be implemented as IPP projects.

6.3.3 Negative impacts during construction

6.3.3.1 Land-use

<u>General</u>

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 is transferred to NREA to be used for renewable energy projects as approved 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 authorities that they were frustrated that the land was allocated by the central government without consultation with them and they considered the project to be blocking the Governorate's potential Eastern desert extension.

Because the distance between current urban developments and the border of the East Wind areas is more than 8 km and since no formal private ownership rights were observed in the areas, this impact is considered to be low. Moreover, the sporadic land take is for economic use, even though without official ownership, it was already considered by defining zone to be preclusive for wind power development. Nevertheless, a detailed analysis will be needed during the ESIA of each site to confirm that no specific impacts on land-use will occur.

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, where heavy loaded and slow lorries may use the road. However, such impact is relatively limited due to the low traffic flow on the road as indicated by the traffic sample. The El Minya-Assiut National Road in particular, which passes through the East Wind-1 subarea, as well as the old El Shaikh Fadel-Ras Ghareb road, passing 500 m south of East Wind-2 subarea, have ample additional capacity to absorb the additional traffic load easily. This impact is considered to be of low severity.

6.3.3.3 Impacts related to occupational health and safety

Major health and safety risks result from working at height (wind turbine construction), on electrical systems and with tools and machinery. Investors will be contractually required to keep to 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, the sector guidelines are of special relevance: Environmental Health and Safety Guidelines for Wind Energy and the Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution.

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 by the 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, according to WHO (World Health Organisation). 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 was human error, accounting for 63.3% of the total figure, followed by the technical condition of the vehicles with 22.9%. The safety risk of transporting personnel to the site has to be taken into consideration and the impact is considered to moderate if strict measures are taken (adherence to the speed limit, having experienced drivers, respecting the law and ensuring that vehicles are in good condition).

6.3.3.4 Impacts related to temporary inconvenience

Construction activities will be limited to small areas at the construction site, which will be blocked for short periods only (e.g. four to five days for construction at a WTG site). Considering that the selected wind farm areas are at a large distance to any community, no measurable inconvenience for local communities will arise.

6.3.3.5 Impacts on the Bedouin community

The wind farm 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 wind projects will change the character of the Project Area to a degree which may affect Bedouins. Furthermore, the influx of labour may also pose an impact to Bedouin communities, if present. Individual projects should seek to 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 Wind-1 and East Wind-2 subareas should be developed. This should be coupled with identifying the exact employment needs of the project and the avail-

ability 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.

6.3.4 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: there are no potential socio-economic negative impacts during the operation phase apart from the visual intrusion.
- Health and Safety impacts: permanent staff employed for normal operations are likely to be well trained and aware of H&S requirements and company H&S policies and management systems. The risk of accidents would therefore be much lower and can be managed by continuing to apply the H&S management practices introduced during construction. However, it is also necessary to have a clear documented health and safety policy as well as monitoring H&S performance. Considering that such measures will be correctly implemented, the residual impacts on occupational Health and Safety are of a minor nature.

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 to 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 the 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, this mitigation hierarchy was applied.

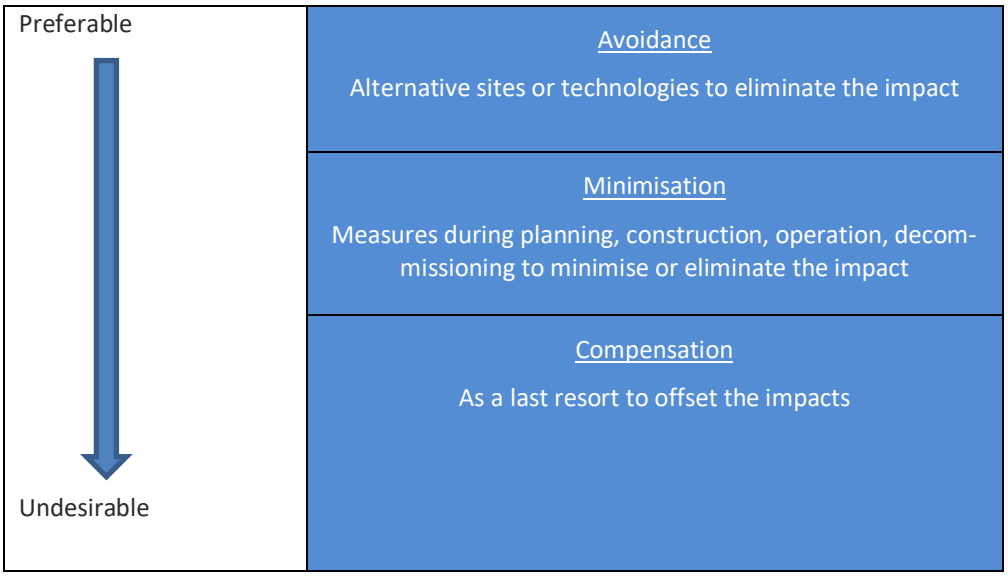

Figure 7-1: Mitigation Hierarchy

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 for wind farm projects include keeping sufficient distance to receptors to make impacts negligible (e.g. noise, shade, landscape) or excluding the use of areas of competing land-use.

For impacts that cannot be completely avoided, steps are taken to ensure minimal damage to the environment. Where possible, such impacts are measured in relation to existing standards (e.g. emissions, ambience and HSE standards). In this case, minimisation means to keep the residual 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 applies 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 wind power development in the East Wind Areas.

All previously identified cumulative impacts of wind 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 both East Wind Subareas

7.2.1 Physical environment

7.2.1.1 Land-use/land-take

Areas of current land-use are already designated to be preclusive for wind power development. This is to avoid social conflicts and at the same time to keep distances as required for noise protection and shadowing. The areas designated to be preclusive are sufficiently dimensioned to take care of such conflicts. In addition, safety distances for the WTG siting of 150 m from the border of preclusive areas apply. This needs consideration during the planning and process for the individual wind farm plots.

<u>Mitigation measures</u>

- A more detailed investigation for land-use impacts during preparation of individual ESIAs.
- Consider the potential for any displacement from the planning stage and try to avoid locating project components at any places that are considered to be the property of local people and used for some activities.
- If this is unavoidable, plans need to be considered to compensate the affected person and allocations should be made available for that purpose.

7.2.1.2 Landscape character and visual impact

Considering the vast character of the landscape and limited presence of human receptors to just a few spots, no specific mitigation measures are required during the planning and permitting process except for the archaeological Athenaton tomb. An area of 3 km around this tomb is designated to be preclusive for wind power development, thus avoiding visual impacts on this national heritage.

7.2.1.3 Water resources and wastewater

Water consumption is marginal compared to the resources available. To protect water resources and water wells, the extraction of water from wells shall be kept at moderate level during periods of high water demand (casting WTG foundations during the construction phase). For this purpose, equalisation water tanks shall be installed at both sites, 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 one foundation that one at the source shall correspond to the volume of the biggest tanker lorry.

Domestic wastewater treatment from the sanitary installations at the site shall be collected and treated in a simple two-stage anaerobic treatment plant by rinsing treated water with desert gravel for natural post-treatment. Sludge from domestic wastewater treatment shall be disposed of regularly to keep the treatment plant well-functioning. This treatment method for biodegradable wastewater is adequate for sandy areas with large groundwater distance and will lead to complete decomposition and no residual impacts.

7.2.1.4 Domestic and hazardous waste

The contractor shall be forced to maintain good workmanship and housekeeping during construction by contractual stipulations and by assignment of supervising engineers, in order to ensure adequate disposal or recycling of waste. To the extent possible, packing material waste shall be returned with 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, plastics, 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 the volume, the waste is burnt. The residual waste will be covered by sand. The waste is inert and in the absence of rain and because of high groundwater distance, there is no harm for the subsurface. Considering the small amounts of domestic waste (about 300 m^3 per year of non-compacted waste, equivalent to about 10 m^3 per year after incineration at the landfill) 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 from gearboxes or transformers into the soils at the site shall be avoided by careful handling and collection in containers and subsequent recycling.

The treatment of domestic and hazardous waste as described above will reduce the significance of impacts to a marginal level.

7.2.1.5 Ambient Air Quality

The impacts on the ambient air quality during the construction phase are negligible, considering the low intensity of works over the area. However, at the individual working sites, dust development caused by machinery when road and foundation excavation works take place need mitigation under occupational health and safety aspects to meet H&S standards (see section 7.3.1). Mitigation measures are:

- spraying water,
- workers to be assigned at the luv side from machinery; and
- wearing protective masks.

7.2.1.6 Noise and electromagnetic interferences

Mitigation of noise impacts from operating wind turbines on sites where workers are employed or even reside for periods of time shall be through keeping siting distances of at least 500 m from any existing economic activity in the area. This applies for both the construction and the operation phase. By maintaining such distances, the noise level resulting from common types of wind turbine at the place of receptors is in the order of 40 dB(A), i.e. well below the applicable standard of 55 dB (night-time) for commercial and industrial areas.

To avoid blockage of signals of existing directional radio link transmitters, ample corridors of 600 m (i.e. 300 m to each side by direct distance) shall be maintained from WTG influence. For siting, the rotor radius has to be added. As the mobile phone masts are next to the transmitter masts, such a corridor will protect the mobile phone signals from disturbance as well.

7.2.1.7 Archaeological, historical and cultural heritage

Mitigation of visual impacts on the Akhenaten tomb shall be through avoidance, i.e. by keeping wind turbine siting distances of at least 3 km to the tomb. This corresponds also to the requirement of the Law 117/1983 and its amendments by law 12/1991, Article 20 related to not granting building permits at archaeological sites or lands and stating that this extends up to three kilometres into uninhabited areas.

7.2.1.8 Mitigation of impact on traffic

The effects of additional traffic load on regional roads during the construction phase were evaluated to be of minor significance. Residual impacts shall be further reduced by shifting heavy haulage transportation to low traffic hours (such as during late evening or night-time hours) and to safeguard heavy haulage transportation, they shall be convoyed by safety cars.

Further investors shall make sure that the employed construction machinery drivers (such as lorries and loaders) have received sensitisation/training on safety utilisation of their machines in order to minimise accidents risks.

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 decommission is crucial. This covers the follow:

- Restricting all activities to the boundaries of the construction areas, storage positions and access roads/tracks. Any use of the surroundings must be strictly avoided.
- Avoiding affecting particular structures (like caves or crevices) that might form a suitable habitat for animals (to be considered in project-specific ESIAs).
- Avoiding importing new species from urban and rural environments into the area (e.g. together with construction materials and containers) in order not to affect indigenous species.
- Taking into consideration 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 placing a ban on:
  - hunting, killing, catching birds and wild animals or marine living organisms,
  - cutting or damaging protected plant species,
  - collecting, possessing, transporting, or offering to sell types of fauna and flora fossils or changing their features, and
  - trading in all endangered living organisms of fauna and flora species.

As a precautionary measure, locating a wind power plant at international or national sites for nature conservation or other areas with large concentrations of birds should be avoided, such as at points of migration crossings. According to Percival (2005), it is important to avoid developing wind farms at sites i) with high-density raptor populations where collisions could be significant, and ii) with high densities of other species vulnerable to a low level of additional mortality where their susceptibility to wind turbine collision may be high.

The results of the baseline studies clearly show that neither the East Wind-1 nor the East Wind-2 subarea meets the aforementioned criteria. Nevertheless, to mitigate impacts on migrating, roosting and local birds caused by large wind farms in the subareas, the following measures should already be considered in the planning and construction phase:

- Avoid installing wind turbines with lattice towers. Lattice towers offer suitable perching sites, and thus might attract large soaring birds, which in turn might increase the risk of collision.
- Avoid lighting up wind turbines, as birds might be attracted to wind farm areas by lights, leading to an increased collision risk. If lighting of turbines is absolutely required (e.g. to meet aviation requirements of the civil and military aviation authority), the minimum number of intermittent flashing white lights of lowest effective intensity shall be used (Drewitt & Langston 2006).
- Build the grid within a wind farm and the grid between different wind farm areas 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 the construction/decommission of wind farms and associated infrastructure in the Project Area. However, the presence of sensitive habitats, if any, needs to be considered on a smaller scale in project-specific ESIAs, to be conducted for each individual project.

Operation and maintenance phase

In order to protect habitats, flora and fauna in the two subareas, 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 the best practice procedures and general mitigation measures during operation and maintenance have to be applied.

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 wind farms and associated infrastructure in the Project Area.

Likewise, there is no need for particular mitigation measures with regards to migrating birds, because the results of the bird monitoring clearly show that migratory activity of relevant species was low, that no threatened species was recorded during spring migration and that only one threatened species occurred in very low numbers during autumn migration.

Need for Post-Construction Monitoring / Risk Management

As given in section 5.2.2.4.1 and 5.2.3.4.1, the results clearly reveal that the two subareas are not of particular importance for migrating birds, neither in spring nor in autumn. This is valid for species of special interest and for species of minor relevance, which mainly migrated on a broad front. Hence, there is no need for additional baseline studies on bird migration in the two subareas (neither before, during nor after the construction of wind farms).

7.2.3 Social and economic environment

7.2.3.1 Mitigation 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: Environmental Health and Safety Guidelines for Wind Energy and Environmental, as well 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 Mitigation 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 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[7].

[7] http://www.ebrd.com/downloads/about/history/workers.pdf

- Involve stakeholders and the public, implement consequential information disclosure, establish a grievance process and redress mechanism by NREA .

7.3 Special Mitigation Features in the individual East Wind Subareas

7.3.1 East Wind-1 subarea

Besides the general mitigation measures to be applied to all wind power developments, special features in the East Wind-1 subarea were identified that require specific mitigation:

- 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, the four identified important Wadis systems have to be assessed as less favourable for wind power developments (see Map 7-1). An appropriate mitigation measure is to avoid construction works in these Wadis as much as possible (limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots).
- Further restrictions in addition to the earlier identified preclusive areas of current economic activities must apply for the East Wind-1 subarea, regarding the existing directional telecommunication transmitters. A corridor of 600 m (300 m to each side of the direct distance line) needs to be kept free from any interference of wind turbine rotors. The corridor is located near to the El Minya–Assiut National Road (see Map 7-1).
- Moreover, a clearance distance of 3 km shall be kept from the Akhenaten kings' tombs to protect the heritage site from disturbances by wind turbines. The clearance circle reaches up to 1.5 km into the East Wind-1 subarea (see Map 7-1).

An overview of all restrictions (preclusive zones and less favourable areas) for wind energy development in the East Wind-1 subarea is given in Map 7-2.

7.3.2 East Wind-2 subarea

Besides the general mitigation measures to be applied to all wind power development, no special features in the East Wind-2 subarea were identified that require specific mitigation (except maintaining preclusive zones for the farmland and farm development land in the low area.

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

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

Map 7.1:
Zones preclusive or less favourable for wind power development in the East Wind-1 subarea as a result of the impact assessment (mitigation measures)

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road

main road

Zones preclusive for wind power development

due to transmitter corridor

due to Royal Tombs

Zones unfavourable for wind power development

wadi of importance

editor: S. Wernitz, August 22nd 2017

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

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

Map 7.2:
Restrictions for wind power developments in the East Wind-1 subarea

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road

main road

Zones preclusive for wind power development

due to farming area
due to industrial area
due to service buildings
due to transmitter corridor
due to Royal Tombs

Zones unfavourable for wind power development

wadi of importance
due to geomorphology

editor: S. Wernitz, August 22nd 2017

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8 Environmental and Social Management and Monitoring Plan

8.1 Environmental and Social Management

To meet the mitigation requirements, measures need to be applied during the bidding, planning, construction and post-construction phase for each individual wind farm that would be constructed in the accepted area. It is intended to tender 50 MW plots for wind power investments by private investors. It is essential that mitigation measures, i.e. the ESMP, shall become part of the tender documents and in the subsequent contract with investors. Moreover, observance of mitigation measures needs to be supervised during the planning for the 50 MW individual plots and the construction, operation and dismantling of the plants. Tendering and supervision should be the task of the same Egyptian competent authority that will be in charge of ESMP monitoring.

Applicable measures are summarised in the following Environmental and Social Management Plan (ESMP).

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 life time 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 life time of each project.

Table 8-1: Environmental and Social Management Plan

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Mitigation Measures
All Phases	Grievance	EBRD PR1 and PR 10, Best Practice	Introduce a grievance mechanism that applies through the life cycle of the wind power development to be managed by the Egyptian Authority in charge
Bidding and Planning Phase	Health and safety risks	EBRD PR1 and PR4, Voluntary and Best Practice	Make keeping standards as defined in the IFC General Environmental, Health and Safety Guidelines of April 2007 and in the Environmental, Health, and Safety Guidelines Wind Energy of August 2015, a minimum obligation in the Tender Documents for each individual plot
			Make the assignment of a fully authorised health and safety and environmental engineer during the construction phase obligatory in the Tender Documents
			Make an HSE for each construction site obligatory in the Tender Documents

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Mitigation Measures
			Make provision of safety tools & equipment as per accepted standards by the Contractor, in a bidding condition in the Tender Documents
	Keeping mitigation measures	EBRD PR 1, Best Practice	As a minimum, make keeping mitigation measures defined for the construction, operation and decommissioning phase in this study obligatory to investors when tendering the 50 MW plots
	Safety distances		Make keeping internal safety distances of 150 m from plot border lines obligatory
	Impact on habitats, flora and fauna	EBRD PR 6, Best Practice	Avoid application of wind turbines with lattice towers. Avoid or minimise lighting of wind turbines. Avoid construction works in the four identified important Wadis systems as much as possible. Avoid impacting upon particular structures (like caves or crevices) that might form a suitable habitat for animals (to be considered in project-specific ESIAs). Consider the presence of sensitive habitats, if any, on a smaller scale in project-specific ESIAs.
			Build the grid within a wind farm and the grid between different wind farms using underground MV 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).
Construction phase	Health and safety risks	EBRD PR4, EP3, Best Practice	Make keeping the "Environmental, Health and Safety Guidelines for Wind Energy, IFC 2007" and the Environmental, Health and Safety Guidelines Wind Energy of August 2015 a minimum condition. Furthermore, carrying this out shall comply with the EBRD PR 4 for Health and Safety.
		EBRD PR4, EP3, Best Practice	The Contractor and Subcontractor shall assign a health and safety and environmental engineer/supervisor fully authorised in giving health and safety instructions
		EBRD PR4, EP3, Best Practice	Establish an HSE plan prior to starting any construction measures
		EBRD PR4, EP3, Best Practice	Make safety tools and equipment available and have training in how to use it properly
		EBRD PR4, EP3, Best Practice	Construct and make available temporary hygienic sanitary facilities at the construction site

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Mitigation Measures
		EBRD PR4, EP3, Best Practice	Assure stoppage of erection during weather conditions beyond safety limits (e.g. sandstorms)
			Assure that work at the wind turbines is only carried out by personnel who have passed a special safety training course
	Protection of water resources	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 concrete-making of one wind turbine foundation One tank at the water supply well with a minimum volume equal to the largest tanker lorry. Minimise water consumption.
	Traffic	EBRD PR4, EP3, Best Practice	Carry out heavy haulage transportation during hours of low traffic load (late evening or night-times) and safeguard them using convoy cars
	Pollution	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
	Non-hazardous waste disposal	EBRD PR3, Best Practice	Collect and safely storage, 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).
	Hazardous waste disposal	EBRD PR3, Best Practice	Avoid spillage of oil, diesel or grease into the soil. Collect used oils or greases and recycle them.
	Domestic wastewater treatment	EBRD PR3, Best Practice	Construct a simple two-stage anaerobic treatment plant and rinse 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: ensure that the contractor puts the construction site into tidy conditions. Excavations are to be backfilled, heaps of excavation material are to be levelled and waste is to be properly disposed of
	Impact on habitats, flora and fauna	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. Constructional works must avoid any sensitive habitats, if any (to be identified on a smaller scale in project-specific ESIAs)
		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).

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Mitigation Measures
		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.
	Labour and working conditions	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, as a minimum, meet the basic needs of workers.
Operation and maintenance phase	Health and safety risks	EBRD PR4, Best practice	Assure that O&M at the wind turbines is only carried out by personnel who have passed a special safety training course
	Hazardous waste	EBRD PR3, Best Practice	For Wind Turbines with gearboxes with required periodical exchange of oil: Avoid any spillage of used oils, collect it in safe containers and deliver it for recycling
	Cultural Heritages	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
Decommissioning	Land-use and landscape	EBRD PR 6, Best Practice	Remove the windfarm installations at the end of the lifetime and return the landscape to a tidy condition (levelling heaps, backfilling 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 and social monitoring follows the management plan and shall be carried out in four phases:

1. The bidding and planning phase
2. The implementation and operation phase
3. The checking and corrective actions phase
4. The 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.

Two extensive bird surveys have been conducted in the wider region of El Minya, to the west and east of the Nile Valley. Both investigations clearly revealed that the desert located at minimum distances of 10 km west and east of 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 baseline studies are required when developing wind power in the East Nile region.

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 have a track on 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)

Accordingly, no significant impact on migrating birds must be expected when installing and operating multiple wind power projects in the East Nile subareas. From a strict technical point of view, this assessment can be regarded as well-founded, and hence no post-construction monitoring is required to verify this assessment. However, if post-construction monitoring is regarded as good international practice by international financing institutes, carrying out such monitoring at individual operational wind farms might be required to double-check the findings of this SESA. The precise approach and the scope of such post-construction monitoring should be defined on a case-by-case basis in the context of project-specific ESIAs. Post-construction monitoring might, for example, include visual observations of migrating birds and carcass surveys at individual wind farms and associated power lines.

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.

It is, in any case, necessary to develop project-specific monitoring plans for the construction phase and to adept 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 noisy activities	Contractor's Project Manager, E&S Coordinator
Waste Water	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,

Environmental aspects	Monitoring location	Frequency	Responsibility
			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
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 hour 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.

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.

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.

EcoConServ (2015): Bird Migration at the 200 MW (KfW) Windfarm in Gabal El Zeit, Egypt (autumn 2014 Season). Report to New and Renewable Energy Authority (NREA). Cairo.

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.

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.

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.

Hoath, R. (2009): A field guide to the mammals of Egypt. American University Press. Cairo. New York. 236 p.

Hötker, H. (2017): Birds: Disturbance. In: Perrow, M. R. (ed) (2017): Wildlife and Wind Farms, Conflicts and Solutions. Volume 1 Onshore: Potential Effects. Pelagic Publishing. Exeter, UK.

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. Urios1, 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-Fetooh (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.

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.

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

JV LAHMEYER INTERNATIONAL

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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

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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 لامايير الدولية Lahmeyer وشركة ايكودا ecoda للاستشارات البيئية لحساب هيئة الطاقة الجديدة والمتجددة (NREA) في مصر، وستقوم الشركتين أيضا بإعداد دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية الكاملة.

وفي اعقاب صدور القانون الرئاسي لتعريفة تغذية الطاقة المتجددة (FIT) في مصر في ديسمبر 2014، اشترك البنك الأوروبي للتشييد 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 ميجاوات. 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 للتشييد والتعمير هذه الدراسة.

<u>ولدراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية الأهداف التالية:</u>

- توفير مصدر موثوق للبيانات البيئية والاجتماعية لمنطقة المشروع لخطط تنمية الطاقة المتجددة ولممولي 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 واخطارهم بدراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية واطلاعهم 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 للتشييد 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 اهميتها 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 المفصح عنها وخطط دراسة تقييم الأثر البيئي والاجتماعي الاستراتيجية في خطة إشراك أصحاب المصلحة، المرفقة بهذا التقرير الاستكشافي، ويتم اعتبار خطة اشراك 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 إلي 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.
- الأثار على نوعية الهواء.
- الضوضاء والاهتزازات والتداخلات الكهرومغناطيسية وانعكاس الضوء / التظليل.
- الآثار على التراث الأثري والثقافي.
- مخاطر الصحة والسلامة المهنية.
- الأثار على حركة المرور وخدمات المرافق والبنية التحتية.
- مخاطر السيول.
- المخاطر الزلزالية.

ويهدف هذا التقرير الاستكشافي إلي إبلاغ أصحاب المصلحة، بما في ذلك الجمهور، بمشارع الطاقة الجديدة والمتجددة المستقبلية في منطقة المشروع وللتعرف على ردود افعالهم 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 km² 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 km² 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 27th, 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 12th, 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 km² 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 km² 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.

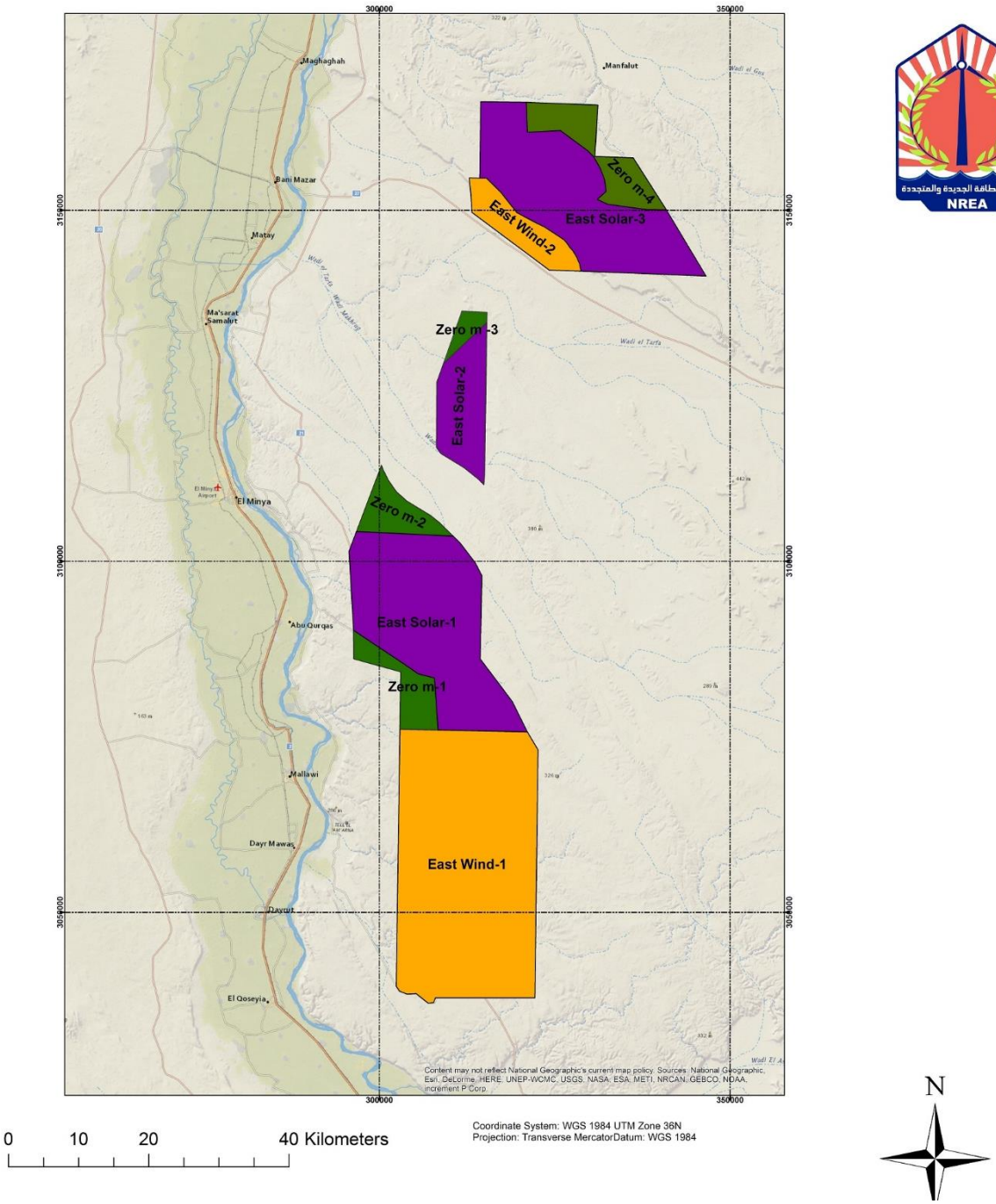


Figure 1: The Project Area including initial RE development areas based upon already prescribed height restrictions for developments in the Project Area.

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:

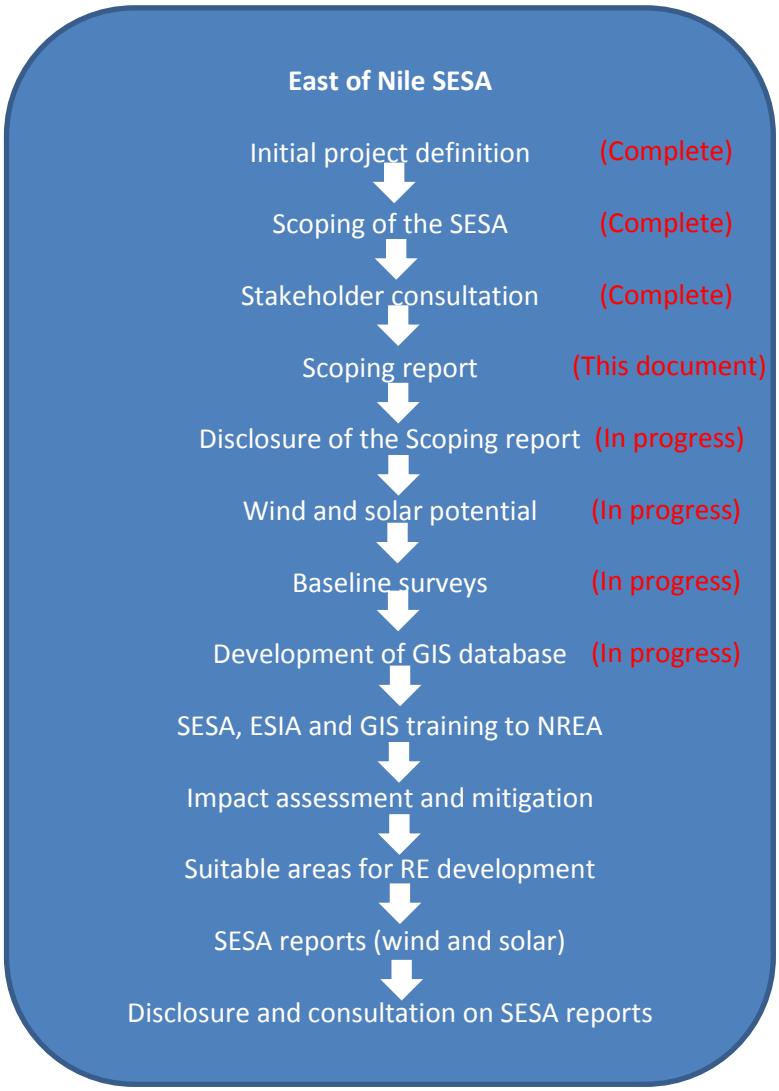


Figure 2: Key stages of the SESA

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, ii) 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 27th, 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 12th, 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 it's 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", 2nd 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", 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 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 27th, 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 km² and photovoltaic plots in the order of 1 to 2 km².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.

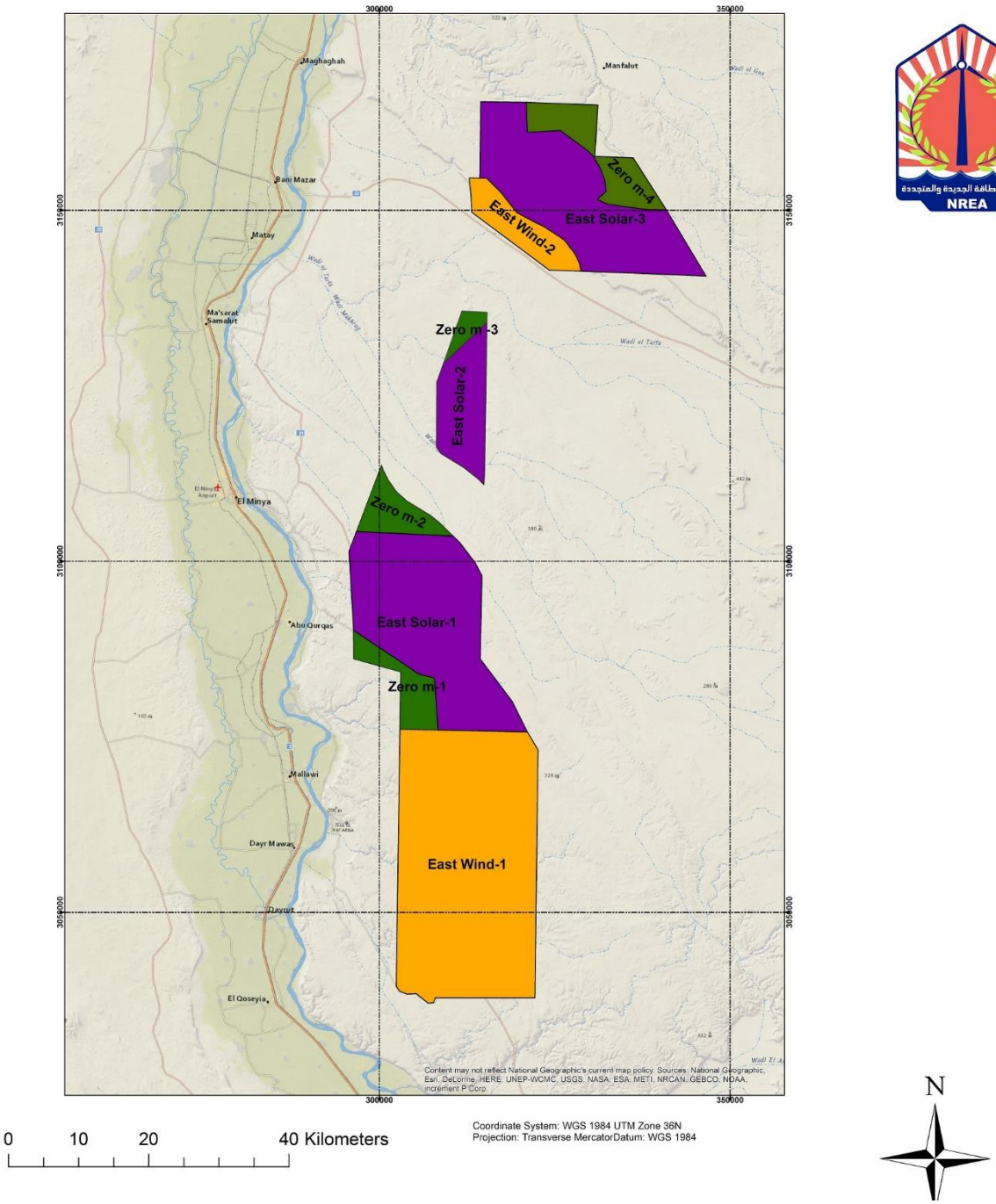


Figure 3: East Nile RE development areas

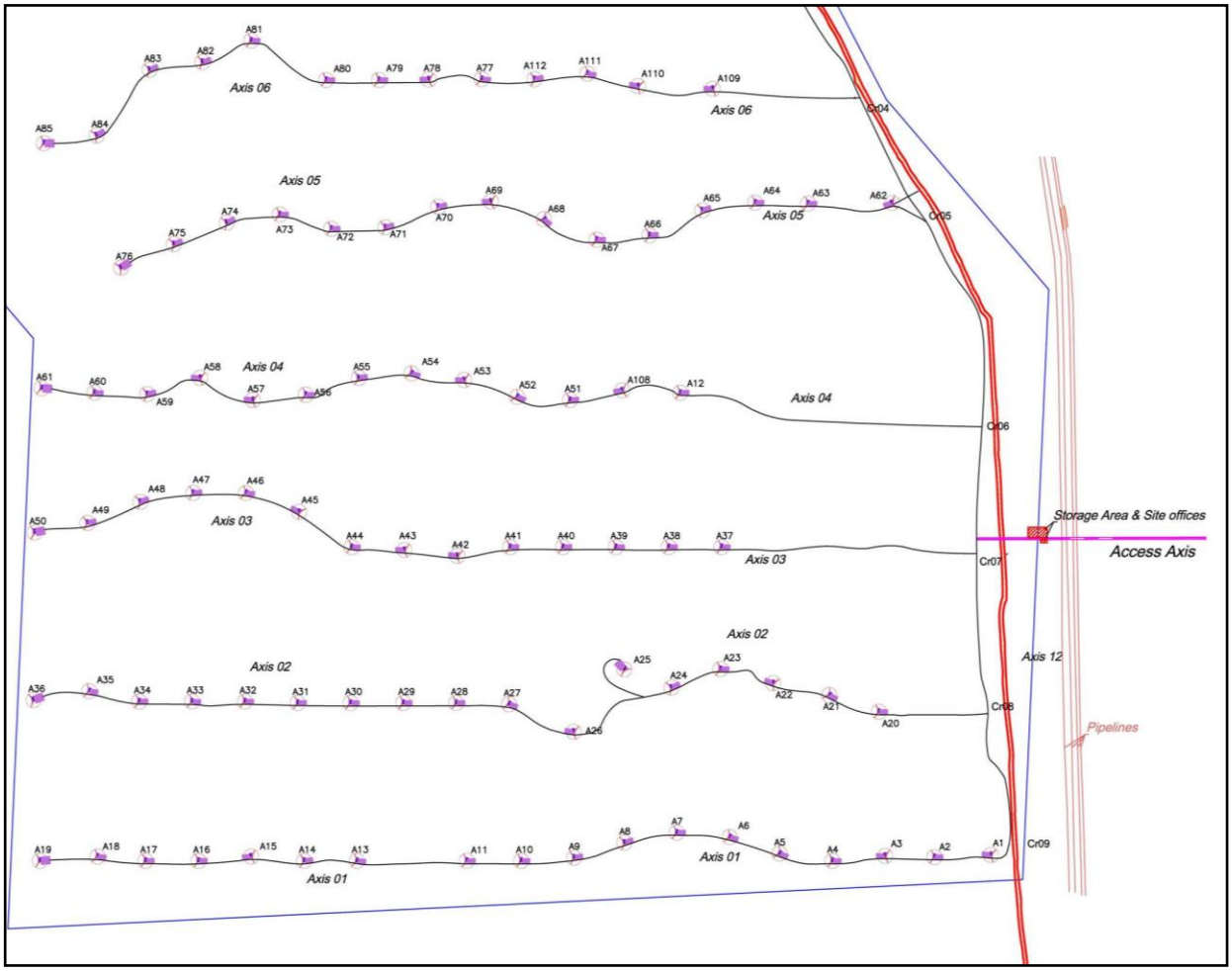
4.2 Typical features and layout of windfarm projects

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 across6 % 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.

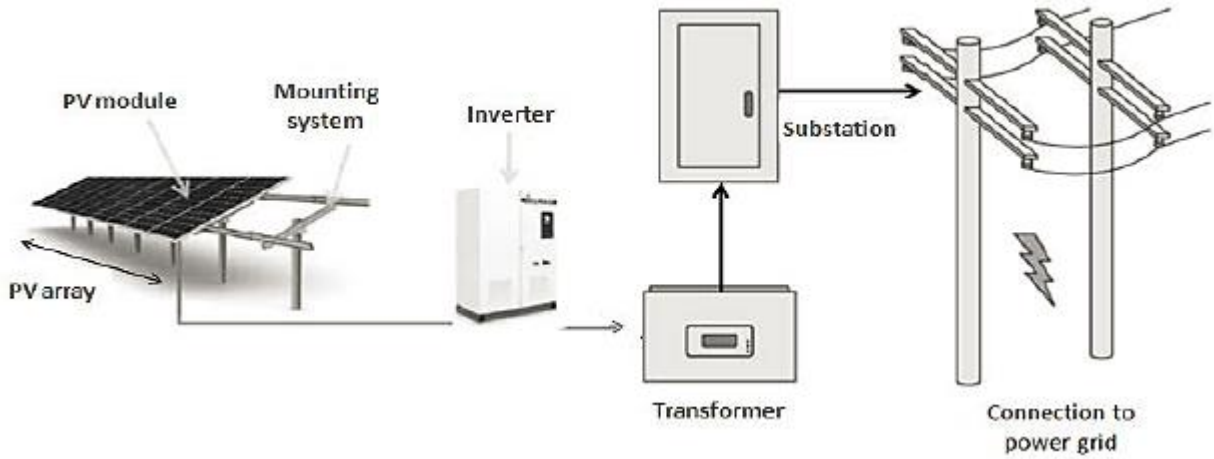


Figure 7: Setup of a PV Plant

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 invertor and transformer arrangement

Figure 10: Example of a PV Plant

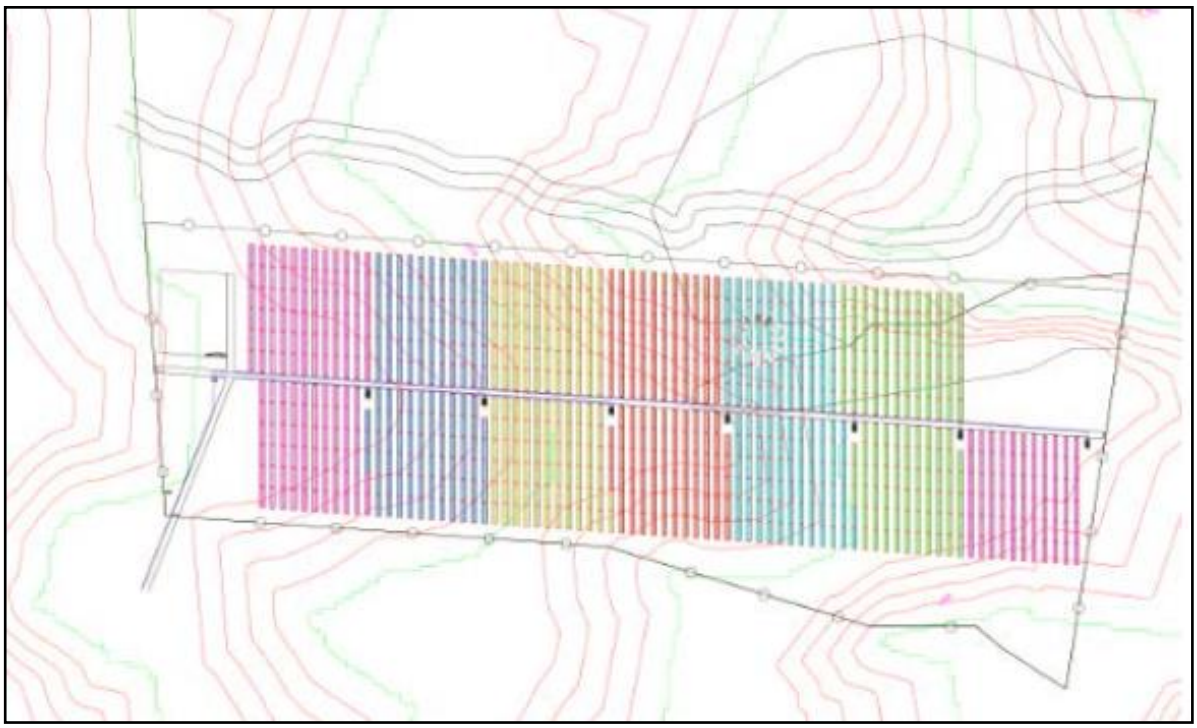


Figure 11: Typical PV Plant layout

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 Ecocene 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 Saharao-Sindian phytogeographical region. Goodman and Hobbs[1] (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.

[1]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[2]). 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

[2] 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*)) recoded 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[3])

Gover-norate	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
Total	**13.9**	**12 258 729**	**6 010 286**	**6 248 443**

Table 3: Separation urban / rural population as per census 2006[4]

Gover-norate	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
Total	**9902884**	**7670182**	**2232702**

Table 4: Mortality and births rates and natural increase in 2014*[5]

Gover-norate	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
Average / Total	**30**	**361375**	**5.6**	**67307**	**35.6**	**428 682**

* Preliminary Data
(1) Rate per thousand of Population

[3] Source: Egypt Statistical yearbook, 2015, CAPMAS (Central Agency for Public Mobilization and Statistics)
[4] Source: Egypt Statistical yearbook, 2015, CAPMAS
[5] 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[6]

Governorate	Share of the total employment market in the three Governorates					
	Education	Public Administration	Transportation	Construction	Agriculture	Total
Beni Suef	**6%**	**7%**	**5%**	**13%**	**47%**	**78%**
Male	5%	9%	7%	19%	33%	73%
Female	9%	4%	0%	0%	75%	89%
Menia	**9%**	**7%**	**4%**	**10%**	**49%**	**80%**
Male	7%	9%	5%	13%	43%	77%
Female	16%	3%	0%	0%	69%	89%
Assiut	**12%**	**8%**	**5%**	**18%**	**34%**	**76%**
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

[6] 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 high-way 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.	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. Assessment of need of appropriate waste water treatment schemes (domestic, hazardous).
Domestic and hazardous waste management	Existing domestic waste disposal facilities and appropriateness.	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). Assessment of appropriate options for on-site treatment of domestic waste with Governorate Authorities. 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.).
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 <u>potential significance</u> 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
negligible	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.
minor	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.
moderate	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.
major	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 12th, 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	Construction Phase: Area coverage rate of about 6 % to 8 % of the land Operation Phase: Area coverage rate about 5 %. Relevant for project subareas, where economic activities (farming, stone crushing, mining) take place (impact zone 0.5 km)	moderate(for both phases)	Field survey of existing economic activities; determination of locations, type of activity, number of people employed. Information gathering from authorities related to legal status of current activities and any future planning in the area For current activities definition of mitigation measures to avoid impacts.
Socio-economic effects	Construction Phase: No adverse impacts expected, if competing uses are adequately considered in planning; positive effects in employment Operation Phase: Nature preservation and resource conservation (saving of conventional energy, emission reduction, creation of employment) (impact zone 40 km)	moderate(for both phases)	Acquisition of statistics on social key parameters and analysis of negative and positive impacts of the RE projects. Field survey to confirm that the project area with immediate surrounding is free from dwellings; in case of dwellings to identify locations and mitigation. The SESA will also investigate the potential presence of Bedouins in the Project Area. Assessment of positive effects

			e.g. employment opportunities, local manufacturing options for components, effect of getting acquainted with modern technologies. Assessment of potential negative effects.
Landscape character and visual impact	Construction and Operation Phase: 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)	minor (for both phases)	Discussion of current and modified landscape character; in case of sensitive receptors inside or nearby the area: visualisation of future wind farm.
Terrestrial flora and fauna	Construction and Operation Phase: Disturbance, destruction or loss of habitats; possibly of major significance in case of existence of sensitive receptors (impact zone 2 km)	minor to moderate(for both phases)	Field surveys along representative cross sections and in 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 to avoid/reduce impacts.
Avifauna	Construction Phase: Disturbance or loss of habitats (breeding birds) Operation Phase: 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)	major (for both phases)	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. 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.
Water resources and waste water	Construction Phase: Minor effects on water resources due to low water	minor (for both phases)	Estimates of water consumption, identification of potential sources of water supply with

	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		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.
Domestic and hazardous waste management	<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)	minor (for both phases)	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).
Air quality	<u>Construction Phase:</u> Occasionally occurrence of dust due to earthworks and transport at single spots only (impact zone up to 1 km)	minor (for construction phase only)	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.
Noise, vibrations, electromagnetic interferences and light reflection / shadowing	<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)	minor (for operation phase only)	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

(public health aspects)			area: Calculation of zones of influence of noise emissions from wind farm and of shadowing/flicker and necessary distances. Assurance that there are no tele-transmission/repeater stations or radar in near distance that could be disturbed; if existing: definition of avoidance measures.
Archaeological, historical and cultural heritage	<u>Construction Phase:</u> Might be existing at the western border, subject to site reconnaissance and stakeholder input (impact zone 1 km)	negligible to major (if impacted)(for both phases)	Verification of non-existence during site survey and inquiry of authorities. If existing: Duly consideration by avoidance/mitigation.
Occupational health and safety risks	<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)	minor (for both phases)	Discussion of risks associated with the construction and operation of wind projects and definition of necessary mitigation. Assess effects of dust development on occupational health and appropriate mitigation (e.g. water spraying). Define application of international health and safety standards during project development.
Impact on traffic, utility services and other infrastructure	<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)	minor (for construction phase only)	Assess sources of water, sand and gravel supply and corresponding transport routes. 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. Assessment of significance of impacts, and, if significant, definition of avoidance or mitigation measures.

Run-off / flash flood risk	Construction and Operation Phase: Flash floods may occur during occasional strong rains in catchments prone for flash floods (shape of catchments and downward slope)	moderate (for both phases)	Desk study on catchment area and slopes to determine wadis that could cause flash floods; interviews of local people; site survey. Mitigation by definition of proper rules for siting of installation.
Earthquake risks	Construction and Operation Phase: Fault lines shown on the geological map might be indicator for earthquake risk	minor (for both phases)	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.

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	Construction and Operation Phase: 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)	moderate to major (for both phases)	Field survey of existing economic activities; determination of locations and type of activity. Information gathering from authorities related to legal status of current activities and any future planning in the area. For ongoing activities definition of mitigation measures to avoid impacts.
Socio-economic effects	Construction Phase: No adverse impacts expected, if competing uses of the area are adequately considered in planning; positive effects in employment Operation Phase: Nature preservation and resource conservation (saving of conventional energy, emission reduction, creation of employment) (impact zone 40 km)	moderate (for both phases)	Acquisition of statistics on social key parameters and analysis of negative impacts and benefits of the RE projects. 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. The SESA will also investigate the potential presence of Bedouins in the Project Area. Assessment of positive effects e.g. employment opportunities. Assessment of potential negative effects.
Landscape character and visual impact	Construction and Operation Phase:	minor (for both phases)	Discussion of current and modified landscape character. In case of sensitive receptors inside or next to the area assessment of

	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)		effects of change of the landscape; if relevant, mitigation according to mitigation hierarchy.
Terrestrial flora and fauna	<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)	minor to moderate(for both phases)	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.
Avifauna	<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)	major (for both phases)	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.
Water resources and waste water	<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)	minor (for construction phase only)	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.

Domestic and hazardous waste management	Construction and Operation Phase: Limited waste generation; no hazardous waste generation, if handling according to accepted standards (impact zone 1 km)	minor (for construction phase only)	Description of kind and quantities of domestic and hazardous waste (e.g. used batteries) 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 with preference on recycling. Assessment of recycling options for hazardous waste and of need for regular disposal (e.g. used batteries, damaged solar cells?).
Air quality	Construction Phase: Occasionally occurrence of dust due to earthworks and transport during construction at single spots only (impact zone up to 1 km)	minor (for construction phase only)	Discussion of sources and relevance of air pollution caused (relevant during construction phase). As applicable definition of minimisation measures (e.g. water spraying).
Noise, vibrations, electromagnetic interferences and light reflection (public health aspects)	Construction Phase: Noise and vibrations may occur during construction, if ramming of frame supports/piles is applied Operation Phase: Light reflection during operation from panels only, if low efficiency PV panels would be chosen In the absence of receptors (settlements) inside or nearby the project area effects are negligible (impact zone up to 500 m)	minor (for both phases)	Discussion of the effects originating from the project and making evident that there are no sensitive receiving bodies. If dwellings or other sensitive receptors are identified in or next to the area: keeping minimum distances. Define requirements for PV panel surfaces to minimise reflection. Avoid ramming of piles at night.
Archaeological, historical and cultural heritage	Construction and Operation Phase: May exist at the western border, subject to site reconnaissance and stakeholder input (impact zone 1 km)	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	Construction and Operation Phase: Risks are small if generally accepted health and safety standards as strictly applied by renowned companies are followed (impact zone 50 m)	minor (for both phases)	Discussion of risks associated with the construction and operation of solar projects and definition of necessary mitigation. Assess effects of dust development on occupational health and appropriate mitigation (e.g. water spraying). Define application of international health and safety standards during project development.
Impact on traffic, utility services and other infrastructure	Construction Phase: Little relevance due to low utilisation of capacities of existing roads and low water consumption during construction	minor (for construction phase only)	Assess sources of water, sand and gravel supply and corresponding transport routes. 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. Assessment of significance of impacts, and, if significant, definition of mitigation measures.
Run-off / flash flood risk	Construction and Operation Phase: Flash floods may occur in wadis due to occasional strong rains in catchments prone for flash floods (shape of catchments and downward slope)	moderate (for both phases)	Desk study on catchment area and slopes to determine wadis that could cause flash floods; interviews of local people; site survey. Mitigation through proper siting during design stage.
Seismicity risks	Construction and Operation Phase: Fault lines shown on the geological map might be indicator for higher earthquake risk	minor (for both phases)	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.

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.

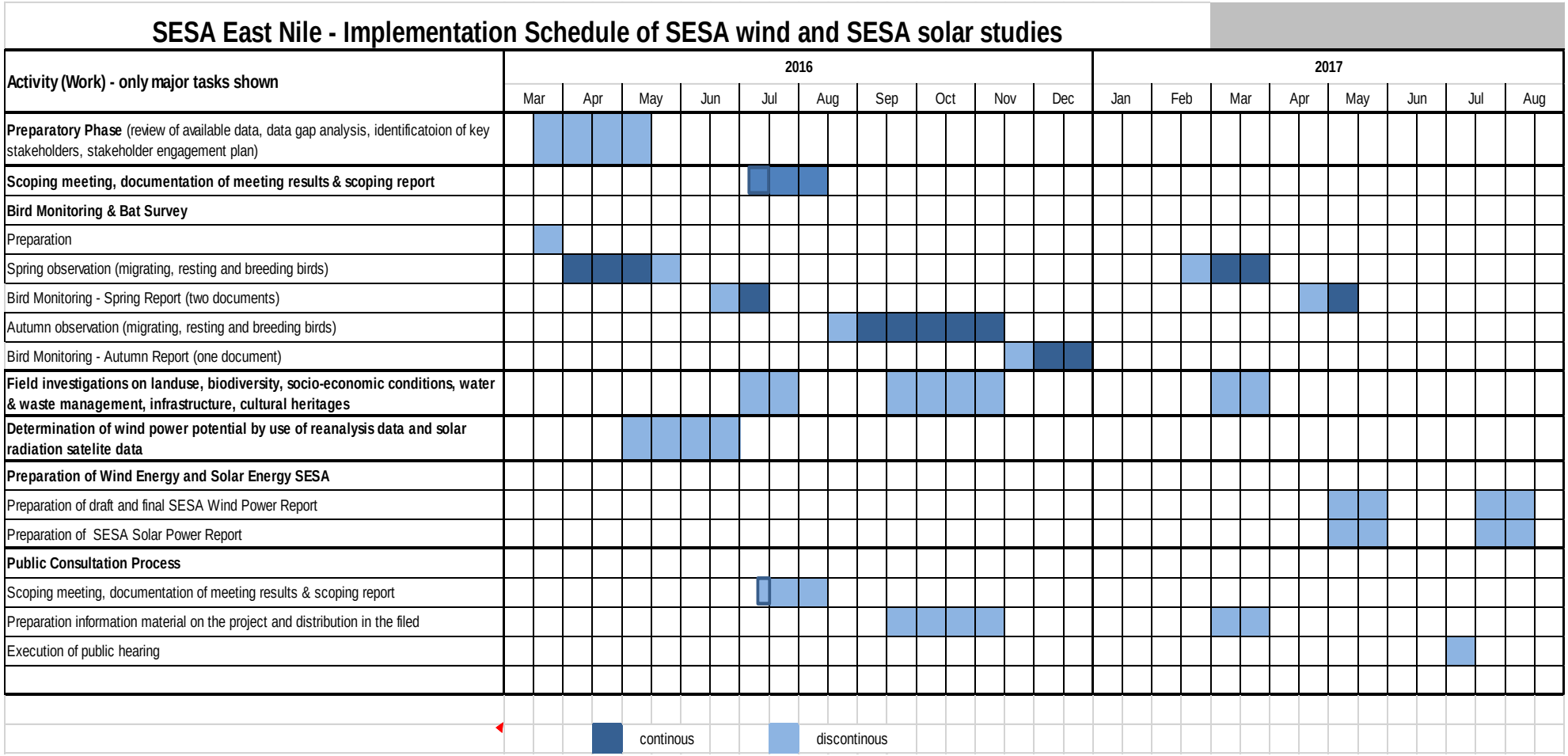


Figure 17: Implementation Schedule of the SESA wind and SESA solar studies

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

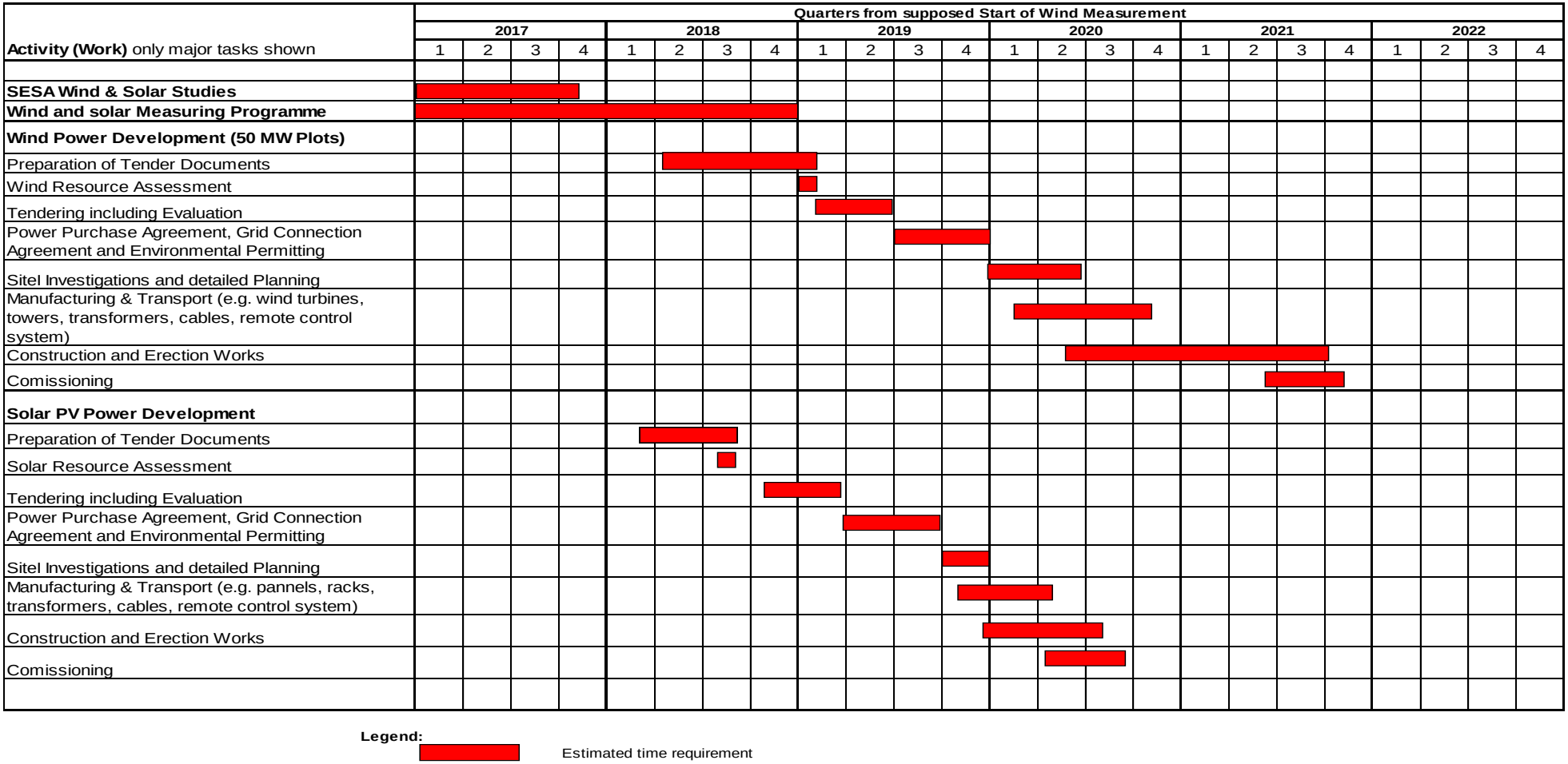


Figure 18: Likely Schedule of 50 MW Wind and PV Solar Power Investment Implementation

Annex A: Stakeholder Engagement Plan

JV LAHMEYER INTERNATIONAL ecoda

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

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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^2across 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 it's 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 12th, 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
SESA Study Phase			
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	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
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 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
General manager of protected areas EEAA	EEAA Misr Helwan El Zeray st. Eng. Mohamed Salem By Visits; E-mail, Telephone; Fax Official invitation for scoping and public hearing	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.	Identification of stakeholders Scoping meeting During course of SESA preparation Review of scoping report and SESA Public Hearing During RE planning and development
Manager of Environmental Department, Beni Suef Governorate	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
Manager of Environmental Department, Menia Governorate	Phone: 0862326021 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

Stakeholders	Communication & Proposed Method	Justification to be stakeholder	Major Phases of Participation
			During RE planning and development
Head of Environmental Department, Assiut Governorate	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
Regional Office of EEAA, Northern Part of Upper E	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
Manager of Information Department, Beni Suef Governorate	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
Manager of Information Department, Menia Governorate	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
General Secretary Beni Suef Governorate	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
General Secretary Menia Governorate	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 orsource 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
General Secretary Assiut Governorate	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
Head of Solid Waste Management Department, Menia Governorate	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
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	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
Urban planning department manager, Beni Suef Governorate	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
Head of Planning Department, Minya Governorate	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
Head of Misr El Wosta Electricity Distribution company	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
General Manager ESIA Specialist Egyptian Electricity Transmission Company	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
Local government, potentially interested population, in the neighboured Nile	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
Valley, Bedouins, institutes or organisations	Advertisement of public hearing in Al Ahram news paper		Communications during RE planning and development Through grievance mechanism
Local press, local research centre& local universities, NGOs	Invitation by letter and confirmation by E-mail or phone	Press: Interest inreporting 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
Bird Life representative in Egypt	Email: noor@natureegypt.org 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
EBRD	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
Ministry of Transportation (Egypt) - General Authority for Roads, Bridges and Land Transport	Fax: +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.
Telecommunication providers: 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 Boulaq.	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
	Cairo, Egypt. Postal Code: 11221 Telecom Egypt: Email: Phone Vodafone Egypt: Media Relations Sr. Specialist Phone: 25294769 Email: Pakinam.rashed@voda-fone.com Invitation for public hearing		

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 were 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 Asiut 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

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Complaints Sample Form

Reference No:	
Full Name	
Contact information and preferred method of communication Please mark how you wish to be contacted (mail, telephone, e-mail).	☐ **By Post: Please provide postal address:** _____ _____ _____ ☐ **By Telephone:** _____ ☐ **By E-mail** _____
Description of incident or grievance:	What happened? Where did it happen? To whom did it happen? What is the result of the problem? Source and duration of the problem?
Date of incident/grievance	
	☐ **One time incident/grievance (date _____)** ☐ **Happened more than once (how many times? _____)** ☐ **On-going (currently experiencing problem)**
What would you like to see happen to resolve the problem?	

Signature: _____

Date _____

10.1.2 Annex A2: Report on the Scoping Meeting

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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 12th, 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 12th, 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 to5 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 send 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 11th 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 it's results to be satisfactory.

Annex 1: Presentation during scoping meeting

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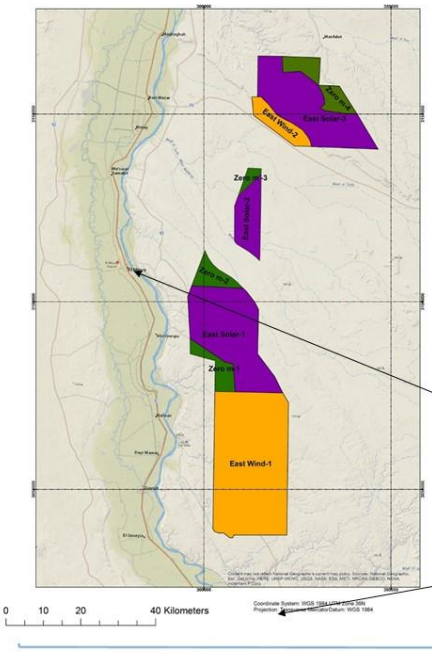
Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region

Scoping Meeting July 12th, 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



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- 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

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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

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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

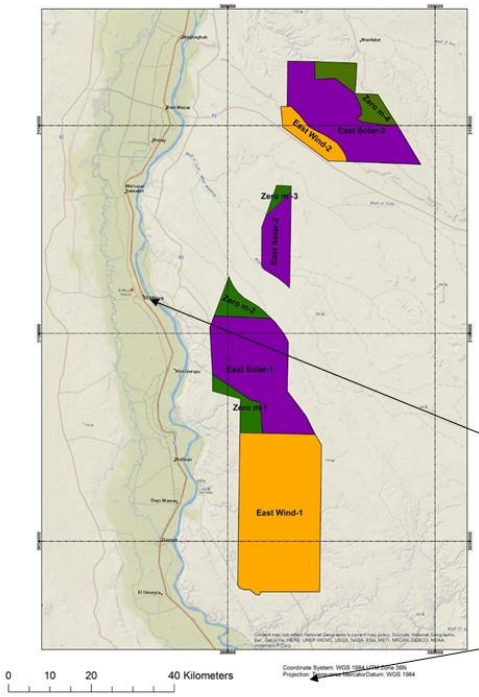
- While RE power potential determination and assessment of technical suitability are engineering tasks following accepted standards/norms the E&S assessment requires input of stakeholders to assure that scope and methods cover all relevant aspects adequately
- Thus, scoping focusses on study element "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 km²)
- 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

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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.

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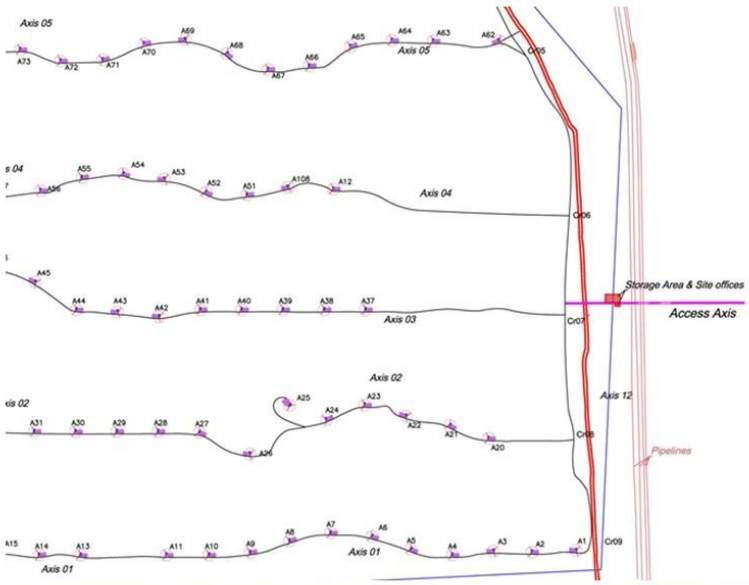
Windfarm in Egyptian Desert

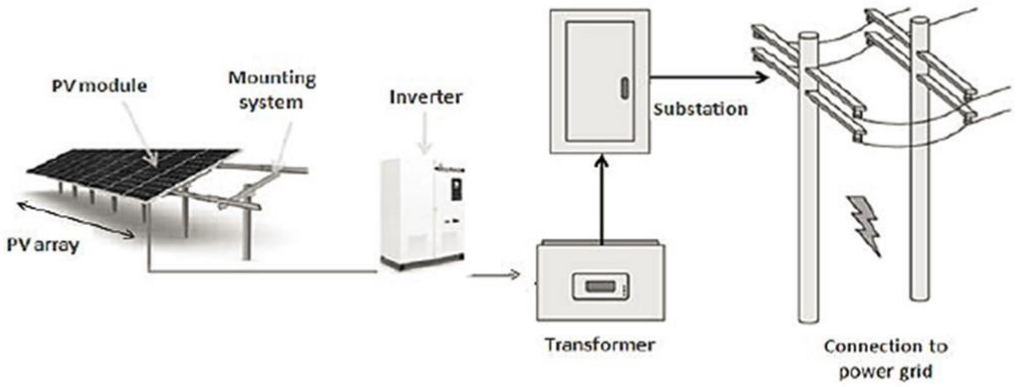
Distance View to a Windfarm



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 km²

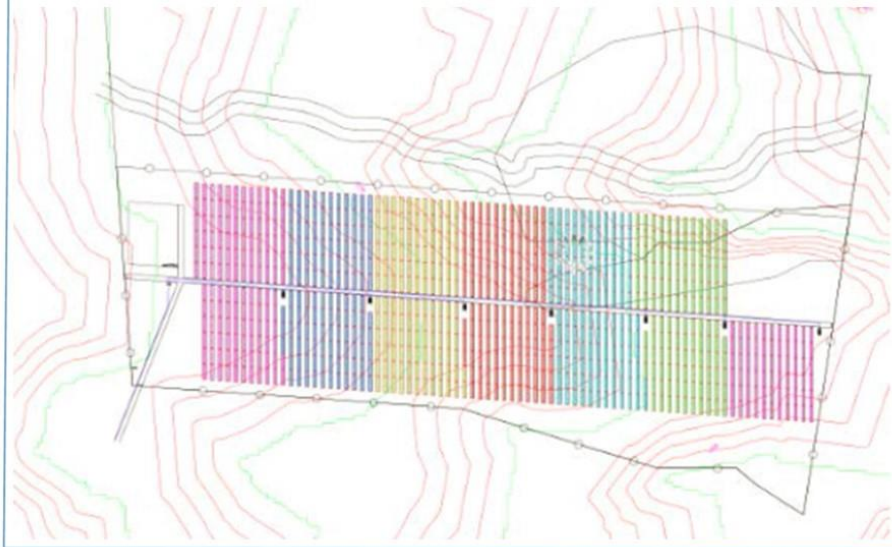
Typical Features of a PV Solar Power Project



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 km²

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 Mallawi.
- 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

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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	*Site reconnaissance, approach of owners and input of relevant Governorate Authority*
Socio-economic impacts	Statistics, land-use	*Data collection and desks studies, field investigation*
Landscape character and visual impact	Verification of non-existence of sensitive receptors	*If existing take photos during site investigations towards RE site for visual impact simulation*
Terrestrial flora and fauna	Only preliminary on-site information available	*Verify and update information through site survey to specify baseline information*
Avifauna	Only preliminary on-site information available	*Migrating Birds: Full spring and autumn monitoring programme - wind power* *Survey on local birds*
Water resources & waste water	Sources of freshwater for project water supply	*Site reconnaissance*

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Social and environmental baseline information and data gaps

Issue	Gaps	Planend Actions
Domestic and hazardous waste management	Existing domestic waste disposal facilities and appropriateness	*Approach relevant Governorate authorities for input*
Air quality	None	*None*
Noise, vibrations, electro-magnetic interferences & light reflection/ shadowing	Verification of non-existence of sensitive receptors inside or next to the areas	*Site survey*
Archaeological, historical and cultural heritages	Verification of non-existence of relevant sites inside or next to the areas	*Site reconnaissance; Approach relevant authorities for input*
Occupational health and safety risks	None (International standards to apply)	*None*
Impact on traffic, utility services and other infrastructure	Identification of likely transport routes of gravel, sand and fresh water	*Site reconnaissance*

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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

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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.

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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

	Potential Impacts (Wind power)	**Level of Significance/ Assessment**	**Mode of Assessment**	**Comments/ Stakeholder Input/ Additions/Modifications etc.**
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)	*Detailed Assess-ment*	*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*	No. of people employed

	Potential Impacts (Wind power)	Level of Significance/ Assessment	Mode of Assessment	Comments/ Stakeholder Input/ Additions/Modifications etc.
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)	*Indica-tive Assess-ment*	*Acquisition of statistics on social key parameters and analysis of negative and positive impacts of the RE projects;* *Field survey to confirm that the project area with immediate surrounding is free from dwellings; in case of dwellings to identify locations* *Assessment of positive effects e.g. employment opportunities* *Assessment of potential negative effects.*	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
Landsca-pe charac-ter 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)	*Cursory Assess-ment*	*Discussion of current and modified landscape character; in case of sensitive receiving bodies inside or nearby the area: Visualisation of future wind farm*	

	Potential Impacts (Wind power)	Level of Significance/ Assessment	Mode of Assessment	Comments/ Stakeholder Input/ Additions/Modifications etc.
Terres-trial 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)	*Detailed Assessment*	*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*	
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)	*Detailed Assessment*	*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*	

	Potential Impacts (Wind power)	**Level of Significance/ Assessment**	**Mode of Assessment**	**Comments/ Stakeholder Input/ Additions/Modifications etc.**
Water resources & waste water	Very minor effects due to low water resource consumption and waste water generation during construction (impact zone 1 km)	*Cursory Assessment*	*Discussion of estimated water consumption, potential sources of water supply, effect on water resources, waste water treatment requirements; appropriate waste water treatment schemes*	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

Domestic and hazar-dous waste manage-ment	Limited waste generation during construction; no hazardous waste generation, if handling according to accepted standards (impact zone 1 km)	*Cursory Assess-ment*	*Description of kind 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 jointed to or applied by the future RE projects (Relevance especially for the construction phase).* *Define methods of hazardous waste handling and treatment*	Assess of appropriate options for on-site treatment of domestic waste 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?)
Air quality	Occasionally occurrence of dust due to earthworks and transport during construction at single spots only (impact zone up to 1 km)	*Cursory Assessm ent*	*Discussion of sources and relevance of air pollution caused (relevant during construction stage)* *As applicable definition of minimisation measures (e.g. water spraying)*	(see occupational health)
Noise, vi-brations, electro-magnetic inter-ferences and light reflection / sha-dowing	In the absence of receiving bodies (settlements) inside or nearby to the project area effects are negligible (impact zone up to 1.5 km)	*Cursory Assessm ent*	*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:*	

(public health aspects)			*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*	
Archaeological, historical and cultural heritages	Might be existing at the western border, subject to site reconnaissance and stakeholder input (impact zone 1 km)	*Cursory Assessment*	*Verification during site survey and inquiry of authorities;* *If existing: Duly consideration by avoidance/mitigation measures.*	
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)	*Cursory Assessment*	*Discussion of risks associated with the construction and operation of wind projects and definition of necessary mitigation*	Assess effects of dust development on occupational health and appropriate mitigation Application of accepted health and safety standards

Impact on traffic, utility services and other infrastructure	Little relevance due to low capacity utilisation of existing roads and low water consumption during construction; negligible during operation (impact zone 10 km)	*Cursory Assessment*	*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*	
Any further issue to be considered as per stakeholder input	Flash Flood risks; earthquake risks	*Detailed Assessment*	*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*	

Solar power development

Issue	Potential Impacts (PV Solar Power)	Level of Significance/ Assessment	Mode of Assessment	Comments/ Stakeholder Input/ Additions/Modifications etc.
Landuse/ Landtake	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)	*Detailed Assess-ment*	*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 ongoing activities definition of social mitigation measures to avoid conflicts according to mitigation hierarchy: 1. Avoidance, 2. Mitigation, 3. Restoration/offset measures*	

Issue	Potential Impacts (PV Solar Power)	Level of Significance/ Assessment	Mode of Assessment	Comments/ Stakeholder Input/ Additions/Modifications etc.
Socio-economic effects	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) (impact zone 40 km)	*Indica-tive Assess-ment*	*Acquisition of statistics on social key parameters and analysis of negative and positive impacts of the RE projects;* *Field survey to confirm that the PV/Solar project area is free from dwellings; in case of dwellings to identify locations & legal status* *Assessment of positive effects, e.g. employment opportunities* *Assessment of potential negative effects*	See additions under wind power
Land-scape character and visual impact	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 (impact zone 3 km)	*Cursory Assess-ment*	*Discussion of current and modified landscape character;* *in case of sensitive receiving bodies inside or next to the area assessment of the change of the landscape*	

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)	*Detailed Assess-ment*	*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*	

Avifauna	Disturbance or loss of habitats (breeding birds); (impact zone 5 km)	*Detailed Assess-ment*	*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*	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)	*Cursory Assess-ment*	*Discussion of estimated water consumption, potential sources of water supply, effect on water resources, waste water treatment requirements; appropriate waste water treatment schemes*	Remark: Consideration of regular cleaning
Domestic and hazar-dous waste manage ment	Limited waste generation during construction; no hazardous waste generation, if handling according to accepted standards (impact zone 1 km)	*Cursory Assess-ment*	*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).*	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)	*Cursory Assess-ment*	*Discussion of sources and relevance of air pollution caused (relevant during construction stage)* *As applicable definition of minimisation measures (e.g. water spraying)*	See remarks regarding wind power

Noise, vibration, electromagnetic interferences and light reflection (public health aspects)	Noise & 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)	*Cursory Assess-ment*	*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*	
Archaeological, histo-rical and cultural heritages	Might be existing at the western border, subject to site reconnaissance and stakeholder input (impact zone 1 km)	*Cursory Assess-ment*	*Verification during site survey and inquiry of authorities;* *If existing: Duly consideration by avoidance/mitigation measures.*	
Occupational health and safety risks	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)	*Cursory Assess-ment*	*Discussion of risks associated with the construction and operation of PV solar power projects and definition of requirements to follow internationally accepted standards*	Relevance of dust for occupational health

Impact on traffic, utility services and other infra-structure	Little relevance due to low capacity utilisation of existing roads and low water consumption during construction; completely negligible during operation (impact zone 10 km)	*Cursory Assess-ment*	*Description of transport infrastructure, current traffic loads and expected additional traffic due to construction measures* *Assessment of significance of impacts, and, if significant, definition of avoidance or mitigation measures*	Assess sources of water, sand and gravel supply and corresponding transport routes
Any further issue to be consider ed as per stakehol-der input	Flash Flood risks; earthquake risks	*To be identi-fied*	*Desk study on catchment area and slopes to determine Wadis that could cause flash floods; Interviews of local people* *Earthquake: Existence of fault lines and reference to consideration of local earthquake design standards*	

Annex 3: List of Stakeholders as agreed with EEAA

Stakeholders	Communication & Proposed Method
SESA Study Phase	
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

Stakeholders	Communication & Proposed Method
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 neighboured 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 centere & 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

	Communication & Proposed Method	Please confirm attendance by signature
NREA Mina Nabil Ramzy	mina_vodafone@yahoo.com	Mina
NREA asmaa Kamel	eng.as_ka@yahoo.com	asmaa
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NREA Mohamed El-Khayat	t-vicechair@nrea.gov.eg	
NREA Ehab Ismail	ehab4768@gmail.com	
NREA Mohamed Selim	moyhn99@gmail.com	Mohamed Selim
~~NREA/ Medhat Abdel Azi~~	m_aziz67@yahoo.com	
Others		
ASHRAF A. MAGUID	local consultant	
Islam elsalamony		
Salma Amr		Salma
Dr. F. Berger	ecoda ENVIRONMENTAL CONSULTANTS berger@ecoda.de	
Ahmad Mesbah		
Mona Hussien	EETC	Mona Hussien

Ahmed Mamdouh NREA (ahmed.mamdouh2008@yahoo.com)

Salem Sayed Awad (WREA) Salem

Tamer mohamed abdElkader (NREA) EngTamer1164@yahoo.com

Ahmed Attia Tolba (NREA) engahmed_Tolba@hotmail.com

Moustafa Al: Mabrouk. EEAA - Assiut RBO.
mostafa.mabrok@yahoo.com

SESA Study, Attendance Sheet - Scoping Meeting on July 12th, 2016 at NREA

4

	Communication & Proposed Method	Please confirm attendance by signature
NREA	Asmaa Fouad shehab	asmaafouad47@yahoo.com
NREA	Suzan Adel Ibrahim	Suzan
NREA	Amany Salah	EEAA. Amany
NREA	Amira Ibrahim	EEAA Amira
NREA	Akmal Mahmoud	
NREA	<akmal.mahmoud@gmail.com>	
Others		

4

SESA Study, Attendance Sheet - Scoping Meeting on July 12th, 2016 at NREA

10.2 Annex B: Interim Reports on the Bird Monitoring

10.2.1 Annex B1: IUCN Red List

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Classification of Target Species according to IUCN Red List of Threatened Species

Annex B1 to
Final SESA Wind Report

October 2017

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

Classification of target species, which are known to migrate along Egypt, according to IUCN Red List

no	species	scientific name	IUCN Red List
1	Greater Flamingo	*Phoenicopterus roseus*	LC
2	Great White Pelican	*Pelecanus onocrotalus*	LC
3	Black Stork	*Ciconia nigra*	LC
4	White Stork	*Ciconia ciconia*	LC
5	Osprey	*Pandion haliaetus*	LC
6	European Honey Buzzard	*Pernis apivorus*	LC
7	Black Kite	*Milvus migrans*	LC
8	Egyptian Vulture	*Neophron percnopterus*	EN
9	Short-toed Snake Eagle	*Circaetus gallicus*	LC
10	Marsh Harrier	*Circus aeruginosus*	LC
11	Pallid Harrier	*Circus macrourus*	NT
12	Montagu's Harrier	*Circus pygargus*	LC
13	Levant Sparrowhawk	*Accipiter brevipes*	LC
14	Eurasian Sparrowhawk	*Accipiter nisus*	LC
15	Steppe Buzzard	*Buteo buteo vulpinus*	LC
16	Long-legged Buzzard	*Buteo rufinus*	LC
17	Lesser Spotted Eagle	*Aquila pomarina*	LC
18	Greater Spotted Eagle	*Aquila clanga*	VU
19	Steppe Eagle	*Aquila nipalensis*	EN
20	Eastern Imperial Eagle	*Aquila heliaca*	VU
21	Booted Eagle	*Aquila pennata*	LC
22	Lesser Kestrel	*Falco naumanni*	LC
23	Common Kestrel	*Falco tinnunculus*	LC
24	Red-footed Falcon	*Falco vespertinus*	NT
25	Eleonora's Falcon	*Falco eleonorae*	LC
26	Sooty Falcon	*Falco concolor*	NT
27	Eurasian Hobby	*Falco subbuteo*	LC
28	Lanner Falcon	*Falco biarmicus*	LC*
29	Barbary Falcon	*Falco pelegrinoides*	LC*
30	Common Crane	*Grus grus*	LC

Classification due to IUCN Red List of Threatened Birds: "Endangered", "Vulnerable", "Near Threatened"

Species not considered in the IUCN Red List are not colored.

*: no classification for migratory birds available, represented category refers to breeding birds

Explanation of different categories of "The IUCN Red List of Threatened Species" for migratory bird species in Egypt

International Union for the Conservation of Nature and Natural Resources

http://www.iucnredlist.org/

http://www.birdlife.org/datazone/speciessearchresults.php?reg=0&cty=63&cri=&fam=0&gen=0&spc=&cmn=&hab=&thr=&bt=&rec=N&vag=N&sea=&wat=&aze=&lab=&enb=&mib=Y&cnv=&hdnAction=ADV_SEARCH&SearchTerms=

ENDANGERED (EN)

A species is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)

A species is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)

A species is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

A species is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant species are included in this category.

For explanations of the mentioned criteria within the explanations of the categories see:
http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf
http://www.iucnredlist.org/documents/reg_guidelines_en.pdf

10.2.2 Annex B2: First Report on the Bird Monitoring in the East Nile Region (Arab Republic of Egypt) - Spring 2016

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First Report on the Bird / Bat Monitoring in Spring 2016 in the East Nile Region (Arab Republic of Egypt)

Draft Report
Revised Version 01

September 2016

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

First Report on the Bird / Bat Monitoring in Spring 2016 in the East Nile Region (Arab Republic of Egypt)

Draft Report – Revised Version 01

Prepared for:

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1 Introduction

1.1 Background and Objectives

Following the issuance of Renewable Energy Feed-in Tariff ("FiT") presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (the "EBRD", has been engaged in partnership with the Government of Egypt ("GoE") to identify a portfolio of Renewable Energy projects (mainly from wind and solar sources) to be financed by prequalified Foreign Direct Investors ("FDIs").

The GoE has identified three large areas suitable for development of wind and solar applications, under the newly issued FiT law mentioned above. One of these areas, the project area, is located in the East Nile Region across the three Governorates of Beni Suef, Minia and Assuitand extents over 2,200 km².

To ensure a strategic level assessment of the potential environmental and social issues associated with these major developments, EBRD has agreed to fund the Strategic Environmental and Social Assessment (SESA) Study for the East of Nile area. Subsequently the execution of a SESA study on the project area was awarded to the Joint Venture Lahmeyer- ecoda. The study shall serve as a framework SESA study considering RE-development in the project area and shall facilitate future ESIA and environmental clearance for the individual projects within the areas.

Installing large wind farms in the East Nile area may lead to significant impacts on migrating birds and on bats caused by collisions with turbines or, to a lower degree, by barrier effects. In addition, development of Renewable Energy projects might lead to other impacts on birds / bats, like habitat loss or disturbance. Since there is no comprehensive knowledge on bird migration and on occurrence of bats in the East Nile Region, a thorough investigation forms a crucial part of the SESA.

The main objectives of the standardized field investigation are to

- collect significant baseline data on migrating birds (mainly soaring and gliding species migrating during the day) and on bats in spring and in autumn;
- describe migration patterns of relevant species in a quantitative way;
- identify and assess possible impacts regarding development of Renewable Energy projects within the area;
- prioritise areas for wind and solar energy utilization according to the level of significance of likely impacts on birds / bats;
- propose criteria for selection of a site with the lowest impact on birds / bats; and finally
- recommend mitigation measures in order to minimize possible conflicts, if required.

The project area is subdivided into different sections, in which wind and solar applications shall be developed. In spring 2016 bird migration was recorded by standardized observations in areas designated for wind applications. The interim report in hand covers

- an overview of the methods and the observation schedule applied in spring 2016;
- a presentation of the main results obtained by observations;
- first conclusions regarding the importance of the area for bird migration in spring; and finally
- a first assessment of possible impacts on spring migration caused by installing and operating wind farms within the project area (impacts of PV solar projects will be assessed in the SESA Solar Power Report).

The standardized field monitoring started on April 2nd, 2016, shortly after contract signature. Thus, the monitoring covers about half of the spring migration period only. In line with the contract the period from late February to the end of March shall be covered by an additional survey to be carried out in spring 2017. Accordingly, the report in hand does not cover a full spring migration period.

Important habitats for local fauna shall be identified in the scope of the SESA, too. Hence, all observations of local or resting birds and of other animals have been recorded during standardized observations or during travelling through the project area.

1.2 Project Area

The project area is located east of the Nile Valley at a nearest distance of 8 km at the latitude of Maghada in the North and El Quoseyia in the South, all on desert land. 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 project area. Inside the area only very few isolated economic activities take place such as agricultural groundwater irrigation schemes, stone crushing or mining. The hyper-arid climate of the Eastern Desert leads to sparse vegetation which belongs to the Saharao-Sindian phytogeographical region.

In the project area two sections are designated for wind applications (East Wind-1 and East Wind-2). These sections are located in the northern and southern part of the project area. The northern section (East Wind-2) covers an area of about 79 km² and the southern section (East Wind-1) about 748 km² (see Map 2.1).

Figure 1.1: Impressions from the project area

2 Methods

2.1 Data Collection

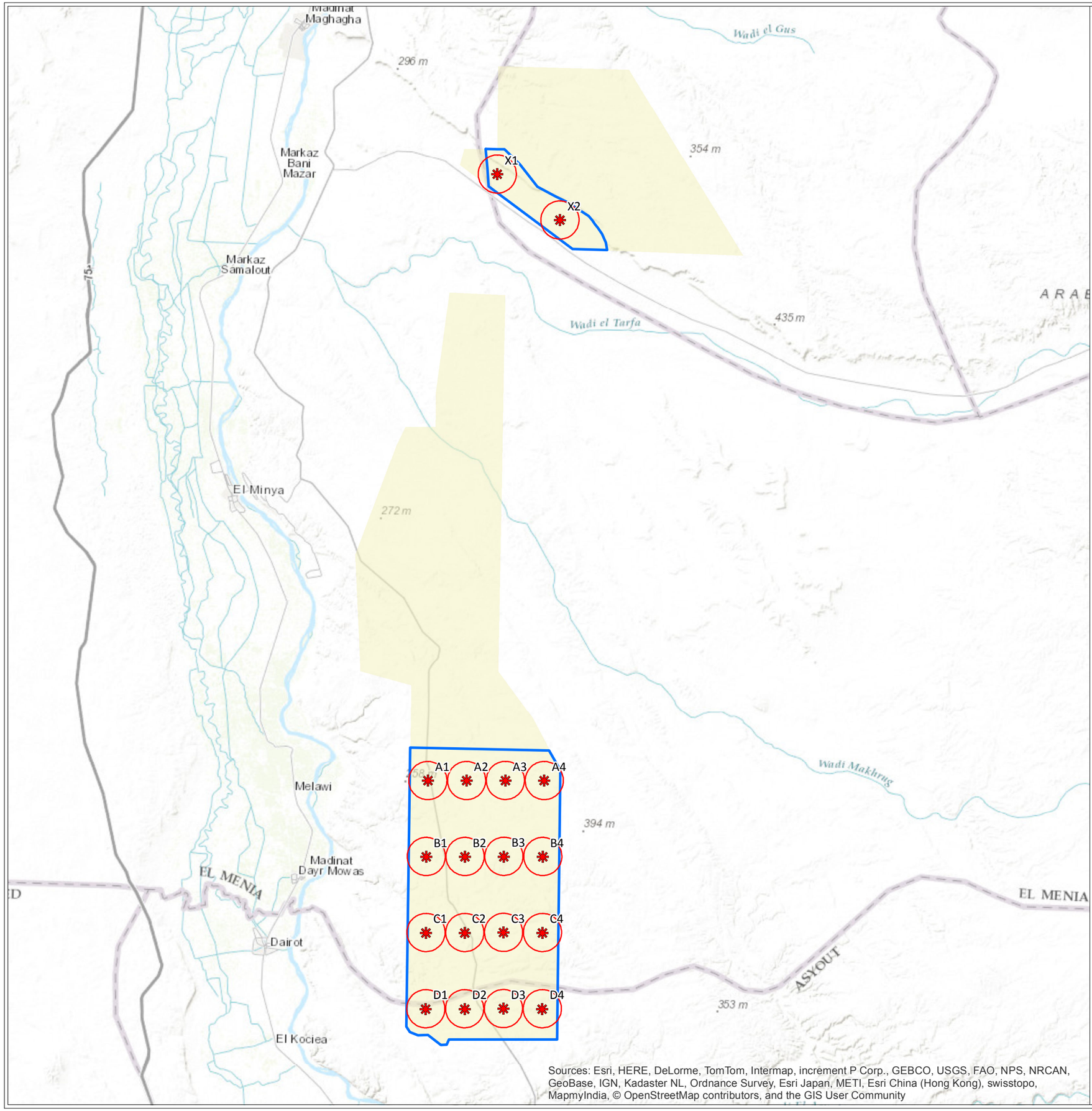
2.1.1 Standardized Field Observations of Migrating Birds

Between April 2nd and May 25th 2016 standardized daytime field observations were carried out. Thus, the study covers an important period of spring migration generally lasting from late February to end of May for most of the relevant species (e.g. Bergen 2009, ecoda 2011, Lesham & Yom-Tov 1996). In general the study design was similar to the ones which were used during previous investigations at the Red Sea and at the Nile Valley (for details see Bergen 2009, Bergen & Gaedicke 2012): using fixed observation sites. Observations were conducted by two teams - each with at least two ornithologists - under guidance of a chief ornithologist, who advised and supervised the ornithologists. The teams consisted of European and Egyptian experts.

As known from earlier studies many birds or -at least- flocks of migrating birds can be recorded and safely identified at distances of up to 5 km (in some cases even up to 10 km or more). However, detection probability of birds decreases with increasing distance to an observation site. Hence, standardized data collection focussed on the area at distances of 2.5 km to each observation site.

With regard to the extent of the project area, a total of 18 observation sites were selected in order to obtain a representative sample of migration within the project area. Two observations site were established in the northern section (X1 and X2; see Map 2.1). Further 16 observation sites were located in the southern section within four rows from West to East (perpendicular to the expected main flight direction of migrating birds). These rows consisted of the observation sites A1 - A4 (row A), B1 - B4 (row B), C1 - C4 (row C) and D1 - D4 (row D; see Map 2.1).

As earlier studies have shown (see Figure 3.4 and 3.15 in Bergen 2009), migratory activity is very low in the early morning and the late afternoon (this conclusion proved true in the course of the survey in spring 2016). Furthermore, in the early morning and the late afternoon bird migration is dominated by species, which are more or less active flyers and, thus, do not depend on thermal uplifts (mainly Harriers). These species are not believed to be particularly vulnerable to collision with wind turbines. As a consequence, the early morning and late afternoon (about 1 hour after sunrise to 1 hour before sunset) were neglected during data collection. The time of day in between these periods was subdivided into four periods (early morning, morning, midday and afternoon). A rotation schedule was used to gain a representative distribution of spatial and temporal observation samples (see Table 2.1). It was possible to follow this schedule most days. Each day standardized daytime field observations should be conducted for 12 hours (six hours per team). During most days eight different observation sites in the southern section were visited for 1.5 hours each. When the northern section was studied, observations lasted for three hours at the sites X1 and X2 (each) and further four different observation sites in the southern section were visited for 1.5 hours each. Most observation units started more or less at the planned time. Delays occurred but observation units were still within the range of the given period of the day.



JV LAHMEYER INTERNATIONAL ecoda

Report on the Bird Monitoring in Spring 2016 in the East Nile Region (Arab Republic of Egypt)

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

Map 2.1
Overview of the project area

Project Area

- extent of the project area
- sections of the project area designated for wind applications
- observation site
- area within a radius of 2.5 km to each observation site

editor: Lars Gaedicke, July 28th 2016

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Table 2.1: Schematic explanation of the rotation schedule applied in spring 2016

observation site	day of observation							
	1st	2nd	3rd	4th	5th	6th	7th	8th
A1	.	.	1.5	.	1.5	.	1.5	1.5
A2	.	.	1.5	.	1.5	.	1.5	1.5
A3	.	.	1.5	.	1.5	.	1.5	1.5
A4	.	.	1.5	.	1.5	.	1.5	1.5
B1	.	1.5	.	1.5		1.5	.	.
B2	.	1.5	.	1.5		1.5	.	.
B3	.	1.5	.	1.5		1.5	.	.
B4	.	1.5	.	1.5		1.5	.	.
C1	1.5	.	1.5	.	1.5	.	1.5	.
C2	1.5	.	1.5	.	1.5	.	1.5	.
C3	1.5	.	1.5	.	1.5	.	1.5	.
C4	1.5	.	1.5	.	1.5	.	1.5	.
D1	.	1.5	.	1.5		1.5	.	.
D2	.	1.5	.	1.5		1.5	.	.
D3	.	1.5	.	1.5		1.5	.	.
D4	.	1.5	.	1.5		1.5	.	.
X1	3	.	.	.		.	.	3
X2	3	.	.	.		.	.	3

During an observation unit (lasting 1.5 or 3 hours; see above) the ornithologists "scanned" the horizon by binoculars with 8 - 10 times magnification as well as by telescopes with 20 - 60 times magnification. Once a bird or a flock of birds was detected, the following variables were determined:

- time of record
- kind of species
- number of birds
- distance and direction to the observation site
  Conspicuous elements (e. g. masts, single trees, powerlines and further elements in the desert) and poles with attached red flags (that made these poles highly visible) were drawn in maps (after having taken their coordinates with a handheld GPS), which were used for the data collection. By these elements and poles (and the information of the distance to the observation site) ornithologists were able to estimate the distance of birds fairly accurately.
- flight path and flight direction
  Flight path and flight direction were recorded by visual observations. After a record a schematic flight path was noted into a map.
  Flight direction was estimated using eight classes (with an extension of 45° each): 1) north-northeast (NNE), 2) east-northeast (ENE), 3) east-southeast, …
- flight altitudes
  A representative height was assigned to each observation of a bird / flock. The flight altitude was recorded in the height classes < 50 m, > 50 m – 150 m and > 150 m. This height band represents the height band, where a bird / flock spent most of the time during the observation. In case a flock distributed over different height classes (over a longer period of the observation),

the ornithologists used different height classes (for the particular number of birds in the different height classes).

At the beginning and the end of each observation unit climatic conditions (temperature, wind speed (Bft) and wind direction using eight classes (see above), cloud cover (in %)) and visibility were measured. For some days, temperature and wind speed could not be measured due to technical problems with the measuring device.

All variables and further information were recorded on a standard form and transferred to a database afterwards.

The observations were carried out almost exclusively during suitable conditions with clear view within the 2.5 km radius around the observation site. During some observations units of four days visibility was less than 2.5 km.

Standardized field observations focussed on species which can be regarded as especially vulnerable to collision strikes or other negative impacts caused by wind turbines. These are mainly large birds (first of all raptors, storks and pelicans) which principally migrate by soaring and gliding during daytime. Soaring and gliding birds seem to be especially vulnerable because of their restricted flight agility (e. g. Ornis Consult 1999). Furthermore, populations of these long-lived species are susceptible to any additional cause of mortality because their rate of annual off-spring is low (Drewitt & Langston 2006).

Some of the relevant species (see Annex I) are generally of special interest within the impact assessment due to their status on the IUCN Red List of Threatened Species (IUCN 2015; see Annex I & II):

- Egyptian Vulture (*Neophron percnopterus*) and Steppe Eagle (*Aquila nipalensis*) are listed as “Endangered”.
- Greater Spotted Eagle (*Aquila clanga*) as well as Eastern Imperial Eagle (*Aquila heliacal*) are listed as “Vulnerable”.

In addition, non-threatened species are considered. Pallid Harrier (*Circus macrourus*), Red-footed Falcon (*Falco vespertinus*) and Sooty Falcon (*Falco concolor*) are listed as “Near Threatened” on the IUCN Red List. EEAA (2013) guidelines for the impact assessment for wind energy developments in Egypt point towards a consideration of common species like White Stork (*Ciconia ciconia*) or European Honey Buzzard (*Pernis apivorus*). Against this background further large soaring birds are considered, which are listed as “Least Concern”.

Small migrating birds (passerines) were not recorded in a systematic way. They are usually flying during night times and at higher altitudes and do not follow specific migration routes. Thus, passerines are considered to be less vulnerable.

2.1.2 Non-Standardized Field Observations of Birds

During standardized field observations sedentary and resting birds as well as other migrating birds (aside from relevant species) were recorded. Furthermore, sedentary and resting as well as migrating birds of relevant species were recorded (species, number of birds, location) while driving through the project area.

2.1.3 Bat Monitoring

To determine whether bats occur in the project area and to measure bat activity a passive detection device was used. Data collection was conducted between March 31st to May 5th at a location close to observation site B3 (see Map 2.1).

The measuring system consists of a batcorder (bat detector) and a batbox extension from the company ecoObs© (see Figure 2.1 and 2.2). The batbox extension includes an interfacial microphone, a GSM module and a rechargeable battery which is connected to a solar panel. All components are installed within a box to protect them against weather conditions.

The measuring system works fully automatic and can be monitored from the distance. Each morning the GSM module text-messages the relevant parameters (number of recordings in general, number of recordings of the last night, power of the battery, remaining store capacity on the data storage medium). Every night a test signal is transmitted by the measuring system to ensure the functional capability (so at least one recording should be recorded during each night). By these functions any technical breakdown of the devices can be detected immediately.

Figure 2.1: Measuring system (batbox) near observation site B3

During the measuring process acoustic signals (between 14 and 150 kHz) in a hemispherical zone around the interfacial microphone are recorded in real-time and high quality (500 kHz and 16 bit). For the signal recognition different sensitivity settings are possible (see Table 2.2). The measuring process is supervised by a software tool which is able to judge whether a recorded signal is a bat echolocation call or another noise (in the ultrasonic range). Possible bat echolocation calls are recorded successively on a SDHC-card.

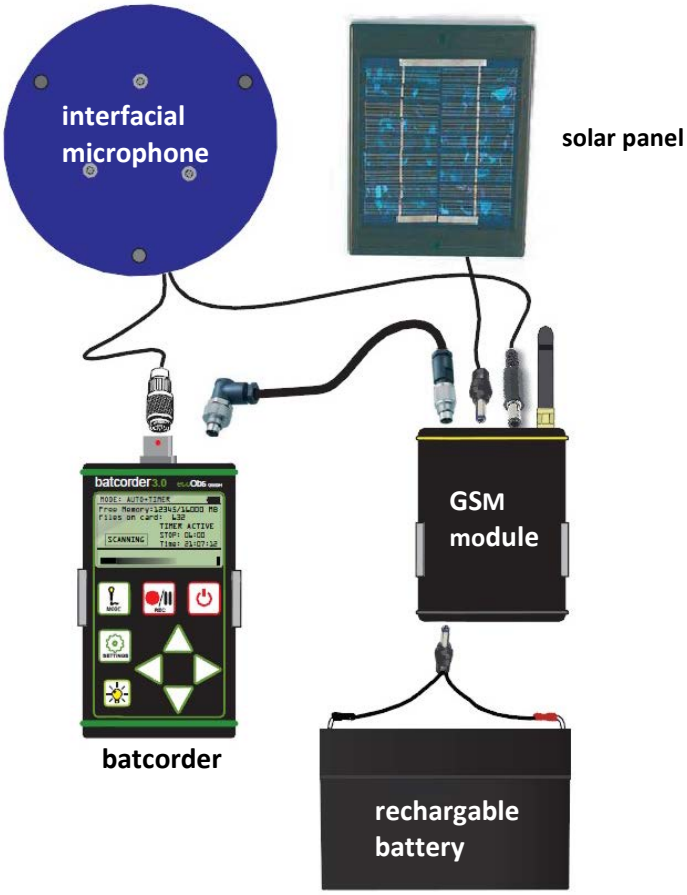

Figure 2.2: Composition of the devices used as a measuring system for recording bat activity

Each day the measuring period started at 16:00 o'clock in the afternoon and lasted until 09:25 o'clock of the following morning. Hence, the total night phase, dusk and dawn (possible activity phases of bats) were covered.

To ensure the possibility to measure a broad range of species, the recording settings differed from the recommendations of ecoObs© (which were developed for the use in European countries, see Table 2.2). The settings were adapted to the local situation and species, which can occur within the region.

Table 2.2: Overview over the used recording settings

BC-Parameter	Quality	Threshold	Posttrigger	Critical Frequency
ecoObs Standard	20	-36 dB	800 ms	14 kHz

Explanation to Table 2.2:

Quality: setting to discriminate between bat call and other signals (in ultrasonic range)
Threshold: influences the range of the interfacial microphone
Posttrigger: max. time between two calls in one file
Critical Frequency: signals below this value are not recorded

2.2 Data Analysis

2.2.1 Observational Time

The analysis for spring 2016 comprises 352 observation units (on 47 days) with a total observational time of 556.7 hours. At each day two / four observation units (lasting for 1.5 / 3 hours) were conducted per team. Observational time at each observation site amounts at least to 29.1 hours.

On April 10th and May 3rd one observation unit has to be shortened and on May 3rd, 15th, 16th and 21st one observation unit has to be skipped.

2.2.2 Standardized Field Observations of Migrating Birds

From the overall dataset obtained birds / records were analysed, which were registered within distances of up to 2.5 km from the observation sites. These dataset is assumed to be of high quality (see chapter 2.1).

The overall dataset (all observations) and the analysed dataset were almost identical. In distances of more than 2.5 km only one Osprey (*Pandion haliaetus*) and a flock of three unidentified raptors were observed.

Number of Migrating Birds and Species Composition

In order to characterize bird migration, the total number of birds for each relevant species was calculated. Furthermore, the number of records was used as a further variable to describe migration patterns. A single record can either be an individual or a flock (independent of the number of birds). The number of records is an important variable because it is independent from flock size. In contrast, a single but large flock has a strong effect on the variable “number of birds”. Therefore, the number of records gives additional information about migratory activity and continuity as well as on species-specific migration behaviour.

Seasonal Distribution of Migratory Activity

To identify peak migration periods the cumulative number of birds / records was plotted over time. By summing up the number of birds / records for every week during the study period a weekly migratory activity (number of birds / records by weekly observation time) was calculated.

Altitude of Migration

Regarding possible impacts of wind turbines on migrating birds, flight altitude is a very important variable. The number of birds / records was summed up for each height class, (0 – 50 m, > 50 – 150 m, > 150 m), which refer to potential characteristics of the wind turbine types (below / above and within rotor swept area).

Migratory Rate as a Measure for Migratory Activity

In order to describe migratory activity we calculated the migration rate (birds / records per hour) for the study period. The results obtained in this study allow a comparison with results from previous studies conducted at the western Red Sea coast between 2006 and 2012 (Bergen 2009, Bergen & Gaedicke 2013, ecoda 2007, 2011) as well as the Nile Valley in 2012 (Bergen & Gaedicke 2012).

2.2.3 Non-Standardized Field Observations of Migrating Birds

This data set consists of migrating or roosting birds of relevant species and sedentary birds, which were recorded while travelling through the project area. In addition roosting birds, which were recorded during standardized field observations (and did not continue migration afterwards), are considered in this dataset, too. Furthermore, records of sedentary birds and non-relevant migrating or resting bird species (mainly passerines) are included.

The total number of European Bee-eaters (*Merops apiaster*) recorded in spring 2016 could not be exactly quantified, because numbers of Bee-eaters were recorded only acoustically by their flight calls. It was assumed that flocks of European Bee-eaters had an average size of about twenty birds. The flock size was estimated by a number of observations of migrating European Bee-eaters at the Nile Valley in 2011 and 2012 (see Bergen & Gaedicke 2012).

2.2.4 Bat Monitoring

The recorded signals on the SDHC-card of the measuring system were analyzed with the software bcAdmin 3.4.6 (1287), bcAnalyze 2 1.13 (1092) and batIdent 1.5 (1), which are recommended by the manufacturer of the measuring system (ecoObs©). The automatic identification system of the software bcAdmin and batIdent allocates every bat call into one of the following six guilds (based on call types):

- type Rhinolophus: bats of the genus *Rhinolophus*
- type Plecotus: bats of the genus *Plecotus*
- type Barbastella: bats of the genus *Barbastella*
- type Nyctaloid: species with low frequency calls e. g. noctule bats and free-tailed bats
- type Myotis: bats of the genus *Myotis*
- type Pipistrelloid: bats of the genus *Pipistrellus* and Schreibers' bat (*Miniopterus schreibersii*)

Further analysis of the recorded and classified signals was made with bcAdmin. This is necessary because the automatic identification system is not error-free. In this case each recorded signal was rechecked (manually).

As a measure for bat activity the number of bat echolocation calls per hour was calculated. This measure refers to the time when bats are potentially active: at night-time. The night length was calculated via the time of sunset and sunrise from Al Minya. Afterwards we summed up the time for the whole study period.

3 Results

3.1 Migratory Species of Relevance for the Impact Assessment

3.1.1 Standardized Field Observations of Migrating Birds

Number of Migrating Birds and Species Composition

During the study period in spring 2016 a total of 57 birds (38 records) from 13 relevant species were observed within distances of up to 2.5 km from the observation sites (Table 3.3). White Stork was the most numerous species (which was caused by one flock of 16 individuals). All registered species do not belong to threatened species. Pallid Harrier and Sooty Falcon are listed as "Near Threatened" and all other species as "Least Concern" according to the IUCN Red List (see Annex I).

No larger flock of migrants occurred during the study period in spring 2016. The observed birds migrated singly (35 of 38 records) or in small flocks (maximum 16 individuals).

Table 3.1: Number of birds / records obtained during standardized observations at the observation sites at row A, B, C and D as well as at the observation sites X1 and X2 at distances of up to 2.5 km to the observation sites (b= number of birds, r= number of records)

species	scientific name	row A		row B		row C		row D		X1/X2	
		b	r	b	r	b	r	b	r	b	r
Black Stork	*Ciconia nigra*	1	1	.	.	.	.	.	.	.	.
White Stork	*Ciconia ciconia*	.	.	.	.	.	.	16	1	.	.
Osprey	*Pandion haliaetus*	.	.	1	1	.	.	.	.	.	.
European Honey Buzzard	*Pernis apivorus*	3	1	1	1	3	1	.	.	1	1
Black Kite	*Milvus migrans*	.	.	.	.	.	.	1	1	.	.
Short-toed Snake Eagle	*Circaetus gallicus*	.	.	1	1	3	3	.	.	.	.
Marsh Harrier	*Circus aeruginosus*	1	1	.	.	.	.	2	2	.	.
Pallid Harrier	*Circus macrourus*	2	2	.	.	.	.	3	3	.	.
Montagu's Harrier	*Circus pygargus*	1	1	.	.	.	.	.	.	.	.
Harrier	*Circus spec.*	1	1	.	.	.	.	.	.	.	.
Steppe Buzzard	*Buteo buteo vulpinus*	.	.	.	.	1	1	2	2	.	.
Buzzard	*Buteo spec.*	1	1	.	.	.	.	.	.	.	.
Booted Eagle	*Aquila pennata*	1	1	.	.	.	.	.	.	1	1
Eagle	-	.	.	.	.	.	.	.	.	1	1
Common Kestrel	*Falco tinnunculus*	1	1	2	2	.	.	1	1	.	.
Sooty Falcon	*Falco concolor*	.	.	.	.	1	1	.	.	.	.
Falcon	*Falco spec.*	2	2	.	.	.	.	1	1	.	.
unidentified raptor	-	.	.	1	1	.	.	.	.	.	.
sum		**14**	**12**	**6**	**6**	**8**	**6**	**26**	**11**	**3**	**3**

Seasonal Distribution of Migratory Activity

Due to the very low migratory activity, the seasonal distribution of migration differed only little throughout the study period (Figure 3.1). Single events with few individuals during certain periods caused an increase: a flock of 16 White Storks in the 2nd week and two flocks of European Honey Buzzards with three individuals each in the 5th week.

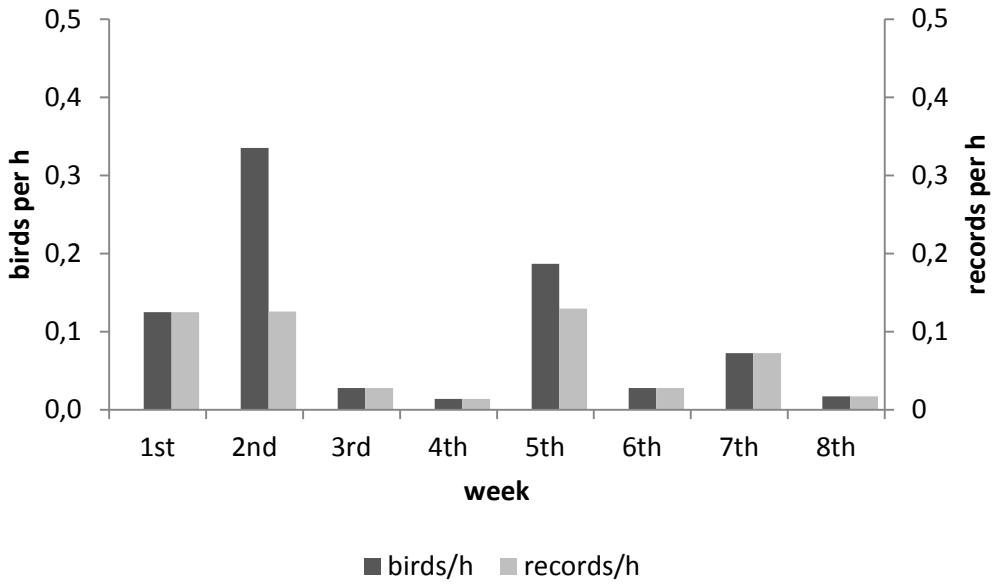

Figure 3.1: Seasonal distribution of birds and records in spring 2016 (only birds at distances of up to 2.5 km to the observation sites; to correct different observational time the number of birds / records were divided through observational time of the particular week; 1st week: April 2nd to 7th)

Altitude of Migration

In spring 2016 the registered birds did not prefer a certain height class during migration (Figure 3.2).

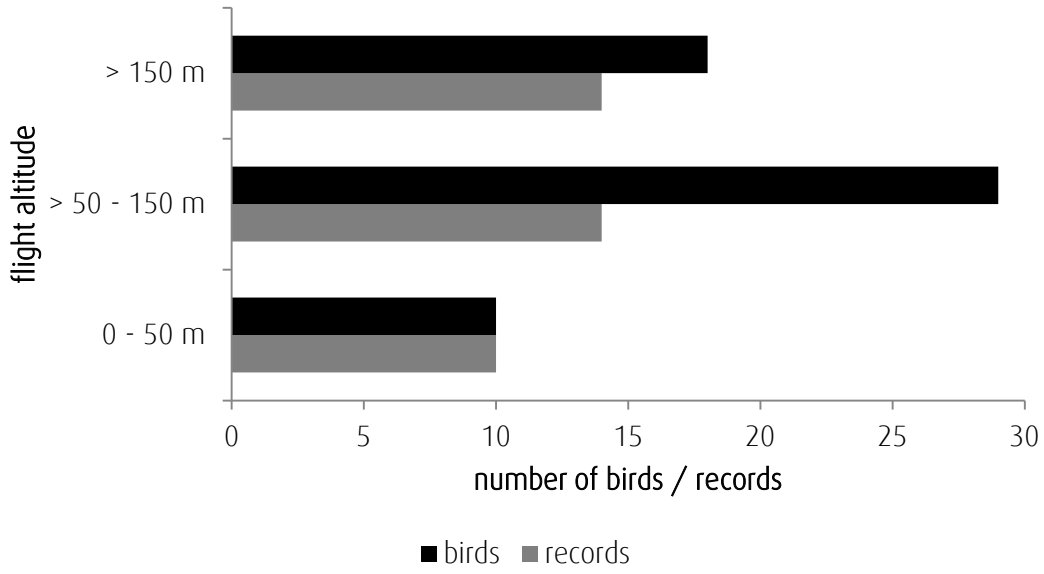

Figure 3.2: Altitude of migrating birds in spring 2016 (only birds at distances of up to 2.5 km to the observation sites)

Migratory Rate as a Measure for Migratory Activity

In spring 2016 a total of 38 records (single birds or flock of birds) were registered during 556.70 hours of observation. Thus, about 0.07 records / h were recorded indicating a low migratory activity. The total number of birds recorded in the study area was low, too: overall 57 birds were recorded (0.10 birds / h).

A study conducted at the Nile valley in spring 2012, about 50 km west of the project area, lead to a migration rate of 0.06 birds / h and 0.05 records / h. The migration rate obtained in the project area was comparable.

In comparison to previous studies at the western coast of the Red Sea, the migration rate, obtained in the project area, was extremely low. At the western coast of the Red Sea migratory activity in spring ranged between 82.6 to 280.1 birds / h and 4.3 to 8.3 records / h (within distances of up to 2.5 km to observation sites; data from Bergen 2009, Bergen & Gaedicke 2013, ecoda 2007, 2011).

3.1.2 Non-Standardized Field Observations of Migrating Birds

While driving within the study area few observations of migrating or resting (roosting or foraging) migrants were made:

- one migrating Pallid Harrier;
- ten Common Kestrels mainly foraging, but not migrating; and
- two Sooty Falcons interacting with each other.

3.2 Migratory Species of minor Relevance for the Impact Assessment

A small number of migrating (rarely roosting) birds from species of minor relevance were recorded in the project area during standardized observations in spring 2016. The European Bee-eater was the most common species (see Table 3.2).

Table 3.2: Numbers of birds from species of minor relevance, which were recorded by chance / randomly in spring 2016

species	scientific name	number of birds
Grey Heron	*Ardea cinerea*	6
Common Pigeon	*Columba livia*	3
European Turtle Dove	*Streptopelia turtur*	1
Alpine Swift	*Tachymarptis melba*	1
Common Swift	*Apus apus*	91
Pallid Swift	*Apus pallidus*	37
European Bee-eater	*Merops apiaster*	1,279
Masked Shrike	*Lanius nubicus*	1
Woodchat Shrike	*Lanius senator*	2
Greater Short-toed Lark	*Calandrella brachydactyla*	10
Lark spec.	-	3
Sand Martin	*Riparia riparia*	7
Barn Swallow	*Hirundo rustica*	133
Common House Martin	*Delichon urbica*	29
Swallow spec.	-	6
Garden Warbler	*Sylvia borin*	1
Common Whitethroat	*Sylvia communis*	1
Spotted Flycatcher	*Muscicapa striata*	1
European Pied Flycatcher	*Ficedula hypoleuca*	1
Rufous-tailed Scrub Robin	*Cercotrichas galactotes*	2
Black-eared Wheatear	*Oenanthe hispanica*	1
Wheater spec.	*Oenanthe spec.*	3
White Wagtail	*Motacilla alba*	9
House Sparrow	*Passer domesticus*	180

3.3 Sedentary Birds

During the survey in spring 2016 single sedentary species, which belong to the typical desert fauna, were recorded in the project area. Some species were supposed to breed in the project area because they were observed regularly, showed territorial-behaviour or reared chicks (but in very low number). For others species the status is not clear.

- Spotted Sandgrouse (*Pterocles senegallus*) was observed regularly (110 records with 290 birds). Once a small flock with a chick roosted between the observation sites B2 and B3.
- Crowned Sandgrouse (*Pterocles coronatus*) and Egyptian Nightjar (*Caprimulgus aegyptius*) were observed once.
- Brown-necked Ravens (*Corvus ruficollis*) were regularly observed single or in pairs (61 records 83 birds).
- Desert Larks (*Ammomanes deserti*) occurred regularly in the project area, especially near observation site A3 (single individuals or pairs).
- Greater Hoopoe-Larks (*Alaemon alaudipes*) were recorded several times in April at various sites within the project area.

Sooty Falcons (already described in chapters 3.1.1 and 3.1.2) were observed occasionally.

3.4 Bats

During the survey in spring 2016 25 bat echolocation calls were recorded during six of the overall 37 nights. Thus, over all nights, about 0.06 bat echolocation calls per hour were recorded. Most of the recorded bat echolocation calls (19) probably belonged to the Botta's Serotine (*Eptesicus bottae*). The other (6) bat echolocation calls could not be determined to species level.

4 Brief Conclusion

4.1 Assessment of the Importance of the Project Area for Bird / Bats in Spring

The following assessment of the importance of the project area is restricted to spring migration (and not valid for autumn migration). Moreover, as a full spring migration period has not been covered in spring 2016, the assessment has to be regarded as preliminary.

By comparing the results obtained in spring 2016 with previous investigations carried out in Egypt the importance of the study area can be easily assessed. According to studies previously conducted at the western coast of the Red Sea migratory activity in spring ranged between 82.6 to 280.1 birds per hour and 4.3 to 8.3 records per hour (within distances of up to 2.5 km to observation sites; data from Bergen 2009, Bergen & Gaedicke 2013, ecoda 2007, 2011). In spring 2016 a total of 57 birds and 38 records (single birds or flock of birds) were registered during 556.70 hours of observation in the project area. Thus, about 0.10 birds and 0.07 records per hour were recorded. In spring 2016 migratory activity of species of importance for the impact assessment was extremely low within the project area. Consequently, the results do not indicate a high importance of the project area for migrating birds from relevant species in April and May.

Based on the results from spring 2016 the local bird community is very poor in species and the density is very low. For sedentary birds vegetated areas are particularly important. The project area offers few sparse vegetated areas. For tree and cliff nesting birds (especially raptors) only very few potential nesting sites (of low quality) were found. The importance of the project area for the local bird community will be further investigated.

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 as a hunting site because of higher prey density. 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.

4.2 First Assessment of Possible Impacts of Wind Energy Projects

As known from the Gulf of Suez area possible impacts on birds can significantly differ between seasons (autumn / spring). Thus, the following assessment is restricted to spring.

4.2.1 Migrating Birds

Construction phase

Due to the extremely low migratory activity in spring, the impact on spring migration caused by the construction of wind farms within the project area is assessed to be very low (not significant).

Operation and Maintenance Phase

Due to the extremely low number of migrating birds in spring, wind farms within the project area will not pose a relevant risk of collision or cause a significant barrier effect. Single collisions at wind farms within the project area might occur even during spring. But the expected collision rate will not cause significant effects on populations. Thus, wind turbines within the project area are not regarded to have a significant impact on spring migration.

Mitigation Measures

Due to the lack of significant impacts on migrating birds in spring, there is no need for specific mitigation measures.

4.2.2 Local Birds / Bats

Construction phase

Based on the results obtained so far, the variety of sedentary birds and bird density as well as activity of bats within the project area is very low (at least in late spring). Consequently, the impact caused by the construction of wind farms within the project area is assessed as not to be significant.

Operation and Maintenance Phase

Based on the results obtained so far, the variety of sedentary birds and bird density as well as the activity of bats within the project area is very low (at least in late spring). Consequently, the impact on sedentary birds and bats related to operating turbines, maintenance or collision risk is assessed as not to be significant.

Mitigation Measures

Based on the results obtained so far, there is no need for specific mitigation measures.

5 Summary

5.1 English Summary

The Government of Egypt has identified three large areas suitable for development of wind and solar applications under the newly issued FiT law. One of these areas is located in the East Nile Region across the three Governorates of Beni Suef, Al Minya and Assuit ("project area") and extents over 2,200 km².

To ensure a strategic level assessment of the potential environmental and social issues associated with these Renewable Energy (RE) developments, EBRD has agreed to fund the Strategic Environmental and Social Assessment (SESA) Study for the East of Nile project area. As RE developments may have significant potential impacts on birds and bats, a thorough investigation on birds / bats forms a crucial part of the SESA. The investigation aims for

- collecting significant baseline data on birds / bats;
- identifying and assessing possible impacts caused by RE developments;
- prioritising areas for wind and solar energy utilization according to the level of significance of likely impacts on birds / bats;
- proposing criteria for selection of a site with the lowest impact; and finally
- recommending mitigation measures in order to minimize possible conflicts, if required.

On that background standardized daytime field observations were carried out between April 2nd and May 25th, 2016, in the so-called East Wind-1 and East Wind-2 sections. Within 556.7 hours of observation (at 18 different sites) a total of 57 migrating birds (38 records) from 13 relevant species were observed within distances of up to 2.5 km from the observation sites. All registered species do not belong to threatened species. Pallid Harrier and Sooty Falcon are listed as "Near Threatened" and all other species as "Least Concern" according to the IUCN Red List. In addition, small numbers of migrating (rarely roosting) birds from species of minor relevance and single sedentary species, which belong to the typical desert fauna, were recorded in the two sections.

During the bat survey conducted in the East Wind-1 section in spring 2016 25 bat echolocation calls were recorded during six of the overall 37 nights (March 31st to May 5th). Most of the recorded bat echolocation calls probably belonged to the Botta's Serotine (*Eptesicus bottae*), a species listed as "Least Concern" according to the IUCN Red List.

To conclude, migratory activity of relevant bird species was very low in April and May 2016. Thus, based on the data in hand, the project area is not particularly important for relevant species during spring migration. According to the results obtained so far, the area does neither serve as an important habitat for roosting or sedentary birds nor for bats or other animals in spring. Hence, at present no significant impacts on migrating, roosting or sedentary birds as well as on bats or other animals are expected when installing and operating wind farms in the project area.

5.2 Arabic Summary / ملخص باللغة العربية

حددت الحكومة المصرية ثلاثة مناطق واسعة مناسبة لاستغلال طاقة الرياح والطاقة الشمسية وفقا للقانون الصادر مؤخرا، ويقع احد هذه المناطق في شرق النيل عبر المحافظات الثلاث: بني سويف والمنيا وأسيوط ("منطقة المشروع") وهي تمتد على مساحة أكثر من 2200 كيلومتر مربع.

ولضمان تقييم المستوى الاستراتيجي للقضايا البيئية والاجتماعية المحتملة المرتبطة بمشاريع الطاقة المتجددة فقد وافق البنك الأوروبي للتنمية على تمويل دراسة التقييم البيئي والاجتماعي الاستراتيجية لمنطقة شرق النيل، ولأن مشاريع الطاقة المتجددة يكون لها آثار كبيرة على الطيور والخفافيش فإن إجراء دراسة شاملة على الطيور / الخفافيش يشكل جزءا أساسيا من دراسة تقييم الآثار البيئية والاجتماعية وتهدف هذه الدراسة إلي:

- جمع البيانات الأساسية عن الطيور / الخفافيش.
- تحديد وتقييم الآثار المحتملة الناجمة عن مشاريع الطاقة المتجددة.
- تحديد المناطق الأكثر ملائمة لمشاريع توربينات الرياح والطاقة الشمسية وفقا لمستوى الآثار المحتملة على الطيور / الخفافيش.
- تحديد معايير لاختيار مواقع إقامة هذه المشاريع بحيث يكون لها أدنى آثار سلبية.
- التوصية باتخاذ تدابير التخفيف من أجل تقليل الآثار السلبية المحتملة، إذا لزم الأمر.

وعلى هذه الخلفية فقد تم إجراء دراسات ميدانية نهارية بين 2 أبريل و 25 مايو 2016، في المناطق المسماة بشرق الرياح 1 و شرق الرياح 2 ، وخلال مدة 556.7 ساعة من المراقبة (في 18 مواقع مختلفة) تمت ملاحظة 57 من الطيور المهاجرة من 13 نوعا على مسافات تصل إلى 2.5 كم من مواقع الرصد، وجميع الأنواع المسجلة لا تنتمي إلى الأنواع المهددة بالانقراض، وطائر الهارير وصقر الغروب مهددان بالانقراض بدرجة طفيفة أما جميع الأنواع الأخرى فهي غير مدرجة على القائمة الحمراء للاتحاد الدولي للحفاظ على الطبيعة IUCN، وبالإضافة إلى ذلك فقد تم تسجيل عدد قليل من الطيور المهاجرة (التي نادرا ما تجثم هناك) من الأنواع ذات الأهمية الثانوية التي تنتمي إلى الطيور الصحراوية في منطقتين هناك.

وخلال المسح الذي تم على الخفافيش الذي تم في قسم شرق الرياح 1 في ربيع 2016 فقد تم تسجيل صدى 25 خفاش خلال 6 من 37 ليلة (خلال 31 مارس - 5 مايو)، وقد كانت معظم هذه الملاحظات تنتمي لنوع Botta's Serotine (Eptesicus bottae) وهو نوع مدرج على أنه ذات أهمية صغيرة وفقا للقائمة الحمراء للاتحاد الدولي للحفاظ على الطبيعة IUCN.

وكخلاصة، فقد كان نشاط هجرة الطيور منخفض جدا في شهري أبريل ومايو 2016، وهكذا واستنادا إلى البيانات المتاحة فإن منطقة المشروع ليست ذات أهمية كبيرة بالنسبة للأنواع ذات الصلة أثناء الهجرة في الربيع، ووفقا للنتائج التي تم الحصول عليها حتى الآن فإن هذه المنطقة لا يمكن اعتبارها بمثابة موطن مهم للطيور المهاجرة أو المحلية أو للخفافيش أو غيرها من الطيور في فصل الربيع، وبالتالي في الوقت الحاضر فليس من المتوقع حدوث آثار سلبية كبيرة على الطيور المهاجرة أو الجاثمة أو المحلية أو على الخفافيش أو غيرها من الطيور عند إقامة مشاريع الطاقة المتجددة في منطقة المشروع.

6 References

Bergen, F. (2009): Expert Opinion on the Additional Ornithological Investigation in Zone II (Orange Zone) as part of the Feasibility Study for a large wind farm at the Gulf of Zayt, Egypt. Final report for MVV decon GmbH. Dortmund.

Bergen, F. & L. Gaedicke (2012): Final Report on the Ornithological Investigation at the West Nile Valley in Arab Republic of Egypt. Report for Oriental Consultants Co., Ltd., and Japan International Cooperation Agency (JICA). Dortmund.

Bergen, F. & L. Gaedicke (2013): Final Report on the Bird Migration Study at the Gulf of Suez (300 km² area) at Ras Gharib in the Arab Republic of Egypt. Report for New & Renewable Energy Authority (NREA). Dortmund.

Drewitt, A. L. & R. H. W. Langston (2006): Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

ecoda (2007): Ornithological Expert Opinion as a part of the Feasibility Study for a large wind farm at Gulf of Zayt, Egypt. Report for DECON - Deutsche Energie-Consult Ingenieurgesellschaft mbH. Dortmund.

ecoda (2011): Expert Opinion on the Ornithological Investigation at the Gulf of Suez as part of the ESIA for 1,000 MW Wind Farms at Gulf of Suez, Arab Republic of Egypt. Report for New and Renewable Energy Authority (NREA) and Kreditanstalt für Wiederaufbau (KfW). Dortmund.

EEAA (Ministry of State for Environmental Affairs Egyptian Environmental Affairs Agency) (2013): Environmental Impact Asessment Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley/Red Sea Flyway with particular reference to wind energy in support of the conservation of Migratory Soaring Birds (MSB). Partners: Global Environment Facility, Birdlife International, United Nations Development Program (UNDP) Egypt, Ministry of State for Environmental Affairs in Egypt, Nature Conservation Egypt. Cairo.

IUCN (International Union for Conservation of Nature) (2015): The IUCN Red List of Threatened Species. Version 2015-3.

http://www.iucnredlist.org/

Lesham, Y. & Y. Yom-Tov (1996): The Magnitude and timing of migration by soaring raptors, pelicans and storks over Israel. Ibis 138: 188-203.

Ornis Consult (1999): Biodiversity review of the western Gulf of Suez. Prepared by M. Baha El Din & F. P. Jensen. Copenhagen, Denmark.

Annex

I Relevant species, which are known to migrate along Egypt

II Explanation of different categories of “The IUCN Red List of Threatened Species” for migratory bird species in Egypt

Annex I Relevant species, which are known to migrate along Egypt

no	species	scientific name	IUCN Red List 2015
1	Greater Flamingo	*Phoenicopterus roseus*	LC
2	Great White Pelican	*Pelecanus onocrotalus*	LC
3	Grey Heron	*Ardea cinerea*	LC
4	Purple Heron	*Ardea purpurea*	LC
5	Western Reef Heron	*Egretta gularis*	-
6	Squacco Heron	*Ardeola ralloides*	LC
7	Cattle Egret	*Bubulcus ibis*	LC
8	Black-crowned Night Heron	*Nycticorax nycticorax*	LC
9	Glossy Ibis	*Plegadis falcinellus*	LC
10	Eurasian Spoonbill	*Platalea leucorodia*	LC
11	Black Stork	*Ciconia nigra*	LC
12	White Stork	*Ciconia ciconia*	LC
13	Osprey	*Pandion haliaetus*	LC
14	European Honey Buzzard	*Pernis apivorus*	LC
15	Black Kite	*Milvus migrans*	LC
16	Egyptian Vulture	*Neophron percnopterus*	EN
17	Short-toed Snake Eagle	*Circaetus gallicus*	LC
18	Marsh Harrier	*Circus aeruginosus*	LC
19	Pallid Harrier	*Circus macrourus*	NT
20	Montagu's Harrier	*Circus pygargus*	LC
21	Levant Sparrowhawk	*Accipiter brevipes*	LC
22	Eurasian Sparrowhawk	*Accipiter nisus*	LC
23	Steppe Buzzard	*Buteo buteo vulpinus*	LC
24	Long-legged Buzzard	*Buteo rufinus*	LC
25	Lesser Spotted Eagle	*Aquila pomarina*	LC
26	Greater Spotted Eagle	*Aquila clanga*	VU
27	Steppe Eagle	*Aquila nipalensis*	EN
28	Eastern Imperial Eagle	*Aquila heliaca*	VU
29	Booted Eagle	*Aquila pennata*	LC
30	Lesser Kestrel	*Falco naumanni*	LC
31	Common Kestrel	*Falco tinnunculus*	LC
32	Red-footed Falcon	*Falco vespertinus*	NT
33	Eleonora's Falcon	*Falco eleonorae*	LC
34	Sooty Falcon	*Falco concolor*	NT
35	Eurasian Hobby	*Falco subbuteo*	LC
36	Lanner Falcon	*Falco biarmicus*	LC*
37	Barbary Falcon	*Falco pelegrinoides*	LC*
38	Common Crane	*Grus grus*	LC

*: no classification for migratory birds available, represented category refers to breeding birds

Annex II Explanation of different categories of "The IUCN Red List of Threatened Species" for migratory bird species in Egypt

(International Union for the Conservation of Nature and Natural Resources)

http://www.iucnredlist.org/

http://www.birdlife.org/datazone/speciessearchresults.php?reg=0&cty=63&cri=&fam=0&gen=0&spc=&cmn=&hab=&thr=&bt=&rec=N&vag=N&sea=&wat=&aze=&lab=&enb=&mib=Y&cnv=&hdnAction=ADV_SEARCH&SearchTerms=

ENDANGERED (EN)
A species is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)
A species is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)
A species is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A species is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant species are included in this category.

For explanations of the mentioned criteria within the explanations of the categories see:

http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf

http://www.iucnredlist.org/documents/reg_guidelines_en.pdf

10.2.3 Annex B3: Second Report on the Bird Monitoring in the East Nile Region (Arab Republic of Egypt) - autumn 2016

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Second Report on the Bird / Bat Monitoring in the East Nile Region (Arab Republic of Egypt) - Autumn 2016

Draft Report

December 2016

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

Second Report on the Bird / Bat Monitoring in the East Nile Region (Arab Republic of Egypt) - Autumn 2016

Draft Report

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1 Introduction

1.1 Background and Objectives

Following the issuance of Renewable Energy Feed-in Tariff ("FiT") presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (the "EBRD", has been engaged in partnership with the Government of Egypt ("GoE") to identify a portfolio of Renewable Energy projects (mainly from wind and solar sources) to be financed by prequalified Foreign Direct Investors ("FDIs").

The GoE has identified three large areas suitable for development of wind and solar applications, under the newly issued FiT law mentioned above. One of these areas, the project area, is located in the East Nile Region across the three Governorates of Beni Suef, Minia and Assuit and extents over 2,200 km².

To ensure a strategic level assessment of the potential environmental and social issues associated with these major developments, EBRD has agreed to fund the Strategic Environmental and Social Assessment (SESA) Study for the East of Nile area. Subsequently the execution of a SESA study on the project area was awarded to the Joint Venture Lahmeyer- ecoda. The study shall serve as a framework SESA study considering RE-development in the project area and shall facilitate future ESIA and environmental clearance for the individual projects within the areas.

Installing large wind farms in the East Nile area may lead to significant impacts on migrating birds and on bats caused by collisions with turbines or, to a lower degree, by barrier effects. In addition, development of Renewable Energy projects might lead to other impacts on birds / bats, like habitat loss or disturbance. Since there is no comprehensive knowledge on bird migration and on occurrence of bats in the East Nile Region, a thorough investigation forms a crucial part of the SESA.

The main objectives of the standardized field investigation are to

- collect significant baseline data on migrating birds (mainly soaring and gliding species migrating during the day) and on bats in spring and in autumn;
- describe migration patterns of relevant species in a quantitative way;
- identify and assess possible impacts regarding development of Renewable Energy projects within the area;
- prioritise areas for wind and solar energy utilization according to the level of significance of likely impacts on birds / bats;
- propose criteria for selection of a site with the lowest impact on birds / bats; and finally
- recommend mitigation measures in order to minimize possible conflicts, if required.

The project area is subdivided into different sections, in which wind and solar applications shall be developed. In autumn 2016 bird migration was recorded by standardized observations in areas designated for wind applications. The interim report in hand covers

- an overview of the methods and the observation schedule applied in autumn 2016;
- a presentation of the main results obtained by observations;
- first conclusions regarding the importance of the area for bird migration in autumn; and finally
- a first assessment of possible impacts on autumn migration caused by installing and operating wind farms within the project area (impacts of PV solar projects will be assessed in the SESA Solar Power Report).

The standardized field monitoring started on August 20th and lasted up to November 15th. Thus, the monitoring covers a full autumn migration period.

Important habitats for local fauna shall be identified in the scope of the SESA, too. Hence, all observations of local or resting birds and of other animals have been recorded during standardized observations or during travelling through the project area.

1.2 Project Area

The project area is located east of the Nile Valley at a nearest distance of 8 km at the latitude of Maghada in the North and El Quoseyia in the South, all on desert land. 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 project area. Inside the area only very few isolated economic activities take place such as agricultural groundwater irrigation schemes, stone crushing or mining. The hyper-arid climate of the Eastern Desert leads to sparse vegetation which belongs to the Saharao-Sindian phytogeographical region.

In the project area two sections are designated for wind applications (East Wind-1 and East Wind-2). These sections are located in the northern and southern part of the project area. The northern section (East Wind-2) covers an area of about 79 km² and the southern section (East Wind-1) about 748 km² (see Map 2.1).

Figure 1.1: Impressions from the project area

2 Methods

2.1 Data Collection

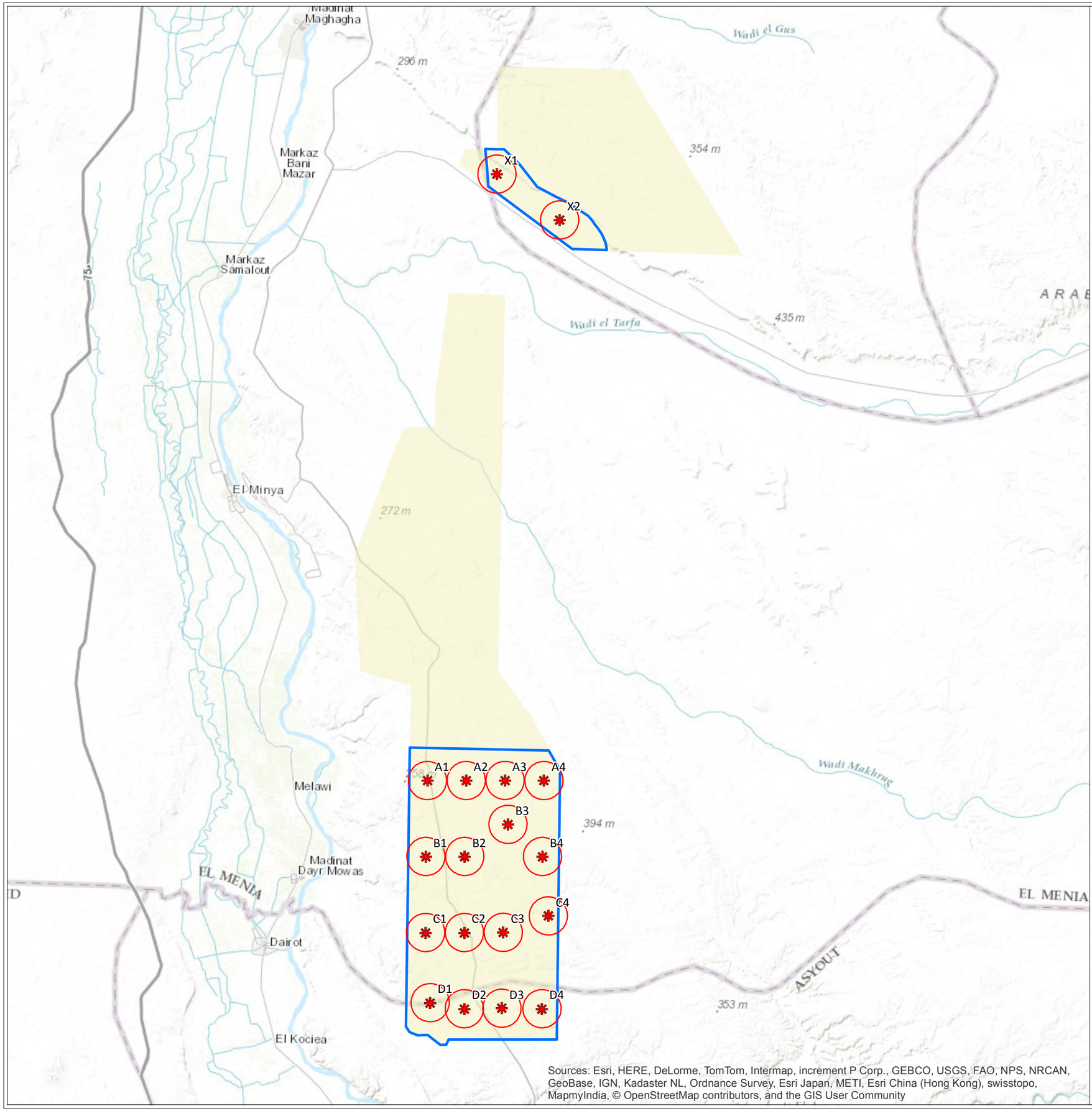
2.1.1 Standardized Field Observations of Migrating Birds

Between August 20th and November 15th 2016 standardized daytime field observations were carried out. Thus, the study covers the migration period of relevant species (e. g. Bergen 2009, ecoda 2011, Lesham & Yom-Tov 1996). In general the study design was similar to the ones which were used during previous investigations at the Red Sea and at the Nile Valley (for details see Bergen 2009, Bergen & Gaedicke 2012): using fixed observation sites. Observations were conducted by two teams - each with at least two ornithologists - mostly under guidance of a chief ornithologist, who advised and supervised the ornithologists. The teams consisted of European and Egyptian experts.

As known from earlier studies many birds or -at least- flocks of migrating birds can be recorded and safely identified at distances of up to 5 km (in some cases even up to 10 km or more). However, detection probability of birds decreases with increasing distance to an observation site. Hence, standardized data collection focussed on the area at distances of 2.5 km to each observation site (the study area).

With regard to the extent of the project area, a total of 18 observation sites were selected in order to obtain a representative sample of migration within the project area. Two observations sites were established in the northern section (X1 and X2; see Map 2.1). Further 16 observation sites were located in the southern section within four rows from West to East (perpendicular to the expected main flight direction of migrating birds). These rows consisted of the observation sites A1 - A4 (row A), B1 - B4 (row B), C1 - C4 (row C) and D1 - D4 (row D; see Map 2.1).

As earlier studies have shown (see Figure 3.4 and 3.15 in Bergen 2009), migratory activity is very low in the early morning and the late afternoon. Furthermore, in the early morning and the late afternoon bird migration is dominated by species, which are more or less active flyers and, thus, do not depend on thermal uplifts (mainly Harriers). These species are not believed to be particularly vulnerable to collision with wind turbines. As a consequence, the early morning and late afternoon (about 1 hour after sunrise to 1 hour before sunset) were neglected during data collection. The time of day in between these periods was subdivided into four periods (early morning, morning, midday and afternoon). A rotation schedule was used to gain a representative distribution of spatial and temporal observation samples (see Table 2.1). It was possible to follow this schedule most days. Each day standardized daytime field observations should be conducted for 12 hours (six hours per team). During most days eight different observation sites in the southern section were visited for 1.5 hours each. When the northern section was studied, observations lasted for three hours at the sites X1 and X2 (each) and further four different observation sites in the southern section were visited for 1.5 hours each. Most observation units started more or less at the planned time. Delays occurred but observation units were still within the range of the given period of the day.



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Second Report on the Bird / Bat Monitoring in the East Nile Region (Arab Republic of Egypt) - Autumn 2016

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

Map 2.1
Overview of the Project Area

Project Area

- extent of the project area
- sections of the project area designated for wind applications
- observation site
- area within a radius of 2.5 km to each observation site

editor: Stefan Wernitz, December 15th 2016

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Table 2.1: Extract from the rotation schedule applied in autumn 2016

observation site	day of observation							
	1st	2nd	3rd	4th	5th	6th	7th	8th
A1	1.5	.	1.5	.	.	.	1.5	.
A2	1.5	.	1.5	.	.	.	1.5	.
A3	1.5	.	1.5	.	.	.	1.5	.
A4	1.5	.	1.5	.	.	.	1.5	.
B1	.	1.5	.	1.5	.	1.5	.	1.5
B2	.	1.5	.	1.5	.	1.5	.	1.5
B3	.	1.5	.	1.5	.	1.5	.	1.5
B4	.	1.5	.	1.5	.	1.5	.	1.5
C1	.	.	1.5	.	1.5	.	1.5	.
C2	.	.	1.5	.	1.5	.	1.5	.
C3	.	.	1.5	.	1.5	.	1.5	.
C4	.	.	1.5	.	1.5	.	1.5	.
D1	.	1.5	.	1.5	.	1.5	.	1.5
D2	.	1.5	.	1.5	.	1.5	.	1.5
D3	.	1.5	.	1.5	.	1.5	.	1.5
D4	.	1.5	.	1.5	.	1.5	.	1.5
X1	3	.	.	.	3	.	.	.
X2	3	.	.	.	3	.	.	.

During an observation unit (lasting 1.5 or 3 hours; see above) the ornithologists "scanned" the horizon by binoculars with 8 - 10 times magnification as well as by telescopes with 20 - 60 times magnification. Once a bird or a flock of birds was detected, the following variables were determined:

- time of record
- kind of species
- number of birds
- distance and direction to the observation site
  Conspicuous elements (e. g. masts, single trees, powerlines and further elements in the desert) and poles with attached red flags (that made these poles highly visible) were drawn in maps (after having taken their coordinates with a handheld GPS), which were used for the data collection. By these elements and poles (and the information of the distance to the observation site) ornithologists were able to estimate the distance of birds fairly accurately.
- flight path and flight direction
  Flight path and flight direction were recorded by visual observations. After a record a schematic flight path was noted into a map.
  Flight direction was estimated using eight classes (with an extension of 45° each): 1) north-northeast (NNE), 2) east-northeast (ENE), 3) east-southeast, …
- flight altitudes
  A representative height was assigned to each observation of a bird / flock. The flight altitude was recorded in the height classes < 50 m, > 50 m – 150 m and > 150 m. This height band represents the height band, where a bird / flock spent most of the time during the observation. In case a flock distributed over different height classes (over a longer period of the observation),

the ornithologists used different height classes (for the particular number of birds in the different height classes).

At the beginning and the end of each observation unit climatic conditions (temperature, wind speed (Bft) and wind direction (using eight classes (see above), cloud cover (in %)) and visibility were measured.

All variables and further information were recorded on a standard form and transferred to a database afterwards.

The observations were carried out almost exclusively during suitable conditions with clear view within the 2.5 km radius around the observation site. Visibility was temporary less than 2.5 km during about 2 % of all observations units (mostly in the early morning). During 1 % of the observation units visibility was less than 2.5 km.

Standardized field observations focussed on species which can be regarded as especially vulnerable to collision strikes or other negative impacts caused by wind turbines. These are mainly large birds (first of all raptors, storks and pelicans) which principally migrate by soaring and gliding during daytime. Soaring and gliding birds seem to be especially vulnerable because of their restricted flight agility (e. g. Marques *et al.* 2014, Ornis Consult 1999). Furthermore, populations of these long-lived species are susceptible to any additional cause of mortality because their rate of annual off-spring is low (Drewitt & Langston 2006).

Some of the relevant species (see Annex I) are generally of special interest within the impact assessment due to their status on the IUCN Red List of Threatened Species (IUCN 2015; see Annex I & II):

- Egyptian Vulture (*Neophron percnopterus*) and Steppe Eagle (*Aquila nipalensis*) are listed as "Endangered".
- Greater Spotted Eagle (*Aquila clanga*) as well as Eastern Imperial Eagle (*Aquila heliacal*) are listed as "Vulnerable".

In addition, non-threatened species are considered. Pallid Harrier (*Circus macrourus*), Red-footed Falcon (*Falco vespertinus*) and Sooty Falcon (*Falco concolor*) are listed as "Near Threatened" on the IUCN Red List. EEAA (2013) guidelines for the impact assessment for wind energy developments in Egypt point towards a consideration of common species like White Stork (*Ciconia ciconia*) or European Honey Buzzard (*Pernis apivorus*). Against this background further large soaring birds are considered, which are listed as "Least Concern".

Small migrating birds (passerines) were not recorded in a systematic way. They are usually flying during night times and at higher altitudes and do not follow specific migration routes. Thus, passerines are considered to be less vulnerable.

2.1.2 Non-Standardized Field Observations of Birds

During standardized field observations sedentary and resting birds as well as other migrating birds (aside from relevant species) were recorded. Furthermore, sedentary and resting as well as migrating birds of relevant species were recorded (species, number of birds, location) while driving through the project area.

2.1.3 Bat Monitoring

To determine whether bats occur in the project area and to measure bat activity a passive detection device was used. Data collection was conducted

- from August 22nd to September 9th at a location close to observation site C4;
- from September 13th to October 10th in the wadi near observation site A3;
- from October 11th to October 26th at a location close to observation site B1; and
- from October 27th to November 14th in the wadi near observation site D1 (see Map 2.1).

However, for unknown technical reason the device was not working on a number of nights (about 50 % of the total recording period; see Chapter 2.2.4).

The measuring system consists of a batcorder (bat detector) and a batbox extension from the company ecoObs© (see Figure 2.1 and 2.2). The batbox extension includes an interfacial microphone, a GSM module and a rechargeable battery which is connected to a solar panel. All components are installed within a box to protect them against weather conditions.

The measuring system works fully automatic and can be monitored from the distance. Each morning the GSM module text-messages the relevant parameters (number of recordings in general, number of recordings of the last night, power of the battery, remaining store capacity on the data storage medium). Every night a test signal is transmitted by the measuring system to ensure the functional capability (so at least one recording should be recorded during each night). By these functions any technical breakdown of the devices can be detected immediately.

Figure 2.1: Measuring system (batbox) near observation site C4 (left) and A3 (right)

During the measuring process acoustic signals (between 14 and 150 kHz) in a hemispherical zone around the interfacial microphone are recorded in real-time and high quality (500 kHz and 16 bit). For the signal recognition different sensitivity settings are possible (see Table 2.2). The measuring process is supervised by a software tool which is able to judge whether a recorded signal is a bat echolocation call or another noise (in the ultrasonic range). Possible bat echolocation calls are recorded successively on a SDHC-card.

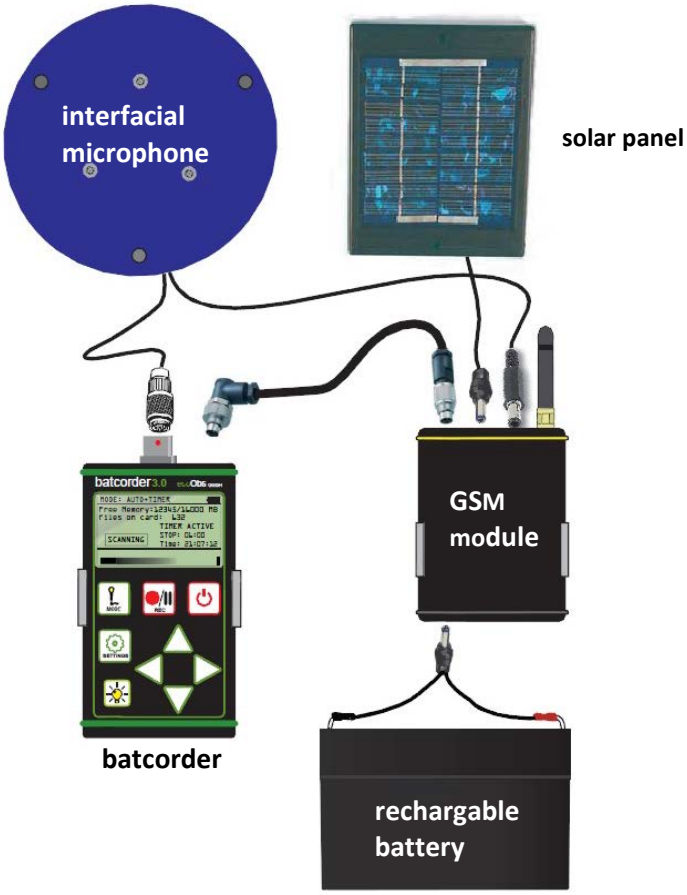

Figure 2.2: Composition of the devices used as a measuring system for recording bat activity

Each day the measuring period started at 16:00 o'clock in the afternoon and lasted until 09:25 o'clock of the following morning. Hence, the total night phase, dusk and dawn (possible activity phases of bats) were covered.

To ensure the possibility to measure a broad range of species, the recording settings differed from the recommendations of ecoObs© (which were developed for the use in European countries, see Table 2.2). The settings were adapted to the local situation and species, which can occur within the region.

Table 2.2: Overview over the used recording settings

BC-Parameter	Quality	Threshold	Posttrigger	Critical Frequency
ecoObs Standard	20	-36 dB	800 ms	14 kHz

Explanation to Table 2.2:

Quality: setting to discriminate between bat call and other signals (in ultrasonic range)
Threshold: influences the range of the interfacial microphone
Posttrigger: max. time between two calls in one file
Critical Frequency: signals below this value are not recorded

2.2 Data Analysis

2.2.1 Observational Time

The analysis for autumn 2016 comprises 574 observation units (on 76 days) with a total observational time of 905.5 hours. At each day two / four observation units (lasting for 1.5 / 3 hours) were conducted per team. Observational time at each observation site amounts at least to 47.2 hours.

Overall six observation units had to be shortened and on October 29th two observation units had to be skipped (after heavy rainfalls on October 27th and 28th).

2.2.2 Standardized Field Observations of Migrating Birds

From the overall dataset obtained birds / records were analysed, which were registered within distances of up to 2.5 km from the observation sites. These dataset is assumed to be of high quality (see Chapter 2.1).

The overall dataset (all observations) and the analysed dataset were almost identical. In distances of more than 2.5 km only six additional individuals of four different raptor species were recorded.

Number of Migrating Birds and Species Composition

In order to characterize bird migration, the total number of birds for each relevant species was calculated. Furthermore, the number of records was used as a further variable to describe migration patterns. A single record can either be an individual or a flock (independent of the number of birds). The number of records is an important variable because it is independent from flock size. In contrast, a single but large flock has a strong effect on the variable “number of birds”. Therefore, the number of records gives additional information about migratory activity and continuity as well as on species-specific migration behaviour.

Seasonal Distribution of Migratory Activity

To identify peak migration periods the cumulative number of birds / records was plotted over time. By summing up the number of birds / records for every week of the study period a weekly migratory activity (number of birds / records by weekly observation time) was calculated.

Altitude of Migration

Regarding possible impacts of wind turbines on migrating birds, flight altitude is an important variable. The number of birds / records was summed up for each of the four height classes, (0 – 50 m, > 50 – 150 m, > 150 m), which refer to potential characteristics of the wind turbine types (below / above and within rotor swept area). Note that the numbers of records may be higher as in other analysis due to the division of a flock in two or more height classes.

Migratory Rate as a Measure for Migratory Activity

In order to describe migratory activity we calculated the migration rate (birds / records per hour) for the study period. The results obtained in this study allow a comparison with results from previous studies conducted at the western Red Sea coast between 2006 and 2016 (Bergen 2009, Bergen & Gaedicke 2013, 2016a, ecoda 2007, 2011) as well as the Nile Valley in 2012 (Bergen & Gaedicke 2012).

2.2.3 Non-Standardized Field Observations of Migrating Birds

This data set consists of migrating or roosting birds of relevant species and sedentary birds, which were recorded while travelling through the project area. In addition roosting birds, which were recorded during standardized field observations (and did not continue migration afterwards), are considered in this dataset, too. Furthermore, records of sedentary birds and non-relevant migrating or resting bird species (mainly passerines) are included.

The total number of European Bee-eaters (*Merops apiaster*) recorded in autumn 2016 could not be exactly quantified, because numbers of Bee-eaters were recorded only acoustically by their flight calls. It was assumed that flocks of European Bee-eaters had an average size of about twenty birds. The flock size was estimated by a number of observations of migrating European Bee-eaters at the Nile Valley in 2011 and 2012 (see Bergen & Gaedicke 2012).

Similarly, for many fly-by-observations of Spotted Sandgrouse (*Pterocles senegallus*) and Sandgrouse spec. (*Pterocles spec.*) the exact number could not be determined because only calls of the species were heard. Most observations of Sandgrouses during autumn 2016 contained flocks up to 10 individuals. Thus, for each record of calls of Sandgrouse ten individuals were assumed as the number of the flock.

2.2.4 Bat Monitoring

The recorded signals on the SDHC-card of the measuring system were analyzed with the software bcAdmin 3.4.6 (1287), bcAnalyze 2 1.13 (1092) and batIdent 1.5 (1), which are recommended by the manufacturer of the measuring system (ecoObs©). The automatic identification system of the software bcAdmin and batIdent allocates every bat echolocation call into one of the following six guilds (based on call types):

- type Rhinolophus: bats of the genus *Rhinolophus*
- type Plecotus: bats of the genus *Plecotus*
- type Barbastella: bats of the genus *Barbastella*
- type Nyctaloid: species with low frequency calls e. g. noctule bats and free-tailed bats
- type Myotis: bats of the genus *Myotis*
- type Pipistrelloid: bats of the genus *Pipistrellus* and Schreibers' bat (*Miniopterus schreibersii*)

The batcorder was efficiently working on a total of 36 nights:

- 18 nights near observation site C4;
- 15 nights near observation site A3;
- 3 nights near observation site B1; and
- no night near observation site D1.

During the 36 nights a small number of signals have been recorded by the batcorder. The signals were checked and classified by the software bcAdmin. As it turned out that no recorded signal refers to a bat call a further analysis was not necessary.

3 Results

3.1 Migratory Species of Relevance for the Impact Assessment

3.1.1 Standardized Field Observations of Migrating Birds

Number of Migrating Birds and Species Composition

During the study period in autumn 2016 a total of 573 birds (382 records) from 21 relevant species were observed within distances of up to 2.5 km from the observation sites (Table 3.1). Short-toed Snake Eagle was the most numerous species.

Table 3.1: Number of birds / records obtained during standardized observations at the observation sites at row A, B, C and D as well as at the observation sites X1 and X2 at distances of up to 2.5 km to the observation sites (b= number of birds, r= number of records)

species	scientific name	row A		row B		row C		row D		X1/X2	
		b	*r*	*b*	*r*	*b*	*r*	*b*	*r*	*b*	*r*
White Stork	*Ciconia ciconia*	.	.	.	.	1	1	.	.	.	.
European Honey Buzzard	*Pernis apivorus*	1	1	4	4	4	2	47	13	.	.
Black Kite	*Milvus migrans*	39	5	6	5	3	2	4	3	3	3
Egyptian Vulture	*Neophron percnopterus*	.	.	2	1	.	.	3	1	.	.
Short-toed Snake Eagle	*Circaetus gallicus*	57	35	50	43	36	32	37	31	29	21
Marsh Harrier	*Circus aeruginosus*	7	7	9	9	16	11	18	13	.	.
Pallid Harrier	*Circus macrourus*	4	3	1	1	3	3	.	.	.	.
Montagu's Harrier	*Circus pygargus*	.	.	2	2	.	.	5	5	.	.
Pallid / Montagu's Harrier	*Circus macrourus /pygargus*	1	1	1	1	1	1	3	3	.	.
Harrier	*Circus spec.*	1	1	2	2	.	.	.	.	.	.
Levant Sparrowhawk	*Accipiter brevipes*	.	.	2	1	.	.	2	2	.	.
Eurasian Sparrowhawk	*Accipiter nisus*	1	1	.	.	.	.	.	.	.	.
Steppe Buzzard	*Buteo buteo vulpinus*	6	5	20	8	18	5	6	4	2	2
Long-legged Buzzard	*Buteo rufinus*	1	1	3	2	.	.	1	1	.	.
Buzzard	*Buteo spec.*	4	2	.	.	.	.	.	.	.	.
Lesser Spotted Eagle	*Aquila pomarina*	.	.	3	2	.	.	.	.	.	.
Steppe Eagle	*Aquila nipalensis*	4	4	3	3	5	5	10	4	2	2
Booted Eagle	*Aquila pennata*	2	2	3	3	2	2	.	.	.	.
Eagle	-	3	1	1	1	2	1	3	2	.	.
Lesser Kestrel	*Falco naumanni*	1	1	1	1	2	2	.	.	.	.
Common Kestrel	*Falco tinnunculus*	2	2	1	1	.	.	3	3	.	.
Lesser / Common Kestrel	*Falco naumanni / tinnunculus*	1	1	.	.	.	.	1	1	.	.
Red-footed Falcon	*Falco vespertinus*	.	.	.	.	.	.	3	3	.	.
Sooty Falcon	*Falco concolor*	.	.	4	2	2	1	1	1	.	.
Eurasian Hobby	*Falco subbuteo*	.	.	1	1	.	.	.	.	.	.
Lanner Falcon	*Falco biarmicus*	.	.	.	.	2	1	1	1	.	.
Falcon	*Falco spec.*	4	4	1	1	.	.	1	1	2	2
Raptor spec.	-	7	5	6	4	13	9	2	1	2	1
sum		**146**	**82**	**126**	**98**	**110**	**78**	**151**	**93**	**40**	**31**

Species of special interest (due to their status on the IUCN Red List of Threatened Species (see Chapter 2.1.1 and Annex I & II)) occurred in low numbers. Egyptian Vulture and Steppe Eagle belong to threatened species. Pallid Harrier and Sooty Falcon are listed as "Near Threatened" and all other species as "Least Concern" according to the IUCN Red List (see Annex I).

No larger flock of migrants occurred during the study period in autumn 2016. The observed birds migrated singly (52 % of all birds and 78 % of all records) or in small flocks of 2 to 10 individuals (39 % of all birds and 21 % of all records).

Seasonal Distribution of Migratory Activity

During the study period the number of birds / records per hour increased within the first weeks and peaked in week 7th (i.e. October 1st to October 6th). Afterwards the number of birds / records per hour decreased and migratory activity was very low from week 9th (Figure 3.1).

Most birds passed the study area between beginning / mid of September and mid / end of October. 79 % of all birds were recorded in the period September 10th to October 20th. This pattern was mainly caused by the phenology of the most numerous species: Short-toed Snake Eagle.

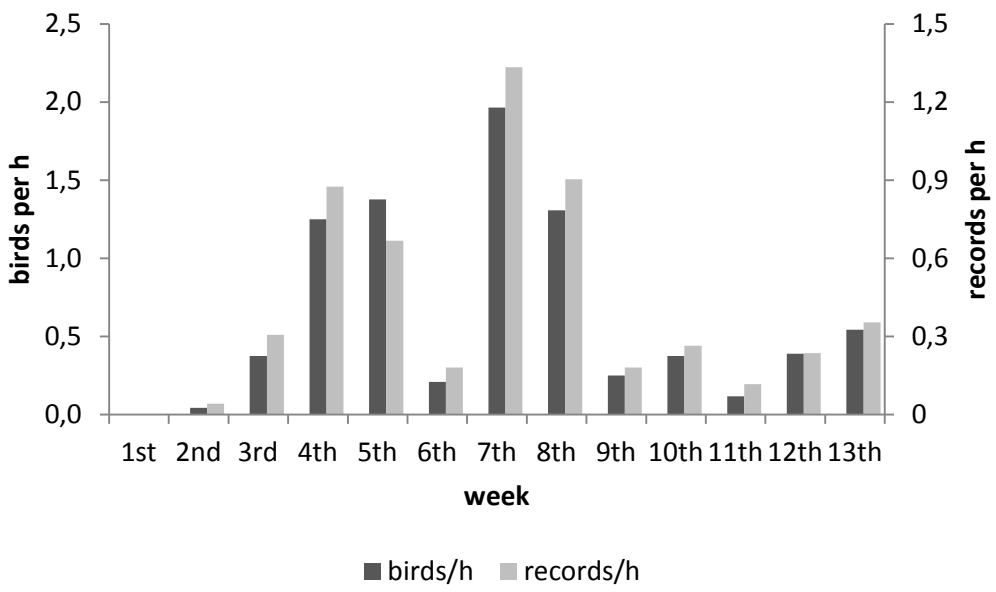

Figure 3.1: Seasonal distribution of birds and records in autumn 2016 (only birds at distances of up to 2.5 km to the observation sites; to correct different observational time the number of birds / records were divided through observational time of the particular week; 1st week: August 20th to 25th)

Altitude of Migration

In autumn 2016 most recorded birds migrated at the height classes > 150 m and > 50 to 150 m (Figure 3.2). A similar distribution within the height classes was found for the Short-toed Snake Eagle.

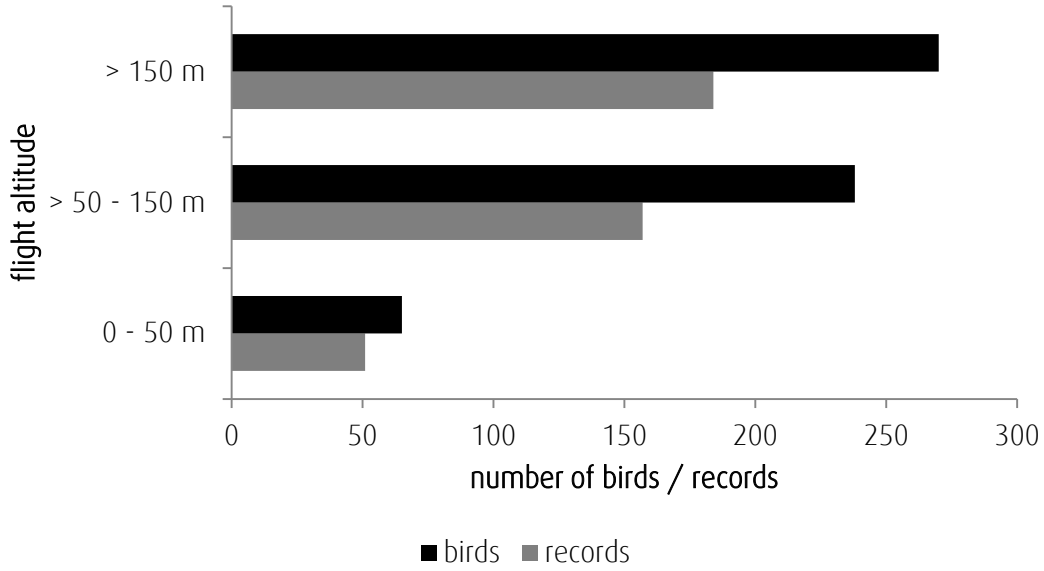

Figure 3.2: Altitude of migrating birds in autumn 2016 (only birds at distances of up to 2.5 km to the observation sites)

Migratory Rate as a Measure for Migratory Activity

In autumn 2016 a total of 382 records (single birds or flock of birds) were registered during 905.50 hours of observation. Thus, about 0.42 records / h were recorded indicating a low migratory activity. The total number of birds recorded in the study area was low, too: overall 573 birds were recorded (0.63 birds / h).

A study conducted at the Nile valley in autumn 2011, about 50 km west of the project area, lead to a migration rate of 0.06 birds / h and 0.05 records / h. The migration rate obtained in the study area was considerably higher.

In comparison to studies conducted at the western coast of the Red Sea the migration rate obtained in the study area was considerably lower. At the western coast of the Red Sea migratory activity in autumn ranged between 5.5 to 86.5 birds / h within distances of up to 2.5 km or 2 km from observation sites (data from Bergen 2009, Bergen & Gaedicke 2013, 2016a, ecoda 2007, 2011). At the western coast of the Red Sea most individuals migrate within few large flocks of several hundred to thousand individuals. These large flocks have a strong effect on the number of birds / h. Such large flocks were not registered within the study area.

To conclude, considering the average numbers of birds / h (one bird in a period of about 1.5 hours) and records / h (one record in a period of about 2.4 hours) migratory activity in the study area was low in autumn 2016.

3.1.2 Non-Standardized Field Observations of Migrating Birds

While driving within the project area few observations of migrating or resting (migrating, roosting or foraging) migrants were made (Table 3.2).

Table 3.2: Numbers of relevant birds, which were recorded by chance / randomly in autumn 2016 within the project area

species	scientific name	number of birds
European Honey Buzzard	*Pernis apivorus*	1
Short-toed Snake Eagle	*Circaetus gallicus*	4
Marsh Harrier	*Circus aeruginosus*	1
Montagu's Harrier	*Circus pygargus*	1
Steppe Eagle	*Aquila nipalensis*	1
Common Kestrel	*Falco tinnunculus*	10
Sooty Falcon	*Falco concolor*	3
Falcon	*Falco spec.*	1

3.2 Migratory Species of minor Relevance for the Impact Assessment

Some migrating (rarely roosting) birds from species of minor relevance were recorded in the project area during standardized observations in autumn 2016. European Bee-eater, Barn Swallow and White Wagtail were the most common species (see Table 3.3).

Table 3.3: Numbers of birds from species of minor relevance, which were recorded by chance / randomly in autumn 2016

species	scientific name	number of birds
Great Cormorant	*Phalacrocorax carbo*	196
Namaqua Dove	*Oena capensis*	1
European Bee-eater	*Merops apiaster*	531
Red-backed Shrike	*Lanius collurio*	91
Lesser Grey Shrike	*Lanius minor*	1
Masked Shrike	*Lanius nubicus*	20
Woodchat Shrike	*Lanius senator*	4
Greater Short-toed Lark	*Calandrella brachydactyla*	21
Lark spec.	-	1
Sand Martin	*Riparia riparia*	9
Barn Swallow	*Hirundo rustica*	227
Red-rumped Swallow	*Cecropis daurica*	2
Common House Martin	*Delichon urbica*	19
Swallow spec.	-	12
Eastern Olivaceous Warbler	*Hippolais pallida*	1
Willow Warbler	*Phylloscopus trochilus*	32
Common Chiffchaff	*Phylloscopus collybita*	54
Wood Warbler	*Phylloscopus sibilatrix*	1
Warbler spec. (Phylloscopus)	*Phylloscopus spec.*	2
Common Whitethroat	*Sylvia communis*	1
Lesser Whitethroat	*Sylvia curruca*	35
Rüppell's Warbler	*Sylvia rueppelli*	1
Thrush Nightingale	*Luscinia luscinia*	1
Bluethroat	*Luscinia svecica*	2
Common Redstart	*Phoenicurus phoenicurus*	2
Whinchat	*Saxicola rubetra*	3
Northern Wheatear	*Oenanthe oenanthe*	7
Black-eared Wheatear	*Oenanthe hispanica*	1
Desert Wheatear	*Oenanthe deserti*	7
Isabelline Wheatear	*Oenanthe isabellina*	2
Wheater spec.	*Oenanthe spec.*	4
Eurasian Golden Oriole	*Oriolus oriolus*	1
White Wagtail	*Motacilla alba*	190
Western Yellow Wagtail	*Motacilla flava*	1
Wagtail spec.	*Motacilla spec.*	1
Red-throated Pipit	*Anthus cervinus*	5
Water Pipit	*Anthus spinoletta*	1
Pipit spec.	*Anthus spec.*	4
Spanish Sparrow	*Passer hispaniolensis*	4
Passerine	-	67

3.3 Sedentary Birds

During the survey in autumn 2016 single sedentary species, which belong to the typical desert fauna, were recorded in the project area.

- Once a pair of Sand Partridges (*Ammoperdix heyi*) was observed.
- Two individuals of Cream-coloured Cursor (*Cursorius cursor*) were registered.
- Spotted Sandgrouse was observed regularly (163 records with an estimated number of more than 2,000 birds). The observations did not concentrate in certain areas.
- Common Pigeons (*Columba livia f. domestica*) occurred regularly. Most often at row A.
- Single individuals or pairs of Brown-necked Ravens (*Corvus ruficollis*) were regularly observed (357 birds, 146 records). Sometimes also small flocks stayed in the project area. This species occurred within different areas of the project area. Most individuals were recorded at row A, near the street (83 birds, 61 records).
- Desert Larks (*Ammomanes deserti*) were registered occasionally at different parts of the project area (20 birds, 16 records).
- Greater Hoopoe-Larks (*Alaemon alaudipes*) were recorded several times at various sites within the project area (22 birds, 19 records).

In addition, Sooty Falcons were observed occasionally (as already described in Chapters 3.1.1 and 3.1.2).

3.4 Bats

During the survey in autumn 2016 no echolocation call of a bat was recorded by the batcorder. Based on this result, the study does not serve as a significant habitat for bats in autumn.

4 Brief Conclusion

4.1 Assessment of the Importance of the Project Area for Bird / Bats in Autumn

The following initial assessment of the importance of the project area is restricted to autumn migration.

Commonly, the importance of a site is assessed by two criteria: 1. the number of migrating birds / records, and 2. the conservational status (IUCN-Red List Category, see Annex I & II) of migrating species. In this process, species that are exposed to a higher threat are of special interest. As noted in Chapter 2.1, such species are Egyptian Vulture and Steppe Eagle (both Endangered), Greater Spotted Eagle and Eastern Imperial Eagle (both Vulnerable) as well as Pallid Harrier, Red-footed Falcon and Sooty Falcon (Near Threatened). Furthermore species should be considered of which a significant proportion of the flyway population crosses the study area.

Several criteria have been developed by Birdlife International for the selection of areas which are internationally important for birds. Within the scope of this investigation two criteria are particularly relevant:

1. An area where at least 20,000 storks, raptors or cranes regularly pass during spring or autumn migration is of international importance.

2. The second criterion is the abundance of each species in relation to the total flyway population. According to this, an area that regularly holds at least 1% of a flyway population of a threatened migratory species is of international importance, too. A flyway population is a population of a species sharing the same migration route linking breeding areas and wintering areas.

Considering the results obtained in autumn 2016, it is obvious that the project area as a whole does not meet the first mentioned criterion developed by Birdlife International ("…at least 20,000 storks, raptors…") and is therefore not of international importance for autumn migration.

A significant portion of the flyway population of Short-toed Snake Eagle was registered in autumn 2016. A total of 209 individuals were recorded representing about 2.4 % of the assumed flyway-population. However, according to the IUCN-Red List Short-toed Snake Eagle is not a threatened species (see Annex I).
About 0.5 % of the flyway population of Pallid Harrier, a species not supposed to be susceptible towards wind turbines during migration, was recorded during standardized observations (data on flyway populations taken from Carlbro 2009). Hence, the second criterion developed by Birdlife International (1 % of the flyway population) is not met, even if it is considered that the recorded migrants represent only a portion of the whole migration and that the calculated species-specific proportion of the flyway population might be underestimated. In addition, it has to be acknowledged that the study area is not a clearly defined location, but a huge part of the Eastern Desert with an extent of about 20 km from the West to the East and about 100 km from the North to the South.

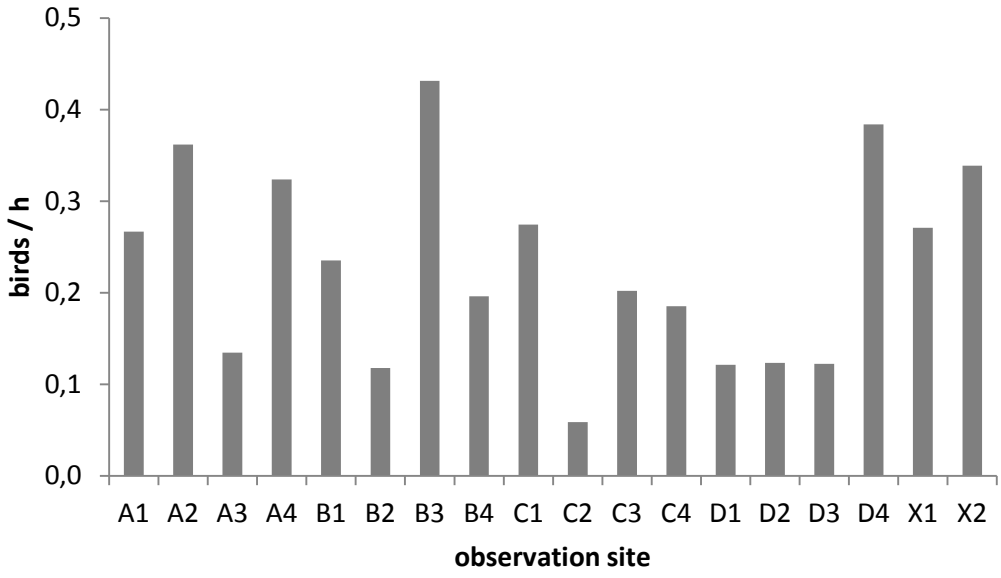

Figure 4.1: Migratory activity of Short-toed Snake Eagles at the observation sites in autumn 2016 (only birds at distances of up to 2.5 km to the observation sites)

The project area is quite uniform and there are no remarkable topographic features which might affect the spatial distribution of bird migration in autumn. The spatial distribution of all recorded Short-toed Snake Eagles at the observation sites, for example, clearly demonstrates that there are no areas in which migration is concentrated (Figure 4.1). To conclude, no spatial differentiation can be made when describing and assessing migratory activity in the project area in autumn.

Based on the results from autumn 2016 the local bird community is very poor in species and the density is very low. For sedentary birds vegetated areas are particularly important. The project area offers few sparse vegetated areas. For tree and cliff nesting birds (especially raptors) only very few potential nesting sites (of low quality) were found yet. The importance of the project area for the local bird community will be further investigated in the SESA reports.

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 as a hunting site because of higher prey density. 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.

4.2 First Assessment of Possible Impacts of Wind Energy Projects

As known from the Gulf of Suez area possible impacts on birds can significantly differ between seasons (autumn / spring). Thus, the following assessment is restricted to autumn. An initial assessment for spring migration can be found in Bergen & Gaedicke (2016b).

4.2.1 Migrating Birds

Construction phase

Noise and dust emission at distinct construction sites might bring migrating birds temporarily to alter their flight path. These alterations will not have a significant effect on the total migration distance. The impact on migrating birds caused by construction of wind farms within the project area is assessed to be very low (not significant).

Operation and Maintenance Phase

Due to the low migratory activity in autumn, wind farms within the project area are not believed to pose a relevant risk of collision. Single collisions at wind farms within the project area might occur even during autumn. But, based on the first assessment, the expected collision rate is not believed to cause significant effects on populations. This will be further investigated, especially for the Short-toed Snake Eagle, in the SESA Wind Power report. The first assessment does not indicate that wind turbines within the project area will have a significant impact on autumn migration.

While avoidance behaviour reduces collision risk, it could result in wind farms acting as barriers to bird movement (*e. g.* Drewitt & Langston 2006). Birds might change horizontal flight direction in order to avoid a wind farm, which obviously leads to additional energy expenditure. However, due to the low migratory activity in autumn, wind farms within the project area are not believed to pose a significant barrier effect. Considering the overall efforts of bird migration, an additional flight path of a few kilometres seems unlikely to have a relevant impact on individuals (in particular, if this distance is covered by soaring flight).

Mitigation Measures

Based on the first assessment there is no need for specific mitigation measures. However, this issue will be further investigated in the SESA Wind Power report.

4.2.2 Local Birds / Bats

Construction phase

Based on the results obtained so far, the variety of sedentary birds and bird density as well as activity of bats within the project area is very low. Consequently, the impact caused by the construction of wind farms within the project area is assessed as not to be significant.

Operation and Maintenance Phase

Based on the results obtained so far, the variety of sedentary birds and bird density as well as the activity of bats within the project area is very low. Consequently, the impact on sedentary birds and bats related to operating wind turbines, maintenance or collision risk is assessed as not to be significant.

Mitigation Measures

Based on the results obtained so far, there is no need for specific mitigation measures.

5 Summary

5.1 English Summary

The Government of Egypt has identified three large areas suitable for development of wind and solar applications under the newly issued FiT law. One of these areas is located in the East Nile Region across the three Governorates of Beni Suef, Al Minya and Assuit ("project area") and extents over 2,200 km².

To ensure a strategic level assessment of the potential environmental and social issues associated with these Renewable Energy (RE) developments, the European Bank for Reconstruction and Development (EBRD) has agreed to fund the Strategic Environmental and Social Assessment (SESA) Study for the East of Nile project area. As RE developments may have significant potential impacts on birds and bats, a thorough investigation on birds / bats forms a crucial part of the SESA. The investigation aims for

- collecting significant baseline data on birds / bats;
- identifying and assessing possible impacts caused by RE developments;
- prioritising areas for wind and solar energy utilization according to the level of significance of likely impacts on birds / bats;
- proposing criteria for selection of a site with the lowest impact; and finally
- recommending mitigation measures in order to minimize possible conflicts, if required.

On that background standardized daytime field observations were carried out between August 20th and November 15th, 2016, in the so-called East Wind-1 and East Wind-2 sections. Within 905.5 hours of observation (at 18 different sites) a total of 573 migrating birds (382 records) from 21 relevant species were observed within distances of up to 2.5 km from the observation sites. Egyptian Vulture and Steppe Eagle belong to threatened species. Pallid Harrier and Sooty Falcon are listed as "Near Threatened", whereas all other species are listed as "Least Concern" according to the IUCN Red List. The most numerous species was the Short-toed Snake Eagle. In addition migrating (rarely roosting) birds from species of minor relevance and single sedentary species, which belong to the typical desert fauna, were recorded in the two sections.

The bat survey conducted in autumn 2016 provided no evidence on the occurrence of bats in the study area.

To conclude, migratory activity of relevant bird species was low in autumn 2016. Thus, based on the data in hand, the project area is not particularly important for relevant threatened species during autumn migration. The whole project area might be important to a certain degree for migrating Short-toed Snake Eagle, a non-threatened species, in autumn. However, the extent of the project area has to be considered, too, when assessing its importance.

According to the results obtained in autumn 2016, the area does neither serve as an important habitat for roosting or sedentary birds nor for bats or other animals.

To conclude, at present no significant impacts on migrating, roosting or sedentary birds as well as on bats or other animals are expected when installing and operating wind farms in the project area. This will be further investigated in the SESA Wind Power report.

5.2 Arabic Summary / ملخص باللغة العربية

حددت الحكومة المصرية ثلاث مناطق واسعة مناسبة لمشارع طاقة الرياح والطاقة الشمسية في ظل القانون الصادر حديثا وتقع أحد هذه المناطق في منطقة شرق النيل عبر المحافظات الثلاث: بني سويف والمنيا وأسيوط ("منطقة المشروع") وتمتد عبر أكثر من 2200 كيلومتر مربع.

ولضمان التقييم الاستراتيجي للقضايا البيئية والاجتماعية المحتملة المرتبطة بمشاريع الطاقة المتجددة هذه، فقد وافق البنك الأوروبي للإنشاء والتعمير على تمويل دراسة التقييم البيئي والاجتماعي الاستراتيجية لمنطقة شرق النيل لمنطقة المشروع، ولأن مشاريع الطاقة المتجددة قد يكون لها آثار محتملة كبيرة على الطيور والخفافيش، فإن البحث الشامل للطيور والخفافيش يشكل جزءا أساسيا من دراسة التقييم البيئي والاجتماعي الاستراتيجية، ويهدف هذا البحث إلي:

- جمع البيانات الأساسية عن الطيور / الخفافيش.
- تحديد وتقييم الآثار المحتملة الناجمة عن مشاريع الطاقة المتجددة.
- تحديد أولوية مناطق مشاريع طاقة الرياح والطاقة الشمسية وفقا لمستوى أهمية الآثار المحتملة على الطيور / الخفافيش.
- اقتراح معايير لاختيار المواقع التي يكون لها أدنى أثر.
- التوصية باتخاذ تدابير التخفيف من أجل تقليل النزاعات المحتملة، إذا لزم الأمر.

وعلى هذه الخلفية فقد تم القيام بالملاحظات الميدانية خلال النهار في المدة بين 20 أغسطس و 15 نوفمبر 2016، في القطاعات المسماة شرق الرياح 1 و شرق الرياح 2، وخلال مدة 5ر905 ساعة مراقبة (في 18 مواقع مختلفة) لوحظت 573 من الطيور المهاجرة تنتمي إلي 21 نوعا من الطيور على مسافات تصل إلى 2.5 كم من مواقع الرصد، والنسر المصري ونسر السهوب تنتمي إلى الأنواع المهددة بالانقراض، بينما طائر الهارير وصقر الغروب هي مهددة بدرجة أقل، في حين تعتبر كافة الأنواع الأخرى غير مهددة بالانقراض وفقا للقائمة الحمراء لمنظمة IUCN. وقد كانت الأنواع الأكثر عددا هي النسر الأفعى قصير الأصابع، وبالإضافة إلى ذلك فقد تمت ملاحظة بعض الطيور من الأنواع ذات الأهمية الثانوية التي تنتمي إلى الأنواع الصحراوية النمطية في منطقتين.

ولم تؤدي دراسة الخفافيش التي أجريت في خريف 2016 أي دليل على وجود الخفافيش في منطقة الدراسة.

وفي النهاية يمكن القول أن نشاط الطيور المهاجرة كان منخفضا في خريف عام 2016، وهكذا واستنادا إلى البيانات المتاحة فإنه يمكن اعتبار أن منطقة المشروع ليست ذات أهمية خاصة بالنسبة للأنواع المهددة من الطيور أثناء هجرة الخريف، وقد تكون منطقة المشروع ككل مهمة لنسر الأفعى القصير الأصابع، وهو من الأنواع غير المهددة، في الخريف، ومع ذلك فيجب اعتبار منطقة المشروع ككل عند تقييم أهميتها.

ووفقا للنتائج التي تم الحصول عليها في خريف عام 2016، فإن المنطقة ليست بمثابة موطن مهم للطيور الجاثمة أو للطيور المستقرة أو للخفافيش أو غيرها من الطيور.

وفي الختام، يمكن القول أنه لا توجد في الوقت الحاضر آثار كبيرة لمشاريع طاقة الرياح والطاقة الشمسية على هجرة الطيور أو الخفافيش أو الطيور الأخرى في منطقة المشروع وسيتم القيام بمزيد من البحث في تقرير الآثار البيئية والاجتماعية الاستراتيجي لمشاريع طاقة الرياح والطاقة الشمسية في المستقبل.

6 References

Bergen, F. (2009): Expert Opinion on the Additional Ornithological Investigation in Zone II (Orange Zone) as part of the Feasibility Study for a large wind farm at the Gulf of Zayt, Egypt. Final report for MVV decon GmbH. Dortmund.

Bergen, F. & L. Gaedicke (2012): Final Report on the Ornithological Investigation at the West Nile Valley in Arab Republic of Egypt. Report for Oriental Consultants Co., Ltd., and Japan International Cooperation Agency (JICA). Dortmund.

Bergen, F. & L. Gaedicke (2013): Final Report on the Bird Migration Study at the Gulf of Suez (300 km² area) at Ras Gharib in the Arab Republic of Egypt. Report for New & Renewable Energy Authority (NREA). Dortmund.

Bergen, F. & L. Gaedicke (2016a): Final Report on the Bird Migration Study for 100 MW wind farms at Ras Gharib in the Arab Republic of Egypt. Report for 5 Capitals Environmental and Management Consulting. Dortmund.

Bergen, F. & L. Gaedicke (2016b): First Report on the Bird / Bat Monitoring in Spring 2016 in the East Nile Region (Arab Republic of Egypt). Report for New and Renewable Energy Authority (NREA), Egypt. Dortmund.

Carlbro (2009): Prelimnary Draft. Bird Migration Study El Zayt, Egypt. Report from bird migration studies autumn 2008 and spring 2009. Report for Italgen - Italcementi Group.

Drewitt, A. L. & R. H. W. Langston (2006): Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

ecoda (2007): Ornithological Expert Opinion as a part of the Feasibility Study for a large wind farm at Gulf of Zayt, Egypt. Report for DECON - Deutsche Energie-Consult Ingenieurgesellschaft mbH. Dortmund.

ecoda (2011): Expert Opinion on the Ornithological Investigation at the Gulf of Suez as part of the ESIA for 1,000 MW Wind Farms at Gulf of Suez, Arab Republic of Egypt. Report for New and Renewable Energy Authority (NREA) and Kreditanstalt für Wiederaufbau (KfW). Dortmund.

EEAA (Ministry of State for Environmental Affairs Egyptian Environmental Affairs Agency) (2013): Environmental Impact Asessment Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley/Red Sea Flyway with particular reference to wind energy in support of the conservation of Migratory Soaring Birds (MSB). Partners: Global Environment Facility, Birdlife International, United Nations Development Program (UNDP) Egypt, Ministry of State for Environmental Affairs in Egypt, Nature Conservation Egypt. Cairo.

IUCN (International Union for Conservation of Nature) (2015): The IUCN Red List of Threatened Species. Version 2015-3.
http://www.iucnredlist.org/

Lesham, Y. & Y. Yom-Tov (1996): The Magnitude and timing of migration by soaring raptors, pelicans and storks over Israel. Ibis 138: 188-203.

Marques, A. T., H. Batalha, S. Rodrigues, H. Costa, M. J. R. Pereira, C. Fonseca, M. Mascarenhas & J. Bernardino (2014): Understanding bird collisions at wind farms: An updated review on the causes and possible mitigation strategies. Biological Conservation 179: 40-52.

Ornis Consult (1999): Biodiversity review of the western Gulf of Suez. Prepared by M. Baha El Din & F. P. Jensen. Copenhagen, Denmark.

Annex

I Relevant species, which are known to migrate along Egypt

II Explanation of different categories of “The IUCN Red List of Threatened Species” for migratory bird species in Egypt

Annex I Relevant species, which are known to migrate along Egypt

no	species	scientific name	IUCN Red List 2015
1	Greater Flamingo	*Phoenicopterus roseus*	LC
2	Great White Pelican	*Pelecanus onocrotalus*	LC
3	Grey Heron	*Ardea cinerea*	LC
4	Purple Heron	*Ardea purpurea*	LC
5	Western Reef Heron	*Egretta gularis*	-
6	Squacco Heron	*Ardeola ralloides*	LC
7	Cattle Egret	*Bubulcus ibis*	LC
8	Black-crowned Night Heron	*Nycticorax nycticorax*	LC
9	Glossy Ibis	*Plegadis falcinellus*	LC
10	Eurasian Spoonbill	*Platalea leucorodia*	LC
11	Black Stork	*Ciconia nigra*	LC
12	White Stork	*Ciconia ciconia*	LC
13	Osprey	*Pandion haliaetus*	LC
14	European Honey Buzzard	*Pernis apivorus*	LC
15	Black Kite	*Milvus migrans*	LC
16	Egyptian Vulture	*Neophron percnopterus*	EN
17	Short-toed Snake Eagle	*Circaetus gallicus*	LC
18	Marsh Harrier	*Circus aeruginosus*	LC
19	Pallid Harrier	*Circus macrourus*	NT
20	Montagu's Harrier	*Circus pygargus*	LC
21	Levant Sparrowhawk	*Accipiter brevipes*	LC
22	Eurasian Sparrowhawk	*Accipiter nisus*	LC
23	Steppe Buzzard	*Buteo buteo vulpinus*	LC
24	Long-legged Buzzard	*Buteo rufinus*	LC
25	Lesser Spotted Eagle	*Aquila pomarina*	LC
26	Greater Spotted Eagle	*Aquila clanga*	VU
27	Steppe Eagle	*Aquila nipalensis*	EN
28	Eastern Imperial Eagle	*Aquila heliaca*	VU
29	Booted Eagle	*Aquila pennata*	LC
30	Lesser Kestrel	*Falco naumanni*	LC
31	Common Kestrel	*Falco tinnunculus*	LC
32	Red-footed Falcon	*Falco vespertinus*	NT
33	Eleonora's Falcon	*Falco eleonorae*	LC
34	Sooty Falcon	*Falco concolor*	NT
35	Eurasian Hobby	*Falco subbuteo*	LC
36	Lanner Falcon	*Falco biarmicus*	LC*
37	Barbary Falcon	*Falco pelegrinoides*	LC*
38	Common Crane	*Grus grus*	LC

*: no classification for migratory birds available, represented category refers to breeding birds

Annex II Explanation of different categories of "The IUCN Red List of Threatened Species" for migratory bird species in Egypt

(International Union for the Conservation of Nature and Natural Resources)

http://www.iucnredlist.org/

http://www.birdlife.org/datazone/speciessearchresults.php?reg=0&cty=63&cri=&fam=0&gen=0&spc=&cmn=&hab=&thr=&bt=&rec=N&vag=N&sea=&wat=&aze=&lab=&enb=&mib=Y&cnv=&hdnAction=ADV_SEARCH&SearchTerms=

ENDANGERED (EN)
A species is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)
A species is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)
A species is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A species is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant species are included in this category.

For explanations of the mentioned criteria within the explanations of the categories see:

http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf

http://www.iucnredlist.org/documents/reg_guidelines_en.pdf

10.2.4 Annex B4: Third Report on the Bird Monitoring in the East Nile Region (Arab Republic of Egypt) - spring 2017

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ecoda

Third Report on the Bird Monitoring in the East Nile Region (Arab Republic of Egypt) - Spring 2017

Final Report

May 2017

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

Third Report on the Bird Monitoring in the East Nile Region (Arab Republic of Egypt) - Spring 2017

Final Report

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1 Introduction

1.1 Background and Objectives

Following the issuance of Renewable Energy Feed-in Tariff ("FiT") presidential law in Egypt in December 2014, the European Bank for Reconstruction and Development (the "EBRD"), has been engaged in partnership with the Government of Egypt ("GoE") to identify a portfolio of Renewable Energy projects (mainly from wind and solar sources) to be financed by prequalified Foreign Direct Investors ("FDIs").

The GoE has identified three large areas suitable for development of wind and solar applications, under the newly issued FiT law mentioned above. One of these areas, the project area, is located in the East Nile Region across the three Governorates of Beni Suef, Minia and Assuit and extents over 2,200 km².

To ensure a strategic level assessment of the potential environmental and social issues associated with these major developments, EBRD has agreed to fund the Strategic Environmental and Social Assessment (SESA) Study for the East of Nile area. Subsequently the execution of a SESA study on the project area was awarded to the Joint Venture Lahmeyer - ecoda. The study shall serve as a framework SESA study considering RE-development in the project area and shall facilitate future ESIA and environmental clearance for the individual projects within the areas.

Installing large wind farms in the East Nile area may lead to significant impacts on migrating birds and on bats caused by collisions with turbines or, to a lower degree, by barrier effects. In addition, development of Renewable Energy projects might lead to other impacts on birds / bats, like habitat loss or disturbance. Since there is no comprehensive knowledge on bird migration and on occurrence of bats in the East Nile Region, a thorough investigation forms a crucial part of the SESA.

The main objectives of the standardized field investigation are to

- collect significant baseline data on migrating birds (mainly soaring and gliding species migrating during the day) and on bats in spring and in autumn;
- describe migration patterns of relevant species in a quantitative way;
- identify and assess possible impacts regarding development of Renewable Energy projects within the area;
- prioritise areas for wind and solar energy utilization according to the level of significance of likely impacts on birds / bats;
- propose criteria for selection of a site with the lowest impact on birds / bats; and finally
- recommend mitigation measures in order to minimize possible conflicts, if required.

The project area is subdivided into different sections, in which wind and solar applications shall be developed. In spring 2017 bird migration was recorded by standardized observations in areas designated for wind applications. The interim report in hand covers

- an overview of the methods and the observation schedule applied in spring 2017;
- a presentation of the main results obtained by observations;
- first conclusions regarding the importance of the area for bird migration and sedentary birds in spring; and finally
- a first assessment of possible impacts on spring migration and sedentary birds caused by installing and operating wind farms within the project area (impacts of PV solar projects will be assessed in the SESA Solar Power Report).

The standardized field monitoring started on February 20th and lasted up to March 31st. Thus, the monitoring covers a part of the spring migration period. The period from early April to end of May was already studied in 2016. The study at hand serves as complement to cover a whole spring migration cycle.

Important habitats for local fauna shall be identified in the scope of the SESA, too. Hence, all observations of local or roosting birds and of other animals have been recorded during standardized observations or during travelling through the project area. Bats were not studied in spring 2017.

No additional data on bats were collected in spring 2017. The monitoring of bat activity was conducted for a period of about four weeks in spring 2016 and again in late summer / autumn 2016. The results clearly showed that bat activity in the study area was very low. Hence, no additional surveys were stipulated for spring 2017.

1.2 Project Area

The project area is located east of the Nile Valley at a nearest distance of 8 km at the latitude of Maghada in the North and El Quoseyia in the South, all on desert land. 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 project area. Inside the area only very few isolated economic activities take place such as agricultural groundwater irrigation schemes, stone crushing or mining. The hyper-arid climate of the Eastern Desert leads to sparse vegetation which belongs to the Saharao-Sindian phytogeographical region.

In the project area two sections are designated for wind applications (East Wind-1 and East Wind-2). These sections are located in the northern and southern part of the project area. The northern section (East Wind-2) and the southern section (East Wind-1) cover areas of about 79 km² and about 748 km², respectively (see Map 2.1).

Figure 1.1: Impressions from the project area

2 Methods

2.1 Data Collection

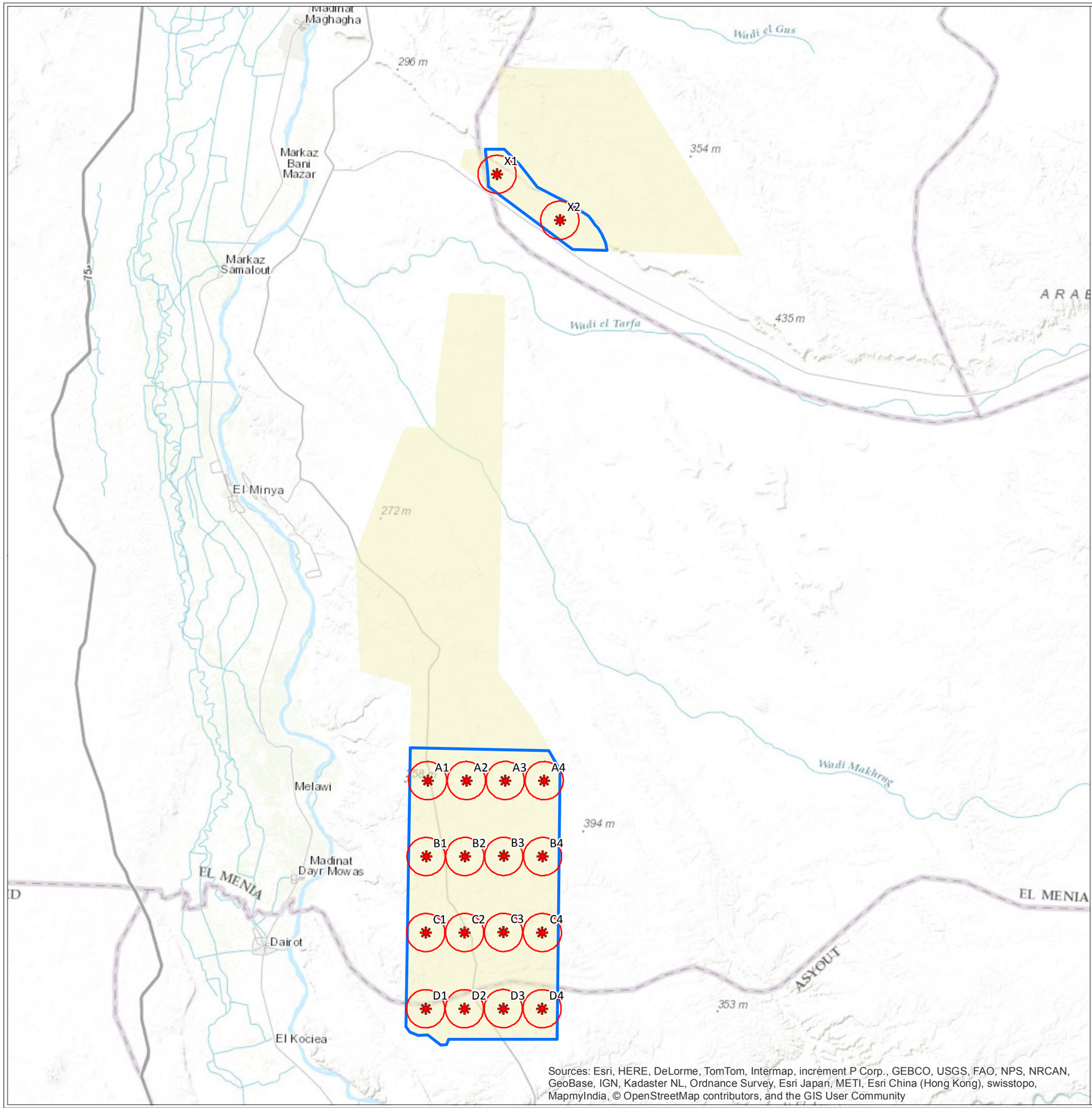
2.1.1 Standardized Field Observations of Migrating Birds

Between February 20th and March 31st 2017 standardized daytime field observations were carried out. Thus, the study covers an important period of spring migration generally lasting from late February to end of May for most of the relevant species (e. g. Bergen 2009, ecoda 2011, Lesham & Yom-Tov 1996). In general the study design was similar to the ones which were used during previous investigations at the Red Sea and at the Nile Valley (for details see Bergen 2009, Bergen & Gaedicke 2012): using fixed observation sites. Observations were conducted by two teams - each with at least two ornithologists - mostly under guidance of a chief ornithologist, who advised and supervised the ornithologists. The teams consisted of European and Egyptian experts.

As known from earlier studies many birds or -at least- flocks of migrating birds can be recorded and safely identified at distances of up to 5 km (in some cases even up to 10 km or more). However, detection probability of birds decreases with increasing distance to an observation site. Hence, standardized data collection focussed on the area at distances of 2.5 km to each observation site (the study area).

With regard to the extent of the project area, a total of 18 observation sites were selected in order to obtain a representative sample of migration within the project area. Two observations sites were established in the northern section (X1 and X2; see Map 2.1). Further 16 observation sites were located in the southern section within four rows from West to East (perpendicular to the expected main flight direction of migrating birds). These rows consisted of the observation sites A1 - A4 (row A), B1 - B4 (row B), C1 - C4 (row C) and D1 - D4 (row D; see Map 2.1).

As earlier studies have shown (see Figure 3.4 and 3.15 in Bergen 2009), migratory activity is very low in the early morning and the late afternoon. Furthermore, in the early morning and the late afternoon bird migration is dominated by species, which are more or less active flyers and, thus, do not depend on thermal uplifts (mainly Harriers). These species are not believed to be particularly vulnerable to collision with wind turbines. As a consequence, the early morning and late afternoon (about 1 hour after sunrise to 1 hour before sunset) were neglected during data collection. The time of day in between these periods was subdivided into four periods (early morning, morning, midday and afternoon). A rotation schedule was used to gain a representative distribution of spatial and temporal observation samples (see Table 2.1). It was possible to follow this schedule on most days. Each day standardized daytime field observations should be conducted for 12 hours (six hours per team). During most days eight different observation sites in the southern section were visited for 1.5 hours each. When the northern section was studied, observations lasted for three hours at the sites X1 and X2 (each) and further four different observation sites in the southern section were visited for 1.5 hours each. Most observation units started more or less at the planned time. Delays occurred but observation units were still within the range of the given period of the day.



JV LAHMEYER INTERNATIONAL ecoda

Third Report on the Bird Monitoring in the East Nile Region (Arab Republic of Egypt) - Spring 2017

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

Map 2.1
Overview of the project area

Project Area

extent of the project area

sections of the project area designated for wind applications

observation site

area within a radius of 2.5 km to each observation site

editor: Lars Gaedicke, May 14th 2017

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Table 2.1: Extract from the rotation schedule applied in spring 2017

observation site	day of observation							
	1st	2nd	3rd	4th	5th	6th	7th	8th
A1	1.5		1.5				1.5	
A2	1.5		1.5				1.5	
A3	1.5		1.5				1.5	
A4	1.5		1.5				1.5	
B1		1.5		1.5		1.5		1.5
B2		1.5		1.5		1.5		1.5
B3		1.5		1.5		1.5		1.5
B4		1.5		1.5		1.5		1.5
C1			1.5		1.5		1.5	
C2			1.5		1.5		1.5	
C3			1.5		1.5		1.5	
C4			1.5		1.5		1.5	
D1		1.5		1.5		1.5		1.5
D2		1.5		1.5		1.5		1.5
D3		1.5		1.5		1.5		1.5
D4		1.5		1.5		1.5		1.5
X1	3.0				3.0			
X2	3.0				3.0			

During an observation unit (lasting 1.5 or 3.0 hours; see above) the ornithologists "scanned" the horizon by binoculars with 8 - 10 times magnification as well as by telescopes with 20 - 60 times magnification. Once a bird or a flock of birds was detected, the following variables were determined:

- time of record
- kind of species
- number of birds
- distance and direction to the observation site
  Conspicuous elements (e. g. masts, single trees, powerlines and further elements in the desert) and poles with attached red flags (that made these poles highly visible) were drawn in maps (after having taken their coordinates with a handheld GPS), which were used for the data collection. By these elements and poles (and the information of its distance to the observation site) ornithologists were able to estimate the distance of birds fairly accurately.
- flight path and flight direction
  Flight path and flight direction were recorded by visual observations. After a record a schematic flight path was noted on a map.
  Flight direction was estimated using eight classes (with an extension of 45° each): 1) north-northeast (NNE), 2) east-northeast (ENE), 3) east-southeast, …
- flight altitudes
  A representative height was assigned to each observation of a bird / flock. The flight altitude was recorded in the height classes < 50 m, > 50 m – 150 m and > 150 m. This height band represents the height band, where a bird / flock spent most of the time during the observation. In case a flock distributed over different height classes (over a longer period of the observation),

the ornithologists used different height classes (for the particular number of birds in the different height classes).

At the beginning and the end of each observation unit climatic conditions (temperature, wind speed (Bft) and wind direction (using eight classes; see above), cloud cover (in %)) and visibility were measured.

All variables and further information were recorded on a standard form and transferred to a database afterwards.

The observations were carried out mostly during suitable conditions with clear view within the 2.5 km radius around the observation site. Visibility was less than 2.5 km in about 4 % of all observations units. In addition, visibility was temporarily restricted to less than 2.5 km in another 3 % of all observation units.

Standardized field observations focussed on species which can be regarded as especially vulnerable to collision strikes or other negative impacts caused by wind turbines. These are mainly large birds (first of all raptors, storks and pelicans) which principally migrate by soaring and gliding during daytime. Soaring and gliding birds seem to be especially vulnerable because of their restricted flight agility (e. g. Marques *et al.* 2014, Ornis Consult 1999). Furthermore, populations of these long-lived species are susceptible to any additional cause of mortality because their rate of annual off-spring is low (Drewitt & Langston 2006).

Some of the relevant species (see Annex I) are generally of special interest within the impact assessment due to their status on the IUCN Red List of Threatened Species (IUCN 2015; see Annex I & II):

- Egyptian Vulture (*Neophron percnopterus*) and Steppe Eagle (*Aquila nipalensis*) are listed as "Endangered".
- Greater Spotted Eagle (*Aquila clanga*) as well as Eastern Imperial Eagle (*Aquila heliacal*) are listed as "Vulnerable".

In addition, non-threatened species are considered. Pallid Harrier (*Circus macrourus*), Red-footed Falcon (*Falco vespertinus*) and Sooty Falcon (*Falco concolor*) are listed as "Near Threatened" on the IUCN Red List. EEAA (2013) guidelines for the impact assessment for wind energy developments in Egypt point towards a consideration of common species like White Stork (*Ciconia ciconia*) or European Honey Buzzard (*Pernis apivorus*), too. Against this background further large soaring birds are considered, which are listed as "Least Concern".

Small migrating birds (passerines) were not recorded in a systematic way. They are usually flying during night times, at higher altitudes and do not follow specific migration routes. Thus, passerines are considered to be less vulnerable.

2.1.2 Non-Standardized Field Observations of Birds

During standardized field observations sedentary and roosting birds as well as other migrating birds (aside from relevant species) were recorded. Furthermore, sedentary and roosting as well as migrating birds of relevant species were recorded (species, number of birds, location) while driving through the project area.

2.2 Data Analysis

2.2.1 Observational Time

The analysis for spring 2017 comprises 258 observation units (on 34 days) with a total observational time of 399.2 hours. At each day two / four observation units (lasting for 1.5 / 3 hours) were conducted per team. Observational time at each observation site amounts at least to 18 hours.

On March 18th four observation units had to be skipped because drifting sand hindered the observations. In addition, on March 21st, the bird monitoring team was driven away from the observation site D2 by armed people who claimed to own the land. As a consequence, the according observation unit had to be shortened. On the following day the logistic support assistant and the local experts talked to the people and explained our activities and aims to them. Subsequently, the bird monitoring team was able to carry on observations without any interference.

2.2.2 Standardized Field Observations of Migrating Birds

The overall dataset covers all birds / records of relevant species recorded during standardized observation. Thereof only birds / records registered at distances of up to 2.5 km from the observation sites were considered in the standardized dataset. This dataset is assumed to be of high quality (see Chapter 2.1).

Note that in spring 2017 the overall dataset and the standardized dataset were similar, because no birds were observed at distances of more than 2.5 km.

Number of Migrating Birds and Species Composition

In order to characterize bird migration, the total number of birds for each relevant species was calculated. Furthermore, the number of records was used as a further variable to describe migration patterns. A single record can either be an individual or a flock (independent of the number of birds). The number of records is an important variable because it is independent from flock size. In contrast, a single but large flock has a strong effect on the variable “number of birds”. Therefore, the number of records gives additional information about migratory activity and continuity as well as on species-specific migration behaviour.

Seasonal Distribution of Migratory Activity

To identify peak migration periods the cumulative number of birds / records was plotted over time. By summing up the number of birds / records for every week of the study period a weekly migratory activity (number of birds / records by weekly observation time) was calculated.

Altitude of Migration

Regarding possible impacts of wind turbines on migrating birds, flight altitude is an important variable. The number of birds / records was summed up for each of the four height classes, (0 – 50 m, > 50 – 150 m, > 150 m), which refer to potential characteristics of the wind turbine types (below / above and within rotor swept area). Note that the numbers of records may be higher as in other analysis due to the division of a flock in two or more height classes.

Migratory Rate as a Measure for Migratory Activity

In order to describe migratory activity we calculated the migration rate (birds / records per hour) for the study period. The results obtained in this study allow a comparison with results from previous studies conducted at the western Red Sea coast between 2006 and 2016 (Bergen 2009, Bergen & Gaedicke 2013, 2016a, ecoda 2007, 2011) as well as at the Nile Valley in 2012 (Bergen & Gaedicke 2012).

2.2.3 Non-Standardized Field Observations of Migrating and Sedentary Birds

This data set consists of migrating or roosting birds of relevant species and sedentary birds, which were recorded while travelling through the project area. Records of sedentary birds and non-relevant migrating or roosting bird species (mainly passerines) are included in this dataset, too.

The total number of European Bee-eaters (*Merops apiaster*) and Greater Short-toed Lark (*Calandrella brachydactyla)* recorded in spring 2017 could not be exactly quantified, because numbers of these species were recorded only acoustically by their flight calls. It was assumed that flocks of European Bee-eaters had an average size of about 20 birds. The flock size was estimated by a number of observations of migrating European Bee-eaters at the Nile Valley in 2011 and 2012 (see Bergen & Gaedicke 2012). For Greater Short-toed Lark also a flock size of 20 birds was assumed, because most of the recorded flocks (visually) in spring 2017 were built up with up to 20 birds.

Similarly, for many fly-by-observations of Spotted Sandgrouse (*Pterocles senegallus*) the exact number could not be determined because only calls of the species were heard. Most observations of Sandgrouses during spring 2017 contained flocks of up to 10 individuals. Thus, for each record of calls of Sandgrouse 10 individuals were assumed as the number of the flock.

3 Results

3.1 Migratory Species of Relevance for the Impact Assessment

3.1.1 Standardized Field Observations of Migrating Birds

Number of Migrating Birds and Species Composition

During the study period in spring 2017 a total of 52 birds (38 records) from nine relevant species were observed within distances of up to 2.5 km from the observation sites (Table 3.1). Short-toed Snake Eagle was the most numerous species.

Species of special interest (due to their status on the IUCN Red List of Threatened Species (see Chapter 2.1.1 and Annex I & II)) did not occur. Pallid Harrier is listed as “Near Threatened” and all other recorded species as “Least Concern” according to the IUCN Red List (see Annex I).

No larger flock of migrants occurred during the study period in spring 2017. The observed birds migrated singly (32 of 38 records) or in small flocks (maximum seven individuals).

Table 3.1: Number of birds / records obtained during standardized observations at the observation sites at row A, B, C and D as well as at the observation sites X1 and X2 at distances of up to 2.5 km to the observation sites (b= number of birds, r= number of records)

species	scientific name	row A		row B		row C		row D		X1/X2	
		b	*r*	*b*	*r*	*b*	*r*	*b*	*r*	*b*	*r*
Osprey	*Pandion haliaetus*	.	.	.	.	.	.	1	1	.	.
Black Kite	*Milvus migrans*	.	.	.	.	.	.	4	2	.	.
Short-toed Snake Eagle	*Circaetus gallicus*	10	6	2	2	1	1	.	.	.	.
Marsh Harrier	*Circus aeruginosus*	2	2	1	1	.	.	2	2	.	.
Pallid Harrier	*Circus macrourus*	3	3	1	1	1	1	1	1	1	1
Harrier	*Circus spec.*	.	.	.	.	.	.	1	1	.	.
Steppe Buzzard	*Buteo buteo vulpinus*	4	2	2	2	1	1	.	.	.	.
Lesser Kestrel	*Falco naumanni*	.	.	2	2	.	.	2	2	.	.
Common Kestrel	*Falco tinnunculus*	.	.	.	.	2	2	1	1	.	.
Common Crane	*Grus grus*	.	.	.	.	.	.	1	1	.	.
sum		**19**	**13**	**8**	**8**	**5**	**5**	**13**	**11**	**1**	**1**

Seasonal Distribution of Migratory Activity

Due to the very low migratory activity in February and March 2017 there appeared no seasonal differences in migration (Figure 3.1).

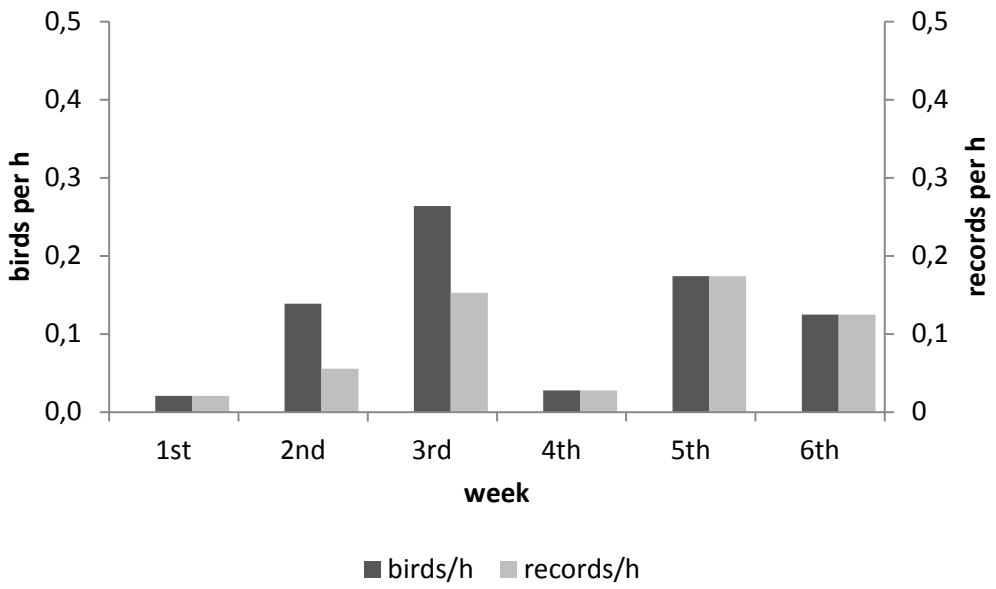

Figure 3.1: Seasonal distribution of birds and records in spring 2017 (only birds at distances of up to 2.5 km to the observation sites; to correct different observational time the number of birds / records were divided by observational time of the particular week; 1st week: February 20th to 23rd, 2nd week: February 25th to March 2nd, 3rd week: March 4th to 9th,…)

Altitude of Migration

In spring 2017 most birds migrated at altitudes above 150 m. However, due to the very low migratory activity differences between the three classes can be regarded as negligible (Figure 3.2).

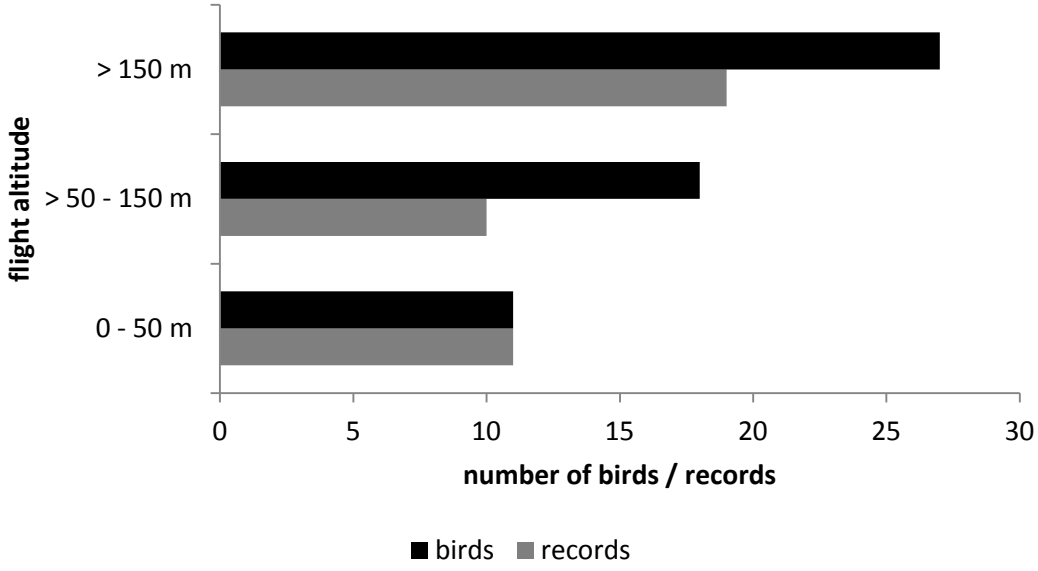

Figure 3.2: Altitude of migrating birds in spring 2017 (only birds at distances of up to 2.5 km to the observation sites; note that n is higher than in Table 3.1 because some birds / flocks made equal use of two different altitude classes and thus were considered for two altitude classes)

Migratory Rate as a Measure for Migratory Activity

In spring 2017 a total of 38 records (single birds or flock of birds) were registered during 399.2 hours of observation. Thus, about 0.095 records / h were recorded indicating an extremely low migratory activity. The total number of birds recorded in the study area was very low, too: overall 52 birds were recorded (0.13 birds / h).

These findings are well in accordance with the results obtained at the East Nile in spring 2016 (only April and May): 0.07 records / h and 0.10 birds / h (Bergen & Gaedicke 2016b). In addition, the study conducted at the West Nile in spring 2012, about 50 km west of the project area, lead to similar results: 0.05 records / h and 0.06 birds / h.

In comparison to previous studies at the western coast of the Red Sea migration rate obtained in the project area was extremely low. At the western coast of the Red Sea migratory activity in spring ranged between 82.6 to 280.1 birds / h and 4.3 to 8.3 records / h (within distances of up to 2.5 km to observation sites; data from Bergen 2009, Bergen & Gaedicke 2013, ecoda 2007, 2011).

3.1.2 Non-Standardized Field Observations of Migrating and Sedentary Birds

While driving within the project area few observations of migrating or roosting (roosting or foraging) migrants were made: three migrating Pallid Harriers and seven Common Kestrels (of which some might have been sedentary, but not migrating birds).

3.2 Migratory Species of minor Relevance for the Impact Assessment

Some migrating or roosting birds from species of minor relevance were recorded in the project area during standardized observations or by chance / randomly in spring 2017. Greater Short-toed Lark, Great Cormorant and European Bee-eater were the most common species (see Table 3.2).

Table 3.2: Numbers of birds from species of minor relevance, which were recorded during standardized observations or by chance / randomly in spring 2017

species	scientific name	number of birds
Great Cormorant	*Phalacrocorax carbo*	509
Grey Heron	*Ardea cinerea*	3
Dunlin	*Calidris alpina*	3
Great Spotted Cuckoo	*Clamator glandarius*	1
Common Cuckoo	*Cuculus canorus*	1
Common Swift	*Apus apus*	4
Pallid Swift	*Apus pallidus*	4
Blue-cheeked Bee-eater	*Merops persicus*	33
European Bee-eater	*Merops apiaster*	459
Eurasian Hoopoe	*Upupa epops*	1
Great Grey Shrike	*Lanius excubitor*	1
Woodchat Shrike	*Lanius senator*	1
Greater Short-toed Lark	*Calandrella brachydactyla*	1,124
Lesser Short-toed Lark	*Calandrella rufescens*	1
Sand Martin	*Riparia riparia*	3
Barn Swallow	*Hirundo rustica*	39
Common House Martin	*Delichon urbica*	10
Common Chiffchaff	*Phylloscopus collybita*	10
Eastern Bonelli's Warbler	*Phylloscopus orientalis*	2
Lesser Whitethroat	*Sylvia curruca*	37
Asian Desert Warbler	*Sylvia nana*	15
Rüppell's Warbler	*Sylvia rueppelli*	6
Subalpine Warbler	*Sylvia cantillans*	1
Sardinian Warbler	*Sylvia melanocephala*	7
Northern Wheatear	*Oenanthe oenanthe*	4
Black-eared Wheatear	*Oenanthe hispanica*	2
Desert Wheatear	*Oenanthe deserti*	8
Isabelline Wheatear	*Oenanthe isabellina*	2
White Wagtail	*Motacilla alba*	21
Tree Pipit	*Anthus trivialis*	1
Spanish Sparrow	*Passer hispaniolensis*	2
Passerine	-	13

3.3 Sedentary Birds

During the survey in spring 2017 single sedentary species, which belong to the typical desert fauna, were recorded in the project area.

- 13 individuals of Cream-coloured Cursor (*Cursorius cursor*) were registered, whereat ten individuals were classified as migrating (in one flock). The other three birds were seen foraging.
- Spotted Sandgrouse was observed regularly (85 records with an estimated number of more than 700 birds). The observations did not concentrate in certain areas.
- Common Pigeons (*Columba livia f. domestica*) occurred occasionally at various sites.
- Single individuals or pairs of Brown-necked Ravens (*Corvus ruficollis*) were regularly observed (172 birds, 87 records). Sometimes also small flocks stayed in the project area. This species occurred within different areas of the project area. By trend most individuals were recorded at row A.
- Desert Larks (*Ammomanes deserti*) were registered occasionally at different parts of the project area (33 birds, 23 records). Near observation site A3 birds showed territorial and nest-building behaviour.
- Greater Hoopoe-Larks (*Alaemon alaudipes*) were recorded near two observation sites (10 birds, 7 records). Most birds were observed near observation site A2, where birds showed territorial behaviour.
- Trumpeter Finches (*Bucanetes githaginea*) were registered at observation site C3 and D1 (21 birds, 12 records) where repeatedly a pair was observed, each. Both pairs showed breeding behaviour (*e. g.* gathering nesting material).

Furthermore Rock Martin (*Ptyonoprogne fuligula*), Hooded Wheatear (*Oenanthe monacha*) and Mourning Wheatear (*Oenanthe lugens*) were seen migrating or roosting during migration. These birds occur as breeding birds in certain desert-habitats. In this case the recorded individuals were clearly migrants, which roosted in the project area.

In addition, Hooded Crow (*Corvus cornix*) and House Sparrow (*Passer domesticus*) were observed, which are sedentary bird species. These species settle at populated or cultivated areas - but are not part of the typical desert fauna.

4 Brief Conclusion

4.1 Assessment of the Importance of the Project Area for Bird Migration in Spring

The following assessment and the derived conclusions are restricted to the study period only, i.e. to February 20th to March 31st. It is not feasible to assess the importance of an area for bird migration by interpolating the results obtained in one season / period to another, as migratory activity can significantly differ between seasons / periods. Final conclusions that can be derived from the overall monitoring will be drawn in the SESA Reports.

By comparing the results obtained in spring 2017 with previous investigations carried out in Egypt the importance of the study area can be easily assessed. According to studies previously conducted at the western coast of the Red Sea migratory activity in spring ranged between 82.6 to 280.1 birds per hour and 4.3 to 8.3 records per hour (within distances of up to 2.5 km to observation sites; data from Bergen 2009, Bergen & Gaedicke 2013, ecoda 2007, 2011). By contrast, in the project area a total of only 52 birds and 38 records (single birds or flock of birds) were registered during 399.2 hours of observation in spring 2017. Thus, migratory activity was about 0.13 birds per hour and 0.095 records per hour. In spring 2017 migratory activity of species of importance for the impact assessment was extremely low within the project area. Consequently, based on the results obtained during the period from February 20th to March 31st, 2017, the project area located in the East Nile Region has not importance for spring migration of relevant species.

Based on the results from spring 2017 the local bird community is very poor in species and the density is very low. For sedentary birds vegetated areas are particularly important. The project area offers few sparse vegetated areas. For tree and cliff nesting birds (especially raptors) only very few potential nesting sites (of low quality) were found. The importance of the project area for the local bird community will be further investigated in the SESA reports.

The results gained in spring 2016 (starting from April, 1st) and in spring 2017 (ending on March, 31st) are very consistent. Migratory activity was about 0.10 birds per hour and 0.07 records per hour in spring 2016, and about 0.13 birds per hour and 0.095 records per hour in spring 2017 (for details on bird migration in spring 2016 see Bergen & Gaedicke (2016b)). Both surveys clearly show that migratory activity in spring is very low in the study area. Hence one can conclude that the approach of dividing the survey on spring migration up into two phases in different years worked. Spring migration in the area was fully covered by this approach. The split of the survey did not affect the main findings on bird migration in spring and, hence, there was no need for any adjustments on the approach (e.g. overlapping of survey periods in 2016 and 2017) in order to increase the explanatory power of the data.

4.2 First Assessment of Possible Impacts of Wind Energy Projects

The following assessment and the derived conclusions are restricted to the study period only, i.e. to February 20th to March 31st. It is not feasible to assess expected impacts of a project by interpolating the results obtained in one season / period to another, as migratory activity can significantly differ between seasons / periods. Final conclusions that can be derived from the overall monitoring will be drawn in the SESA Reports.

4.2.1 Migrating Birds

Construction phase

Due to the extremely low migratory activity in spring, the impact on spring migration caused by the construction of wind farms within the project area is assessed to be very low (not significant).

Operation and Maintenance Phase

Due to the extremely low number of migrating birds in spring, wind farms within the project area will not pose a relevant risk of collision or cause a significant barrier effect. Single collisions at wind farms within the project area might occur even during spring. But the expected collision rate will definitely not cause significant effects on populations. Thus, wind turbines within the project area are not regarded to have a significant impact on spring migration.

Mitigation Measures

Due to the lack of significant impacts on migrating birds in spring, there is no need for specific mitigation measures.

4.2.2 Local Birds

Construction phase

Based on the results obtained so far, the variety of sedentary birds and bird density within the project area is very low. Consequently, the impact expected by construction of wind farms within the project area is assessed as not to be significant.

Operation and Maintenance Phase

Based on the results obtained so far, the variety of sedentary birds and bird density within the project area is very low. Consequently, the impact on sedentary birds related to operating wind turbines, maintenance or collision risk is assessed as not to be significant.

Mitigation Measures

Based on the results obtained so far, there is no need for specific mitigation measures.

5 Summary

5.1 English Summary

The Government of Egypt has identified three large areas suitable for development of wind and solar applications under the newly issued FiT law. One of these areas is located in the East Nile Region across the three Governorates of Beni Suef, Al Minya and Assuit ("project area") and extents over 2,200 km².

To ensure a strategic level assessment of the potential environmental and social issues associated with these Renewable Energy (RE) developments, the European Bank for Reconstruction and Development (EBRD) has agreed to fund the Strategic Environmental and Social Assessment (SESA) Study for the East of Nile project area. As RE developments may have significant potential impacts on birds and bats, a thorough investigation on birds / bats forms a crucial part of the SESA. The investigation aims for

- collecting significant baseline data on birds / bats (whereat bats were not studied in spring 2017);
- identifying and assessing possible impacts caused by RE developments;
- prioritising areas for wind and solar energy utilization according to the level of significance of likely impacts on birds / bats;
- proposing criteria for selection of a site with the lowest impact; and finally
- recommending mitigation measures in order to minimize possible conflicts, if required.

The report at hand informs about the bird monitoring conducted in spring 2017. From February 20th to March 31st, 2017, standardized daytime field observations were carried out in the so-called East Wind-1 and East Wind-2 sections. Within 399.2 hours of observation (at 18 different sites) a total of 52 migrating birds (38 records) from nine relevant species were observed within distances of up to 2.5 km from the observation sites. All registered species do not belong to threatened species. Pallid Harrier is listed as "Near Threatened" and all other species as "Least Concern" according to the IUCN Red List. In addition, small numbers of migrating or roosting birds from species of minor relevance and single sedentary species, which belong to the typical desert fauna, were recorded in the two sections.

To conclude, migratory activity of relevant bird species was extremely low in February and March 2017. Thus, based on the data at hand, the project area is not particularly important for relevant species during the studied spring migration period. This is very much in accordance with the results obtained in spring 2016 (from April 1st to May 25th). Hence one can conclude that the split of the survey did not affect the main findings on bird migration in spring.

According to the results obtained, the area does neither serve as an important habitat for roosting nor for sedentary birds in spring. Hence, no significant impacts on migrating, roosting or sedentary birds are expected for the spring season when installing and operating RE developments, particularly wind farms, in the project area.

5.2 Arabic Summary / ملخص باللغة العربية

وتقع أحد هذه المناطق في منطقة شرق النيل عبر المحافظات الثلاث: بني سويف والمنيا وأسيوط ("منطقة المشروع") وتمتد عبر أكثر من 2200 كيلومتر مربع.

ولضمان التقييم الاستراتيجي للقضايا البيئية والاجتماعية المحتملة المرتبطة بمشاريع الطاقة المتجددة هذه، فقد وافق البنك الأوروبي للإنشاء والتعمير على تمويل دراسة التقييم البيئي والاجتماعي الاستراتيجية لمنطقة شرق النيل لمنطقة المشروع، ولأن مشاريع الطاقة المتجددة قد يكون لها آثار محتملة كبيرة على الطيور والخفافيش، فإن البحث الشامل للطيور والخفافيش يشكل جزءا أساسيا من دراسة التقييم البيئي والاجتماعي الاستراتيجية، ويهدف هذا البحث إلي:

- جمع البيانات الأساسية عن الطيور / الخفافيش (لم يتم دراسه الخفافيش في ربيع 2017)
- تحديد وتقييم الآثار المحتملة الناجمة عن مشاريع الطاقة المتجددة.
- تحديد أولوية مناطق مشاريع طاقة الرياح والطاقة الشمسية وفقا لمستوى أهمية الآثار المحتملة على الطيور / الخفافيش.
- اقتراح معايير لاختيار المواقع التي يكون لها أدنى أثر.
- التوصية باتخاذ تدابير التخفيف من أجل تقليل النزاعات المحتملة، إذا لزم الأمر.

وعلى هذه الخلفية فقد تم القيام بالملاحظات الميدانية خلال النهار في فترة ربيع 2017 في المدة بين 20 فبراير وحتي 31 مارس 2017، في القطاعات المسماة شرق الرياح 1 و شرق الرياح 2، وخلال مدة 2ر399 ساعة مراقبة (في 18 مواقع مختلفة) لوحظت 52 من الطيور المهاجرة (تم تسجيل 38) من 9 انواع مختلفة من الطيور على مسافات تصل إلى 2.5 كم من مواقع الرصد، والانواع التي تم رصدها مثل طائر الهاريير هي من الانواع المهدده بدرجه قليله بالانقراض بينما بقيه الانواع تعتبر من الانواع الغير مهددة بالانقراض وفقا للقائمة الحمراء لمنظمة IUCN وبالإضافة إلى ذلك فقد تمت ملاحظة بعض الطيور من الأنواع ذات الأهمية الثانوية التي تنتمي إلى الأنواع الصحراوية النمطية في منطقتين.

وفي النهاية يمكن القول أن نشاط الطيور المهاجرة كان منخفضا جدا في فبراير ومارس عام 2017، وهكذا واستنادا إلى البيانات المتاحة فإنه يمكن اعتبار أن منطقة المشروع ليست ذات أهمية خاصة بالنسبة للأنواع المهددة من الطيور أثناء هجرة الربيع . ووفقا للنتائج التي تم الحصول عليها ، فإن المنطقة ليست بمثابة موطن مهم للطيور الجاثمة أو للطيور المستقرة أو غيرها من الطيور.

وفي الختام، يمكن القول أنه لا توجد في الوقت الحاضر اي اثار لمشاريع الطاقة المتجدده على هجرة الطيور أو الطيور الأخرى في منطقة المشروع وخاصه مشروعات طاقة الرياح.

6 References

Bergen, F. (2009): Expert Opinion on the Additional Ornithological Investigation in Zone II (Orange Zone) as part of the Feasibility Study for a large wind farm at the Gulf of Zayt, Egypt. Final report for MVV decon GmbH. Dortmund.

Bergen, F. & L. Gaedicke (2012): Final Report on the Ornithological Investigation at the West Nile Valley in Arab Republic of Egypt. Report for Oriental Consultants Co., Ltd., and Japan International Cooperation Agency (JICA). Dortmund.

Bergen, F. & L. Gaedicke (2013): Final Report on the Bird Migration Study at the Gulf of Suez (300 km² area) at Ras Gharib in the Arab Republic of Egypt. Report for New & Renewable Energy Authority (NREA). Dortmund.

Bergen, F. & L. Gaedicke (2016a): Final Report on the Bird Migration Study for 100 MW wind farms at Ras Gharib in the Arab Republic of Egypt. Report for 5 Capitals Environmental and Management Consulting. Dortmund.

Bergen, F. & L. Gaedicke (2016b): First Report on the Bird / Bat Monitoring in Spring 2016 in the East Nile Region (Arab Republic of Egypt). Report for New and Renewable Energy Authority (NREA), Egypt. Dortmund.

Drewitt, A. L. & R. H. W. Langston (2006): Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

ecoda (2007): Ornithological Expert Opinion as a part of the Feasibility Study for a large wind farm at Gulf of Zayt, Egypt. Report for DECON - Deutsche Energie-Consult Ingenieurgesellschaft mbH. Dortmund.

ecoda (2011): Expert Opinion on the Ornithological Investigation at the Gulf of Suez as part of the ESIA for 1,000 MW Wind Farms at Gulf of Suez, Arab Republic of Egypt. Report for New and Renewable Energy Authority (NREA) and Kreditanstalt für Wiederaufbau (KfW). Dortmund.

EEAA (Ministry of State for Environmental Affairs Egyptian Environmental Affairs Agency) (2013): Environmental Impact Asessment Guidelines and Monitoring Protocols for Wind Energy Development Projects along the Rift Valley/Red Sea Flyway with particular reference to wind energy in support of the conservation of Migratory Soaring Birds (MSB). Partners: Global Environment Facility, Birdlife International, United Nations Development Program (UNDP) Egypt, Ministry of State for Environmental Affairs in Egypt, Nature Conservation Egypt. Cairo.

IUCN (International Union for Conservation of Nature) (2015): The IUCN Red List of Threatened Species. Version 2015-3.

http://www.iucnredlist.org/

Lesham, Y. & Y. Yom-Tov (1996): The Magnitude and timing of migration by soaring raptors, pelicans and storks over Israel. Ibis 138: 188-203.

Marques, A. T., H. Batalha, S. Rodrigues, H. Costa, M. J. R. Pereira, C. Fonseca, M. Mascarenhas & J. Bernardino (2014): Understanding bird collisions at wind farms: An updated review on the causes and possible mitigation strategies. Biological Conservation 179: 40-52.

Ornis Consult (1999): Biodiversity review of the western Gulf of Suez. Prepared by M. Baha El Din & F. P. Jensen. Copenhagen, Denmark.

Annex

I Relevant species, which are known to migrate along Egypt

II Explanation of different categories of “The IUCN Red List of Threatened Species” for migratory bird species in Egypt

Annex I Relevant species, which are known to migrate along Egypt

no	species	scientific name	IUCN Red List 2015
1	Greater Flamingo	*Phoenicopterus roseus*	LC
2	Great White Pelican	*Pelecanus onocrotalus*	LC
3	Black Stork	*Ciconia nigra*	LC
4	White Stork	*Ciconia ciconia*	LC
5	Osprey	*Pandion haliaetus*	LC
6	European Honey Buzzard	*Pernis apivorus*	LC
7	Black Kite	*Milvus migrans*	LC
8	Egyptian Vulture	*Neophron percnopterus*	EN
9	Short-toed Snake Eagle	*Circaetus gallicus*	LC
10	Marsh Harrier	*Circus aeruginosus*	LC
11	Pallid Harrier	*Circus macrourus*	NT
12	Montagu's Harrier	*Circus pygargus*	LC
13	Levant Sparrowhawk	*Accipiter brevipes*	LC
14	Eurasian Sparrowhawk	*Accipiter nisus*	LC
15	Steppe Buzzard	*Buteo buteo vulpinus*	LC
16	Long-legged Buzzard	*Buteo rufinus*	LC
17	Lesser Spotted Eagle	*Aquila pomarina*	LC
18	Greater Spotted Eagle	*Aquila clanga*	VU
19	Steppe Eagle	*Aquila nipalensis*	EN
20	Eastern Imperial Eagle	*Aquila heliaca*	VU
21	Booted Eagle	*Aquila pennata*	LC
22	Lesser Kestrel	*Falco naumanni*	LC
23	Common Kestrel	*Falco tinnunculus*	LC
24	Red-footed Falcon	*Falco vespertinus*	NT
25	Eleonora's Falcon	*Falco eleonorae*	LC
26	Sooty Falcon	*Falco concolor*	NT
27	Eurasian Hobby	*Falco subbuteo*	LC
28	Lanner Falcon	*Falco biarmicus*	LC*
29	Barbary Falcon	*Falco pelegrinoides*	LC*
30	Common Crane	*Grus grus*	LC

*: no classification for migratory birds available, represented category refers to breeding birds

Annex II Explanation of different categories of "The IUCN Red List of Threatened Species" for migratory bird species in Egypt

(International Union for the Conservation of Nature and Natural Resources)

http://www.iucnredlist.org/

http://www.birdlife.org/datazone/speciessearchresults.php?reg=0&cty=63&cri=&fam=0&gen=0&spc=&cmn=&hab=&thr=&bt=&rec=N&vag=N&sea=&wat=&aze=&lab=&enb=&mib=Y&cnv=&hdnAction=ADV_SEARCH&SearchTerms=

ENDANGERED (EN)
A species is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)
A species is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)
A species is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A species is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant species are included in this category.

For explanations of the mentioned criteria within the explanations of the categories see:

http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf

http://www.iucnredlist.org/documents/reg_guidelines_en.pdf

10.2.5 Annex B5: Numbers of Birds/Records (rec) registered at the 18 Observation Sites in spring 2016, autumn 2016 and spring 2017

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Numbers of Birds/Records registered at the 18 Observation Sites in Spring 2016, Autumn 2016 and Spring 2017

Annex B5 to
Final SESA Wind Report

October 2017

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

Annex B5: Numbers of birds/records (rec) registered at the observation sites (A1 to X2) in spring 2016

species	scientific name	A1		A2		A3		A4		B1		B2		B3		B4		C1		C2		C3		C4		D1		D2		D3		D4		X1		X2	
		birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec
Black Stork	*Ciconia nigra*					1	1																														
White Stork	*Ciconia ciconia*																													16	1						
Osprey	*Pandion haliaetus*									1	1																										
European Honey Buzzard	*Pernis apivorus*					3	1					1	1							3	1															1	1
Black Kite	*Milvus migrans*																											1	1								
Short-toed Snake Eagle	*Circaetus gallicus*											1	1									2	2	1	1												
Marsh Harrier	*Circus aeruginosus*					1	1																					2	2								
Pallid Harrier	*Circus macrourus*			1	1			1	1																			3	3								
Montagu's Harrier	*Circus pygargus*							1	1																												
Harrier	*Circus spec.*					1	1																														
Steppe Buzzard	*Buteo buteo vulpinus*																			1	1							1	1	1	1						
Buzzard	*Buteo spec.*							1	1																												
Booted Eagle	*Aquila pennata*																																			1	1
Eagle	-			1	1																															1	1
Common Kestrel	*Falco tinnunculus*	1	1							1	1					1	1											1	1								
Sooty Falcon	*Falco concolor*																							1	1												
Falcon	*Falco spec.*					1	1	1	1																			1	1								
Raptor spec.	-															1	1																				
total		**1**	**1**	**2**	**2**	**7**	**5**	**4**	**4**	**2**	**2**	**2**	**2**	**0**	**0**	**2**	**2**	**0**	**0**	**4**	**2**	**2**	**2**	**2**	**2**	**0**	**0**	**9**	**9**	**17**	**2**	**0**	**0**	**0**	**0**	**3**	**3**

Annex B5: Numbers of birds/records (rec) registered at the observation sites (A1 to X2) in autumn 2016

species	scientific name	A1		A2		A3		A4		B1		B2		B3		B4		C1		C2		C3		C4		D1		D2		D3		D4		X1		X2	
		birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec
White Stork	*Ciconia ciconia*																							1	1												
European Honey Buzzard	*Pernis apivorus*	1	1									3	3			1	1	4	2							20	4	2	2	23	6	2	1				
Black Kite	*Milvus migrans*	2	2	8	1	1	1	28	1					4	3	2	2					3	2			4	3							1	1	2	2
Egyptian Vulture	*Neophron percnopterus*													2	1															3	1						
Short-toed Snake Eagle	*Circaetus gallicus*	14	6	19	12	7	6	17	11	12	10	6	5	22	19	10	9	14	12	3	3	10	9	9	8	6	5	6	5	6	4	19	17	13	9	16	12
Marsh Harrier	*Circus aeruginosus*	3	3	2	2			2	2	1	1	6	6	2	2			4	4	2	2	10	5			1	1	15	11	2	1						
Pallid Harrier	*Circus macrourus*	1	1			1	1	2	1			1	1					1	1	1	1	1	1														
Montagu's Harrier	*Circus pygargus*													2	2													2	2	3	3						
Pallid/Montagu's Harrier	*Circus macr./pyga.*							1	1					1	1							1	1			1	1	2	2								
Harrier	*Circus spec.*			1	1							2	2																								
Levant Sparrowhawk	*Accipiter brevipes*									2	1															2	2										
Eurasian Sparrowhawk	*Accipiter nisus*	1	1																																		
Steppe Buzzard	*Buteo buteo vulpinus*	1	1	1	1	3	2	1	1	3	3	4	1			13	4			17	4			1	1	4	2	2	2					1	1	1	1
Long-legged Buzzard	*Buteo rufinus*					1	1			2	1					1	1									1	1										
Buzzard	*Buteo spec.*	3	1	1	1																																
Lesser Spotted Eagle	*Aquila pomarina*													1	1	2	1																				
Steppe Eagle	*Aquila nipalensis*	2	2			1	1	1	1					3	3					2	2	2	2	1	1			7	2	3	2					2	2
Booted Eagle	*Aquila pennata*			1	1			1	1					3	3					1	1	1	1														
Eagle	-					3	1									1	1					2	1					2	1	1	1						
Lesser Kestrel	*Falco naumanni*	1	1									1	1							2	2																
Common Kestrel	*Falco tinnunculus*	1	1			1	1					1	1															1	1	1	1	1	1				
Lesser/Common Kestrel	*Falco naum./tinn.*					1	1																							1	1						
Red-footed Falcon	*Falco vespertinus*																									2	2	1	1								
Sooty Falcon	*Falco concolor*									2	1	2	1											2	1					1	1						
Eurasian Hobby	*Falco subbuteo*											1	1																								
Lanner Falcon	*Falco biarmicus*																							2	1			1	1								
Falcon	*Falco spec.*	2	2	1	1	1	1							1	1															1	1			2	2		
Raptor spec.	-	1	1	5	3	1	1			2	1			2	2	2	1	5	5	6	2			2	2							2	1	2	1		
total		**33**	**23**	**39**	**23**	**21**	**17**	**53**	**19**	**24**	**18**	**27**	**22**	**43**	**38**	**32**	**20**	**28**	**24**	**34**	**17**	**30**	**22**	**18**	**15**	**41**	**21**	**41**	**30**	**45**	**22**	**24**	**20**	**19**	**14**	**21**	**17**

Annex B5: Numbers of birds/records (rec) registered at the observation sites (A1 to X2) in spring 2017

species	scientific name	A1		A2		A3		A4		B1		B2		B3		B4		C1		C2		C3		C4		D1		D2		D3		D4		X1		X2	
		birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec	birds	rec
Osprey	*Pandion haliaetus*																											1	1								
Black Kite	*Milvus migrans*																													4	2						
Short-toed Snake Eagle	*Circaetus gallicus*	4	2	2	1			4	3					1	1	1	1			1	1																
Marsh Harrier	*Circus aeruginosus*	2	2											1	1													1	1			1	1				
Pallid Harrier	*Circus macrourus*	1	1					2	2			1	1											1	1					1	1					1	1
Harrier	*Circus spec.*																															1	1				
Steppe Buzzard	*Buteo buteo vulpinus*					1	1	3	1	1	1					1	1					1	1														
Lesser Kestrel	*Falco naumanni*									1	1	1	1																	2	2						
Common Kestrel	*Falco tinnunculus*																					1	1	1	1							1	1				
Common Crane	*Grus grus*																											7	1								
total		**7**	**5**	**2**	**1**	**1**	**1**	**9**	**6**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**0**	**0**	**1**	**1**	**2**	**2**	**2**	**2**	**0**	**0**	**9**	**3**	**7**	**5**	**3**	**3**	**0**	**0**	**1**	**1**

10.2.6 Annex B6: Potential Effects of Operating Wind Farms on Migratory Soaring Birds

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Potential Effects of Operating Wind Farms on Migratory Soaring Birds

Annex B6 to
Final SESA Wind Report

October 2017

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

1. Possible Effects of Operating Wind Farms on Migratory Soaring Birds

The major potential hazards to migrating birds are mortality due to collision as well as barrier effects.

1.1 Collision Risk and Mortality

Wind turbines seem to add an obstacle for bird movements and research has shown that birds fly into rotor blades. Although some studies have recorded bird collisions, other studies give evidence that birds could detect the presence of wind turbines and generally avoid them.

1.1.1 Results of Collision Risks at Different Wind Farms

As one of the first, Erickson et al. (2001) collected data from many studies conducted at different wind farms in the U.S. The results indicate an average of 2.19 avian fatalities per turbine per year in the U.S. for all species combined and 0.033 raptor fatalities per turbine per year. At different wind farms in Europe the annual number of dead birds per turbine varies between 0.04 (Percival 2000) and 35.00 (Everaert et al. 2002) depending on site characteristics and bird densities. Madders & Whitfield (2006) pointed out that simply presenting mortality rates per turbine or per installed MW, in the absence of further information on the abundance of birds (or birds at risk of death), does little to inform about the collision risk by a wind farm. And Langston & Pullan (2004) suggested that a low collision rate per turbine does not necessarily mean that collision mortality is insignificant, especially in wind farms comprising several hundreds or thousands of turbines.

Comparably high mortality rates due to collision have been recorded at large wind farms in areas with high concentrations of birds: Altamont Pass in California (Hunt 1995, Orloff & Flannery 1992, Smallwood & Thelander 2004, 2008, Thelander & Smallwood 2007) and in the Campo de Gibraltar region (Cádiz) in Spain (Barrios & Rodriguez 2004). In particular, large numbers of raptors have collided with wind turbines at these sites, including substantial numbers of Golden Eagles (*Aquila chrysaetos*) and Griffon Vultures (*Gyps fulvus*). These wind farm areas are characterized by large numbers of turbines (c. 7,000 at Altamont and 256 at Cádiz, which are often closely packed together) and by predominantly small turbines comprised of lattice towers and high-speed rotors relatively close to the ground (Percival 2005). Both areas are located in mountainous surroundings, sustain important food resources and, consequently, high densities of birds, which thus are susceptible to collisions with turbines.

As with Altamont or Cádiz, most of all investigated wind farms affect stationary (breeding or wintering) birds and / or small passerines migrating at night. Thus, there is a great lack of information about collision risk for migrating birds, in particular about migrating raptors or other large birds. Most studies, which also focus on migrating birds, were made for offshore wind farms (see for example Hüppop et al. 2006, Vanermen et al. 2013) and thus are about migrating waterbirds and passerines.

During a 14-month study, which included two autumn migration periods, only two bird carcasses were found at a wind farm ("EEE"66 turbines) near the Strait of Gibraltar: a Griffon vulture, which is a stationary (wintering) bird species in the region, and a Short-toed Snake Eagle. Janss (2000) estimated that about 45,000 Griffon Vultures and 2,500 Short-toed Snake Eagles fly over the wind farm per year.

In contrast to these findings Barrios & Rodriguez (2004), during a one-year period at a wind farm (called "PESUR", 190 turbines) located less than 10 km away from the above mentioned study area, found 28 Griffon Vultures, twelve Common Kestrels, three Lesser Kestrels, two Short-toed Snake Eagles, one Black Kite and two White Storks. The authors estimated a mortality rate of 0.36 raptors per year per turbine. Considering the number of turbines, such increases in mortality rates may be significant for some birds, especially large, long-lived species with a generally low annual productivity

and long maturation. Barrios & Rodriguez (2004) concluded that mortality at wind power plants reflects a combination of site-specific (wind-relief interaction), species-specific and seasonal factors.

During a three-year study (2000-2002) 13 wind power plants containing 741 turbines were studied in Navarra (Spain; Lekuona & Ursúa 2007). Thirty seven study plots containing 277 turbines were selected for fatality searches and behavioural bird observations. Overall 345 bird fatalities were recorded. Most dead birds were raptors (72.8 %) with the Griffon Vulture representing 63.1 % of raptor fatalities. Most raptors were killed during spring (March to June). By contrast, all three Lesser Kestrels were found during postbreeding migration, because there was a postbreeding roost near a wind plant.

At the wind farm "Al Koudia" (84 turbines) in northern Morocco, corpse searches were done over a three-month period in 2001 (El Ghazi & Franchimont 2001). Only two carcasses were found in autumn 2001 (one Pallid Swift (Apus pallidus) and one Woodlark (*Lullula arborea*), but no raptor or large bird). In autumn 2000, four other birds (mainly local, stationary species) were found by chance. It must be mentioned that the results might lead to an underestimation of collision risk, because no correction factors (e.g. for search efficiency or scavenger activity) were used.

At a wind farm (220 turbines) at the western bank of the Gulf of Suez (Egypt) corpse searches were carried out over a four-week period in spring 2007 (Bergen 2007). Body parts, feathers and bones of three birds were found, which had died weeks or months ago — possibly by collision with a turbine. No fresh bird corpse was found. Due to the characteristics of the study area and the high intensity of investigation, search efficiency and / or scavengers were not regarded to play an important role. Thus, the results strongly indicate that the number of collisions was very low if not zero throughout the period of investigation. It must be pointed out, however, that the study is limited due to the short period of investigation.

In autumn 2014, a total of 24 bird casualties are documented in and around KfW wind farm (with 30 operating turbines at that time) (EcoConServ 2015). Most casualties collided at the existing power line and at guide wires for wind measuring instruments. Two birds (one White Stork found on 24/8 and one Steppe Buzzard found on 22/9) most probably died due to a collision with an operating turbine in KfW wind farm.

Based on the monitoring results obtained in autumn 2014 EcoConServ (2015) estimated the expected number of fatalities at KfW wind farm during autumn migration using the collision risk-model (CRM) developed by Band (e.g. Band 2000, Band et al. 2007). As a result a total of about 87 White Storks, 16 Great White Pelicans and 4 European Honey Buzzards were believed to collide on average at KfW wind farm every autumn season. However, the explanatory power of the CRM is limited (see Chapter 6.1.1) and, thus, the estimates lack a reasonable basis.

In spring 2016 an additional survey on collision victims was conducted at KfW wind farm for a period of one month (late March to late April; Al Hasani & Al-Mongy 2016). At the same time a shutdown on demand-program was run at KfW wind farm. A total of three casualties were found under the turbines during systematic carcass searches within the period of one month: one Collard Flycatcher (Ficedula albicollis), one unidentified raptor species (only large feathers attached to skin were detected) and one old Harrier species (Al Hasani & Al-Mongy 2016).

Occasional fatality searches at wind turbines in Hurghada wind farm did not reveal any evidence of bird mortality (Baha El Din 1996).

1.1.2 Factors Influencing Vulnerability to Collision

The risk of collision depends on a broad range of external and internal factors (Johnson et al. 2000). After having reviewed more than 200 documents about this topic Marques et al. (2014) assume species-, site- and turbine-specific factors determine the collision probability at a certain site.

1.1.2.1 Weather, Visibility and Season

Collision risk seems to be greatest in poor flying conditions, such as strong winds that affect the birds' ability to control flight manoeuvres, or in rain, fog, and on dark nights when visibility is reduced (Langston & Pullan 2004, Winkelman 1992). But collisions occurred in conditions of good visibility, too: all of the 68 collisions at turbines of the above mentioned wind farm "PESUR" occurred on clear days (Barrios & Rodriguez 2004); and collision of Vultures occurred rarely in strong winds, which could have indicated little manoeuvrability by the Vultures (see below).

At the wind farm "PESUR" all Vultures died between October and April, with 66.7 % of all accidents taking place between December and February (although the Griffon vulture is a resident species in the region). Barrios & Rodriguez (2004) assumed that the seasonal pattern of Vulture deaths might be explained by flight behaviour. As is known, Griffon Vultures need vertical air currents to gain height. In winter low temperatures make thermals scarcer. Birds are thus constrained to gain height with slope updrafts, whose force on most winter days may be insufficient to lift Vultures well above the ridge, thereby exposing them to wind turbines.

1.1.2.2 Site-specific factors

It is quite obvious that a higher collision rate is to be expected at locations with high bird densities (Langston & Pullan 2004), especially by species vulnerable to collision. When comparing wind energy facilities, it appears that birds tend to be killed at rates that are proportional to their relative abundance amongst wind farms (Smallwood & Thelander 2004). However, there are several wind farms where the correlation between usage by birds and fatality is low (Erickson et al. 2001). An investigation at several wind power plants in Spain also confirmed that the relative abundance of species does not predict the relative frequency of fatalities (Lekuona & Ursúa 2007). For the wind farm areas "PESUR" and "EEE" de Lucas et al. (2008) did not find a close relationship between bird abundance and the number of collisions victims. For these areas species-specific and topographic factors seem to determine the collision probability.

California Energy Commission (2002) and Orloff & Flannery (1992) suggested that the abundance of ground squirrels within the Altamont Pass Wind Resource Area might significantly increase raptor foraging, and thus collision risk. Within some wind farms in Navarra (Spain), Vultures and Kites were apparently killed because of the nearby livestock carcass and dump sites (Lekuona & Ursúa 2007).

Howell & Di Donato (1991) identified significant topographical features associated with collision mortality. Notably mountain passes and hill shoulders, which tend to be the preferred crossing places for soaring species, were associated with multiple collisions.

Field studies in the Altamont Pass resource Area have clearly shown that not all turbines have an equal probability of causing raptor fatalities (Morrison et al. 2007). While some turbines were involved in multiple fatalities, others killed none. Fifteen turbine strings, which are located in highly complex topographic areas, were responsible for 60 % of all raptor fatalities: 80 % of Red-tailed Hawk (*Buteo jamaicensis*) and 100 % of Golden Eagle.

The 190 wind turbines at the wind farm "PESUR" — which prompted a relatively high number of collisions (Barrios & Rodriguez 2004) — are arranged in rows along the ridges of mountains or hills, too. However, the wind farm which is less than 10 km away from "PESUR" and which is arranged in a similar way, yielded evidence of only very few collision victims (de Lucas et al. 2004).

1.1.2.3 Turbine-specific Factors

Orloff & Flannery (1992) suggested that the high collision rate at Altamont Pass might be correlated to the lattice towers of the wind turbines which provide many perches, thus attracting birds, particularly raptors, into the collision-risk zone. However, recent investigation showed that perching on wind turbines is a less important factor contributing to mortality than previously suspected (Smallwood & Thelander 2004).

Percival (2005) assumed that collision risk at small turbines with high-speed rotors and with the turbines often packed closely together is higher.

Differences in collision rates also appear between turbines within a single wind farm although the same turbine type is used: in the wind farm "PESUR" a single group of 28 turbines (from 190) was responsible for 57 % of Griffon vulture mortality. These turbines were arranged in two rows with little space between consecutive turbines (Barrios & Rodriguez 2004). However, little or no risk was recorded for five turbine rows having exactly the same windwall spatial arrangement.

Smallwood & Thelander (2004) found that wind turbines were most dangerous at the ends of turbine strings, at the edges of gaps in strings, and at the edges of clusters of wind turbines. Furthermore, most isolated wind turbines killed disproportionately more birds.

Barclay et al. (2007) found that neither rotor diameter nor tower height have an effect on bird fatalities.

1.1.2.4 Species-specific Factors

Manoeuvrability and flight behaviour might be crucial factors to explain differences in collision risks between species (Drewitt & Langston 2006).

Especially soaring birds, like Griffon Vulture or Golden Eagle, are believed to be particularly vulnerable to collision with wind turbines (Langston & Pullan 2004), because of their lower manoeuvrability and their dependence on thermals. In contrast, at "PESUR" other soaring birds, such as Common Buzzards or Short-toed Snake Eagles, often circled together with Vultures in slope updrafts but did not closely approach the turbine blades and rarely collided with them. Barrios & Rodriguez (2004) suggest that these species have lower wing loads than Vultures, and make a more efficient use of the ascending currents, gaining altitude faster and farther away from the turbines.

In the Altamont Pass Wind Resource Area Smallwood et al. (2009) found that fatality rates were high for Red-tailed Hawk and American Kestrel (*Falco sparverius*), but low for Common Raven (*Corvus corax*) and Turkey Vulture (*Cathartes aura*), indicating specific behaviours or visual acuity differentiated these species by susceptibility to collision.

Ornis Consult (1999) subdivided soaring birds into four different categories depending on manoeuvrability and flight behaviour. On the basis of this classification the vulnerability of different species to collision can be deduced (see Table). Due to the number of factors affecting the risk of collision, it is very difficult to transfer the results obtained at a particular wind farm to another. At present, there is insufficient information available to form a reliable judgement on the scale of collision at a proposed wind farm. However, the results of a current study show that migrating raptors adjust their flight path to avoid wind farms effectively reducing the risk of collision (Cabrera-Cruz & Villegas-Patraca 2016).

Table: Assessment of species-specific vulnerability to collision depending on manoeuvrability and flight behaviour (adapted from Ornis Consult 1999)

category	description	species	vulnerability to collision
very passive fliers	very dependent on thermals, avoid large bodies of water	Egyptian Vulture, Short-toed Snake Eagle and all Eagles of the genus Aquila	very high
less passive fliers	less dependent on thermals, majority avoids large bodies of water	Buzzards, Kites, Honey Buzzard, Storks, Cranes and Pelicans	medium to high
less active fliers	rely on thermals and avoid large bodies of water to a limited degree	Harriers and Sparrowhawks	low to medium
very active fliers	do not dependent on thermals, do not avoid large bodies of water	Falcons	very low

Nevertheless, collision risk seems to depend not only on manoeuvrability and flight behaviour but also to a large (or maybe larger) extent on species-specific avoidance behaviour.

The high number of collided Common Kestrel (a very active flier that does not depend on lifting air currents) and maybe Griffon Vultures too, might be explained with the absence of avoidance behaviour. At “PESUR” Kestrels sometimes perched on lattice towers, and Vultures frequently flew at close distance to the blades, or between two adjacent turning turbines (Barrios & Rodriguez 2004). Soaring flights at low wind speeds and crossing flights that commenced below blade height increased the risk of collision, as Vultures showed little reaction to the turbine with only 2 % altering their approaching flight pattern.

In the wind farm at the western bank of the Gulf of Suez the majority of birds migrating at altitudes below 100 m showed clear avoidance behaviour in the presence of the wind turbines (Bergen 2007). While Steppe Buzzards predominately changed flight direction and avoided to enter the wind farm area altogether, most Black kites increased altitudes and subsequently entered the wind farm at heights above rotor blades but also at heights of the area swept by the rotor. Thus, they passed over or through the wind farm. Furthermore, the results of the study indicate that birds migrating individually are less sensitive to the presence of wind turbines than flocks. Large flocks seem to avoid wind turbines at greater distances.

The preferred altitude of migration is likely to be another factor effecting collision risk in a species-specific way. Most birds of such species that tend to migrate at altitudes well above 200 m (e.g. Eagles) are unlikely to come close to the area swept by rotors of wind turbines. Other species that prefer to migrate at altitudes around turbine height might often come into the range of rotors and hence face a risk to collide.

Furthermore the altitude of migration above ground can be influenced by site, depending on the availability of thermal uplifts. At the western coast of the Gulf of Suez birds arrive mainly in altitudes below 200 m after having crossed the Red Sea in autumn (ecoda 2011). Those birds cannot make use of any thermal uplifts and thus arrive at low altitudes. In Israel White Pelicans, White Storks, Lesser Spotted Eagles and Honey Buzzards flew on average at height bands between 344 and 1,123 m above ground during autumn and spring migration (Lesham & Yom-Tov 1996) by making extensive use of thermal uplifts.

There are indications that migrating passerines might be vulnerable to collision, especially when migrating at night (because of poor visibility; Langston & Pullan 2004). Collisions of passerines were recorded at several wind farms (Erickson et al. 2001). But mass collisions, which occurred at lighthouses during some nights, were not documented at wind turbines. Until now, collision risk of nocturnal migrants at onshore wind farms does not seem to be a major concern (e.g. Krijgsveld et al. 2009), possibly for several reasons:

- Usually nocturnal migration by passerines is at altitudes well above turbine height (e.g. Alerstam 1990, Carlbro 2010), so there is a very low potential for these birds to come into the collision risk zone. It can be suggested that nocturnal migrants should be most vulnerable during take-off soon after sunset and during descent. Furthermore, birds facing strong headwinds, forcing them to fly at lower altitudes, might face an increased risk of collision.
- Due to the large populations of most passerine species, they are not of major conservational interest. Results from studies in the United States indicate that the levels of fatalities are not considered significant enough to threaten local or regional population levels (Sterner et al. 2007).
- Most passerines have an r-selected reproductive strategy: individuals are short-lived, mature rapidly, have many offspring and a high adult and juvenile mortality. Consequently, additional mortality caused by wind turbines is unlikely to have a significant effect on populations of most passerine species.
- Mortality of passerines seems to be much higher at other man-made structures compared to mortality at wind turbines (Erickson et al. 2001).

1.1.2.5 Individual Factors

Finally, collision risk might be influenced by individual attributes of a bird (e.g. age, experience or fitness). It is quite obvious that the risk of collision varies depending on the stage of a bird's annual cycle (breeding, roosting or migrating).

Some studies indicate that immature birds are more vulnerable than adults, a phenomenon which may be attributed to the inexperience of younger birds. However, within the Altamont Pass Wind Resource Area most Golden Eagle mortalities were not juveniles but subadults and non-breeding adults (California Energy Comission 2002).

At "PESUR", "Al Koudia" as well as three windfarms in the Netherlands collision victims were usually species with resident populations rather than species appearing during migration (Barrios & Rodriguez 2004, El Ghazi & Franchimont 2001, Krijgsveld et al. 2009).

1.1.2.6 Conclusion

Many studies have shown that birds are generally able to avoid collisions with wind turbines and do not simply fly into them blindly (e.g. de Lucas et al. 2004, Desholm 2006, Dirksen et al. 1998). Nevertheless, at a few locations relevant numbers of collision victims were found, leading to significant increases in mortality rates and possibly to population decreases.

As shown, the scale of collision depends on a wide range of factors which - in some cases - correlate with each other. It is quite plausible that a combination of factors (e.g. flight behaviour, wind speed and relief of location) influences collision risk. As a consequence, it is very difficult to transfer the results obtained at a particular wind farm to another. At present, there is insufficient information available to form a reliable judgement on the scale of collision at a proposed wind farm.

1.2 Barrier Effect

There are several reliable studies indicating that wind turbines have a disturbing effect on birds and hence may act as barriers to bird movement.

At a wind farm (220 turbines) at the western bank of the Gulf of Suez, the behaviour of migrating birds was observed over a four-week period in spring 2007 (Bergen 2007). In the vicinity of the wind farm most birds (almost 88 %) used altitudes above 100 m, showed no clear reaction in presence of wind turbines and migrated over the wind farm. Most birds (over 83 %) migrating at altitudes below 100 m showed a clear reaction to the presence of wind turbines.

Black Kites most often increased altitude and subsequently entered the wind farm at heights above rotor blades but also at heights swept by the rotor. Thus, they passed over or through the wind farm. Some birds reacted to the presence of wind turbines with a combined vertical and horizontal behaviour. But change in flight direction alone was recorded relatively rarely. Accordingly, less than 11 % of all Black Kites did not pass the wind farm. In contrast, Steppe Buzzards did not change altitude in relevant numbers. The majority of birds changed their flight direction, so that they subsequently did not enter the wind farm area. Thus, Steppe Buzzards seem to regard the whole wind farm as a barrier. Consequently, Steppe Buzzards appear to be more sensitive to the presence of wind turbines, whereas Black Kites might be more vulnerable to collision.

The proportion of recordings of Black Kites changing altitude was markedly lower than the proportion of birds, indicating that birds migrating individually or in small flocks are less sensitive to the presence of wind turbines than flocks. The analysis of behaviour of Steppe Buzzards presents similar patterns.

Harriers usually migrated alone only a few meters above the ground. In the presence of wind turbines most Harriers showed no conspicuous reaction and simply flew through the wind turbines at heights below the rotor blades. A relevant number of birds (about 42 %) changed flight direction. As a consequence, one-third of migrating Harriers did not enter the wind farm area. Nevertheless, since the number of migrating Harriers was very low the findings must be treated with caution.

The results demonstrate that migrating birds were able to detect the presence of wind turbines and thus to react in an appropriate way depending on external (e.g. weather conditions) and internal (e.g. altitude, physical capabilities) factors. Birds at altitudes above 100 m simply migrated over the wind farm without any noticeable reaction. Birds at altitudes below 100 m became aware of the presence of wind turbines and apparently avoided them by changing their flight direction or increasing altitude. Sometimes birds seemed to avoid turbines in operation and purposefully approached a turbine not in operation and subsequently passed by.

A flight reaction of a bird in the vicinity of a turbine was recorded only twice. Irrespective of a bird's motivation (migrating, flying, hunting, resting) or of weather conditions, an appreciably irritated bird or a bird in a critical situation that might have led to a collision or to loss of flight control never occurred. Since the investigation refers to a rather short period, which did not cover the main migrating period of all species, results have to be verified.

A current study conducted at the wind farm La Venta II, which comprises 98 wind turbines and is located in the Isthmus of Tehuantepec in southern Mexico, has shown that migratory soaring birds adjust their flight paths suggesting a strong avoidance pattern during autumn migration and a possible avoidance pattern during spring migration (Cabrera-Cruz & Villegas-Patraca 2016, Villegas-Patraca et al. 2014). The observed avoidance behaviour indicates that the wind farm La Venta II is regarded as an obstacle. However, to date no study has provided proof for the hypothesis that a wind farm acts as a barrier that significantly hampers birds from migrating through a region.

During a 14-month study at a wind farm (66 turbines in a single row on top of a mountain ridge) near the Strait of Gibraltar, 72,000 migrating birds were recorded during about 1,000 hours of observation from fixed observation points (Janss 2000). The most abundant species were Black Kites, White Storks, House Martins (*Delichon urbica*) and Barn Swallows. Most of the migrating birds observed were passing over the wind farm, but at a higher average altitude than over two control areas. Average flight altitude at the wind farm was more than 100 m above ground. Almost 72 % of all soaring birds (n = 16,225) displayed changes in flight direction in the wind farm area (de Lucas et al. 2004, de Lucas et al. 2007). Raptors appeared to be accustomed to the presence of turbines and many birds flew close to turbines (de Lucas et al. 2004).

During a behavioural study at thirty seven study plots containing 277 turbines most birds (58.6 %) flew very low (< 5 m). 24.1 % of all birds showed panic behaviour in the risk zone, 20,3 % a sudden change of flight, and 15,6 % a slight change of flight (Lekuona & Ursúa 2007).

At the wind farm “Al Koudia” (84 turbines) in northern Morocco, autumn migration was observed over a three-month period in 2001 (El Ghazi & Franchimont 2001). Most birds (depending on species up to 100 %) showed clear avoidance behaviour in the presence of the turbines.

Further studies have shown that birds alter their routes to avoid flying through on- and offshore wind farms (e.g. Desholm & Kahlert 2005, Dirksen et al. 1998, Osborn et al. 2000). However, there are also locations where large numbers of birds regularly fly through wind farms without diverting around it (e.g. Everaert et al. 2002, Everaert & Stienen 2007).

Percival (2005) assumed that the ecological consequences of such a barrier effect are unlikely to be a problem at small wind farms. Drewitt & Langston (2006) suggest that none of the barrier effects identified so far have significant impacts on populations. However, under certain circumstances barrier effects might lead to population level impacts indirectly, e.g. where a wind farm effectively blocks a regularly used air route between nesting and foraging areas, or where several wind farms interact cumulatively. Then large wind farms or a number of wind farms might lead to increased energy expenditure for birds and thus might reduce annual survival rates and / or breeding output (Fox et al. 2006, Langston et al. 2006). In summary, until now it is quite difficult to judge whether avoidance behaviour causes a significant effect on individuals and, ultimately, on populations.

10.3 Annex C: 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)

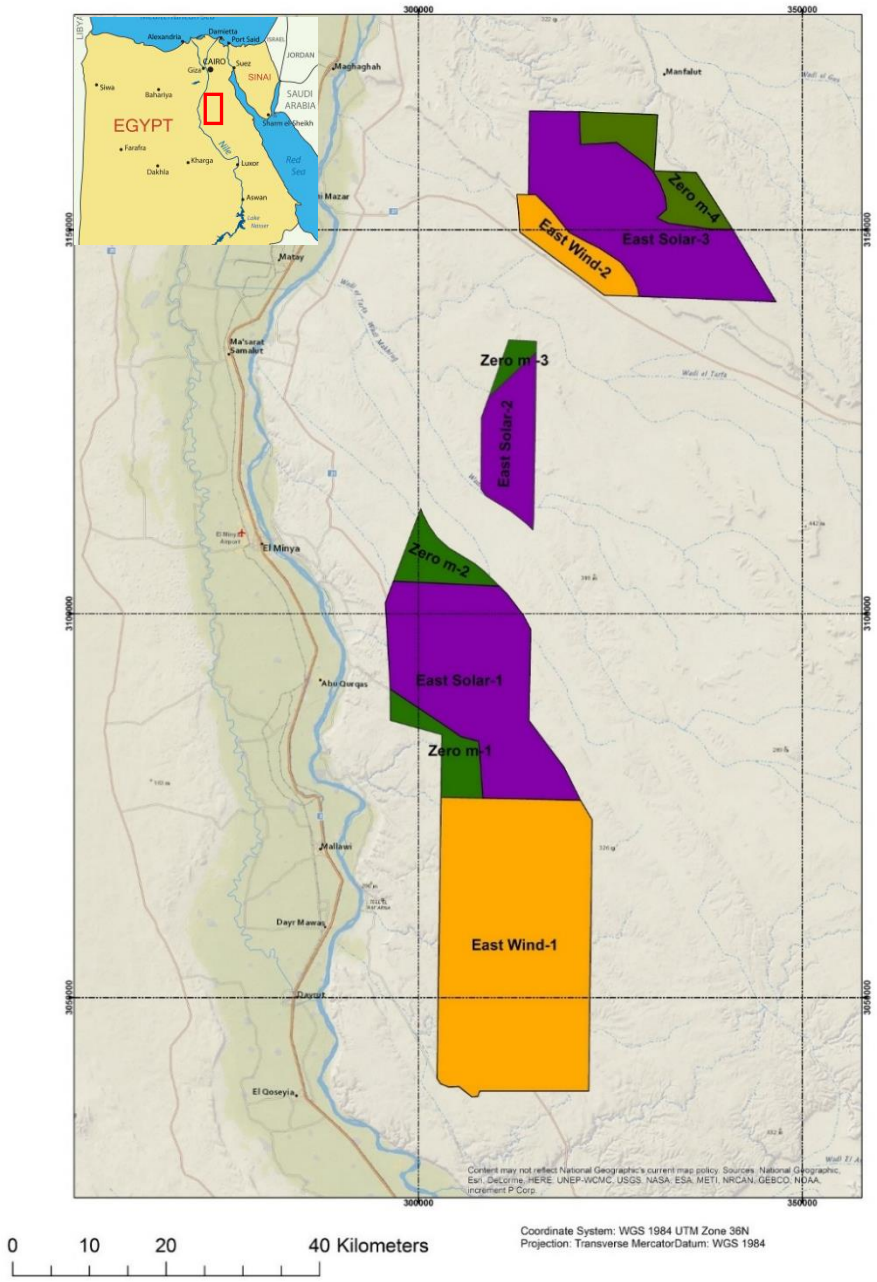
Execution of Assessment Study 2016 – 2017

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

10.4 Annex D: Interviews

10.4.1 Annex D1: 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 perfomed 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 no 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 signalized 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 Abdel Hafez Adel Said		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.

10.4.2 Annex D2: 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

Information / Option received:

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.

The team discussed with him the existing activities in the project area, he noted that some activities occur at the project area:

- Quarry activities
- Land Reclamation and cultivation at some area
- Archaeological areas at Tal el Amarna and Beni Hassan

Governorate officials feel excluded since the governorate has no jurisdiction on the project area (the project is officially located outside of the governorate borders).

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.

Received Documents:

- Number of Quarry Mines at Minia Governorate
- Details about the Industrial Zone at Al Matahra Baharya

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

Information / Option received:

- The SESA study team explained the aim of the project.
- 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.
- The Secretary General explained that the governorate officials were mixing between both projects and were thinking that the two projects are one.
- The Secretary General indicated that NREA team should participate in the mission.
- The governorate was not able to participate in the scoping session but would like to participate in the coming events
- Departments of Information, Public Property and the Geological Adviser will participate in discussing the SESA study and providing necessary input for the team.
- The relevant developmental plans in the area include:
    - Extension of some villages and cities in the Eastern Desert: plans were submitted but no official decree has been issued yet
    - There are plans to establish an airport (about 15 thousand feddans)

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

Information / Option received:

- The team introduced the SESA study to the governorate
- 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.
- 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.
- 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.
- The Governor instructed the governorate team to collaborate with the SESA study team and to provide realistic developmental plans.
- Data to be given to the project will be supervised by the Governor.

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

Information / Option received:

Some activities needs to be strongly investigated:

- Land reclamation activities (some of those activities may be used in the future as housing areas).
- NREA needs to clearly declare its ownership over the land to avoid illegal encroachments. (Officially claim its ownership by advertising or fencing)
- 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.
- It is important to discuss with the "National Center for Planning Land Use جهاز تخطيط استخدامات اراضي الدولة"
- 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.
- Expected future development plans for the project to take into consideration, include:
    - Expansion of New Malawy city
    - Expansion of New Minia City
    - Expansion of Industrial areas

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

Information / Option received:

- The main two obstacles that occur close or at the project areas are:
  - Land reclamation activities
  - Quarry activities
- 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
- There are no protected areas around the project areas.
- There is an industrial area in Beni Mazar (Senarya) – Cement factories
- 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.
- Sand storms only occur at some seasons (end of summer and autumn) their impact is not so strong on increasing air pollution levels.
- Child labour occurs in many cases in quarry areas.
- The department tried to held awareness raising activities against the impacts of quarries but still the impacts are high.

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: aem5151@yahoo.com
Subject of Interview	Discuss issues related to quarrying activities at the area

Information / Option received:

- 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).
- 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.
- 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.
- 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.
- There are two NGOs that worked with the quarry workers and studied their situation: جمعية رعاية وتطوير العاملين بالمحاجر – جمعية وادي النيل
- In case of environmental violations, he informs the environment department in the governorate that does not take a serious action.
-

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

Information / Option received:

- Villages located at the East Nile area that are affiliated to Abyoha Local Government Unit are:
    - Al Matahra Baharya
    - Nowirat
- There is an industrial area at Al Matahra Bahrya. It has several factories including Crystal Asfour, Petrochemicals, composting and metal refining.
- 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.
- New land reclamation activities occur at the ends of the village close to the desert areas.
- Population of Al Matahra Baharya: 3700 persons, Nowirat: 3500 persons
- Except for the land reclamation and the industrial area there are no future expansion plans in the village towards the eastern desert

-

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

Information / Option received:

- Several Farming activities occur at the outskirts of Nowirat and Matahra villages. This farming entails reclamation of desert areas surrounding the villages
- 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.
- He mentioned that the water quality is very good and is not salty, it is suitable for all types of crops
- Water is available at a depth of 40 meters, they extract water using pumps from the well.
- They depend on diesel to operate the pumping equipment since electricity is not connected.
- 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.
- About 1000 persons working in the new reclaimed land. Mainly workers without their families
- He has 5 children.

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

Information / Option received:

- Affiliated villages located at the East Nile to Beni Hassan Local Government Unit are:
    - Beni Hassan(40,000 persons)
    - Beni Hassan el Shrouk (22,000 persons)
    - Naga' el Dek (10,000 perons)
    - Sheikh Temy
    - El Arab
- The area has a large archaeological plateau.
- It used to receive large numbers of tourists so many were employed in tourism. Currently tourism activities are limited. So there is high unemployment
- Average family size is 8 persons (6 children)
- Beni Hassan now depends mainly on agriculture
- Quarrying activities also attract large number of workers from the villages
-

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

Information / Option received:

- Affiliated villages at the East Nile close to the desert areas:
    - Tel Beni Omran (9087 persons)
    - Hag Kandeel (6000 persons)
    - Nasser (1000 persons)
    - Geziret el Tel (5000 persons)

- The average family size 7 persons.
- 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. The project was submitted to the Cabinet two years ago awaiting a decree (1157 feddans)
- New Malawy City
- Active NGOs:
    - Community development association at Tel Beni Hassan
    - Ebad el Rahman NGO
-

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

Information / Option received:

- They started reclaiming the land 3 years ago
- They work together as a family (only the males are staying in the land) gradually reclaiming the area
- Originally their grandfather and family were working in quarry mining then they thought of the opportunity to explore farming in the area.
- They are a family of about 50 persons working together.
- Water quality is good and they plant different types of crops without problems
- They stay on the farm and go home to the village once every month

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)

Information / Option received:

- 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
- They dug a well for pumping water about 140 meters – 200 meters depth of the well
- The owner of the farm is lieutenant General Yasser.
- 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
- 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.
- All types of crops are growing well in the area. The water is not salty. They plant Malt, Wheat and Fenugreek

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:

- Usually people purchase the land from one person (Sayed Ba'gar) then they reclaim the land. After farming for several years the owners reconciliate with the local authority and pay certain fines to own the land legally (after proving they have been farming for several years).
- Crops are all growing very well. The water is not salty. Malt, Wheat and Fenugreek
- There are many investors along the old road including companies.
- They pay electricity fees (16000 LE/ 3 months)
- Average price for feddan between 7000 – 8000 LE uncultivated and about 15000 LE cultivated
- Usually 2-3 persons work on full time basis at the farm in addition to seasonal labourers
- The solar project is important to create job opportunities at the area
- They heard of another electricity project in the area (Chinese project)

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)

Information / Option received:

- Mr. Ba'gar was identified by all stakeholders (including governmental sources) to be coordinating the illegal land reclamation activities along the old desert road.
- He arranges land deals for the persons who want to reclaim the land in the area.
- 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.
- 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
- 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.
- 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.

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

Information / Option received:

- The farm started in this area about 9 years ago since 2009
- They farm leek, dill, parsley, cilantro in addition to aromatic and pharmaceutical plants.
- The length of the farm (in the wadi) is 18 kms, with a width of 250 meters at maximum.
- 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.
- The farm includes also a small guest house and housing area for workers.
- Water is found at depth of 140 m and its surface about 96 meters. The water allows planting any types of crops.
- They employ 19 permanent workers and 30 seasonal workers
- 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.
- They plan to install a solar system to operate the water pumps.
- They pay security fees to the Bedouins (about 3500-3800 LE/month)
- They also paid the Bedouins when they bought the land originally
- 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.
- A buffer zone is needed between other development activities about 100 meters to protect the plants (to be organic certified).

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

Information / Option received:

- Zawya el Baharia
- Zawya el Qeblya
- 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 (40% of village workforce) and agriculture (40% of village workforce). The remaining work in handicrafts
- Total population of Zawya is 16000 persons

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	

Information / Option received:

- 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)
- He mentioned that they do no prefer to apply for formal permit since they will have to pay very high fees for the government.
- Each mine employs at least 30-35 workers in cutting and extracting bricks in addition to indirect activities related to loading and transportation.
- 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.
-

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

Information / Option received:

- About 40% of the population of Zawya work in agriculture
- about 2-3 workers are employed in each feddan of the old agriculture land
- The main problems facing farmers are:
    - The deteriorated revenue of farming after selling the crops.
    - Small tenures do not allow mechanization (very difficult to invest)
    - Spread of pests in some crops may cause disasters for farmers
    - Fertilizers may not be available at some times (this year the situation is better).
    - Encroachments on cultivated land that led to rapid shrinking of the fertile land
- 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.
- Mostly owners of the new reclaimed areas are from the surrounding villages
- The new land needs about 10 workers per feddan (2-3 permanent workers in addition to seasonal workers)
-
-

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

-

10.5 Annex E: Official Communication between NREA and Regional Governorates

10.5.1 Annex E1: Summary 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 meting	NREA	El Minya Governorate	Invitation to scoping meeting	Invitation letter submitted via Fax
2		04.07.2016	Scoping meting	NREA	Assiut Governorate	Invitation to scoping meeting	Invitation letter submitted via Fax
3		11.07.2016	Scoping meting	El Minya Governorate	NREA	Governorate asks NREA to postpone the meeting from 12 July to 19 July	
4			Scoping meting	NREA	El Minya Governorate	NREA informs El Minya Governorate that it is not possible to postpone the scoping meeting	
5		12.07.2016	Scoping meting			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. / 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 signalled their willingness to support the JV LI/ecoda in carrying out the SESA Study, i.e. by providing the required data.
9			Data collection	NREA	Al Minya Governorate	NREA asks Al Minya Governorate for support in collecting statistical data and information, in particular on: - The population in surrounding areas of the Project. - Activities and projects to be established in the areas surrounding the Project in the future. - The compatibility of the infrastructure. Further, in the referred letter dated of March 23, 2017 it is probably announced that the Consultant will visit the Governorate in the period during the period 26-28.3.2017.	A few days before the planned visit, the Consultant's local coordinator and NREA jointly called Al 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	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: - A copy of the contract in Arabic between New and Renewable Energy Authority and the above-mentioned consulting office is formulated. - A copy of the protocol in Arabic with the European Bank for Re-construction and Development (EBRD) to carry out this project is provided to the Governorate.	On basis of this request, it is assumed that the data procurement has not been further followed up by NREA
11		30.10.2017	Data collection	NREA	Assiut Governorate	NREA informs Assiut Governorate that on October 31, the Consultant will visit the Governorate for collecting the data.	This visit was conducted by the Consultant on 07.11.2016 and some planning data was received unofficially (see item 8)

10.5.2 Annex E2: Official 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

ارة الكهرباء والطاقة المتجددة
نمية واستخدام الطاقة الجديدة والمتجددة
. إبراهيم أبو النجا - إمتداد شارع عباس العقاد
حى الزهور - مدينة نصر - القاهرة

يد الاستاذ/ سكرتير عام – محافظ المنيا

تحية طيبة وبعد...

فى البداية يُسعدنى أن أتقدم لسيادتكم بخالص التقدير على دعمكم لمشروعات هيئة الطاقة الجديدة والمتجددة.

أتشرف بإحاطة سيادتكم بان الهيئة تقوم حاليا بإعداد الدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعي لإنشاء مشروعات طاقة متجددة لإنتاج كهرباء من طاقة الرياح والطاقة الشمسية وذلك على مساحة ٢٢٠٠كم٢ 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 لامابر الالماني خبراؤه المكلفين باعداد هذه الدراسة لديوان عام المحافظة لتوضيح فكرة المشروع وايضا لادماج خطط التنمية الخاصة بالمحافظه ضمن الدراسة الاستراتيجية للمنطقة (مرفق صورة) ، وقد طلب الاستشاري موافاته ببعض البيانات المطلوبة لإستكمال هذه الدراسة حيث ان من اهداف الدراسة الاستراتيجية ما يلى :

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 الاثر 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 ستشاري لامابر 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
للدراسات والبحوث والشئون الفنية
دكتور مهندس / محمد مصطفى الخياط

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Tel. Switch : 22725891, 2 , 3 , 4

ب : ٤٥٤٤ مكتب بريد مساكن ضباط الصف
السادس – مدينة نصر – القاهرة
: ٢٢٧١٧١٧٣ – ٢٢٧١٧١٧٢ (٢٠٢)
ونات العمومية : ٢٢٧٢٥٨٩١ , ٢ , ٣ , ٤

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 النواحى 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 .

(جـ) إذا كانت قيمة العطاء الأقل تزيد على القيمة التقديرية .

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حى الزهور - مدينة نصر - القاهرة

Ministry of Electricity & Renewable Energy
New & Renewable Energy Authority
NREA

السيد الأستاذ/ سكرتير عام - محافظ المنيا

تحية طيبة وبعد...

فى اطار التعاون بين هيئة تنمية واستخدام الطاقة الجديدة والمتجددة والبنك الأوروبى لإعادة الإعمار والتنمية لتمويل الدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعى لمساحة ٢٢٠٠كم٢ بمنطقة شرق النيل (المنيا - سيرط - بنى سويف) لإنشاء محطات رياح ومحطات طاقة شمسية.

أتشرف بإحاطة سيادتكم بان خبراء من مكتب الاستشارى لاماير Lahmeyer international GmbH الالمانية استشارى المشروع يرغبون فى زيارة ديوان عام المحافظة لمقابلة المسئولين عن الانشطة والدراسات الخاصة بالمشروع فى الفترة من ٢٦-٢٠١٧/٣/٢٨.

رجاء التفضل بالإحاطة والتنبيه نحو تيسير مأمورية العمل للخبراء الاستشاريين للمكتب الاستشارى المشار اليه.

وتفضلوا بقبول فائق الإحترام،،،

نائب الرئيس التنفيذي
للدراسات والبحوث والشئون الفنية

دكتور مهندس/ محمد مصطفى الشيتا

صورة لمكتب معالى الوزير
٢٠١٧/٣/٢٣

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 لحين الانتهاء من التفريغ وتدون 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 كشوف 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 تندبه 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 المطروحة 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

السيد الدكتور مهندس / محمد مصطفي الخياط
نائب رئيس هيئة تنمية واستخدام الطاقة الجديدة والمتجدده
بوزارة الكهرباء والطاقة المتجدده .
تحية طيبه وبعد ...

بالاشارة الي كتاب سيادتكم المؤرخ ٢٠١٧/٤/٢٧ بشأن طلب توفير البيانات المطلوبه لخبراء المكتب الاستشاري (لاماير الالماني) لاعداد الدراسات الخاصة بانشاء محطات رياح ومحطات طاقه شمسيه علي مساحة ٢٢٠٠كم٢ بمنطقة شرق النيل (بني سويف – المنيا – اسيوط) .

نتشرف بالاحاطه بما يلي :-

اولا : - سبق ان ورد للمحافظة كتاب سيادتكم المؤرخ ٢٠١٧/٣/٢٣ برغبة خبراء هذا المكتب في زيارة محافظة المنيا في الفتره من ٢٦-٢٨/٣/٢٠١٧ لمقابله المسئولين عن الانشطه والدراسات الخاصه بهذا المشروع . الا أنه لم تتم هذه الزيارة في الموعد المحدد ولم يرد من سيادتكم ما يفيد الاعتذار عن عدم الحضور ومبررات ذلك .

ثانيا :- يجري حاليا اعداد البيانات المطلوبه واتخاذ الاجراءات اللازمه في هذا الشأن وسيتم اخطار سيادتكم بنتيجة الدراسه فور الانتهاء منها .

مع رجاء موافاتنا بما يلي :-

١ - صورة (باللغه العربيه) من التعاقد المبرم بين الهيئة والمكتب الاستشاري المذكور لاعداد الدراسات المطلوبه .

٢ – صورة (باللغه العربيه) من البروتوكول الموقع مع البنك الدولي لاعادة الاعمار والتنمية EBRD لتنفيذ هذه المشروعات بمنحة لا ترد .

وتفضلوا سيادتكم بقبول فائق الاحترام والتقدير ...

السكرتير العام
(نبيل عبد الرحمن منصور)

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 موقعاً 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 المظاريف المالية .

تجتمع لجنة فتح المظاريف بذات تشكيلها السابق فى الموعد والمكان المحددين لفتح المظاريف المالية وتتولى اللجنة مباشرة ذات الإجراءات المنصوص عليها بهذه اللائحة بشأن فتح المظاريف الفنية بعد التحقق من سلامة المظاريف المالية ووجود رقم العطاء وتوقيع أعضاء اللجنة السابق إثباته على كل مظروف بجلسة فتح المظاريف الفنية .

يكلف موظف مسئول أو أكثر بمراجعة العروض المالية قبل تفريغها مراجعة حسابية تفصيلية والتوقيع عليها بما يفيد هذه المراجعة وإذا وجد اختلاف بين سعر الوحدة وإجمالى

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هيئة تنمية واستخدام الطاقة الجديدة والمتجددة
شارع د. إبراهيم أبو النجا - إمتداد شارع عباس العقاد
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١٣٢٧
٢٠١٧/٨/١٤
CD
٢٠١٧/٣-٥/٤

السيد اللواء / ماجد عبد الكريم

السكرتير العام لمحافظة أسيوط

تحية طيبة...وبعد ،،،

بالاشارة الى الدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعى لمساحة ٢٢٠٠كم٢ 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 تحياتى

13-8-2017

- مرفق (CD)

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ص . ب : ٤٥٤٤ مكتب بريد مساكن ضباط الصف
الحى السادس - مدينة نصر - القاهرة
فاكس : ٢٢٧١٧١٧٣ - ٢٢٧١٧١٧٢ (٢٠٢)
التليفونات العمومية : ٢٢٧٢٥٨٩١ , ٢ , ٣ , ٤

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شارع د. إبراهيم أبو النجا - إمتداد شارع عباس العقاد
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١٣٣٦
٢٠١٧/٨/١٤
CD
٤/٣٢٥/ك

السيد الاستاذ / محمد عبد الفتاح ادم

السكرتير العام المساعد لسكرتير محافظة المنيا

تحية طيبة...وبعد ،،،

بالاشارة الى الدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعى لمساحة ٢٢٠٠كم٢ بمنطقة شرق النيل والممولة بمنحة لا ترد من البنك الاوروبى لاعادة الاعمار والتنمية EBRD ، والى الخطاب المرسل الى سيادتكم بتاريخ ٢٠١٦/٧/١٨ بشان نتائج عقد جلسة المشاورة الاولى للدراسة المشار اليها عاليه (مرفق صورة).

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،،،،

13-8-2017

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دكتور مهندس / محمد مصطفى الخياط

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الحى السادس - مدينة نصر - القاهرة
فاكس : ٢٢٧١٧١٧٣ - ٢٢٧١٧١٧٢ (٢٠٢)
التليفونات العمومية : ٢٢٧٢٥٨٩١ , ٢ , ٣ , ٤

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وزارة الكهرباء والطاقة المتجددة
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شارع د. إبراهيم أبو الناجا - إمتداد شارع عباس العقاد
حى الزهور - مدينة نصر - القاهرة

صادر ١٣٣٥
تاريخ ٢٠١٧/٨/١٤
مرفقات CD
ملف ٢٠١١/٣-٥٠٤

السيد الاستاذ / يسرى عبد المنعم عبد الرحمن

السكرتير العام لمحافظة بنى سويف

تحية طيبة...وبعد ،،،

بالاشارة الى الدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعى لمساحة ٢٢٠٠كم٢ 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

13-8-2017

- مرفق (CD)

٢٠١٧/٨/١٠

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ص . ب : ٤٥٤٤ مكتب بريد مساكن ضباط الصف
الحى السادس - مدينة نصر - القاهرة
فاكس ٢٢٧١٧١٧٢ - ٢٢٧١١ (٢٠٢)
التليفون : ٢٢٧٢٥٨٩١ . ٢ . ٣ . ٤

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 (١١٧٤) المؤرخ في ٢٠١٦/٦/٢٨ بشأن عقد جلسة المشورة الجماهيرية الأولى الخاصة بالدراسة الإستراتيجية لتقييم الأثر البيئي والاجتماعي لمساحة ٢٢٠٠ كم٢ 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 البحوث

مدير عام الاختبارات
مدير عام الكيمياء الحيوية
مدير عام الدراسات المتخصصة

وارد: ٣٩٠ ٧
التاريخ: ٢٠١٦/٧/١١
المكتب المالي والإداري
المكتب للمشروعات والتشغيل
المكتب الفني
الإدارة العامة للمعلومات
الإدارة العامة للتدريب
الإدارة العامة للعلاقات الخارجية
الإدارة العامة للتخطيط
الكيمية

10.6 Annex F: Manual for identification of coordinates of preclusive and unfavourable zones

Coordinates of preclusive and unfavourable zones can easily be taken 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: Public Hearing Report

JV LAHMEYER INTERNATIONAL

ecoda

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, 28th 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:

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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

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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 km² area (2,200 km² 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 km² 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 frams) which are located in an area of about 1,725 km² in the East Nile Region across the three governorates of Beni Suef, El Minya and Assiut was held in El Minya City on Thursday, 28th 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, 4th 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 km², resulting in an area of 1,750 km² 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^2 in the East and 4,200 km^2 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 Suef: 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 Suef. 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 of 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 EEAA.

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 لواء1

مقدمة –1.1

دراســه التقييم الاســتراتيجي البيئي والاجتماعي لتطوير مشــاريع الطاقة المتجددة في منطقة مســاحتها 1725 كيلومتر مربع (2200 كيلومتر مربع خلال مرحلة الاقتراح وقبل تعديل المنطقة من قبل الحكومة المصــرية) الواقعة إلى الشــرق من نهر النيل في مصــر عبر المحافظات الثلاث بني ســويف ، المنيا وأسيوط قام بها تحالف استشاري الماني مكون من شركه لامايرو شركه ايكودا بالنيابة عن هيئة الطاقة الجديدة والمتجددة في مصر.

بعد إصـدار القانون الرئاسـي لتعريفه التغذية في مجال الطاقة المتجددة في مصـر في ديسـمبر 2014 ، شـارك البنك الأوروبي للإنشـاء والتعمير في شـراكة مع الحكومة المصـرية لتحديد مجموعة من مشـاريع 5ؤل7الطاقة المتجددة (من مصــادر الرياح والطاقة الشـمسـية) يتم تمويلها من قبل المسـتثمرين الأجانب المؤهلين

ومن المتوقع أن يكون كل مشروع قدرة 50 ميجاوات..

وقد حددت الحكومة المصـــرية ثلاث مناطق كبيرة مناســـبة لتطوير وتنميه مزارع الطاقة المتجددة من مشـــاريع طاقة الرياح والطاقة الشـــمســـية بموجب قانون تعريفه التغذيه الموحده الصـــادر حديثًا ، وهذه المناطق تبلغ مسـاحتها1725 كيلومتر مربع (شـرق الرياح -1 ومنطقة الشـرق-الرياح 2 مع اقصـي حد ارتفاع 150 مترًا للمباني ، وثلاث مناطق شمسي شرق ذات حد ارتفاع اقصي 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 مشـاريع الطاقة المتجددة في هذا المجال ، وإعلام صـناع القرار للبدء في المشــروع ، قامت الحكومة المصــرية ، بالاشــتراك مع هيئة الطاقة الجديدة والمتجددة ، بعمل دراسه بيئية استراتيجية و دراسة تقييم الاثر الاجتماعي لمنطقة المشروع. وهذه الدراسة هي عملية دعم لاتخاذ قرار يبين انـه تم الاخذ في الاعتبار جميع الجوانب البيئية والاجتماعية وغيرها من جوانب الاستدامة بشكل فعال في السياسات والتخطيط ووضع البرامج اثناء الدراسه. تم تمويل هذه الدراسه من قبل البنك الأوروبي للإنشاء والتعمير.

جلسة استماع عامة – 1.2

الأهداف والمنهج

كجزء من متطلبات التشاور والمناقشه العامةحسب 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 اشترط عقد اجتماع تشاوري عام لإطلاع جميع الأطراف المهتمة على النتائج الرئيسية التي اليها الدراسه وملاحظتهم والتعليقات والإراء حول الدراسه. توصلت

الاجتماع التشاوري العام (جلسة استماع عامة) لمشروعات طاقة الرياح والطاقة الشمسية الكهروضوئية بسعة إجمالية تبلغ حوالي 9600 ميجاوات (2000 ميجاوات من طاقة الرياح و 7600 ميجاوات 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 الدراسه قائمة على مشاركة جميع الاطراف وتشارك فيها مجموعات مختلفة من أصحاب المصلحة. لم تضف 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 الدراسه ، قام الاستشاري بترتيب جلسة استماع عامة بعد إعداد مسودة وملخص لتقارير الدراسه .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 للدراسه بما في ذلك التأثيرات المحددة وتدابير التخفيف المقترحة وإتاحة الفرصة لجميع أصحاب المصلحة للتعليق على مسودة تقارير الدراسه وكان الهدف من ردود المشاركين هو اعداد النسخة النهائية لتقارير الدراسه من خلال النظر بشكل كامل ودمج التعليقات ذات الصلة والاخذ في الاعتبار جميع الملاحظات التي ذكرت بالجلسه.

تم الإعلان عن دعوة جلسه الاستماع في جريدة الأخبار الوطنية باللغة العربية يوم الاثنين الموافق 4 يونيو 2018 (مرفق نسخة من هذا الإعلان في القسم 4.1 الملحق A). تضمن هذا الإعلان إشارة إلى موقع الويب الخاص بـ هيئه الطاقه الجديده والمتجدده و البنك الأوروبي للإنشاء والتعمير لتنزيل نسخة عربية وإنجليزية من الملخص غير الفني لمسودة تقارير الدراسه ومشروع التقرير النهائي للتوصيات. بالإضافة إلى ذلك ، تم توزيع دعوات شخصية على أصحاب المصلحة الرئيسيين بالإضافة إلى ملخص غير فني لمسودة تقارير الدراسه وتقرير التوصيات النهائي. تم توزيع أجزاء من الدعوات من قبل هيئه الطاقه الجديده والمتجدده ، في حين تم توزيع أجزاء أخرى من قبل استشاري الدراسه وذلك وفقا لمتطلبات جهاز شئون البيئة . وتضم قائمة المشاركين المقترحين في جلسة الاستماع العامة فئات مختلفة ذات صلة بالمشاريع.

تم إعداد نماذج التسجيل باللغه العربية والإنجليزية خلال جلسة الاستماع العامة لتوثيق قوائم المشاركين. (القسم 4.4 يتضمن الملحق D القوائم المترجمة للمشاركين ونماذج التسجيل المصوره ضوئيًا للجلسة العامة). وقد شارك ما مجموعه حوالي 35 مشاركًا من مختلف الانتماءات في جلسة الاستماع العامة. وكانت الجهات المعنية التي شاركت في الحدث منظمات حكومية ، ومنظمات غير حكومية ، ووسائط 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 لامايز مهندس ماتيس دروش ود فرانك بيرجن من ايكودا استشاري هجره الطيور والدكتور محمد عبد الله ممثل جهاز شئون 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 الدراسه (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 تبعتها 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 الدراسه. وقد تمت دعوة المشاركين لتنزيل التقرير وفحص مسودة تقارير الدراسه 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 الدراسه.

تعرض الأقسام التالية القضايا الرئيسية التي أثيرت أثناء جلسه الاستماع

6 Annex

6.1 Annex A: Public Hearing Advertisement in Al-Akhbar on Monday, 4th June 2018

هيئة الطاقة الجديدة والمتجددة

تتشرف

بدعوة الجهات المعنية للمشاركة وابداء الرأي
في جلسة المشورة الجماهيرية المزمع عقدها عن
التقييم البيئي والاجتماعي الاستراتيجي لمشاريع 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

وموقع البنك الأوروبي لإعادة الإعمار 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

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

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 - إمتداد شارع عباس العقاد
حى الزهور - مدينة نصر - القاهرة

صادر	٩٧٨
تاريخ	/ /
مرفقات	(٤)
منطق	٢٠١٨/٦/١٨

السيد /

تحية طيبة ... وبعد،،،

أتشرف بدعوة سيادتكم لحضور جلسة المشورة الجماهيرية الخاصة بالدراسة الاستراتيجية لتقييم الاثر البيئى والاجتماعى لمساحة ٢٢٠٠ كم٢ والمخصصة للهيئة بمنطقة شرق النيل بمحافظات (بنى سويف – المنيا – أسيوط) لانشاء مشروعات توليد الكهرباء من مصادر الطاقة المتجددة (الخلايا الشمسية الفوتوفلطية 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 الإستشاري البيئي بعرض ومناقشة المسودة النهائية لدراسة تقييم التأثيرات البيئية والإجتماعية لكافة الجهات المعنية المحيطة بمنطقة المشروع.

هذا وسوف يتم عقد الإجتماع بمشيئة الله يوم الخميس الموافق٢٨ يونيو ٢٠١٨ بقاعة مؤتمرات منتجع حورس السياحى بالمنيا – كورنيش النيل في تمام الساعة العاشرة صباحاً.

ونحن نتطلع إلي تشريف سيادتكم لحضور الإجتماع .

وتفضلوا بقبول فائق الإحترام ،،،

أسماء كامل

الرئيس التنفيذي

دكتور مهندس/ محمد مصطفى الخياط

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
الحى السادس – مدينة نصر – القاهرة
فاكس : ٢٢٧١٧١٧٣ – ٢٢٧١٧١٧٢ (٢٠٢)
٢٢٧٢٥٨٩١ ٢ ٣ ٤ ٥

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 km2 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
		EEAA	
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	
		Beni Suef Governorate	
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

El Minya Governorate			
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

Assiut Governorate			
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 Husseini	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
Egyptian Electricity Transmission Company			
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	
Other Parties			
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)

JV LI - 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
١	[illegible]	استشاري		01272170835	
٢	[illegible]	بالسماه		01203255015	
٣	[illegible]	مسئول تقارير بالأوقاف		01227470057	
٤	[illegible]			01283579764	
٥	[illegible]			01205736464	
٦	[illegible]	[illegible]		01176502949	
٧	[illegible]	[illegible]		01184991142	
٨	[illegible]	[illegible]			

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

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Public Hearing on Thursday, 28 June, 2018

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Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Registration Form

No.	Name	Position and Firm	Email	Telephone	Signature
9	[illegible]	[illegible]		[illegible]	[illegible]
10	James Lee-Cox	EBRD	Lee-Cox@EBRD.com		[illegible]
11	Matthias Drosch	DM. Lahmeyer International	matthias.drosch@de.lahmeyer.com		[illegible]
12	محمد الملك محمود	مدير عام الإدارة		01002704507	[illegible]
13	مينا نبيل رمزي	NREA	mina_vodafone@yahoo.com	01002781909	مينا
14	[illegible]	NREA	engahmed_tolba@gmail	01079107047	[illegible]
15	Dr. Frank Berger	ecoda	berger@ecoda.de	+49 7820 34158	[illegible]
16	[illegible]	[illegible]	Wael.abaas@tiwg	010673445 37	[illegible]
17	محمد نادر كامل	[illegible]	Mohamed.Nader@[illegible].eg 01006655676		[illegible]

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

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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
١٨	محمد عبد الله عوض	مدير مركز الطاقة EEAA		٠١١٤٦٠٠٩٨٠٤	
١٩	ظريف يوسف ابراهيم	م. م. الصوفات الحكومية		٠١٥٥٠٠٧٧٧٠	
٢٠	مقرب ابراهيم محمد	مدير مركز الطاقة	mingovamicl gmail.com	٠١٠٦٧٢٠٨٩١	
٢١	[illegible] عباس كامل	مدير ادارة التخطيط بالمحافظة	—	٠١٠٦٢٤٠٦١٦	
٢٢	[illegible] محمد محمد ابراهيم	طبيب بشري استشاري		٠١٠٦٨٢١٤٢٤٧	
٢٣	[illegible]	NREA	[illegible]	٠١١٢٠٠٠٦٧٣	
٢٤	[illegible] صلاح محفوظ	[illegible]		٠١٢٢٤٥٧٠٥١٠	
٢٥	دريني عاشور عبد القادر	مدير ادارة [illegible]		01003018336	
٢٦	[illegible]	مدرس مساعد		01601496606	

الأثر البيئي جهاز
شئون البيئة بالمنيا

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

JV LAHMEYER - 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	Farag Mohamed Farag	manager of EEHA Elmnia		01000934657	
٢٨	د. محمد موسى ابو حليقة	الاستشاري الجولي	haleikaa@yahoo.com	01288169854	
٢٩	انسي وصلا محمد علي	مدير ادارة التوقعات بكهرباء		01021483655	
٣٠	شذا ماضي محمد	مهندس ادارة خطط كهرباء		01009867080	
٣١	[illegible]	[illegible]	مندوب الأهلي	٠١٠٠٥٧٢٠٥٧٨	
٣٢	[illegible]	[illegible]			
٣٣	اسامه علي [illegible]	عضو مكتب الاستثمار بالمحافظة	miniainvestorsOffice@gmail.com	٠١٠٠٥٥٧٥٦٥	
٣٤	[illegible]				
٣٥	[illegible]	[illegible]	٠١٠٦٠٢٢٢٨١٠		

Translation

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 1

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		

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 2

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

No.	Name	Job Title	e-mail	Phone No.
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

No.	Name	Job Title	e-mail	Phone No.
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

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 **Wind Energy Projects** 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 **Solar Energy Projects** 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)

JV LAHMEYER - 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

Name of Participants (optional) Osama Ali Bachie

Position and Organization (optional) Minia investors office

Mobile (optional) 01010557535

Email (optional) Miniainvestorsoffice@gmail.com

Your comments and suggestions

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)

JV LAHMEYER - 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

Name of Participants (optional) Faraq Mohamed Faraq

Position and Organization (optional) manager of Minia of EEAA Minia

Mobile (optional) 01000934667

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)

JV LAHMEYER INTERNATIONAL - 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

Name of Participants (optional) Lamiaa Shaikhon Hashem

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)

JV LAHMEYER INTERNATIONAL - ecoda

Public Hearing on Thursday, 28 June, 2018

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Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants (optional)

Position and Organization (optional)

Mobile (optional)

Email (optional)

Your comments and suggestions

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)

JV LAHMEYER INTERNATIONAL - 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

Name of Participants (optional)..... [illegible]

Position and Organization (optional).....

Mobile (optional)..... [illegible]

Email (optional)..... [illegible]

Your comments and suggestions

هل الاعمال من المحافظات عمه المقول
وبعد انتهاء المشروع هيتم تشغيل العمال

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)

JV LAHMEYER INTERNATIONAL - 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

Name of Participants (optional)..... hag. Said Abd El ghany noner

Position and Organization (optional).....

Mobile (optional)..... 01227474057

Email (optional)..... hag.n.g61@yahoo.com 01227474057

Your comments and suggestions

طالما تقوم بـ ٣ مراحل وبالمصر مدة من المرحلة الاولى ١٦ شهر والثانية
بـ ٣٤ والثالثة بـ ٣٨ وبالمصر الموانئ او الجهات التي تقوم امامنا التجارة
المقررة في المراحل

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)

JV LAHMEYER INTERNATIONAL - 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

Name of Participants (optional) hany said Abdelghany mômen

Position and Organization (optional) مسؤول التقارير بإدارة ملوكي المنيا

Mobile (optional) ٠١٢٢٧٤٧٤٠٥٧

Email (optional) 01227474057

Your comments and suggestions

كيف يمكن لي التقدم للعمل وما هي أولويات وأين يتقدم العامل للحصول على وظيفة أولاً

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)

JV LAHMEYER INTERNATIONAL - 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

Name of Participants (optional) د. محروس أبو حليقة أبو العلا

Position and Organization (optional) الاستشاري الجيولوجي للمحافظة

Mobile (optional) 01288169854

Email (optional) heleika@yahoo.com

Your comments and suggestions

يوجد مساحة ١,٥ مليون ونصف فدان مخصصة للطاقة الجديدة منها مليون فدان في الوادي الغربي لا تصلح لوجودها من خوف ترسيب وعلوه ، أما النصف مليون شرق النيل وبعضها يصلح لانتاج الطاقة الشمسية إذا تم عمل دراسة جيولوجية كنزوبيجي توضح أماكن الهضبة الجيرية وتثبت أماكن الأودية. وخصوصا لوجود خط ريط كهربائي في الشرق، ولابد من إعادة الدراسة في اختيار المواقع ويتم التخفيض المساحة إلى نصف مليون فدان في الشرق.

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)

JV LAHMEYER INTERNATIONAL - 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

Name of Participants (optional) Maha Mohamed Mohamed

Position and Organization (optional) G.I.T. Alminia Minia

Mobile (optional) 01068212647

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
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Alminia, Egypt

Thursday 28/6/2018

Name of Participants (optional) Nada Ashour Abd-Elzaher

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Your comments and suggestions

* اشكال تواكم بشرين الناتجة عن لحاجر على المواقع مصادر الطاقة الشمسية وخواص بالبيئة
وحاجة لتشريعات اي استخدام لمياه النيل (ما توصلت لمياه و مشروع وتكلفة نقلها) وصدى
ومدى الجدوى الاقتصادية مع العلم ان اسيا حتى تلك هذه المشروعات اقبال من المستثمرين

Please submit your comments' sheet to the consultant to include your views in the study

* وجود الجهاز التنفيذي بالمحافظة مهم جدا لعمل المتابعة بعمل الدراسات الاولية لهذه
المشروعات و الاستعانة بهم خلال مراحل الاعداد والتنفيذ
*

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

JV LAHMEYER - ecoda

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Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants (optional) Mohamed Nader Ramel

Position and Organization (optional) We2 - Customer care

Mobile (optional) 01550158777

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

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

JV LAHMEYER - ecoda

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Hours Hotel

Alminia, Egypt

Thursday 28/6/2018

Name of Participants (optional) Wael Mohamed Abass

Position and Organization (optional) We2 Manager of Menia exchange

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Email (optional) Wael.abass@te.eg

Your comments and suggestions

Best R @ 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

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Mobile (optional): 01010557535

Email (optional): miniainvestorsofffice@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

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

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)

10.8 Annex H: Non-Technical Summary

JV

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

Non-Technical Summary (NTS) of the Final SESA Wind Report

September 2018

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

JV

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

Non-Technical Summary (NTS) of the Final SESA Wind 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:

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Germany

Report Status: Approved

Revision History:

Revision	Date	Author	Checked by	Approved by	Description
01	04.10.2017	Dr. Frank Bergen Dr. Ernst Niemann Tony Moens de Hase Dr. Omneya Nour Eddin Matthias Drosch	Matthias Drosch	Matthias Drosch	NTS of the Draft SESA Wind Report
02	22.12.2017	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	NTS of the Second Draft SESA Wind 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 Wind 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 Wind Report

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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^2 with a usable area of 1,725 km² (425 km^2 were excluded due to military height limitations, see section 2) located to the east of the Nile River across three Governorates – Beni Suef, El Minya and Assiut, which have been identified based on existing data on solar and wind potential and existing land-use (the "Project Area", see section 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, planning 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 zones in the Project Area, which are suitable for RE development based on the outcome of the environmental and social impact assessment.
- 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 the 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 SESA course, the SESA consultant provided training to the staff of the New and Renewable Energy Authority (NREA) on SESA, Environmental and Social Impact Assessment (ESIA) and GIS.

Major elements of the assessment were field surveys such as general area reconnaissance, ornithological field monitoring over three migration periods (spring 2016, autumn 2016 and spring 2017) and other surveys (e.g. flora and fauna, land-use and other social aspects).

1.2 Objectives and Approach of the SESA Wind Report

This subject report, the SESA Wind Report, focuses on the social and environmental assessment to define the suitability for wind power development within the greater East Wind-1 and East Wind-2 subareas identified by NREA, considering technical, social or environmental constraints.

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

- areas that are favourable for wind power development
- areas that are less favourable, but can be developed with restrictions, and
- areas in which wind 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 Wind 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) will take place according to the spatial wind power distribution, which, however, is not part of this report and will be dealt with in the separate Final Recommendation Report.

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

2 The Project Area

The East Nile Area originally refers to an area of 2,200 km² with a usable area of 1,725 km² 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^2 were excluded from further RE developments due to military height limitations ("zero height", see Map NTS 2–1) leading to five subareas for wind (East Wind-1 and East Wind-2) and solar power (photovoltaic) development (East Solar-1, East Solar-2 and East Solar-3) defined by NREA. This report comprises the SESA Wind Report for the East Wind-1 and East Wind-2 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 170 km east of the Nile into the Red Sea Mountains.

East-Wind 1

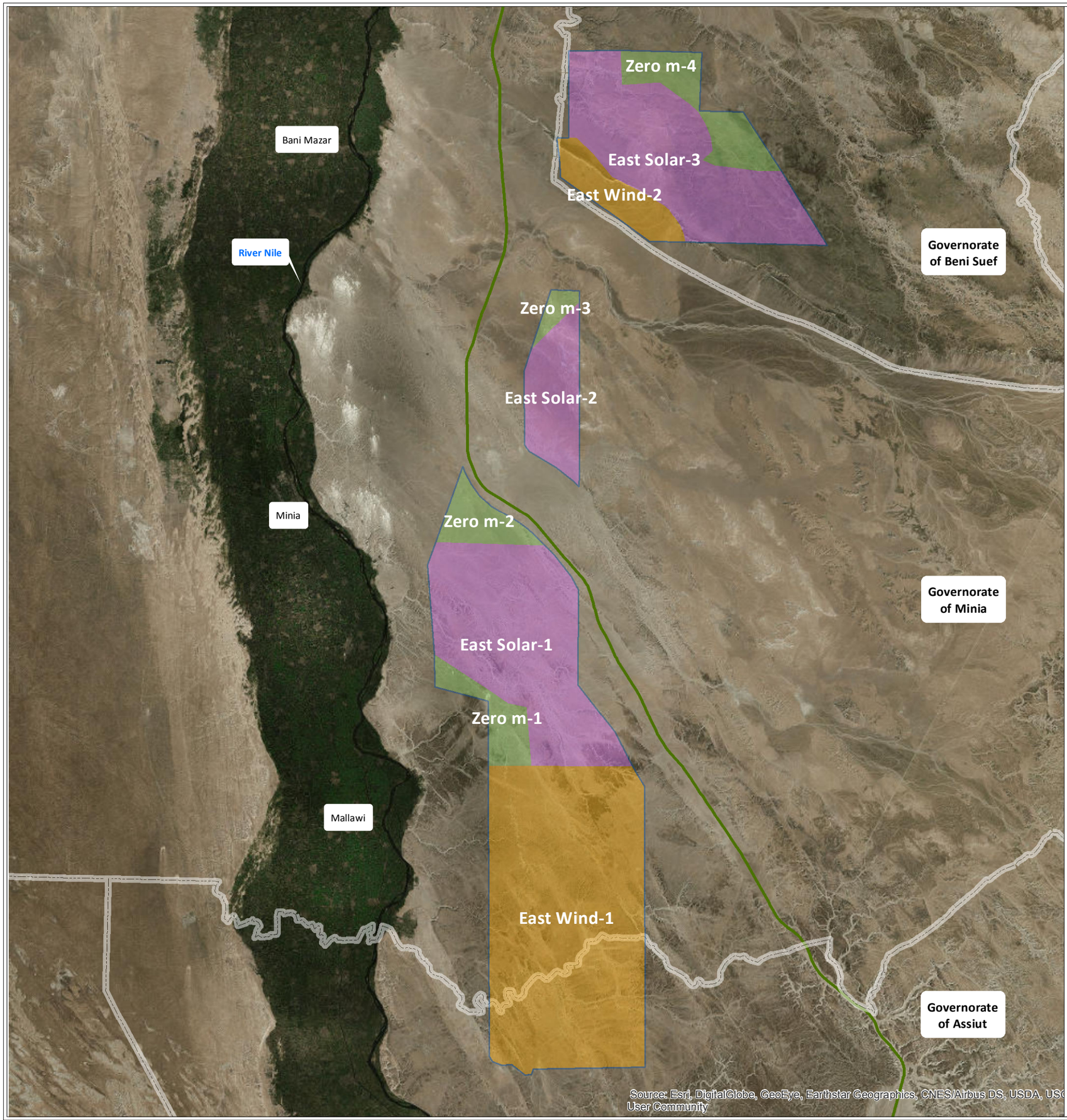
The East Wind-1 subarea stretches over nearly 43 km from the North to the South at a minimum distance of 12 km east of the River Nile. The maximum width of this subarea is about 22 km (total area of about 750 km^2). It is mainly located in the area of the Governorate El Minya, whereas the very south is located in the Governorate Assiut. The El Minya – Assiut National Road runs in a southerly direction through this subarea.

East-Wind 2

The East Wind-2 subarea is located at a minimum distance of about 25 km east of the Nile Valley in the area of the Governorate Beni Suef. In the south, the El Shaikh Fadel - Ras Ghareb Road borders this subarea. At a distance of about 8 km, the Cairo - Aswan Highway runs from south to north. The maximum extent of this subarea is about 20 km from the north-west to the south-east and about 4 km from the south-west to the north-east (total area of about 79 km^2).

In the SESA Wind Report, the following terminology is used to distinguish between different areas:

- Project Area: whole area useable for RE developments (1,725 km²)
- Subareas: East-Wind 1 or East-Wind 2 subarea
- Zones: favourable, less favourable and preclusive zones as defined under section 5 and 6 of the SESA Wind Report.



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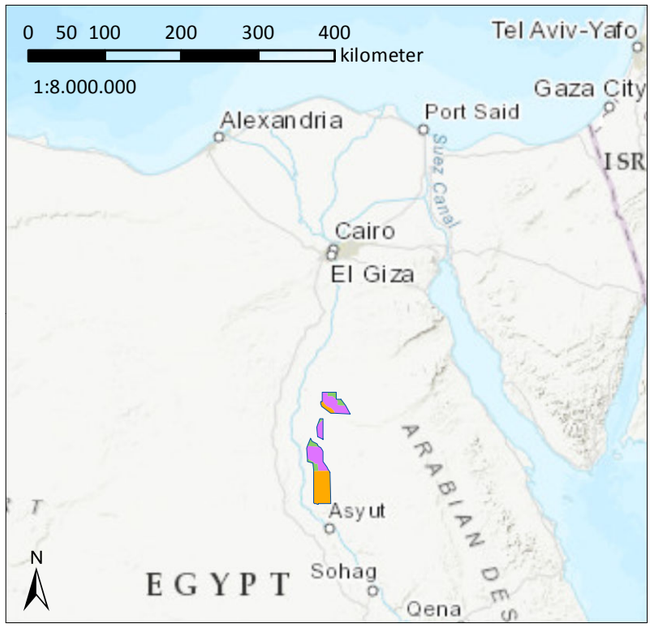
Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)
SESA Wind Report

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

Map NTS 2-1:
Overview of 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
- Assiut - Cairo Desert Road (motorway)



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3 Legislative Framework and International Environmental and Social Standards

The SESA Wind Report will take into account Egyptian legal and regulatory framework, EBRD Performance Requirements and the Equator Principles. Whilst 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.

4 Description of a Typical Wind Power Development in the Area

Typical features of a wind farm are:

- Three-bladed wind turbines (wind turbine generator or WTG) of the 3 MW class with rotor diameters of about 100 to 120 m and a maximum tip height of 150 m above ground, installed in rows from 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 1,200 m.

- A medium voltage wind farm internal grid made by an underground cable. Kiosks for ring main stations might be installed next to each WTG or inside the WTG tower.

- High voltage substation for power evacuation at high voltage level and high voltage overhead transmission lines (OHTL). Collector substations and OHTL shall serve for the power evacuation of several 50 MW wind farms combined. As existing power lines are already loaded, new OHTL will have to be built up to the Load Centres.

- Internal wind farm gravel roads of about 8 m in width as well as construction platforms of compacted gravel (hard stands) with dimensions in the order of 150 x 100 m mainly depending on the dimensions of the WTG blades.

- External access roads from existing road network.

- Service facilities such as possibly a control room, spare part stores, workshop and facilities for service personnel inside or outside the Project Area.

Wind farm construction works typically extend across 6% to 8% of the overall wind farm plot, while this is reduced to about 5% of the land once the wind farm 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 be initiated in parallel to wind power utilisation.

4.1 Construction Works

Construction works for a typical wind farm project consist of civil, electrical, transport and installation works. Major elements of civil works are the construction of concrete foundations, cable trenches, roads and platforms as well as auxiliary buildings (e.g. service buildings, control room, substation).

Foundation bodies for a 3 MW class WTG usually involve a ring foundation with diameters of about 20 m and a depth of about 3 m. This requires excavation of foundation pits, construction of formwork and reinforcement, concreting of about 500 m³ and backfilling of excavated materials. Aggregates for concrete (Cement, river gravel, water) need to be procured from external sources.

Roads will be gravel roads of a width of 5 to 8 m mainly depending on transport requirements and with a two-layer road body of about 0.4 to 0.5 m in depth. The road alignment need to consider maximum gradients of about 6 to 8 %, what in complex terrain requires thorough planning balancing cut and fill. Gravel can be collected from nearby gravel deposits. Gravel needs to be compacted in layers by rollers and spraying water. For the erection platforms with dimensions of about 150 x 100 m next to each WTG, the same principles apply as for road construction.

Further civil works are the excavation and backfilling of cable trenches (with a depth of about 1 m and a width of 1 to 2 m). Service buildings for storage and control may be erected at the wind farm site or its surroundings.

Wind farm construction of 3 MW class WTG requires special transport for parts of the WTG and the substation. Critical parts are the WTG blades with a length of 50 to 60 m, the nacelle with a weight of 60 to 80 t and the power transformers with a weight of more than 100 t.

Major elements of electrical works are construction of the wind farm internal Medium Voltage (MV) grid and collector substation. For wind turbines of the 3 MW class MV, step-up transformers are part of the WTG. Moreover, the WTG internal switchgears serve as well as the ring main station. Therefore, no external kiosks will be required.

4.2 Operation and Maintenance Works

Operation and maintenance (O&M) activities comprise the regular control/operation of the wind farm as well as troubleshooting, repair and scheduled maintenance. Considering that wind farm operation can be done by remote control, concerned activities for a 50 MW wind farm are usually limited and do not require the 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, checking and restarting WTGs) to avoid loss of generation. For the O&M, a standard set of weir and spare parts would need to be stored near to the site to have that available to not cause 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 WTGs is about 20 years. Modern WTGs may even be operated over longer periods. The design lifetime of the other infrastructure (substation, buildings) is even longer. Decommissioning means the removal of the WTGs with their foundation and of the electrical infrastructure. Existing gravel roads are fitting for the desert environment and do not need to be removed. 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 of the SESA Wind Report). The SEP is seen as a living document which was implemented and 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, considering the various stages when stakeholders, including the public, are engaged and how, the different type of information is disclosed during and after the SESA process.

As the first step in stakeholder engagement and information disclosure, the draft Scoping Report was issued, following submission to the NREA on 27 June 2016, and was 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 the 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 the NREA and EBRD accordingly.

During the various site reconnaissance missions of the Consultant's experts, people who have been encountered accidentally in the Project Area have been addressed and project information flyers in Arabic have been distributed (see Annex C of the SESA Wind Report). The results of all interviews were documented on interview forms (see Annex D of the SESA Wind Report). A summary of the received feedback can be found in the SESA Wind Report under section 5 and in section 5.3.1.8 in particular.

Further, key stakeholders such as the regional Governorates of El Minya and Assiut were visited on 4 October 2016 and 31 October 2016 (El Minya and Assiut) and on 7 November 2016 (Assiut), respectively. In addition, Governorates were informed and asked to raise comments via fax, email or mail by NREA.

The scope of the SESA Wind has been defined at an early stage in the SESA process through a scoping study (results were documented in a separate report and submitted in October 2016 as mentioned above). The scoping determined which impacts are likely to be significant and will 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 the Existing Physical, Biological and Social Environment

Baseline data on the physical, biological and social environment of the Project Area was investigated by:

- Desktop 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 via 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 physical environment investigation 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 with a special focus on migrating, roosting and local birds,

as certain birds species are known to be affected by wind turbine operation. In this context, an extensive bird monitoring was undertaken in spring 2016 (1 April to 25 May, i.e. the second and third parts of the spring season), autumn 2016 (20 August to 15 November) and spring 2017 (20 February to 31 March, i.e. the first third of the spring season). The main objective of the standardised monitoring was describing migration patterns of relevant species in a quantitative way. In 2016, only a part of the spring migration period could be covered due to the monitoring starting late. For that reason, the monitoring in spring 2017 aimed to cover the missed part. The results gained in spring 2016 and 2017 are very consistent. Hence, one can conclude that the approach of dividing up the survey on spring migration into two phases in different years was appropriate. Spring migration in the area was fully covered by this approach. The split of the survey did not affect the main findings on bird migration in spring and, hence, there was no need for any adjustments on the approach (e.g. overlapping of survey periods in 2016 and 2017) in order to increase the explanatory power of the data. Furthermore, the occurrence of bats was investigated at certain plots in the Project Area in spring and autumn 2016.

The focus of the investigation of the social environment was on general and administrative issues, existing infrastructure such as paved access roads and power grid, current land-use and sociological conditions.

5.3 Technical and Land-use Criteria for Classification of Area as preclusive of less favourable

Based on the information gathered, the East-Wind-1 and East Wind-2 subareas were screened with regards to constraints due to competing land-use and technical constraints, which impede wind power development or make it more difficult. This leads to areas defined to be preclusive, i.e. not usable for wind 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: the area of influence, percentage of resource affected, persistence of effects and 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 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 occur at rare intervals, such as in October 2016.

The underground of the Project Area 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 Wadibeds and hangs. In some subareas to the south of the East Wind-1 subarea, the upper layers contain blocks and bombs of an unknown nature. The assessed geological map shows one major fault line forming an escarpment of more than 100 m height difference, which is partly inside the East Wind-2 subarea. Otherwise, the two subareas are mostly uniform, consisting mostly of slightly undulated land, except for some cuts by major Wadis in the East Wind-1 subarea, especially in the southern and western part. All Wadis have a moderate slope and sandy underground. The Wadibeds were free from erosion marks (e.g. accumulation of stones) that indicate any major water flow that occurred at rare frequency.

Figure NTS 6-1: View over the low part of the East Wind-2 subarea to the fault line (cliff) in the background

In general, the areas show good foundation conditions (except the cliff at in the East Wind-2 subarea). Soft soils or migrating sand dunes are not observed in the two East Wind areas. However, due to the marine limestone underground, the subsurface may contain caves.

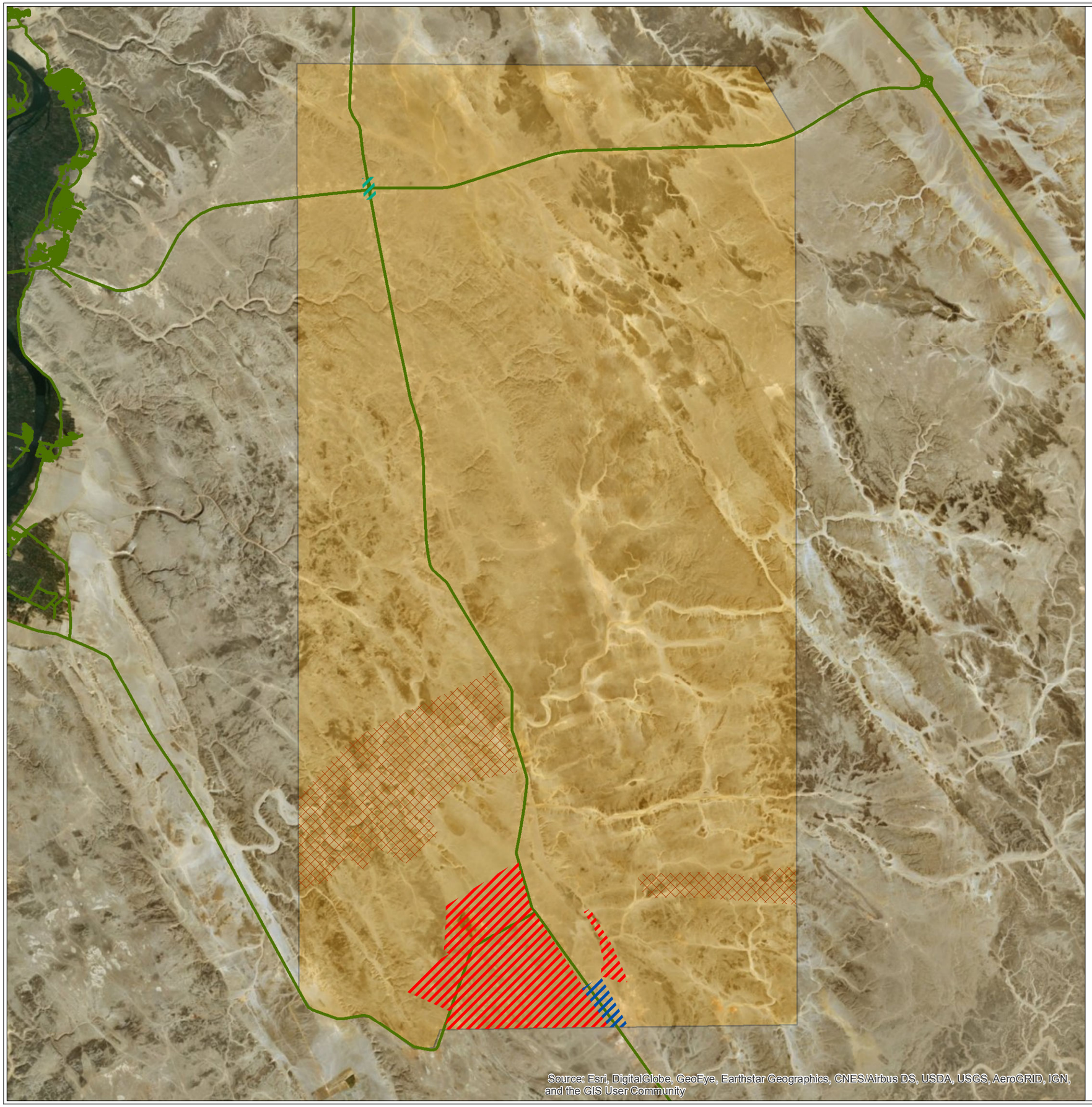
An evaluation of the physical environment with regards to technical and land-use aspects, according to the defined criteria, leads to the following conclusions:

East Wind-1 subarea (see Map NTS 6-1)

- No preclusive zone was identified due to accessibility.
- No preclusive zone was identified due to geomorphology, however some zones were identified to be less favourable due to the inhomogeneous geomorphology (steep slopes, small ridges).
- With regards to land-use, the following areas are preclusive for wind power development:
  - Small roadhouse subarea at the road crossing in the north-west,
  - Farmland already existing, even connected to the MV line along the El Minya – Assiut National Road and the other portion is currently developed) in the south-west, and
  - Asphalt plant and farmland partly existing, partly under development in the south.

East Wind-2 subarea (see Map NTS 6-2)

- No preclusive zone was identified due to accessibility.
- Geomorphology: The fault line (cliff) is unstable and prone to continuous erosion, thus, accumulating rock and gravel material at its footing. Moreover, the wind, predominantly blowing from the north, transports sand towards the luv side of the cliff, causing the accumulation of fines at the footing. Occasional rains sometimes cause runoff over the rim of this escarpment causing erosion by water flow. Accordingly, the cliff area itself and its near environment (about a 300 m border zone on top and about a 1 km zone from the footing) are assessed to be unfit for wind power development (preclusive area).
- With regards to land-use, the following area is preclusive for wind power development: Farming and farmland development was identified in the lowlands of the East Wind-2 subarea.



JV LAHMEYER INTERNATIONAL ecoda

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

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

Map NTS 6-1:
Zones preclusive or less favourable
for wind power development in the East Wind-1 subarea

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road

main road

Zones preclusive for wind power development

due to farming area

due to industrial area

due to service buildings

Zones unfavourable for wind power development

due to geomorphology

0 10.000 Meter

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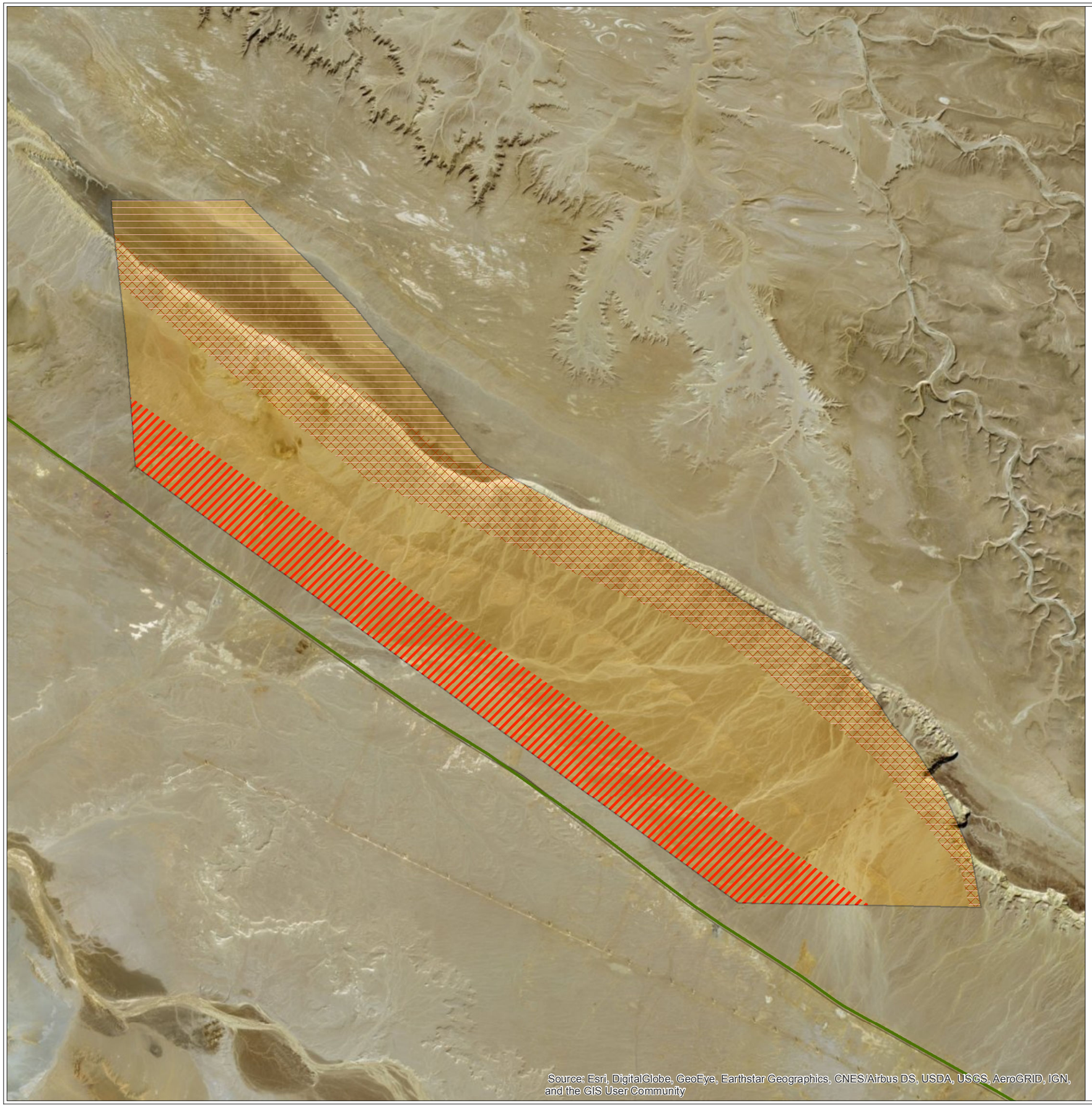

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Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)
SESA Wind Report

client:
New and Renewable Energy Authority (NREA),
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Map NTS 6-2:
Zones preclusive or less favourable
for wind power development in the East Wind-2 subarea

Bordering of East Wind-2 subarea

East Wind-2 subarea

Main road

main road (Ras Ghareb-El Sheik Fadl road)

Zones preclusive for wind power development

due to farming area

due to geomorphology

Zones unfavourable for wind power development

due to acess accessibility

0 5.000 Meter

1:80.000

N

6.2 Biological Environment

East Wind-1 subarea

The investigation reveals that there exist no legally protected site / area, no national park or important bird area and no internationally recognised area of biodiversity value in the East Wind-1 subarea or its surrounding.

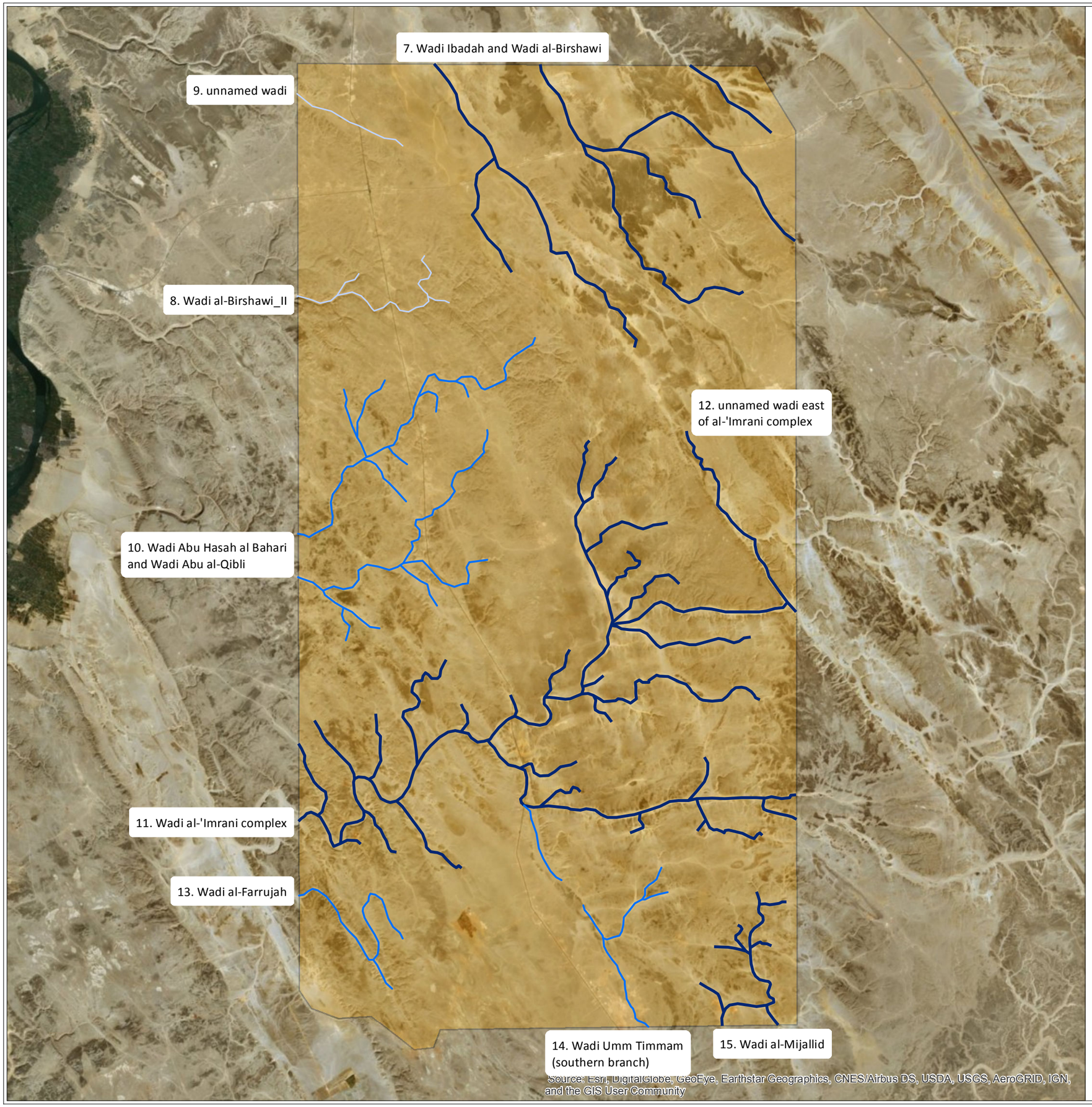
Due to the extreme aridity of the Eastern Desert, the gravely and pebbly plains, elevated areas and small hills within the East Wind-1 subarea do not serve as a suitable habitat for plants. Hence, large parts of the subarea have a very low to no importance as a habitat for plants and animals.

No Wadi within the East Wind-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 in the very north, the Wadi al-'Imrani complex and the unnamed Wadi east of 'Imrani complex and, finally, Wadi al-Mijallid in the south provide appropriate living conditions for single plant and animal species and, thus, differ remarkably from the vast desert habitats dominating the East Wind-1 subarea. The aforementioned Wadis are important for plants and animals (see Map NTS 6–3). The importance of all other Wadis as a valuable habitat for plants and animals was assessed to be low or very low.

As caves form particular structures in the desert offering habitats for animals, caves in the East Wind-1 area, which can be particularly found in the canyon-like Wadis and on slopes, are important as a habitat for plants and animals.

Most parts of the East Wind-1 area 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 Wind-1 subarea are considered to be of "Least concern" in the IUCN Red List of Threatened Species. Hence, besides the Wadis mentioned above, the East Wind-1 area is not important for plants.

According to the findings of the comprehensive investigation on bird migration in the East Wind-1 subarea conducted in spring 2016, autumn 2016 and spring 2017, bird migration of relevant species revealed no remarkable spatial differences between the 16 observation sites. Migratory activity was low at every observation site (for detailed data, see Annex B5 of the SESA Wind Report). No threatened species was recorded during spring migration (both, in 2016 and 2017). In autumn 2016, four species of special interest (according to the IUCN Red List of Threatened Species) occurred in low numbers: the Egyptian Vulture (5 birds), Steppe Eagle (22 birds; both species assessed by IUCN as "Threatened"), Pallid Harrier (8 birds) and Sooty Falcon (7 birds, both species assessed as "Near-threatened"). All other species which are particularly relevant for the study have been classified by IUCN as of "Least concern". A relevant portion of the eastern flyway population of the Short-toed Snake Eagle crossed the East Wind-1 subarea in autumn. However, one has to acknowledge that the subarea covers a huge part of the Eastern Desert, extending about 20 km from west to east and about 40 km from north to south and that there is no indication of a concentration of migrating Short-toed Snake Eagles in the subarea. The species can be regarded as a regular migrant, but the subarea is not of particular importance for migration of this species. In addition, Short-toed Snake Eagle is assessed by IUCN as of "Least concern" and is thus not a threatened species. To summarise, the results clearly reveal that the East Wind-1 subarea is not of particular importance for migrating birds – neither in spring nor in autumn. This is valid for species of special interest and for species of minor relevance which mainly migrated on a broad front.



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SESA Wind Report

client:
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Map NTS 6-3:
Assessment of the importance of main wadis in the East Wind-1 subarea as a habitat for plants and animals

Bordering of East Wind-1 subarea

East Wind-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

0 10.000 Meter

1:170.000

N

Single sedentary birds species that are adapted to the harsh climatic conditions of the Eastern Desert can find a suitable habitat in the larger Wadis in the East Wind-1 subarea, in particular, Wadi Ibadah and Wadi al-Birshawi, the Wadi al-'Imrani complex and the unnamed Wadi east of the 'Imrani complex and, Wadi al-Mijallid, which comprise patches of vegetation. 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 East Wind-1 subarea are quite widespread and can be found in several desert habitats in Egypt. According to the IUCN Red List of Threatened Species, no recorded species is assessed as endangered or threatened. Consequently, the East Wind-1 subarea is not an important habitat for local birds.

The larger Wadis in the East Wind-1 subarea (see above) also form a stopover habitat (mainly for a single day) for passerines during migration. However, according to the low numbers of roosting birds, the East Wind-1 subarea has no significant importance as a roosting habitat.

In addition, the larger Wadis form suitable habitats for single animal species from different groups (mammals, 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 Wind-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 Wind-1 subarea is not an important habitat for other animals.

The review of secondary data revealed that desert areas, like the East Wind-1 subarea, are usually not populated by bats (Hoath 2009). Consistently, the activity of bats within the East Wind-1 subarea was found to be very low during the conducted bat monitoring. The subarea apparently does not serve as a significant habitat for bats.

To conclude, in the East Wind-1 subarea, no zones preclusive for wind power development with regards to the biological environment were identified.

East Wind-2 subarea

The investigation reveals that no legally protected site or area exists, nor any national park nor important bird area or internationally recognised area of biodiversity value in the East Wind-2 subarea or its surrounding area.

Due to the extreme aridity of the Eastern Desert, the gravely and pebbly plains and the huge cliff within the East Wind-2 subarea do not serve as a suitable habitat for plants. No larger Wadi exists in the subarea and, thus, it is nearly completely free of vegetation. The East Wind-2 subarea has a very low to no importance as a habitat for plants and animals.

Caves likely to be found at the huge scarp (fault line) might form particular structures in the desert in offering habitats for animals. Hence, such caves are important as a habitat for plants and animals.

According to the findings of the comprehensive investigation on bird migration in the East Wind-2 subarea, conducted in spring 2016, autumn 2016 and spring 2017, bird migration of relevant species revealed no remarkable spatial differences between sites. Migratory activity was low at both observation sites (for detailed data, see Annex B5 of the SESA Wind Report). No threatened species was recorded during spring migration (neither in 2016 nor 2017). In autumn 2016, only one

species of special interest (according to the IUCN Red List of Threatened Species) occurred in very low numbers (2 individuals): the Steppe Eagle (assessed by IUCN as "Threatened"). All other species, which are particularly relevant for the study, have been classified by IUCN as of "Least concern". A total of 29 Short-toed Snake Eagles were recorded at the two observation sites, i.e. 0.3 % of the eastern flyway population. This species can be regarded as a regular migrant, but the subarea is not of particular importance for migration of this species. In addition, the Short-toed Snake Eagle is assessed by IUCN as of "Least concern" and is, thus, not a threatened species. To summarise, the results clearly reveal that the East Wind-2 subarea is not of particular importance for migrating birds – neither in spring nor in autumn. This is valid for species of special interest and for species of minor relevance which mainly migrated on a broad front.

No larger Wadi exists in the subarea and thus it is nearly completely free of vegetation. Accordingly, the local bird community is very poor in species and bird density is very low. The species (namely the Spotted Sandgrouse, Greater Hoopoe-Lark and Brown-necked Raven) recorded in the East Wind-2 subarea are quite widespread and can be found in several desert habitats in Egypt. According to the IUCN Red List of Threatened Species, no recorded species is assessed as endangered or threatened. Consequently, the East Wind-2 subarea is not an important habitat for local birds.

Only very few roosting birds (e.g. single White Wagtails) were recorded in the subarea. Most roosting birds (especially most passerines) need at least small patches of vegetation, which form a stopover habitat (mainly for a single day) during migration. Due to the lack of vegetation, the East Wind-2 subarea has no importance as a roosting habitat.

The local fauna was found to be very poor in species and density was very low, too. Single records refer to Desert Pebble Mantis and Camel Spiders (local animals) as well as migrating dragonflies (e.g. *Sympetrum fonscolombii*), butterflies (e.g. *Vanessa cardui*) and grasshoppers (Migratory Locust). None of the recorded species is known to be endangered or threatened. Consequently, the East Wind-2 subarea is not an important habitat for other animals.

The review of secondary data revealed that desert areas, like the East Wind-2 subarea, are usually not populated by bats (Hoath 2009). It is reasonable to assume that the activity of bats in the subarea is very low, as verified for the East Wind-1 subarea during a bat monitoring conducted in spring and autumn 2016. The subarea apparently does not serve as a significant habitat for bats.

To conclude, in the East Wind-2 subarea, no zones preclusive for wind power development with regards to the biological environment were identified.

6.3 Social and Economic Environment

The Project Area is located in the Governorates of Beni Suef, El Minya and Assiut. 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's less likely that there will be an impact on mining activities, since most mines are not permanent and no brick mines are located inside the East-Wind-1 and East Wind-2 subareas. 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.

- Cultural heritages

  No cultural heritage sites are located in or within the zone of influence of the East Wind-1 and East Wind-2 areas except the Akhenaten tomb near Tal El Amarna, located at a distance of 1.5 km to the western border of the East Wind-1 area and requiring mitigation.

- 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 highway Ras Gareb-El Minya. That allows project equipment to be transported from harbour to the East Wind-1 and East Wind-2 subareas.

- Bedouin community near the Project Area

  Although no Bedouin camp was identified during the site reconnaissance, the Consultant learnt from discussions with the authorities and local Bedouin that 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 the general views and attitudes of the local authorities and population towards the proposed project, meetings and discussion were conducted with the regional Governorates as described under section 4.2 of the SESA Wind Report 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 wind farm project were mentioned by the local authorities / population:

- A 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 up 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, many statements obtained from the interviewed people concluded that there are be no reservation as the mining areas will move to other sites in the case that wind power will be installed on their land. Many mining areas were deemed illegal, as the mine owners prefer not to apply for a formal permit since they will have to pay very high fees to the government.

- Cooperation with local Governorates:

  Officials on the Governorate level feel excluded, since they were not included in selecting the area. The presidential decree means they have no potential for future urban expansion into the Eastern Desert.

<u>East-Wind 1 subarea</u>

- Land-use

  During the site reconnaissance in October 2016, it was noted that in the Southwest of the East Wind-1 area farmland development activities (levelling and deep groundwater irrigation systems) are ongoing. Some farms are already in operation.

  Farmers which were interviewed indicated that the land development activities are coordinated by one family. They are responsible for dividing the plots and supporting the encroachment process until the person officially becomes the landowner.

  The process of land encroachment was explained during the interview and it was mentioned that most of the areas along the El Minya - Assiut National Road are already planned to be used for farming by many people. It was also highlighted that there are even some projects that are planned in the area.

  Other activities identified in the East Wind-1 area are gravel quarrying and screening and one Asphalt Plant.

- Roads and traffic

  The area is located more than 7 km away from the Nile Valley, but has good accessibility via well dimensioned asphalt roads next to or even crossing the area from El Minya (north), the Nile Valley (west) and Assiut (south).

Areas identified to be used for farming or being already under development as well as the asphalt plant and the gravel screening plant sites were defined to be preclusive for wind power development.

<u>East-Wind 2 subarea</u>

- Land-use

  In the East Wind-2 subarea, only one land reclamation was observed only. Similar to the aforementioned activities as described in the previous section, the land reclamation activities are coordinated by one family.

- Roads and traffic

  The southern portion of the East Wind-2 subarea, which is separate from the smaller northern portion of the area by a cliff of about 100 m in height can be reached via the Cairo – Aswan Highway and the El Shaikh Fadel - Ras Ghareb Road.

  For the smaller northern part of the East-Wind 2 subarea, complete new access roads for transportation of heavy equipment would have to be built. The access to the area on top of the cliff (11 km linear distance from the toll-controlled Cairo – Aswan highway) or 40 km from next regular exit of this highway on land not allocated by presidential decree) is considered less favourable. The cliff area including a zone of 300 m on top and 500 m from the footing is assessed as preclusive for wind power developments. The accessibility of the residual lower area in the south is favourable as mentioned before.

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 from machinery and dust at individual working places (road construction and foundation excavation sites) may occur. During the operation phase, only occasional service visits will take place and no dust and gaseous emissions will originate from wind farms and/or associated infrastructure during operation.

Thus, minor significance of impacts on the ambient air quality is assumed during the construction phase, which is respectively negligible during the operation phase.

Water resources and wastewater

Water will have to be transported from the sources inside and next to the Nile Valley. These water sources are fed by the river Nile having an average discharge of about 2,000 m^3/s. Water supply will mainly be required for the construction phase, i.e. for concrete-making, anti-dust spraying and sanitary purposes. Minor amounts of biodegradable wastewater from the sanitary facilities of the temporary construction yard offices will be treated using a two stage septic tank and percolation into the sandy subsurface for post-treatment. Wastewater will not get into contact with groundwater. No wastewater emissions will originate during the operation phase of wind farms and the associated infrastructure, except from collector substation manned with few non-permanent personnel.

The water consumption impact significance is assessed to be minor for the construction phase. During the other phases, the impact significance is negligible.

Moreover, regarding wastewater, 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 wind power construction projects. The waste essentially consists of packing material (paper, plastics, wood) for transport of the turbine and auxiliary equipment components. The waste will occur mostly at the individual turbine erection sites 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, cranes) and from the handling and commissioning of deliveries (e.g. transformer or gearbox oil, hydraulic oil). Both waste littering and hazard spillages can easily be avoided by proper workmanship and strong supervision. Little domestic waste, if any, will be generated by personnel at the service facilities, and likewise for the power substations. The Zafarana experience 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 used consumables, when servicing the machines, and smaller defective parts. These are non-hazardous materials, most of them valuables and fit for recycling. Larger defective parts such as gearboxes or generators would, in any case, be returned to the factory for repair or re-use of materials. In the case that there are no gearless wind turbines, hazardous used oil will be exchanged once per year or once every two years and be sent off to be recycled. The practice at other Egyptian wind farms shows that this works without problems.

Noise, shadowing, vibrations and electromagnetic interferences

For the portions of land with economic activities within wind power development areas, 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 of the SESA Wind Report. The more strict Egyptian standards are considered.

Human receptors in the neighbourhood of some wind power development plots such as workers, farmers or service personnel at roadhouses, i.e. personnel in a few dispersed commercial or industrial properties, are not living permanently at the place of work. Moreover, the places of work are at fair distances from the wind farm plots (in addition to border safety distances of individual wind turbines added up to a minimum total distance to a WTG of 500 m), and that **noise** levels at the receptors' place will be well below the limit of 65 dB (construction works during daytime only) and 55 dB (during night-time, operation phase). Thus, a minor noise impact is expected during all phases.

Regarding shadowing, accepted standards is 30 hours per year and 30 minutes per day for residential areas during the operation phase of a wind farm. This can be achieved at places near to wind turbines only, where the observed transition time of the sun through the rotor area can achieve such durations. At 28°N, latitude transition of the sun during morning or evening hours is fast. Moreover, as there are only commercial and industrial activities at distances outside the wind farm areas, it is obvious that there is no impact from flickering beyond acceptable level.

Vibrations result from wind turbine operation. However, wind turbines working under regular conditions with the blades correctly balanced and the main shaft correctly adjusted show very little vibration. The propagation of the vibration is dampened by the foundation body and there is very little transmission into the underground, especially in soft rocks (like limestones predominating in the subareas). Thus, vibration effects will not be measurable in the underground already near the wind turbines.

Wind turbines could potentially cause electromagnetic interference with aviation radar and telecommunication systems (e.g. microwave, television, and radio). The nature of the potential impacts depends primarily on the location of the wind turbine relative to the transmitter and receiver, characteristics of the rotor blades, signal frequency receiver, characteristics, and radio wave propagation characteristics in the local atmosphere.

There was no radar observed inside or near the East Wind subareas. However, the area accommodates both, mobile phone masts and a radio link/telecommunication repeater. It is obvious that wind power development impact on this infrastructure could be significant. No wind farm shall block any signal from any directional transmitters and adversely affect the mobile phone signal transmission. Ample corridors between directional transmitters (300 m to each side from

direct distance line are considered) need to be kept free and mobile phone masts shall not be affected by nearby wind turbines.

Archaeological, historical and cultural heritage

The site investigation revealed that the two East Wind subareas are free from archaeological, historical and cultural heritages. Sites of great national historical and archaeological value are the 3,500 years old ruins and tombs of the Akhetaton city next to Tal El Amarna, about 10 km south-west of Mallawi.

Assuming that the road to the Akhenaten tomb is anyhow blocked for access to the wind power area, there would still be the impact of one or more 150 m high wind turbine(s) at the western border of the East Wind-1 subarea as the distances are less than 2 km. Accordingly, the impact significance is assessed to be major, subject to mitigation. According to Egyptian law, a clearance distance of 3,000 m must be considered, as recommended in the SESA Wind Report under section 7-Mitigation measures, and this value exceeds the distance of 2 km as mentioned above. Thus, the tip height is not considered as critical in case the buffer zone of 3,000 m radius is applied.

Land-use

The net area coverage rate of land-use/land-take for wind power development (roads, platforms, foundations, auxiliary installations) is about 6 to 8 % during the construction phase and 5 % during the operation phase. These percentages will be even lower in subareas containing Wadis considering that wind power development will not extend into Wadis (because of lower wind energy resources) except for a few road or medium voltage line crossings. The land-use/land-take impact is evaluated against the different nature of ground. As the soil (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 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

Wind power developments will be independent from existing utility services as are water supply, wastewater treatment or electricity supply. Water will be provided by tankers from high yield sources at the Nile Valley (see water resources and wastewater before).

Wind power developments will have to be interconnected to the national power grid, which requires expansion before commissioning. This requires in-depth load flow analysis studies and power grid expansion planning and implementation.

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 nowhere near reached their capacity. During the operation phase, the additional traffic load is not quantifiable.

Run-off / flash flood risk

The region is hyper arid with very minor precipitation during wintertime. However, occasionally rains of high intensity can occur.

If such torrential rains fall on areas with mountainous character (i.e. larger hangs with good gradients, narrow Wadis with high slopes) the caused runoff can accumulate and develop to become dangerous flash floods.

Desktop studies and field inspection to the East Wind-1 and East Wind-2 subareas revealed that the Wadis are not prone to such floods. Cross sections are wide, slope is low and hills only exist with heights of 50 m only above Wadibeds. Moreover, the Wadis don't show large stones or rocks at the low areas of the Wadibed.

Accordingly, no special risk from flash floods in the Wadis is expected. However, occasionally some discharge may occur.

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 6.1.11 of the SESA Wind Report. The strength for the areas is low to moderate, corresponding to a peak ground acceleration of 0.8 to 1.0 m/s². 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 wind farms is valid for both subareas (East Wind-1 and East Wind-2 subareas). Where impacts have to be assessed differently, this is explicitly mentioned in the text.

Construction

Construction works (including decommission) of multiple wind farms in the subareas might lead to:

- Compacting of soil due to land-use

  Compacting of soil might lead to a damage of local seed banks and a reduction of the suitability for plant growth. However, the affected area is limited (usually about 5 % of the overall area of a wind farm during the operation phase), leaving most of each subarea free from any interventions. Moreover, the potential for plant growth in this hyper-arid area is very limited. Finally, the subareas comprise no threatened species or plant communities of conservational concern. To sum up, the residual effects due to the construction of multiple wind farms in the subareas are assessed as a minor impact (medium event magnitude and low receptor sensitivity).

- Dust emissions

  Dust emissions will be limited to a very small area and limited to rather brief periods. Only negligible impacts on habitats, flora or animals 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 animals. 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.

- Direct damage of habitats and plants or modification / direct loss of habitats for plants and animals by using areas for foundations of turbines and of auxiliaries, permanent access roads, erection platforms, storage positions for heavy machinery and other technical installations.

  During construction works of multiple wind farms which includes mobilisation and demobilisation, a removal and partial destruction of the top soil surface and some deeper soil layers will occur. However, the affected area is limited (usually about 5 % of the overall area of a wind farm during the operation phase) leaving most of the area free from any interventions. Consequently, the affected area will cover only a small fraction of each subarea (medium event magnitude).

  The vast majority of the East Wind-1 subarea and almost the complete East Wind-2 subarea have no significant importance as a habitat for plants, local or roosting birds, bats or other animals (low receptor sensitivity). Birds in active flight (migrating birds) will not be affected during the construction phase at all. The important Wadis in the East Wind-1 subarea, however, form specific sites in the desert and might form a suitable habitat for plants, single sedentary and roosting birds and single other animals. Therefore, no turbine shall be installed next to or inside important Wadis in the East Wind-1 subarea (no Wadis exist in the East Wind-2 subarea), namely Wadi Ibadah and Wadi al-Birshawi in the very north, the Wadi al-’Imrani complex and the unnamed Wadi east of 'Imrani complex and, finally, Wadi al-Mijallid in the south. Construction works in those Wadis shall be limited to a single crossing by gravel roads and by cable trenches carried out at less sensitive spots. In doing so, receptor sensitivity can be kept at a low stage. Hence, important Wadis in the East Wind-1 subarea have to be assessed as less favourable for wind energy developments (see Map NTS 8-1).

  To conclude, direct damage of habitats and plants or modification / direct loss of habitats for plants and animals caused by the construction of multiple wind farms within the East Wind-1 and East Wind-2 subareas will not lead to significant impacts. Expected residual impacts have been assessed as negligible or minor.

- Disturbance of animals by human activities with heavy machinery, traffic, noise and dust emission

  Local birds, such as Sandgrouse, Larks or Falcons, roosting birds or other animals might be affected by disturbances 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. Local birds can reoccupy all areas after construction phase. To conclude, the impact on animals caused by disturbance during construction is assessed to be negligible.

- 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.

Operation and maintenance

Under the precondition that no turbines will be installed in the important Wadis (East Wind-1 subareas) and in the absence of other valuable habitats in the two subareas, it can be assumed that no important area will be affected during operation and maintenance of multiple wind farms. Moreover, operating wind turbines are not known to affect plants or plant growth. During periods of maintenance, human activities will be restricted to the roads and storage positions. In conclusion, operation and maintenance of multiple wind farms 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.

Migrating birds might be generally affected by collision or barrier effects during operation and maintenance phase.

During spring 2016, autumn 2016 and spring 2017, migratory activity of relevant species was low in both subareas (for detailed data see Annex B5 of the SESA Wind Report). No threatened species was recorded during spring migration (both, in 2016 and 2017) and only two (East Wind-1) and one (East Wind-2) threatened species occurred in low numbers in autumn 2016, respectively. Though there is not always a strict correlation between abundance of birds and collision rate (see Annex B6 of the SESA Wind Report), it is reasonable to assume that collision risk is low in areas with low migratory activity (low receptor sensitivity). Thus, collision risk for migrating soaring birds with operational wind turbines is not assumed to pose a major threat because migratory activity of relevant species in the two subareas was low in spring and in autumn. Rare collisions with wind turbines within the subareas might occur (low event magnitude), but the expected collision rate will not cause significant effects on populations. Hence, collision risk at multiple wind farms is assessed to be a negligible impact for migrating birds. This assessment is also valid for species of minor relevance, because

- the subareas are not of particular importance for those species,
- those species mainly migrate on a broad front, and
- those species are not particularly prone to collision with wind turbines.

In order to avoid a wind farm, birds might change horizontal flight direction or flight altitude (mostly by rising). Both reactions probably cause a certain additional expenditure of energy. However, one can suggest that the additional effort (e.g. an increased flight path of a few kilometres) seems unlikely to have a relevant impact on an individual bird. Moreover, due to the low migratory activity, only few birds will be affected, even if multiple wind farms are considered. To conclude, although the degree of additional energy expenditure cannot be estimated precisely, a possible barrier effect of multiple wind farms will not cause notable risk potential for the populations of relevant species. Due to the low migratory activity, only very few birds might be affected and possible effects are assessed as a negligible impact.

Migrating birds might even be endangered by overhead power lines associated with wind power projects in the subareas. In flight, birds can collide into the cables of power lines, 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. Casualties from migratory soaring bird species have already been found at a power line on the Red Sea coast (EcoConServ 2015). The risk may even be higher in situations where power lines and wind turbines act together, e.g. migrating birds might encounter a critical situation at power lines while escaping the rotor blades of a wind turbine (or vice versa). However, as migratory activity of relevant species in the two subareas was

low in spring and in autumn, collision risk for migrating soaring birds at overhead power lines is not assumed to pose a major threat. Rare collisions at overhead power lines within or next to the subareas might occur (low event magnitude), but the expected collision rate will not cause significant effects on populations.

Operation and maintenance of wind farms might affect local and roosting birds or other animals as follows:

- Disturbance by operation of turbines leading to a decrease in habitat quality or total habitat loss

  Local birds, such as Sandgrouse, Larks or Falcons, and roosting birds might be affected by disturbance during the operational phase of multiple wind farms. However, most species (as resident birds) are known to be unsusceptible to the nearly constant acoustic and visual stimuli of wind turbines. Moreover, disturbance effects are restricted to a rather small distance and cover at most the area up to 300 m to a turbine. As the two subareas do not hold important habitats for local or roosting birds, the effects caused by disturbance related to operating turbines are assessed as negligible impacts.

  According to recent knowledge, bats, other (ground-living) mammal species and reptile species are not known to be displaced by operating wind turbines. Thus, disturbance effects on those species are assessed as negligible.

- Disturbance by human activities relating to the maintenance of multiple wind farms

  Local and roosting birds or other animals might be affected by disturbances from human activities during the operational phases of multiple wind farms. However, human activity is expected to be rather limited in time and space (low event magnitude) and the subareas do not hold important habitats for local and roosting birds or for other animals (low receptor sensitivity). In conclusion, effects on animals caused by disturbances related to maintenance are assessed as negligible impacts.

- Collision risk

  Local or roosting birds and bats will, in general, also face the risk of collision with operating turbines. However, resident birds are aware of turbines and their behaviour might be better adapted to the presence of turbines. As the local bird community is very poor in species, bird density is very low and no threatened species were found in the two subareas (low receptor sensitivity), collision risk is rather low and multiple wind farms will not lead to significant impacts on local populations (negligible impact).

To conclude, operation of multiple wind farms in the East Wind-1 and East Wind-2 subarea are not expected to affect animal wildlife significantly.

7.3 Social and Economic Environment

Workforce and jobs

With regards to job creation, the project will result in direct and indirect jobs. The following numbers are assumed for each 50 MW project: For electrical and civil works including transportation/delivery, about 140 unskilled workers plus 30 skilled personnel are needed for supervisory tasks (duration 4-6 months), for turbine erection, 20 semi-skilled workers plus 20 skilled specialists are required (duration 5-6 months). In addition, assuming a common collector substation for eight 50 MW projects, the share per 50 MW project would be 10 unskilled workers and 10 skilled specialists for a period of about 8 months.

If three projects are carried out in parallel, this would require about 700 workers. The local communities at the Nile Valley could provide a larger proportion of this temporary labour force dependent on skills needed.

The project will allow the creation of some permanent jobs for wind farm O&M. It is expected that about 2 to 5 people will be required for O&M and about 4 people will be required as guards for a 50 MW wind farm.

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 will be involved in supplying materials (e.g. cement, river sand and gravel, reinforcement, formwork, cables, construction equipment) or occasionally in repair works of defective parts.

Vehicle drivers will benefit from the project through the provision of transportation to those who work in the project. In addition, 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 contractor's personnel. Hotels, shops and restaurants will also see their turnover increase.

The project might result in the development of the surrounding areas. Future wind farms will require new 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 to for the workers, labour and working conditions defined in EBRD PR2 and IFC PS2 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 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_2 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 wind farms:

- Development of a wind power economy (development of related industries, development of commercial activities and O&M services for 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 any subsidies allocated for non-renewable fuel. In addition, the new source of energy is considered to be clean energy.
- Additional tax income because the projects will be implemented as IPP projects.

Bedouin community

The wind farm 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 wind projects will change the character of the Project area to a degree which may impact upon Bedouins. Furthermore, the potential influx of labour may also create an impact on Bedouin communities. 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 Wind-1 and East Wind-2 subareas should be developed. This impact is considered minor due to the fact that the two subareas are far from the villages at East Nile banks.

Impacts related to temporary inconvenience

Construction activities will be limited to small areas which will be blocked for short periods only (e.g. one or two days for erection at a WTG site). Considering that the selected wind farm areas are within fare distance of any community, no measurable inconvenience for local communities will arise.

Occupational Health and Safety

Major health and safety risks result from working at height (erecting wind turbines), 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 IFC guidelines: Environmental Health and Safety Guidelines for Wind Energy and the Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution.

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 from the 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 the 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 to secure a “no net loss” outcome.

The mitigation strategy shall be accompanied by a thorough risk management assessment, 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 both subareas and for each project 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 according to internationally accepted standards.
- 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 assigning supervising engineers in order to assure adequate disposal of solid waste and wastewater and to avoid or collect spillages of used oils, greases, etc.
- The contractor shall be forced not to leave the construction site unless the area is left in a tidy condition, excavations are backfilled, heaps of excavation material are levelled and waste is adequately disposed of.
- Consider the regulations defined in Article 28 of the Egyptian Law no. 4/1994 for the Protection of the Environment amended by Law 9/2009, mainly: 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 are already designated to be preclusive for wind power development. This is to avoid social conflicts and at the same time to keep distances as required for noise protection and shadowing. The areas designated to be preclusive are sufficiently dimensioned to take care of such conflicts. In addition, safety distances for wind turbines at 150 m from the border of preclusive areas shall be applied. This needs consideration during planning and permitting process for the individual wind farm plots.

Mitigation measures

- A more detailed investigation for land-use impacts during preparation of ESIAs for individual 50 MW projects.
- Consider the potential for any displacement since the planning stage and try to avoid locating project components at any place that is considered the property of local people and used for some activities.
- If this is unavoidable, plans should be considered to compensate the affected person and allocations should be made available for that purpose.

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, no specific mitigation measures are required during planning and permitting process except for the archaeological kings' tombs area.

8.2.3 Water resources and wastewater

To protect water resources and to keep the withdrawal of water from wells at a moderate level during periods of high water demand (casting of foundations during the construction phase), equalisation water tanks shall be installed at both sites, 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 one foundation; that one at the source shall correspond to the volume of the biggest tanker lorry.

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 of 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. 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^3 per year and a 50 MW plot of non-compacted waste equivalent to about 2 m^3/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 from gearboxes or transformers into the soils at the site shall be avoided by carefully handling and collecting it in containers and through 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:

- spraying water;
- workers are to be assigned at the luv side from machinery; and
- wearing protective masks.

8.2.6 Noise and electromagnetic interferences

Mitigation of noise impacts on sites where workers are employed or even reside for periods of time shall be done by keeping distances of at least 500 m from any existing economic activity in the area. This applies for both the construction and the operation phase.

To avoid blockage of signals of existing directional radio link transmitters, ample corridors of 600 m (i.e. 300 m to each side, measured using a straight line) shall be kept from the wind turbine's influence. For siting, the rotor radius has to be added. As the mobile phone masts are next to the transmitter masts, such a corridor will protect the mobile phone signals from disturbance as well.

8.2.7 Archaeological, historical and cultural heritage

The impact on the 3,500 years old Akhenaten tomb near the Project Area was considered to be major. Mitigation of such a visual pollution impact shall be carried out by keeping wind turbine siting distances of at least 3 km to the tombs. This corresponds to the requirement of Law 117/1983 and its amendments by Law 12/1991, Article 20 related to not granting building permits at archaeological sites or lands and stating that this extends up to three kilometres in uninhabited areas.

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 heavy haulage transportation 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 risks of accidents. Heavy haulage transport shall be convoyed by safety cars.

8.3 Biological environment

No significant impacts caused by construction/decommission activities calling for particular mitigation measures have been identified during the process of the assessment. Nevertheless, applying general measures to avoid or, at least, minimising any impact on habitats, flora and fauna during construction and decommission 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.

To mitigate impacts on migrating, roosting and local birds caused by large wind farms in the sub-areas, the following measures should already have been taken into account during the planning and construction phase:

- Avoid turbines with lattice towers. Lattice towers offer suitable perching sites and, thus, might attract large soaring birds, which in turn might increase the risk of collision.
- Avoid lighting of wind turbines, as birds might be attracted to wind farm areas by lights, leading to an increased collision risk. If lighting of turbines is absolutely required (e.g. to meet aviation requirements of the civil and military aviation authority), the minimum number of intermittent flashing white lights of lowest effective intensity shall be used (Drewitt & Langston 2006).
- Build the electrical grid within a wind farm and between different wind farm areas by underground MT cables. If the use of overhead lines cannot be avoided (e.g. 220 kV OHL), such overhead lines should be designed according to available guidelines (e.g. BirdLife International 2015) in order to avoid the risk of electrocuting large birds.

Except for 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 the development of multiple wind farms in the Project Area.

Likewise, there is no need for particular mitigation measures with regards to migrating birds, because the results of the bird monitoring clearly show that migratory activity of relevant species was low, that no threatened species was recorded during spring migration and that only a single threatened species was present in very low numbers during autumn migration.

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 either working high up or in trenches.

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 the environment, occupational health and safety and community health and safety aspects, of special relevance are the IFC guidelines: Environmental Health and Safety Guidelines for Wind Energy and the Environment, 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 the 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, 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 individual work tasks.

Mitigation of impacts on the Bedouin community

Bedouins are a special ethnic group with their 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 wind 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 field-work. 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 of 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 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 Bedouins community. This is essential for monitoring benefits from the project and to ensure that Bedouins are not excluded.

<u>Mitigation of labour influx and of labour and working conditions</u>

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 the rights of workers need to be respected in line with EBRD PR2 and IFC PS2 and with special reference to the 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[1].
- Involve stakeholders and the public, implement consequential information disclosure, establish a grievance process and redress mechanism by NREA.

[1] http://www.ebrd.com/downloads/about/history/workers.pdf

8.5 Special Mitigation Features in the individual East Wind Subareas

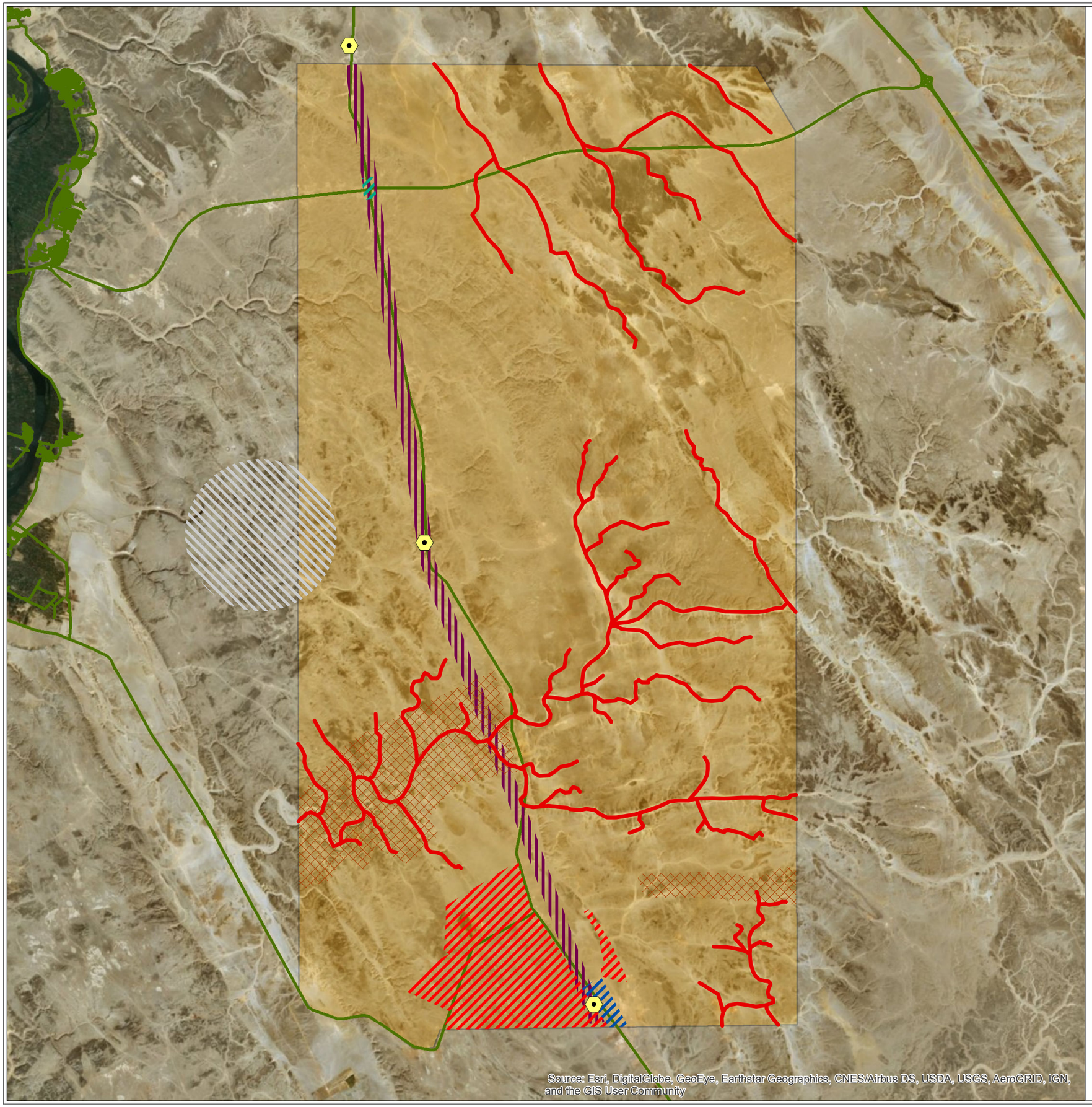
East Wind-1 subarea

Besides the general mitigation measures to be applied to all wind power development, special features in the East Wind-1 subarea were identified that require specific mitigation (see Map NTS 8-1):

- 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, the four identified important Wadis systems have to be assessed as less favourable for wind power developments (see Map NTS 8-1). An appropriate mitigation measure is to avoid installation of turbines in the important Wadi systems and to minimise construction works in these Wadis as much as possible (limited to single crossing by gravel roads and by cable trenches carried out at less sensitive spots).
- Further restrictions in addition to the earlier identified preclusive areas of current economic activities must apply on the East Wind-1 subarea regarding the existing directional telecommunication transmitters. A corridor of 600 m (300 m to each side of the direct distance line) needs to be kept free from any interference of wind turbine rotors. The corridor is located near to the El Minya - Assiut National Road (see Map NTS 8-1).
- Moreover, a clearance distance of 3 km shall be kept from the Akhenaten kings' tomb to protect the national heritage site from disturbances (landscape pollution) by wind turbines. The clearance circle reaches up to 1.5 km into the East Wind-1 subarea (see Map NTS 8-1).

East-Wind 2 subarea

Besides the general mitigation measures to be applied to all the wind power development, no special features in the East Wind-2 area were identified that require specific mitigation - except the farmland and its development in the southern lower flat part of the East Wind-2 area, which is defined to be preclusive for wind power development.



JV LAHMEYER INTERNATIONAL ecoda

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

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

Map NTS 8-1:
Restrictions for wind power developments in the East Wind-1 subarea

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road and telecommunication tower

main road

telecommunication tower

Zones preclusive for wind power development

due to farming area

due to industrial area

due to service buildings

due to transmitter corridor

due to Royal Tombs

Zones unfavourable for wind power development

wadi of importance

due to geomorphology

0 10.000 Meter

1:170.000

N

9 Environmental and Social Management and Monitoring Plan

It is understood that NREA or another Egyptian authority will launch tenders for the selection of private investors for the individual 50 MW wind power plots and will supervise the investors, during the lifetime of the projects. NREA shall consider keeping the ESMP obligatory in the Tender Documents and in the later contract with private investors. As part of this supervisory task, NREA will also be the address and in charge to follow up any grievance during the lifetime of each project.

Two extensive bird surveys have been conducted in the wider region of El Minya west and east of the Nile Valley. Both investigations clearly revealed 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 baseline studies are required when developing wind power or PV solar power in the East Nile region.

Accordingly, no significant impact on migrating birds must be expected when installing and operating multiple wind power projects in the East Nile subareas. From a strict technical point of view, this assessment can be regarded as well-founded, and hence no post-construction monitoring is required to verify this assessment. However, if post-construction monitoring is regarded as good international practice by international financing institutes, carrying out such monitoring at individual operational wind farms might be required to double-check the findings of this SESA. The precise approach and the scope of such post-construction monitoring should be defined on a case-by-case basis in the context of project-specific ESIAs. Post-construction monitoring might, for example, include visual observations of migrating birds and carcass surveys at individual wind farms and associated power lines.

The implementation of mitigation measures require actions during the bidding, planning, construction and post-construction phase for each individual wind farm 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 wind power 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)	Mitigation Measures
All Phases	Grievance	EBRD PR1 and PR 10, Best Practice	Introduce a grievance mechanism that applies through the life cycle of the wind power development to be managed by the Egyptian Authority in charge
Bidding and Planning Phase	Health and safety risks	EBRD PR1 and PR4, Voluntary and Best Practice	Make keeping standards as defined in the IFC General Environmental, Health and Safety Guidelines of April 2007 and in the Environmental, Health, and Safety Guidelines Wind Energy of August 2015, a minimum

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Mitigation Measures
			obligation in the Tender Documents for each individual plot
			Make the assignment of a fully authorised health and safety and environmental engineer during the construction phase obligatory in the Tender Documents
			Make an HSE for each construction site obligatory in the Tender Documents
			Make provision of safety tools & equipment as per accepted standards by the Contractor, in a bidding condition in the Tender Documents
	Keeping mitigation measures	EBRD PR 1, Best Practice	As a minimum, make keeping mitigation measures defined for the construction, operation and decommissioning phase in this study obligatory to investors when tendering the 50 MW plots
	Safety distances		Make keeping internal safety distances of 150 m from plot border lines obligatory
	Impact on habitats, flora and fauna	EBRD PR 6, Best Practice	Avoid application of wind turbines with lattice towers. Avoid or minimise lighting of wind turbines. Avoid construction works in the four identified important Wadis systems as much as possible. Avoid impacting upon particular structures (like caves or crevices) that might form a suitable habitat for animals (to be considered in project-specific ESIAs). Consider the presence of sensitive habitats, if any, on a smaller scale in project-specific ESIAs.
			Build the grid within a wind farm and the grid between different wind farms using underground MV 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).
Construction phase	Health and safety risks	EBRD PR4, EP3, Best Practice	Make keeping the "Environmental, Health and Safety Guidelines for Wind Energy, IFC 2007" and the Environmental, Health and Safety Guidelines Wind Energy of August 2015 a minimum condition. Furthermore, carrying this out shall comply with the EBRD PR 4 for Health and Safety.
		EBRD PR4, EP3, Best Practice	The Contractor and Subcontractor shall assign a health and safety and environmental engineer/supervisor fully authorised in giving health and safety instructions
		EBRD PR4, EP3, Best Practice	Establish an HSE plan prior to starting any construction measures
		EBRD PR4, EP3, Best Practice	Make safety tools and equipment available and have training in how to use it properly
		EBRD PR4,	Construct and make available temporary hygienic

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Mitigation Measures
		EP3, Best Practice	sanitary facilities at the construction site
		EBRD PR4, EP3, Best Practice	Assure stoppage of erection during weather conditions beyond safety limits (e.g. sandstorms)
			Assure that work at the wind turbines is only carried out by personnel who have passed a special safety training course
	Protection of water resources	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 concrete-making of one wind turbine foundation One tank at the water supply well with a minimum volume equal to the largest tanker lorry. Minimise water consumption.
	Traffic	EBRD PR4, EP3, Best Practice	Carry out heavy haulage transportation during hours of low traffic load (late evening or night-times) and safeguard them using convoy cars
	Pollution	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
	Non-hazardous waste disposal	EBRD PR3, Best Practice	Collect and safely storage, 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).
	Hazardous waste disposal	EBRD PR3, Best Practice	Avoid spillage of oil, diesel or grease into the soil. Collect used oils or greases and recycle them.
	Domestic wastewater treatment	EBRD PR3, Best Practice	Construct a simple two-stage anaerobic treatment plant and rinse 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: ensure that the contractor puts the construction site into tidy conditions. Excavations are to be backfilled, heaps of excavation material are to be levelled and waste is to be properly disposed of
	Impact on habitats, flora and fauna	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. Constructional works must avoid any sensitive habitats, if any (to be identified on a smaller scale in project-specific ESIAs)
		EBRD PR 6, Best Practice	Avoid importing new species of urban and rural environments into the area (e.g. together with construc-

Project activity	Environmental Concern	Requirement (Legislative, EBRD PR, Best Practice)	Mitigation Measures
			tion 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.
	Labour and working conditions	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, as a minimum, meet the basic needs of workers.
Operation and maintenance phase	Health and safety risks	EBRD PR4, Best practice	Assure that O&M at the wind turbines is only carried out by personnel who have passed a special safety training course
	Hazardous waste	EBRD PR3, Best Practice	For Wind Turbines with gearboxes with required periodical exchange of oil: Avoid any spillage of used oils, collect it in safe containers and deliver it for recycling
	Cultural Heritages	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
Decommissioning	Land-use and landscape	EBRD PR 6, Best Practice	Remove the windfarm installations at the end of the lifetime and return the landscape to a tidy condition (levelling heaps, backfilling excavations)

10.9 Annex I: Non-Technical Summary – Arabic Version

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التقييم الاستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح في منطقة شرق النيل (جمهورية مصر العربية)

ملخص غير فني للتقرير النهائي للتقييم الاستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح

سبتمبر 2018

هيئة الطاقة الجديدة والمتجددة

وزارة الكهرباء والطاقة المتجددة

JV

التقييم الاستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح في منطقة شرق النيل – جمهورية مصر العربية

ملخص غير فني للتقرير النهائي للتقييم الإستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح

مقدم إلي:

هيئة الطاقة الجديدة والمتجددة

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01	04.10.2017	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 طاقة الرياح
02	22.12.2017	Dr. Frank Bergen Dr. Ernst Niemann Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	ملخص ثاني غير فني لمسودة التقييم الإستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح مع اعتبار ملاحظات هيئة الطاقة الجديدة والمتجددة
03	25.05.2018	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	Dr. Frank Bergen Matthias Drosch	ملخص نهائي غير فني لمسودة التقييم البيئي والاجتماعي لمشروعات طاقة الرياح 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 الإستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح

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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 ولتمويل 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 لتنمية 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.

وكانت العناصر الرئيسية للتقييم هي عمليات المسح الميداني مثل الاستطلاع الميداني العام ورصد ميداني للطيور خلال ثلاث فترات هجرة (ربيع 2016 وخريف 2016 وربيع 2017) أعمال مسح أخرى (على سبيل المثال للنباتات والحيوانات واستخدام الأراضي وغيرها من الجوانب الاجتماعية).

1-2- أهداف ونهج تقرير التقييم الاستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح:

يركز تقرير التقييم الاستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح على التقييم الاجتماعي والبيئي لتحديد مدى ملاءمة مشروعات طاقة الرياح في منطقة الرياح الشرقية الفرعية 1 ومنطقة الرياح الشرقية الفرعية 2 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 طاقة الرياح

- المناطق الأقل ملاءمة، ولكن يمكن اقامة محطات طاقة رياح بها بقيود، و

- المناطق التي يتم فيها منع اقامة محطات طاقة الرياح.

والنتائج التي تم إدخالها أيضًا 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 طاقة الرياح فقد تم تصنيف المناطق من وجهة نظر المعايير الاجتماعية والبيئية فضلا عن القيود المادية، وسيتم إجراء مزيد من التمايز داخل المناطق الفرعية ذات السمات الفنية والبيئية والاجتماعية المتساوية (مواتية أو أقل تفضيلاً) وفقاً لتوزيع طاقة الرياح المكانية التي لا تشكل جزءاً من هذا التقرير وسيتم التعامل معها في تقرير التوصيات النهائي.

وهذا التقرير عن التقييم الاستراتيجي البيئي والاجتماعي لمشروعات طاقة الرياح مماثل لدراسة إقليمية لتقييم الأثر البيئي والاجتماعي (ESIA) لمناطق الرياح الشرقية الفرعية 1 & 2 ويجب أن ييسر في وقت لاحق الحصول على التصاريح البيئية لمزارع الرياح 50 ميجاوات 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 2-1) ومع التعديل في عام 2016 تم استبعاد ثلاث مناطق فرعية بمساحة كلية 425 كم 2 من مشروعات طاقة الرياح بسبب قيود الارتفاع العسكرية ("انظر خريطة 2-1) 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 11، 2 &3) التي حددتها هيئة الطاقة الجديدة والمتجددة ويناقش هذا التقرير منطقتي الرياح الشرقية الفرعية 1 & 2.

تقع منطقة المشروع في الصحراء الشرقية وتتكون من مرتفعات رملية متدحرجة ترتفع فجأة من وادي النيل وتدمج على مسافة 80 - 170 كم شرق النيل في جبال البحر الأحمر.

<u>منطقة الرياح الشرقية الفرعية 1:</u>

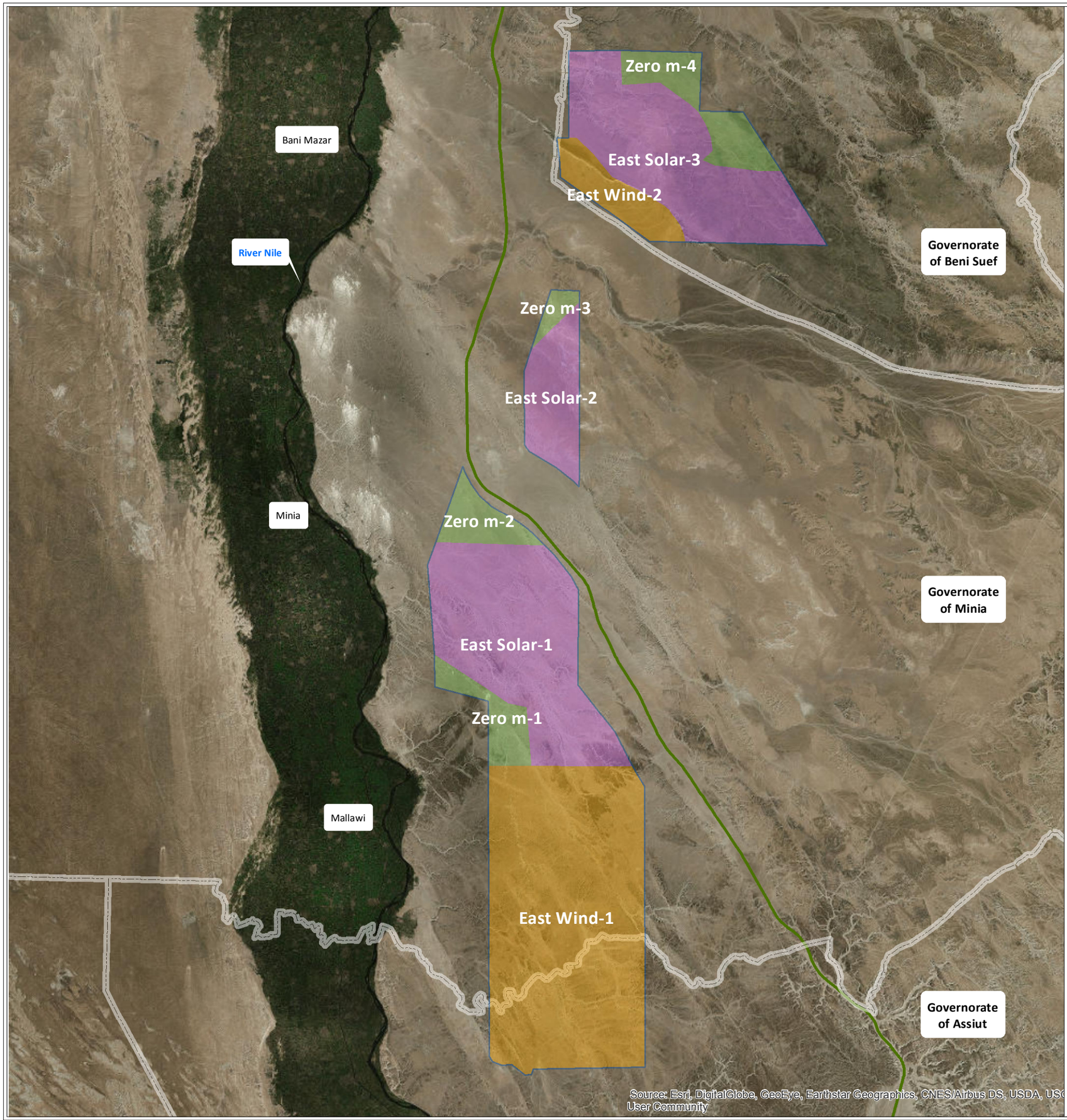
تمتد منطقة الرياح الشرقية الفرعية 1 على ما يقرب من 43 كم من الشمال إلى الجنوب على مسافة 12 كم من شرق نهر النيل وأقصى عرض لهذه المنطقة الفرعية هو حوالي 22 كم (المساحة الإجمالية حوالي 750 كم2) وهي تقع أساسا في محافظة المنيا بينما يقع الجزء الجنوبي في محافظة أسيوط ويمر طريق المنيا - أسيوط السريع في اتجاه جنوبي عبر هذه المنطقة الفرعية.

منطقة الرياح الشرقية الفرعية 2:

تقع منطقة الرياح الشرقية الفرعية 2 على مسافة لا تقل عن 25 كم شرق وادي النيل في محافظة بني سويف وفي الجنوب يحد طريق الشيخ فاضل - رأس غارب هذه المنطقة الفرعية، وعلى مسافة حوالي 8 كم يمر طريق القاهرة - أسوان السريع من الجنوب إلى الشمال، والعرض الأقصى لهذه المنطقة الفرعية هو حوالي 20 كيلومترا من الشمال الغربي إلى الجنوب الشرقي وحوالي 4 كيلومترات من الجنوب الغربي إلى الشمال الشرقي (بمساحة إجمالية تبلغ حوالي 79 كم 2).

وفي تقرير التقييم الاستراتيجي البيئي والاجتماعي يتم استخدم المصطلحات التالية للتمييز بين المناطق المختلفة:

- منطقة المشروع: المنطقة الكلية القابلة للاستخدام لمشروعات الطاقة المتجددة بمساحة 1725 كيلومتر مربع.
- المناطق الفرعية: منطقة الرياح الشرقية الفرعية 1 ومنطقة الرياح الشرقية الفرعية 2
- المناطق: تصنيف المناطق من حيث المواتية، الأقل تفضيلاً، المستبعدةً كما هو محدد في القسمين 5 و 6 من التقرير.



JV LAHMEYER INTERNATIONAL ecoda

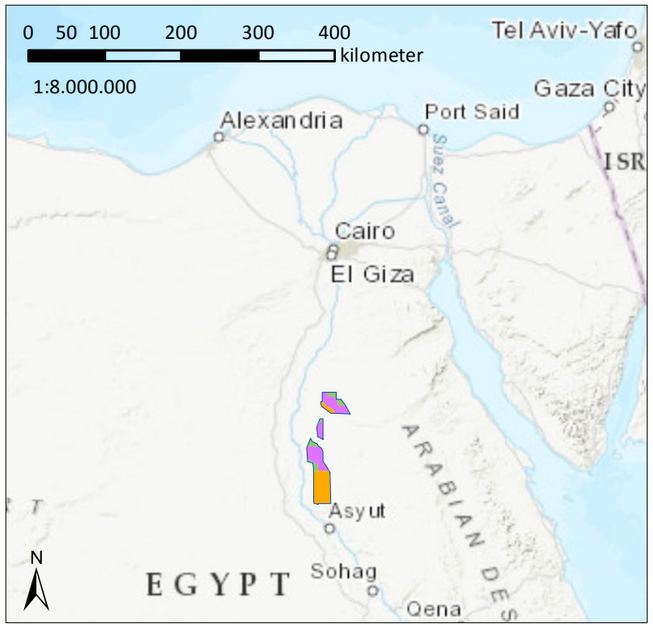
Strategic Environmental and Social Assessment of Renewable Energy Projects in the East Nile Region (Arab Republic of Egypt)
SESA Wind Report

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

Map NTS 2-1:
Overview of 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
- Assiut - Cairo Desert Road (motorway)



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3- الإطار التشريعي والمعايير البيئية والاجتماعية الدولية:

سيأخذ تقرير التقييم الاستراتيجي البيئي والاجتماعي في الاعتبار الإطار القانوني والتنظيمي المصري ومتطلبات البنك الأوروبي لإعادة التعمير والتنمية ومبادئ خط الاستواء، 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 لمزرعة رياح نمطية في المنطقة:

سمات مزرعة الرياح النمطية هي:

- توربينات رياح بثلاثة ريش (مولدات توربينية) بقدرة 3 ميجاوات بأقطار الدوار من حوالي 100 إلى 120 متر وبأقصى ارتفاع لقمة الريشة الدوارة 150 متر فوق سطح الأرض يتم تركيبها في صفوف من الشرق إلى الغرب (باعتبار أن الرياح السائدة من الشمال) على مسافات بينية حوالي 250 - 350 متر ومسافة بين الصفوف حوالي 800 إلى 1200 متر.

- تكون الشبكة الكهربية الداخلية ذات جهد متوسط تتمثل في كبل تحت الأرض وقد يتم تركيب كبائن كهربية بجوار كل توربينة أو بداخل برجها.

- يتم استخدام محطة فرعية ذات جهد مرتفع لنقل الطاقة عند مستوى الجهد المرتفع وخطوط النقل العلوية ذات الجهد العالي (OHTL) وتعمل المحطات الفرعية للمُجمَّع وخطوط نقل الكهرباء العلوية في نقل طاقة عدة مزارع ريح بقدرة 50 ميجاوات مجتمعة ونظرًا لأن خطوط نقل الطاقة الحالية محملة بالفعل فسيتعين إنشاء خطوط علوية جديدة لنقل طاقة محطات الرياح.

- يكون مطلوبا تشييد طرق داخلية حصوية بعرض حوالي 8 متر وكذلك قواعد حصوية صلبة كأساسات لأبراج التوربينات بأبعاد في حدود 150 × 100 متر اعتمادًا على مقاس التوربينات.

- طرق الوصول خارجية من شبكة الطرق القائمة.

- مرافق الخدمة مثل غرفة التحكم ومخازن قطع الغيار وورشة العمل والمرافق لموظفي الخدمة داخل أو خارج منطقة المشروع.

- تمتد أعمال إنشاءات مزارع الرياح على مساحة 6% - 8% من مساحة مزرعة الرياح الكلية ثم يتم خفض هذه النسبة إلي حوالي 5% من الأرض بعد تشغيل مزرعة الرياح،

وأكثر من 90 % من منطقة مزرعة الرياح تبقى بدون تغيير، وإلى حد كبير يمكن الحفاظ على البيئة الطبيعية والأنشطة الاقتصادية الأخرى في المنطقة.

4-1- أعمال التشييد:

تشمل أعمال التشييد لمشروع مزرعة الرياح النمطية أعمال مدنية وكهربائية ونقل وتركيبات والعناصر الرئيسية للأعمال المدنية هي صب الأساسات الخرسانية وحفر خنادق الكابلات واقامة الطرق والمنصات بالإضافة إلى المباني المتعلقة (مثل المباني الخدمية وغرفة التحكم والمحطات الفرعية).

وتتكون أساسات التوربينات الهوائية فئة 3 ميجاوات عادة من أساس حلقي بقطر حوالي 20 متر وعمق حوالي 3 متر ويتطلب ذلك حفر الأساسات وعمل الشدات اللازمة، وصب الخرسانة بحجم حوالي 500 متر مكعب ثم ردم نواتج الحفر، ويجب الحصول على الحصى المطلوب للخرسانة من مصادر خارجية.

ستكون الطرق عبارة عن طرق من الحصى بعرض يتراوح بين 5 إلى 8 أمتار وفقا أساسا لمتطلبات النقل ويكون جسم الطريق من طبقتين بسمك 0.4 - 0.5 متر ولا يجب أن يزيد ميل الطريق عن 6 – 8% وفي حالة التضاريس المعقدة فإن ذلك يتطلب أعمال حفر وردم، ويمكن جمع الحصى من رواسب الحصى القريبة ويجب أن يتم دمك الحصى في طبقات بواسطة معدات الدمك والمياه وبالنسبة لمنصات التركيب ذات الأبعاد 150 × 100 متر حول كل توربينة هوائية فيجب تطبيق نفس التقنية من ناحية الدمك.

والأعمال المدنية الإضافية هي أعمال حفر وردم لخنادق الكابلات (بعمق 1 متر وعرض من 1 إلى 2 متر) ويمكن إنشاء مباني الخدمات للتخزين والتحكم في موقع مزرعة الرياح أو في المناطق المحيطة بها.

ويتطلب بناء مزرعة الرياح فئة 3 ميجاوات للتوربينات النقل الخاص لأجزاء التوربينة والمحطة الفرعية وشفرات التوربينات الضخمة بطول 50 - 60 متر ومحور التوربينة بوزن نحو 60-80 طن ومحولات الطاقة التي يزيد وزنها عن 100 طن.

والعناصر الرئيسية للأعمال الكهربائية هي بناء شبكة الجهد المتوسط الداخلية ومحطة تجميع المجمعات وبالنسبة لتوربينات الرياح من فئة 3 ميجاوات تعتبر محولات رفع الجهد جزءًا من التوربينة وعلاوة على ذلك تعمل المفاتيح الكهربائية الداخلية للتوربينة، ولذلك لن تكون هناك حاجة إلى أكشاك خارجية.

4-2- أعمال التشغيل والصيانة:

تشتمل أنشطة التشغيل والصيانة على التحكم / التشغيل العادي لمزرعة الرياح بالإضافة إلى استكشاف الأخطاء وإصلاحها والصيانة المقررة، وباعتبار أن عمليات مزرعة الرياح يمكن أن تتم عن طريق التحكم عن بعد فإن الأنشطة المعنية لمزرعة الرياح بقدرة 50 ميجاوات 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 التوربينات) لتجنب توقف توليد الطاقة الكهربية، وبالنسبة للتشغيل والصيانة يجب تخزين مجموعة محددة من قطع الغيار بالقرب من الموقع بحيث لا يحدث تأخير في الصيانة وتوقف لتوليد الطاقة الكهربية، وبناءً على ذلك يجب ألا يكون مبنى تخزين قطع الغيار بعيدًا عن الموقع.

4-3- أعمال إنهاء التكليف:

يتم تصميم التوربينات الهوائية لعمر تشغيل 20 سنة وقد يتم تشغيلها على مدار فترات أطول، أما عمر التصميم للبنية التحتية الأخرى (المحطات الفرعية، المباني) فهو أطول، وإنهاء التكليف يعني إزالة التوربينات الهوائية وأساسها والبنية التحتية الكهربائية، أما الطرق الحصوية فهي مناسبة للبيئة الصحراوية ولا تحتاج إلى إزالتها ويعني إنهاء التشغيل إمكانات كبيرة لإعادة تدوير واسترداد المكونات والمعادن الثمينة الداخلة في التوربينات الهوائية وبالتالي فله منافع تجارية.

5- المنهجية والنهج:

5-1- 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 لمشروعات الرياح) 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 للاجتماع 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 الجديدة المتجددة والبنك الأوروبي لإعادة 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 لمشروعات مزارع الرياح) وتم توثيق نتائج جميع المقابلات في استمارات المقابلات (انظر الملحق D لتقرير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح) ويمكن الاطلاع على ملخص للردود الواردة في تقرير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح، القسم 5 وفي القسم 5-3-1-8 خاصة.

كما تم زيارة أصحاب المصلحة الرئيسيين مثل محافظات المنيا وأسيوط في 4 أكتوبر 2016 و31 أكتوبر 2016 (المنيا وأسيوط) وفي 7 نوفمبر 2016 (أسيوط) على التوالي وبالإضافة إلى ذلك فقد اخطرنا هذه المحافظات أن يرسلوا ملاحظاتهم من خلال الفاكس أو البريد الإلكتروني أو البريد العادي إلي هيئة الطاقة المتجددة.

تم تحديد نطاق تقرير التقييم الإستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح 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 لمشروعات مزارع الرياح 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 لمشروعات المحطات 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 الاستشارة 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 الاخبار 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 او شكوك إضافية خلال جلسة الاستماع العامة بشأن القضايا الاجتماعية او البيئية والتي تم بالفعل تناولها في مسودة تقرير التقييم الاستراتيجي البيئي والاجتماعي. ولذلك، لم تكن هناك حاجة إلى وزن الحجج والتعديلات او 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 او حجج إضافية. وبالمثل، سيتم الإفصاح مرة أخرى عن مسودة تقارير والتقارير النهائية للتقييم الاستراتيجي البيئي والاجتماعي وتقرير التوصيات الختامي على المواقع الالكترونية لهيئة الطاقة الجديدة والمتجددة والبنك الأوروبي لإعادة الإعمار والتنمية، وفقا لنفس المبدأ التوجيهي.

5-2- 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 وربيع 2017.

وقد كان 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 مع التركيز بشكل خاص على الطيور المهاجرة والطيور المحلية حيث أن بعض أنواع الطيور معروف أنها تتأثر بتوربينات الرياح، وفي هذا السياق تم إجراء مراقبة واسعة للطيور في ربيع عام 2016 (من 1 أبريل إلى 25 مايو ، أي في الجزئين الثاني والثالث لموسم الربيع) وخريف عام 2016 (من 20 أغسطس إلى 15 نوفمبر) وربيع 2017 (من 20 فبراير إلى 31 مارس ، أي أوّل موسم الربيع) وكان الهدف الرئيسي للرصد الموحد هو وصف أنماط الهجرة للأنواع ذات الصلة بطريقة كمية، وفي عام 2016 تمت فقط تغطية جزء من فترة هجرة الربيع بسبب بدء المراقبة في وقت متأخر، ولهذا السبب هدفت المراقبة في ربيع عام 2017 إلى تغطية الجزء المفقود، والنتائج المتحققة في ربيع عام 2016 و 2017 متناسقة للغاية وبالتالي يمكن أن نستنتج أن نهج تقسيم المسح على الهجرة الربيعية إلى مرحلتين في سنوات مختلفة كان مناسبًا، وقد تمت تغطية الهجرة الربيعية في المنطقة بالكامل بهذا النهج، ولم يؤثر تقسيم الاستطلاع على النتائج الرئيسية حول هجرة الطيور في فصل الربيع وبالتالي لم تكن هناك حاجة لإجراء أي تعديلات على النهج (مثل تداخل فترات المسح في عامي 2016 و 2017) من أجل زيادة القدرة التفسيرية للبيانات، وعلاوة على ذلك تم استطلاع وجود خفافيش في أماكن معينة في منطقة المشروع في ربيع وخريف 2016.

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 مناطق الرياح الشرقية الفرعية 1 & 2 فيما يتعلق بالقيود الناجمة عن التنافس في استخدام الأراضي والقيود الفنية مما يعوق اقامة مزارع الرياح أو

يجعل الأمر أكثر صعوبة وهذا يؤدي إلى تصنيف المناطق على أنها غير موائمة أي غير قابلة للاستخدام في مشاريع طاقة الرياح أو لتكون 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 الآثار البيئية:

تحدث الآثار 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 ضارًا أو مفيدًا ، ناتجًا كليًا أو جزئيًا 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 وفقًا "لأهميتها" والتي هي دالة في "حجم الحدث" و "حساسية المستقبل" ويتطلب تحديد حجم الحدث تحديد وتقدير مصادر الآثار البيئية والاجتماعية المحتملة من أنشطة المشاريع الروتينية وغير الروتينية، وتصنف مقادير الحدث وفقًا لمدى وتكرارية ومدّة وشدة حدث منخفض أو متوسط أو مرتفع، وتتطلب حساسية المستقبِل فهمًا 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 مهمل، صغير، معتدل، كبير.

6- البيئة الراهنة:

6-1- 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 الحرارية بين 19 درجة مئوية (في الشتاء) و37 درجة مئوية (في الصيف) وتتراوح المتوسطات الشهرية بين 12 درجة مئوية و29 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، وفي بعض المناطق الفرعية إلى الجنوب من منطقة الرياح الشرقية الفرعية 1 تحتوي الطبقات العليا على كتل ذات طبيعة غير معروفة وتوضح الخريطة الجيولوجية صدعا رئيسيًا واحدًا بجرف يزيد عن مائة متر ارتفاعًا يقع جزئيًا داخل منطقة الرياح الشرقية الفرعية 2 ، وبخلاف ذلك فإن المنطقتين الجزئيتين هما في الغالب متجانسين ويتألفان في الغالب من أرض غير متموجة بعض الشيء باستثناء بعض المنخفضات بالأودية الرئيسية في منطقة الرياح الشرقية الفرعية 1، وخاصة في الجزء الجنوبي والغربي، وجميع الأودية لها انحدار معتدل ورملية تحت الأرض والوديان خالية من علامات التآكل التي تشير إلى تدفق ضعيف للمياه الذي يحدث بتواتر نادر.

شكل 6-1- منظر للجزء المنخفض من منطقة الرياح الشرقية الفرعية 1 مع الجرف في الخلفية

وشكل عام تُظهر المناطق ظروف تربة جيدة (باستثناء الجرف الموجود في منطقة الرياح الشرقية الفرعية 2) ولا نجد تربة رطبة أو كثبان رملية متحركة في منطقتي الرياح الشرقية، 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:

<u>منطقة الرياح الشرقية الفرعية 1(راجع خريطة 6-1):</u>

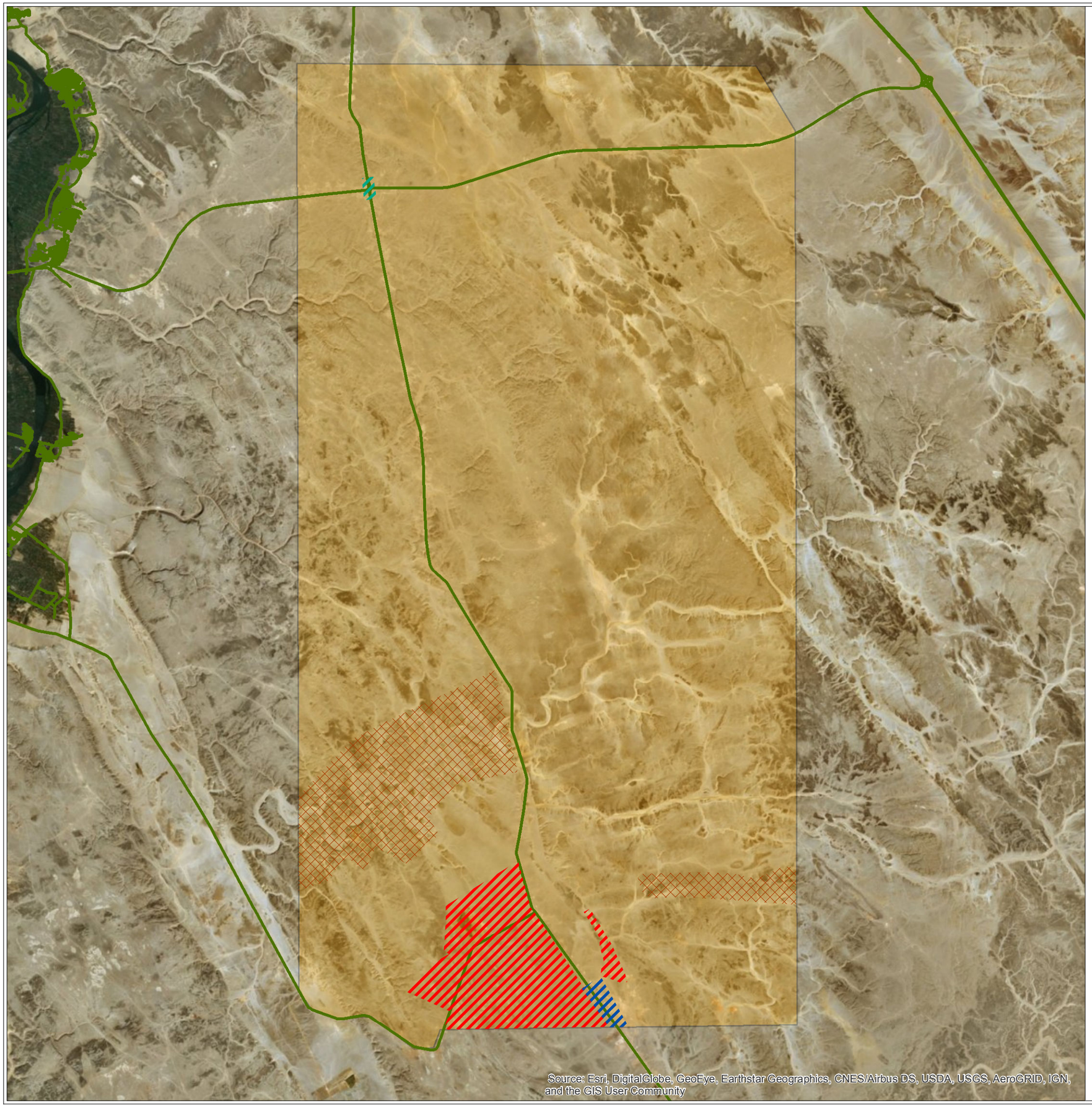
- لم يتم تحديد منطقة غير موائمة نتيجة لصعوبة الوصول.
- لم يتم تحديد منطقة غير موائمة بسبب عوامل جيومورفولوجية ولكن تم تحديد بعض المناطق الأقل ملاءمة بسبب الجيومورفولوجيا غير المتجانسة (المنحدرات الحادة والتلال الصغيرة).
- فيما يتعلق باستخدام الأرض فإن المناطق التالية غير موائمة لمزارع الرياح:
  - قطعة أرض صغيرة قريبة من الطريق عند معبر الطريق في الشمال الغربي.
  - الأراضي الزراعية القائمة بالفعل حتى لو كانت متصلة بخط الجهد المنخفض على طول طريق المنيا - أسيوط السريع والجزء الآخر في الجنوب الغربي.
  - منطقة مصنع الأسفلت والأراضي الزراعية الموجودة قيد التطوير جزئيا في الجنوب.

منطقة الرياح الشرقية الفرعية 2(راجع خريطة 6-2):

- لم يتم تحديد منطقة غير موائمة نتيجة لصعوبة الوصول.

- الجيومورفولوجيا: خط الصدع (الجرف) غير مستقر وعرضة للنحر المستمر وبالتالي تتراكم الصخور والحصى في أسفله، وعلاوة على ذلك فإن الرياح التي تهب في الغالب من الشمال تنقل الرمال نحو الجانب المنخفض من الجرف مما يؤدي إلى تراكم الحصى وتسبب الأمطار جريانًا على حافة هذا الجرف مما يؤدي إلى تآكلها، وبناءً على ذلك فإن منطقة الجرف ووسطها القريب (حوالي منطقة حدودية تبلغ 300 متر فوق القمة وحوالي 1 كيلومتر من منطقة القدم) يتم تقييمها على أنها غير صالحة لمشاريع المزارع الرياح (منطقة غير موائمة).

- فيما يتعلق باستخدام الأرض، فإن المنطقة التالية غير موائمة لمشاريع الرياح: تم تحديد مزارع في الأراضي المنخفضة في منطقة الرياح الشرقية الفرعية 2.



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

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

Map NTS 6-1:
Zones preclusive or less favourable
for wind power development in the East Wind-1 subarea

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road

main road

Zones preclusive for wind power development

due to farming area

due to industrial area

due to service buildings

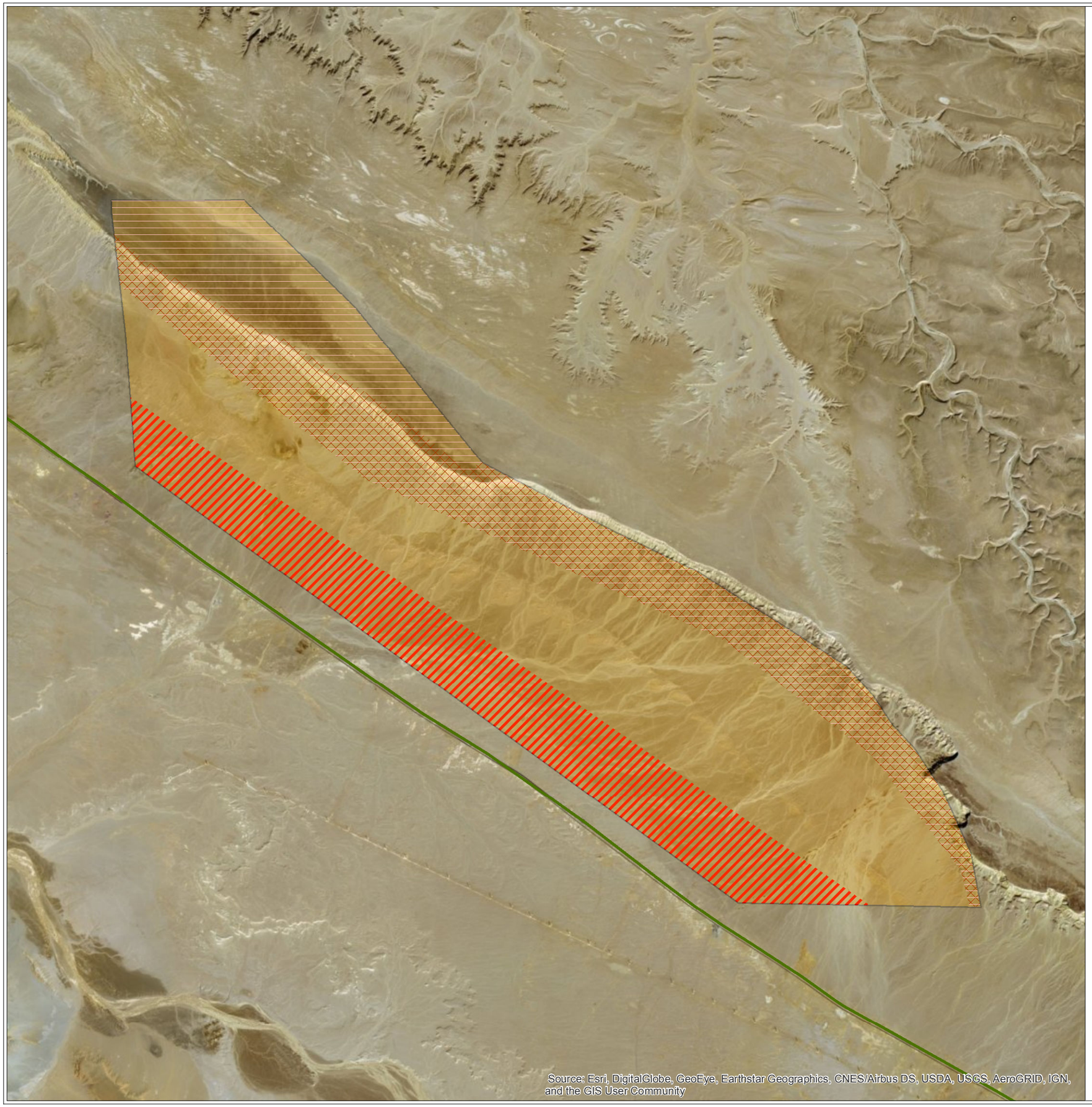
Zones unfavourable for wind power development

due to geomorphology

0 10.000 Meter

1:170.000

N



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

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

Map NTS 6-2:
Zones preclusive or less favourable
for wind power development in the East Wind-2 subarea

Bordering of East Wind-2 subarea

East Wind-2 subarea

Main road

main road (Ras Ghareb-El Sheik Fadl road)

Zones preclusive for wind power development

due to farming area

due to geomorphology

Zones unfavourable for wind power development

due to acess accessibility

0 5.000 Meter

1:80.000

N

6-2- البيئة البيولوجية:

منطقة الرياح الشرقية الفرعية :

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 منطقة الرياح الشرقية الفرعية 1 أو في المنطقة المحيطة بها.

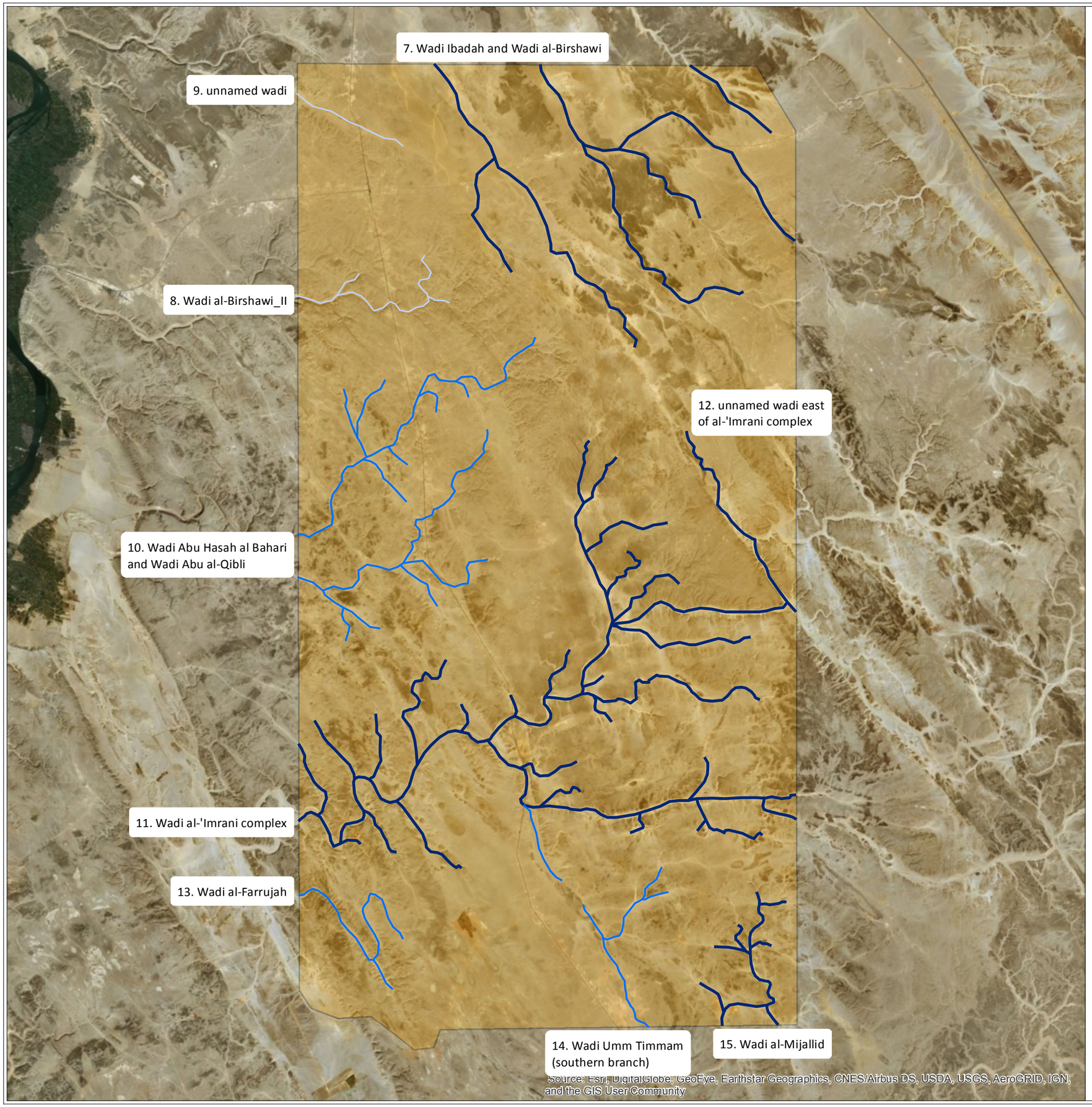
وبسبب الجفاف الشديد في الصحراء الشرقية، فإن السهول الحصوية والمناطق المرتفعة والتلال الصغيرة داخل منطقة الرياح الشرقية الفرعية 1 غير مؤهلة لأن تكون من الموائل المناسبة للنباتات، وبالتالي فإن أجزاء كبيرة من هذه المنطقة الفرعية لها أهمية منخفضة للغاية أو بلا أي أهمية كموطن للنباتات والحيوانات.

لا توجد وديان ضمن منطقة الرياح الشرقية الفرعية 1 لها أهمية عالية كموئل للنباتات والحيوانات حيث نجد أن وادي عباداه ووادي البرحاوي في الشمال ووادي العمراني والوادي الشرقي من مجمع العمراني وأخيراً وادي المجليد في الجنوب تقدم ظروف معيشية المناسبة لبعض الأنواع النباتية والحيوانية مما يجعلها تختلف بشكل ملحوظ عن الموائل الصحراوية الشاسعة التي تسيطر على منطقة الرياح الشرقية الفرعية 1، والوديان لمذكورة أعلاه مهمة للنباتات والحيوانات (انظر الخريطة 6-3) 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 منطقة الرياح الشرقية الفرعية 1 التي يمكن العثور عليها بشكل خاص في الوديان وعلى المنحدرات مهمة كموئل للنباتات والحيوانات.

ومعظم أجزاء منطقة الرياح 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 منطقة الرياح الشرقية 1 "أقل اهمية" في القائمة الحمراء للأنواع المهددة بالانقراض ومن ثم وإلى جانب الأودية المذكورة أعلاه فإن منطقة الرياح الشرقية الفرعية 1 غير مهمة للنباتات.

ووفقاً لنتائج دراسة شاملة حول هجرة الطيور في منطقة الرياح الشرقية الفرعية 1 التي أجريت في ربيع عام 2016 وخريف عام 2016 وربيع عام 2017 ، فإن هجرة الطيور من الأنواع ذات الصلة لم تكشف عن وجود اختلافات مكانية ملحوظة بين مواقع المراقبة البالغ عددها 16 موقعاً وكان نشاط الهجرة منخفضاً في كل موقع مراقبة (للاطلاع على البيانات التفصيلية ، انظر الملحق B5 في تقرير التقييم الاستراتيجي البيئي والاجتماعي لمشروعات مزارع الرياح) ولم يتم تسجيل أي أنواع مهددة خلال هجرة الربيع (كلاهما في عامي 2016 و 2017) وفي خريف عام 2016 تواجدت أربعة أنواع ذات أهمية خاصة (حسب قائمة IUCN الحمراء للأنواع المهددة بالانقراض) بأعداد قليلة: النسر المصري (5 طيور) ، صقر الوديان (22 طائر) وكلا النوعين تم تقييمهم من قبل IUCN على أنه "مهدد") ، وصقور ونسور أخر تم تقييمهما على أنهما "مهددين"، وقد صنفت IUCN جميع الأنواع الأخرى ذات الصلة بشكل خاص بالدراسة على أنها "أقل اهمية"، وهناك بعض النسور قصيرة الأصابع تعبر منطقة الرياح الشرقية الفرعية 1 في فصل الخريف، ومع ذلك فإن هذه المنطقة الفرعية التي تغطي جزءًا كبيرًا من الصحراء الشرقية تمتد على مسافة حوالي 20 كيلومترًا من الغرب إلى الشرق وحوالي 40 كيلومترًا من الشمال إلى الجنوب لا يوجد بها تركيز كبير لنسور الأفعى قصيرة الأصابع المهاجرة وليس لها أهمية خاصة بالنسبة للهجرة هذا النوع من الطيور، وبالإضافة إلى ذلك فقد تم تقييم نسر الأفعى القصير الأصبع من قبل الاتحاد الدولي لحماية الطبيعة (IUCN) على أنه "أقل اهمية" وبالتالي فهو ليس نوعًا مهدّدًا بالانقراض، وتشير النتائج بوضوح أن منطقة الرياح الشرقية الفرعية 1 غير ذات أهمية خاصة للطيور المهاجرة - لا في الربيع ولا في الخريف، وهذا صحيح للأنواع ذات الأهمية الخاصة وللأنواع ذات الأهمية البسيطة التي تهاجر بشكل رئيسي على جبهة عريضة.



JV LAHMEYER INTERNATIONAL ecoda

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

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

Map NTS 6-3:
Assessment of the importance of main wadis in the East Wind-1 subarea as a habitat for plants and animals

Bordering of East Wind-1 subarea

East Wind-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

0 10.000 Meter

1:170.000

N

يمكن أن تجد أنواع الطيور المحلية الوحيدة التي تتكيف مع الظروف المناخية القاسية في الصحراء الشرقية موئلا مناسبا في الأودية الكبيرة في منطقة الرياح الشرقية الفرعية 1 وعلى وجه الخصوص في وادي اديبادا ووادي-بيرشاوي مجمع وادي العمراني ووادي المقلد التي تضم بقعًا من النباتات ومع ذلك تظهر النتائج التي تم الحصول عليها بوضوح أن مجتمع الطيور المحلي فقير للغاية في الأنواع وأن كثافة الطيور منخفضة للغاية والأنواع المسجلة في منطقة الرياح الشرقية الفرعية 1 غير منتشرة على نطاق واسع ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر، ووفقًا لقائمة IUCN الحمراء للأنواع المهددة لا يتم تقييم أي نوع مسجل كأنواع مهددة وبالتالي لا تعتبر منطقة الرياح الشرقية الفرعية 1 موطنا ا هامًا للطيور المحلية.

كما تشكل الوديان الكبيرة في منطقة الرياح الشرقية الفرعية 1 (انظر أعلاه) أيضًا موئل توقف (ليوم واحد) للطيور المهاجرة ومع ذلك وفقا للأعداد المنخفضة من الطيور فلا تعتبر منطقة الرياح الشرقية الفرعية 1 مهمة لذلك.

بالإضافة إلى ذلك ، تشكل الأودية الكبيرة موائل مناسبة لبعض أنواع الحيوانات من مجموعات مختلفة (الثدييات ، الزواحف ، الحشرات ، العناكب) ومع ذلك فإن النتائج التي تم الحصول عليها من الدراسة تظهر بوضوح أن الحيوانات المحلية ضعيفة في الأنواع ومنخفضة الكثافة، والأنواع المسجلة في منطقة الرياح الشرقية الفرعية 1 غير منتشرة على نطاق واسع ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر، وهذه الأنواع غير مهددة، وبالتالي لا تعتبر منطقة الرياح الشرقية الفرعية 1 موئلا هامًا للحيوانات الأخرى.

وقد كشفت مراجعة البيانات الثانوية أن المناطق الصحراوية مثل منطقة الرياح الشرقية الفرعية 1 ليست عادة مأهولة بالخفافيش (Hoath 2009) وبالتالي فإن نشاط الخفافيش في منطقة الرياح الشرقية الفرعية 1 كان منخفضا جدا خلال مراقبة الخفافيش التي تمت والمنطقة الفرعية على ما يبدو لا تعتبر موطنا هاما للخفافيش.

وكخلاصة فإن منطقة الرياح الشرقية الفرعية 1 لم يتم فيها تحديد أي مناطق غير موائمة لمشاريع مزارع الرياح فيما يتعلق بالبيئة البيولوجية.

<u>منطقة الرياح الشرقية الفرعية 2:</u>

كشفت الدراسة عن عدم وجود أي موقع أو منطقة محمية ولا أية حديقة قومية أو منطقة طيور هامة معترف بها دوليًا للتنوع البيولوجي في منطقة الرياح الشرقية الفرعية 2 أو المنطقة المحيطة بها.

وبسبب الجفاف الشديد للصحراء الشرقية فإن السهول الحصوية والجبال الضخمة في هذه المنطقة لا تعتبر موئلا مناسبا للنباتات ولا توجد أودية كبيرة فيها وبالتالي فهي خالية تماما تقريبا من الغطاء النباتي، وتتميز منطقة الرياح الشرقية الفرعية 2 بمستوى منخفض جدًا من حيث الأهمية كموطن للنباتات والحيوانات.

ويمكن أن تشكل الكهوف المتواجدة في التصدعات موائل للحيوانات ومن ثم فإن هذه الكهوف مهمة كموئل للنباتات والحيوانات.

ووفقا لنتائج الدراسة الشاملة حول هجرة الطيور في منطقة الرياح الشرقية الفرعية 2 والتي أجريت في ربيع عام 2016 وخريف عام 2016 وربيع عام 2017 ، فإن هجرة الطيور لم تكشف عن وجود اختلافات مكانية ملحوظة بين المواقع وكان نشاط الهجرة منخفضًا في كلا موقعي المراقبة (للبيانات التفصيلية ، راجع الملحق B5 من تقرير التقييم الاستراتيجي البيئي والاجتماعي) ولم يتم تسجيل أي أنواع مهددة خلال هجرة الربيع (لا في 2016 ولا 2017) وفي خريف عام 2016 تمت ملاحظة واحد فقط من الأنواع ذات الأهمية الخاصة (وفقا لقائمة IUCN الحمراء للأنواع المهددة بالانقراض) بأعداد قليلة جدا (2 فرد): النسر السهيب (تم تقييمه من قبل IUCN بأنه "مهدد") أما جميع الأنواع الأخرى ، التي تعتبر ذات أهمية خاصة للدراسة ، فقد تم تصنيفها من قبل IUCN على أنها "غير مقلقة"، وقد تم تسجيل ما مجموعه 29 من نسور الأفاعي القصيرة الأصابع في موقعي المراقبة ، أي بنسبة 0.3% من سكان الممر الشرقي ويمكن اعتبار هذا النوع كمهاجر منتظم ، ولكن لا يوجد في هذه المنطقة الفرعية أهمية خاصة لهجرة هذا النوع، وبالإضافة إلى ذلك يتم تقييم نسر الأفعى القصير الأصبع من قبل الاتحاد الدولي لصون الطبيعة (IUCN) على أنه "أقل أهمية"، وبالتالي فهو ليس من الأنواع المهددة. وكملخص تكشف النتائج بوضوح أن منطقة الرياح الشرقية الفرعية 2 ليست ذات أهمية خاصة للطيور المهاجرة - لا في الربيع ولا في الخريف وهذا صحيح للأنواع ذات الأهمية الخاصة وللأنواع ذات الأهمية المنخفضة التي تهاجر بشكل رئيسي على جبهة عريضة.

ولا توجد وديان كبيرة في المنطقة الفرعية وبالتالي فهي خالية تماما من الغطاء النباتي وبالتالي فإن مجتمع الطيور المحلي فقير للغاية في الأنواع كما أن كثافة الطيور منخفضة للغاية، والأنواع المسجلة

في منطقة الرياح الشرقية الفرعية 2 غير منتشرة على نطاق واسع ويمكن العثور عليها في العديد من الموائل الصحراوية في مصر، ووفقًا لقائمة IUCN الحمراء للأنواع المهددة فلا يتم تقييم أي نوع مسجل كأنواع مهددة، ونتيجة لذلك لا تعتبر منطقة الرياح الشرقية الفرعية 2 موئلاً هامًا للطيور المحلية.

وقد تم تسجيل عدد قليل جدا من الطيور الجاثمة في هذه المنطقة الفرعية وتحتاج معظم الطيور إلى بقع صغيرة من النباتات تشكل موائل للتوقف (خاصة ليوم واحد) أثناء الهجرة ولكن بسبب عدم وجود الغطاء النباتي؛ فلا تعتبر منطقة الرياح الشرقية الفرعية 2 هامة كموطن مؤقت للطيور المهاجرة.

وقد تبين أن الحيوانات المحلية فقيرة جدا في الأنواع وبكثافة منخفضة جدا أيضا وتشير السجلات إلى وجود بعض الحشرات مثل الجراد واليعسوب والفراشات ولكن لا يعتبر أي من هذه الأنواع المسجلة مهددة، وبالتالي لا تعتبر منطقة الرياح الشرقية الفرعية 2 موطنًا مهمًا للحشرات.

وقد كشفت مراجعة البيانات الثانوية أن المناطق الصحراوية مثل منطقة الرياح الشرقية الفرعية 2 لا تكون عادة مأهولة بالخفافيش (Hoath 2009) ومن المعقول أن نفترض أن نشاط الخفافيش في هذه المنطقة الفرعية منخفض جدًا كما تم التحقق منه في منطقة الرياح الشرقية الفرعية 1 أثناء مراقبة الخفافيش التي أجريت في الربيع والخريف عام 2016. وعلى ما يبدو لا تعتبر هذه المنطقة الفرعية موطن هام للخفافيش.

وكخلاصة فإن منطقة الرياح الشرقية الفرعية 2 لم يتم فيها تحديد أي مناطق غير موائمة لمشاريع مزارع الرياح فيما يتعلق بالبيئة البيولوجية.

3-6- البيئة الاجتماعية والاقتصادية:

تقع منطقة المشروع في محافظات بني سويف والمنيا وأسيوط ويعيش السكان بشكل رئيسي في وادي النيل في حين أن منطقة المشروع لا يوجد بها مستوطنات دائمة.

<u>الخصائص العامة:</u>

- 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 مناطق الرياح الشرقية الفرعية 1 & 2 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 مناطق الرياح الشرقية الفرعية 1 & 2 باستثناء قبر أخناتون بالقرب من تل العمارنة وتقع على مسافة 1.5 كم إلى الحدود الغربية لمنطقة الرياح الشرقية الفرعية 1.

- 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 مناطق الرياح الشرقية الفرعية 1 & 2.

- 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 المحافظات ة 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 مزرعة الرياح 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.

منطقة الرياح الشرقية الفرعية 1:

- استخدام الأراضي:

خلال استطلاع الموقع في أكتوبر 2016 لوحظ أنه في الجنوب الغربي من منطقة الرياح الشرقية الفرعية 1 تتم بعض الأنشطة الزراعية (أعمال حفر وتسوية وأنظمة الري) وبعض المزارع أصبحت في حالة تشغيل بالفعل.

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 رسميا 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.

والأنشطة الأخرى التي تم تحديدها في منطقة الرياح الشرقية الفرعية 1 هي محاجر الزلط ومصنع الأسفلت.

- 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) وأسيوط (جنوب).

وقد تم اعتبار المناطق التي تم تخصيصها لاستخدامها في الزراعة أو التي يجري تطويرها بالفعل وكذلك مصنع الأسفلت ومواقع محاجر الزلط على أنها غير موائمة لمشاريع مزارع الرياح.

منطقة الرياح الشرقية الفرعية 2:

- استخدام الأراضي:

في منطقة الرياح الشرقية الفرعية 2 لم يلاحظ سوى عملية استصلاح أرض واحدة فقط وعلى غرار الأنشطة المذكورة أعلاه كما هو موضح في القسم السابق يتم تنسيق أنشطة استصلاح الأراضي بواسطة عائلة واحدة.

- الطرق وحركة المرور:

يمكن الوصول إلى الجزء الجنوبي من منطقة الرياح الشرقية الفرعية 2 وهي منطقة منفصلة عن الجزء الشمالي الأصغر من المنطقة بواسطة جرف يبلغ ارتفاعه حوالي 100 متر عبر طريق القاهرة - أسوان السريع وطريق الشيخ فاضل - رأس غارب.

وبالنسبة للجزء الشمالي الأصغر من منطقة الرياح الشرقية الفرعية 2، يجب بناء طرق وصول جديدة كاملة لنقل المعدات الثقيلة ويعتبر الوصول إلى المنطقة على قمة الجرف (على مسافة 11 كم خطية من طريق القاهرة - أسوان السريع) أو 40 كم من المخرج التالي لهذا الطريق السريع) أقل ملاءمة ويتم تقييم منطقة المنحدرات بما في ذلك منطقة 300 متر في القمة و500 متر في القاعدة على أنها غير موائمة لمشاريع مزارع الرياح أما إمكانية الوصول إلى المنطقة المتبقية في الجنوب فهي مواتية كما ذكرنا من قبل.

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 مزارع الرياح أو البنية التحتية المرتبطة بها أثناء التشغيل.

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 لتثبيط 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 ولن تنشأ أي مياه صرف خلال مرحلة تشغيل مزارع الرياح والبنية التحتية المرتبطة بها.

ويتم تقييم أهمية أثر استهلاك الماء على أنه صغير في مرحلة التشييد ومهمل لمرحلة التشغيل.

وعلاوة على ذلك فيما يتعلق بمياه الصرف الصحي فيتم تقييم أهمية الأثر على أنها صغيرة خلال مرحلة التشييد وضئيلة أو مهملة خلال مرحلة التشغيل.

النفايات المنزلية والخطرة:

سيتم توليد كميات كبيرة من النفايات الصلبة خلال مشاريع تشييد مزارع الرياح وتتكون النفايات بشكل أساسي من مواد التعبئة (الورق والبلاستيك والخشب) لنقل مكونات التوربينات والمعدات المساعدة وتتراكم النفايات في معظمها في مواقع التوربينات 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 أو زيت صناديق التروس والزيت الهيدروليكي) 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 الزعفرانة 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 الآلات والأجزاء المعيبة الأصغر وهذه المواد غير خطرة ومعظمها من الأشياء الثمينة ومناسبة لإعادة التدوير وفي حالات أخرى يتم إرجاع الأجزاء المعيبة الأكبر مثل صناديق التروس أو المولدات إلى المصنع للإصلاح أو إعادة استخدام المواد. في حالة عدم وجود توربينات الرياح بدون تروس وسيتم تبديل الزيت المستعمل مرة واحدة في السنة أو مرة واحدة كل سنتين ثم يتم إرساله لإعادة تدويره وتظهر الممارسة في مزارع الرياح المصرية الأخرى أن هذا يعمل دون مشاكل.

الضوضاء والتظليل والاهتزازات والتداخلات الكهرومغناطيسية:

بالنسبة لأجزاء الأراضي التي بها أنشطة اقتصادية في مناطق اقامة مزارع الرياح 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 مزارع الرياح 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.

وفيما يتعلق بالتظليل فإن المعايير المقبولة هي 30 ساعة في السنة و 30 دقيقة في اليوم للمناطق السكنية خلال مرحلة تشغيل مزرعة الرياح ويمكن تحقيق ذلك في أماكن قريبة من توربينات الرياح فقط حيث يمكن أن تحقق فترة الانتقال المرصودة للشمس خلال منطقة الدوران هذه الفترات وعند خط عرض 28 درجة شمالاً يكون انتقال أشعة الشمس خلال ساعات الصباح أو المساء سريعًا وعلاوة على ذلك حيث أنه توجد أنشطة تجارية وصناعية فقط على مسافات قريبة خارج مناطق مزارع الرياح فمن الواضح أنه لا يوجد أي أثر للتظليل أو الخفقان يزيد عن المستوى المقبول.

تنتج الاهتزازات من تشغيل توربينات الرياح ومع ذلك فإن توربينات الرياح التي تعمل في ظروف منتظمة بشفرات متوازنة بشكل صحيح وبعمود رئيسي متمركز جيدا تحدث القليل من الاهتزازات وتمتص معظم هذه الاهتزازات بواسطة الأساسات وينتقل القليل منها إلى باطن الأرض وخاصة في الصخور الناعمة (مثل الحجر الجيري السائد في هذه المناطق) وبالتالي فسوف يكون أثر الاهتزازات صغير بالقرب من توربينات الرياح.

ولكن يمكن أن تسبب توربينات الرياح تداخل كهرومغناطيسي مع أنظمة رادار الطيران والاتصالات السلكية واللاسلكية (مثل الميكروويف والتلفزيون والراديو) وتعتمد طبيعة التأثيرات المحتملة في المقام الأول على موقع توربينات الرياح بالنسبةً إلى المرسل والمستقبل وخصائص ريش الدوار ومستقبل تردد الإشارة وخصائص انتشار الموجات الكهرومغناطيسية في الجو المحيط.

ولم نجد أي رادار داخل أو بالقرب من مناطق الرياح الشرقية الفرعية ومع ذلك يوجد بالمنطقة صواري الهاتف المحمول وأجهزة اتصالات لاسلكية ومن الواضح أن أثر مزارع الرياح على هذه البنية التحتية يمكن أن يكون كبيرا ولكن لن تقوم أية مزرعة رياح بحجز أي إشارة من أي مرسلات ولن تؤثر سلبًا على إرسال إشارة الهاتف المحمول ويجب أن تبقى الممرات الواسعة بين أجهزة

الإرسال الاتجاهية (300 متر إلى كل جانب من خط المسافة المباشرة) ويجب ألا تتأثر أعمدة الهواتف النقالة بفعل الرياح القريبة.

التراث الأثري والتاريخي والثقافي:

توضح نتائج الدراسة أن المنطقتين الفرعيتين للرياح الشرقية خالية من التراث الأثري والتاريخي والثقافي والمواقع ذات القيمة التاريخية والأثرية هي الأطلال والمقابر التي تعود إلى 3500 سنة في مدينة أخاتون بجانب تل العمارنة على بعد حوالي 10 كم جنوب غرب ملوي.

وعلى افتراض أن الطريق إلى قبر اخناتون سيكون مقيدا للوصول بسبب منطقة مزارع الرياح فسيكون هنالك تأثير لتوربينات الرياح بارتفاع 150 متر على الحدود الغربية لمنطقة الرياح الشرقية الفرعية 1 حيث المسافة تقل عن 2000 متر وبناءً على ذلك فإن الأثر سيكون كبيرا ولكن يمكن تخفيفه، لأنه وفقا للقانون المصري يجب أن تكون هناك مسافة لا تقل عن 3000 متر على النحو الموصى به في تقرير التقييم الاستراتيجي البيئي والاجتماعي لمزارع الرياح، القسم 7 - تدابير التخفيف، وهذه القيمة تتجاوز مسافة 2000 متر المذكورة أعلاه، وبالتالي لا يعتبر ارتفاع ريشة التوربينة حرجًا في حالة تطبيق المنطقة العازلة التي يبلغ مداها 3000 متر.

استخدام الأراضي:

يبلغ معدل استخدام الأراضي لإقامة مزارع الرياح (الطرق والمنصات والأساسات والمرافق المساعدة) حوالي 6 – 8 % خلال مرحلة التشييد و 5% خلال مرحلة التشغيل وستكون هذه النسب المئوية أقل في المناطق الفرعية التي تحتوي على الأودية باعتبار أن مزارع الرياح لن تمتد إلى الوديان (بسبب موارد طاقة الرياح المنخفضة) باستثناء عدد قليل من الطرق أو خطوط الجهد المتوسط، كما أن التربة ذات قيمة منخفضة (رملية أو صخرية صحراوية غير نباتية).

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:

ستكون مشاريع طاقة الرياح مستقلة عن خدمات المرافق القائمة مثل إمدادات المياه ومعالجة مياه الصرف الصحي أو إمدادات الكهرباء وسيتم توفير المياه بواسطة شاحنات فنطاس من مصادر غنية في وادي النيل (انظر الموارد المائية ومياه الصرف الصحي أعلاه).

ويجب ربط مشاريع طاقة الرياح بشبكة الطاقة القومية وهذا يتطلب التوسع قبل التشغيل ويتطلب ذلك دراسات تحليل لتدفق الحمولة وتخطيط وتنفيذ شبكة توزيع الطاقة.

وعند اعتبار حركة النقل أثناء مرحلة التشييد فإن الحركة العامة على الطرق الإسفلتية في المنطقة لا تزال منخفضة وعلاوة على ذلك فإن الطرق ذات أبعاد جيدة ولم تصل إلى ذروة تحميلها بعد ويمكنها تحمل حركة المرور المتعلقة بإقامة مزارع الرياح.

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 لمنطقتي الرياح الشرقية الفرعية 1 & 2 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 ومع ذلك فقد يحدث بعض التفريغ في بعض الأحيان.

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 / ثانية² ويمكن التحكم في المخاطر بشكل جيد من خلال تطبيق قوانين الزلازل كجزء من معايير البناء.

7-2- البيئة البيولوجية:

يعتبر التقييم التالي للآثار المحتملة التي تسببها مزارع الرياح صالحا لكل من المناطق الشرقية الفرعية 1 & 2، وفي حالة إذا كانت الآثار مختلفة فسيتم تحيد ذلك أدناه.

مرحلة التشييد:

قد تؤدي أعمال التشييد (بما في ذلك إنهاء التكليف) لمزارع الرياح في مناطق الرياح الشرقية الفرعية إلى:

- دمك التربة:

قد يؤدي دمك التربة إلى إلحاق ضرر بالتربة من ناحية قابلية الزراعة ونمو النباتات، ولكن المنطقة المتأثرة محدودة (عادة حوالي 5 % من المساحة الكلية لمزرعة الرياح خلال مرحلة التشغيل) تاركة معظم مساحة المنطقة خالية من أية تدخلات، وعلاوة على ذلك فإن إمكانية نمو النباتات في هذه المنطقة القاحلة محدودة للغاية، وأخيرًا لا تشتمل هذه المناطق على أية أنواع مهددة أو مجتمعات نباتية ذات أهمية، وكخلاصة يكون أثر بناء مزارع الرياح في هذه المناطق منخفضا أو طفيف.

- انبعاث الغبار:

يقتصر انبعاث الغبار على منطقة صغيرة جدًا ولفترات قصيرة إلى حد ما ومن المتوقع حدوث آثار قليلة جدًا على الموائل أو النباتات أو الحيوانات بسبب انبعاث الغبار (حجم الحدث متوسط وحساسية المستقبلات منخفضة).

- النفايات:

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، وبالتالي يجب إزالة النفايات مباشرة من الموقع ويجب تخزينها في الموقع أو بالقرب منه بطرق مناسبة.

- ضرر مباشر للموائل والنباتات أو التعديل / فقد الموائل للنباتات والحيوانات مباشرة باستخدام بعض المناطق كأساسات للتوربينات وكطرق للوصول ومنصات لنصب التوربينات ومواقع لتخزين الآلات الثقيلة وغيرها من المنشآت التقنية.

- خلال أعمال البناء لمزارع الرياح التي تشمل التعبئة وإنهاء التعبئة سيتم إزالة لسطح التربة العلوي وبعض طبقات التربة العميقة، ومع ذلك فإن المنطقة المتأثرة ستكون محدودة (عادة حوالي 5 % من المساحة الكلية لمزرعة الرياح خلال مرحلة التشغيل) تاركة معظم المنطقة خالية من أي تدخلات، وبالتالي فإن المنطقة المتأثرة لن تغطي سوى جزء صغير من كل منطقة (حجم الحدث متوسط).

- لليس للغالبية العظمى من منطقة الرياح الشرقية الفرعية 1 أو لمنطقة الرياح الشرقية الفرعية 2 بكاملها أهمية كبيرة كموئل للنباتات أو الطيور المحلية أو الجاثمة أو الخفافيش أو الحيوانات الأخرى (حساسية المستقبلات منخفضة)، ولن تتأثر الطيور المهاجرة خلال مرحلة التشييد على الإطلاق، ومع ذلك تشكل الوديان في منطقة الرياح الشرقية الفرعية 2 موائل مناسبة للنباتات والطيور المحلية والمهاجرة والحيوانات الأخرى، ولذلك فلن يتم تركيب أية توربينات بجانب أو داخل الوديان في منطقة الرياح الشرقية الفرعية 1 (لا توجد أودية في منطقة الرياح الشرقية 2)، وهي: وادي إبداع ووادي البيرشاوي في الشمال ومجمع وادي العمراني ووادي ووادي المقلد في الجنوب، ويجب أن تقتصر أعمال البناء في تلك الأودية على الطرق المعبدة ولخنادق الكابلات التي تتم في مناطق أقل حساسية، وهكذا يمكن أن تظل حساسية المستقبلات منخفضة، ومن ثم يجب تقييم أهمية الوديان في

منطقة الرياح الشرقية الفرعية 1 على أنها أقل ملاءمة لمشروعات مزارع الرياح)أنظر الخريطة 8-1).

وكخلاصة، فلن يكون هناك تلف كبير للموائل والنباتات والحيوانات نتيجة بناء مزارع الرياح في مناطق الرياح الشرقية الفرعية 1 & 2 وبالتالي تم تقييم الأثر على أنه طفيف أو صغير.

-اضطراب الحيوانات من خلال الأنشطة البشرية باستخدام الآلات الثقيلة وحركة المرور والضوضاء وانبعاث الغبار:

-قد تتأثر الطيور المحلية أو الحيوانات الأخرى بالاضطرابات خلال مرحلة البناء ومع ذلك تقتصر تأثيرات الاضطراب على مساحة صغيرة نوعًا ما، وهكذا يمكن للحيوانات إيجاد موائل بديلة لوقت الأعمال الإنشائية، وعلاوة على ذلك يقتصر العمل الإنشائي على فترة زمنية قصيرة نوعًا ما ويمكن للطيور المحلية إعادة احتلال جميع المناطق بعد مرحلة البناء، وكخلاصة يتم تقييم الأثر على الحيوانات الناجم عن الاضطرابات أثناء مرحلة التشييد على أنه طفيف أو مهمل.

- أنواع جديدة من البيئات الحضرية والريفية:

يمكن إدخال بعض الأنواع الجديدة من البيئات الحضرية والريفية إلى المنطقة مع مواد البناء والحاويات التي تنقل المعدات، وينبغي تجنب ذلك قدر الإمكان لأن الأنواع الجديدة غالباً ما تؤثر على الأنواع المحلية.

مرحلة التشغيل والصيانة:

في ظل الشرط المسبق بعدم تركيب أي توربينات في المنطقة المهمة (مناطق الرياح الشرقية الفرعية) وفي غياب الموائل الأخرى القيمة في هذه المناطق يمكن الافتراض أنه لن تتأثر أي منطقة مهمة أثناء تشغيل وصيانة توربينات الرياح، وعلاوة على ذلك فمن المعروف أن تشغيل توربينات الرياح لا يؤثر على النباتات أو نمو النباتات، وخلال فترات الصيانة تقتصر الأنشطة البشرية على الطرق وأماكن التخزين، وكخلاصة فإن تشغيل وصيانة مزارع الرياح لن يسبب سوى آثار متبقية ضئيلة على الموائل أو النباتات أو المجتمعات النباتية ولا توجد أيضًا أنشطة أخرى في منطقة فرعية قد تساهم في زيادة الآثار إلى مستويات كبيرة.

قد تتأثر الطيور المهاجرة عمومًا بالآثار الناجمة عن التصادم أثناء مرحلة التشغيل والصيانة.

خلال ربيع عام 2016 وخريف عام 2016 وربيع عام 2017 ، كان نشاط هجرة الأنواع ذات الصلة منخفضًا في كلٍ من المناطق الفرعية (للاطلاع على البيانات التفصيلية ، انظر الملحق B5 من تقرير التقييم الاستراتيجي البيئي والاجتماعي لمزارع الرياح) ولم يتم تسجيل أي أنواع مهددة خلال هجرة الربيع (في عامي 2016 و 2017) وتم تسجيل اثنان فقط (في منطقة الرياح الشرقية الفرعية 1) وواحد فقط (في منطقة الرياح الشرقية الفرعية 2) والأنواع المهددة كانت بأعداد منخفضة في خريف عام 2016 ، وعلى الرغم من عدم وجود ارتباط دائم بين كثافة الطيور ومعدل الاصطدام (انظر الملحق B6 من تقرير التقييم الاستراتيجي البيئي والاجتماعي لمزارع الرياح) إلا أنه يمكننا أن نفترض أن خطر الاصطدام منخفض (حساسية مستقبل منخفضة)، وبالتالي لا يُفترض أن يشكل خطر الاصطدام الطيور المهاجرة مع توربينات الرياح العاملة تهديدًا كبيرًا لأن نشاط هجرة الأنواع ذات الصلة في المنطقتين كان منخفضًا في الربيع والخريف، وقد تحدث اصطدامات نادرة مع توربينات الرياح داخل المناطق الفرعية (حجم حدث منخفض) ولكن معدل الاصطدام المتوقع لن يسبب أثرا كبيرا، ومن ثم فإن خطر الاصطدام بتوربينات الرياح أثرا ضئيلًا بالنسبة للطيور المهاجرة، وهذا التقييم صحيح أيضا للأنواع ذات الأهمية المنخفضة وذلك لأن:

- هذه المناطق ليست ذات أهمية خاصة لتلك الأنواع،

- هذه الأنواع تهاجر بشكل رئيسي على جبهة واسعة، و

- هذه الأنواع ليست عرضة بشكل خاص للتصادم مع توربينات الرياح.

ومن أجل تجنب مزرعة الرياح فقد تغير الطيور اتجاه الطيران الأفقي أو ارتفاع الطيران (في الغالب عن طريق الارتفاع) ومن المحتمل أن يتسبب ذلك في زيادة الطاقة التي تبذلها لطيور في الطيران، ولكن مع ذلك يمكن أن نفترض أن الجهد الإضافي (على سبيل المثال زيادة مسار طيران بضعة كيلومترات) لن يؤثر عليها، وعلاوة على ذلك وبسبب انخفاض نشاط الهجرة في المنطقة فلن يتأثر سوى عدد قليل من الطيور حتى باعتبار مزارع رياح متعددة، وكخلاصة وعلى الرغم من أن زيادة جهد الطيور لا يمكن تقديره بدقة فإن أي تأثير للحاجز المحتمل لمزارع الرياح الن يتسبب في مخاطر

لأنواع الطيور ذات الصلة، وبسبب انخفاض نشاط هجرة الطيور فلن يتأثر إلا عدد قليل جدًا من الطيور وبالتالي يمكن تقييم الأثر على أنه ضئيل.

وقد تتعرض الطيور المهاجرة لخطر الاصطدام بكابلات الكهرباء العلوية المرتبطة بمشاريع طاقة الرياح أثناء طيرانها لأن الكابلات يصعب تصورها كعوائق، وفي معظم الحالات يؤدي تأثير الاصطدام إلى الموت الفوري أو إلى إصابات مميتة وتشوهات، وقد تم العثور بالفعل على إصابات لأنواع الطيور المهاجرة عند خط كهرباء على ساحل البحر الأحمر (EcoConServ 2015)، وقد تكون المخاطر أعلى في الحالات التي تعمل فيها خطوط الطاقة وتوربينات الرياح معا ، على سبيل المثال قد تواجه الطيور المهاجرة خطر الاصطدام بكابلات الكهرباء أثناء الهروب من ريش توربينات الرياح (أو العكس)، ومع ذلك بما أن نشاط هجرة الطيور ضئيلا في هذه المنطقة في الربيع والخريف فإن خطر الاصطدام بكابلات الكهرباء لن يشكل تهديدًا كبيرًا وقد تحدث تصادمات نادرة بها داخل أو بجوار المناطق الفرعية (انخفاض حجم الحدث) ، ولكن معدل التصادم المتوقع لن يسبب أثرا كبيرا على الطيور المهاجرة.

وقد يؤثر تشغيل وصيانة مزارع الرياح على الطيور المحلية على النحو التالي:

- اضطراب تشغيل التوربينات قد يؤدي إلى انخفاض في نوعية الموائل أو فقدان الموائل كلية.

قد تتأثر الطيور المحلية بالاضطراب خلال المرحلة التشغيلية لمزارع الرياح، ومع ذلك فإن معظم الأنواع معروفة بأنها لا تتأثر بالآثار الصوتية والبصرية المستمرة لتوربينات الرياح، وعلاوة على ذلك تقتصر آثار الاضطرابات على مسافة صغيرة تصل إلى 300 متر من التوربين، وحيث أن المنطقتين الفرعيتين ليس بهما موائل مهمة للطيور المحلية فإن الآثار الناجمة عن الاضطرابات المتعلقة بتشغيل التوربينات يتم تقييمها على أنها آثار ضئيلة.

ووفقاً لمعلومات حديثة، فإن الخفافيش وغيرها من أنواع الثدييات الأرضية والزواحف لا تتأثر بتشغيل توربينات الرياح، وبالتالي يتم تقييم آثار الاضطراب على تلك الأنواع على أنها مهملة.

- الاضطراب نتيجة للأنشطة البشرية المتعلقة بصيانة مزارع الرياح:

قد تتأثر الطيور المحلية أو الحيوانات الأخرى بالاضطرابات الناجمة عن الأنشطة البشرية خلال المراحل التشغيلية لمزارع الرياح، ومع ذلك فمن المتوقع أن يكون النشاط البشري محدودًا إلى حد ما في الزمان والمكان (حجم الحدث منخفض) ولا تحتضن المناطق الفرعية موائل مهمة للطيور المحلية أو للحيوانات الأخرى (حساسية مستقبلية منخفضة)، وكخلاصة يتم تقييم الآثار على الحيوانات الناجمة عن الاضطرابات المتعلقة بالصيانة كآثار ضئيلة.

- خطر الاصطدام:

سوف تواجه الطيور والخفافيش المحلية خطر الاصطدام بالتوربينات العاملة، ومع ذلك فإن الطيور المحلية ستكون على دراية بالتوربينات ويكون سلوكها مكيفًا بشكل أفضل مع وجود التوربينات. وبما أن مجتمع الطيور المحلية فقير جداً في الأنواع فإن كثافة الطيور منخفضة جداً ولم يتم العثور على أي نوع من الأنواع المهددة في المنطقة (حساسية المستقبلات منخفضة) ومخاطر التصادم منخفضة إلى حد ما ولن تؤدي مزارع الرياح إلى آثار كبيرة على الطيور المحلية (تأثير لا يذكر).

وكخلاصة فمن غير المتوقع أن يؤثر تشغيل العديد من مزارع الرياح في منطقتي الرياح الشرقية 1 & 2 على الحياة البرية الحيوانية بشكل كبير.

7-3- البيئة الاجتماعية والاقتصادية:

<u>القوى العاملة وفرص العمل:</u>

فيما يتعلق بتوفير فرص عمل جديدة سيؤدي المشروع إلى وظائف مباشرة وغير مباشرة، ويمكننا افتراض الأرقام التالية لكل مشروع قدرة 50 ميجاوات: بالنسبة للأعمال الكهربائية والمدنية بما في ذلك أعمال النقل / التوريد ، فإن هناك حوالي 140 عامل غير مهني بالإضافة إلى 30 من العمال المهرة الذين يقومون بمهام إشرافية (مدة 4-6 أشهر) لتركيب التوربينات (20) ويكون مطلوبا العمال المهرة زائد 20 من العمال المتخصصين (المدة 5-6 أشهر)، وبالإضافة إلى ذلك وبافتراض وجود محطة مشتركة لثمانية مشاريع تبلغ طاقة كل منها 50 ميجاوات ، سيكون نصيب كل مشروع 50 ميجاوات 10 عمال غير مهرة و10 عمال مهرة لمدة 8 أشهر.

وإذا تم تنفيذ ثلاثة مشاريع بالتوازي، فإن هذا يتطلب حوالي 700 عامل، المجتمعات المحلية في وادي النيل ستوفر نسبة أكبر من هذه القوة العاملة المؤقتة.

وسيقدم المشروع بعض الوظائف الدائمة لمزارع الرياح أثناء تشغيلها وصيانتها ومن المتوقع أن يكون مطلوبا 2 - 5 أشخاص للتشغيل والصيانة وستكون هناك حاجة إلى حوالي 4 أشخاص لحراسة مزرعة رياح بقدرة 50 ميجاوات.

ولابد من تطبيق المبادئ والحقوق الأساسية للعمال وفقا للمحدد في توجيهات البنك الأوروبي لإعادة التعمير والتنمية المحددة في EBRD PR2 و IFC PS2 وهذا ينطبق أيضا على مرافق الإقامة المؤقتة في الموقع.

<u>الموردين:</u>

كما سيؤدي المشروع إلى توفير فرص إيجابية للشركات المحلية التي ستشارك في توريد المواد (مثل الأسمنت والرمال والزلط والكابلات وغير ذلك) أوقد 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 مزارع الرياح 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 مع احترام التوجيهات 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.

تعزيز 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 لاسيما عن طريق خفض انبعاثات ثاني أكسيد الكربون.

الفوائد الاقتصادية والاستثمار:

سيؤدي المشروع إلى فوائد اقتصادية من خلال التحسين طويل الأجل لإمدادات الطاقة.

وعادة من المتوقع حدوث الآثار الإيجابية التالية من تطوير مزارع الرياح:

- تطوير اقتصاد طاقة الرياح (تطوير الصناعات ذات الصلة، وتطوير الأنشطة التجارية وخدمات التشغيل والصيانة لهذه المعدات) وسيكون هذا مجال جديد يجتذب المستثمرين وبالتالي ستزداد موارد العملة الصعبة.

- سيؤدي توفير مصدر متجدد للطاقة إلى تخفيض أي دعم مخصص للوقود غير المتجدد وبالإضافة إلى ذلك يعتبر المصدر الجديد للطاقة طاقة نظيفة.

- دخل ضريبي إضافي لأن المشاريع ستنفذ كمشروعات IPP.

المجتمع البدوي:

تقع مناطق مزارع الرياح في الصحراء وهي منطقة تستخدم تقليدياً للبدو، وخلال العمل الميداني لم نواجه بدو، ومع ذلك فإن تطوير مشاريع الرياح 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 الصحة على المجتمع من خلال تدفق العمال وتجنب التوترات المجتمعية) يجب اتباع سياسة منسقة وشاملة للمطورين في تطوير مزارع الرياح في منطقتي الرياح الشرقية الفرعية 1 & 2 ويعتبر هذا الأثر طفيفًا نظرًا لكون هاتين المنطقتين بعيدتين عن القرى في شرق النيل.

الآثار المتعلقة بالإزعاج المؤقت:

ستقتصر أنشطة الإنشاء على المناطق الصغيرة التي سيتم حظرها لفترات قصيرة فقط (مثل يوم أو يومين لتركيب توربينات الرياح) ونظرا لأن مناطق مزارع الرياح المختارة لا تقع على مسافة قريبة من أي مجتمع فلن يحدث أي إزعاج للمجتمعات المحلية.

الصحة والسلامة المهنية:

تنجم المخاطر الرئيسية المتعلقة بالصحة والسلامة عن العمل عند الارتفاع (إقامة توربينات الرياح) والعمل على الأنظمة الكهربائية والعمل بالأدوات والآلات، وسيكون المستثمرون مطالبين بالحفاظ على توجيهات البيئة والصحة والسلامة لمجموعة البنك الدولي كحد أدنى، وإلى جانب الالتزام بالمبادئ التوجيهية العامة فيما يتعلق بالصحة والسلامة المهنية والبيئة فيجب أيضا الالتزام بتوجيهات مؤسسة التمويل الدولية: توجيهات السلامة والصحة والبيئة الخاصة بطاقة الرياح والمبادئ التوجيهية البيئية والصحية الآمنة لنقل الطاقة الكهربائية وتوزيعها.

وعلاوة على ذلك يتعين على المستثمرين المستقبليين، من خلال مقاوليهم، الاستعانة بمهندسين / مشرفين للصحة والسلامة والبيئة لمنع أي مخالفات، وسيتم وضع خطة إدارة 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:

8-1- 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 التكيفية.

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 تبعثرها.

- 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 والخنادق 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.

8-2- لبيئة الفيزيائية:

8-2-1- استخدام الأراضي:

الأراضي المستخدمة حاليًا لاستخدامات أخرى تم استبعادها لمشروعات مزارع الرياح لتجنب الصراعات الاجتماعية وفي الوقت نفسه للحفاظ على المسافات المطلوبة للوقاية من الضوضاء والإزعاج، والمناطق المستبعدة على مسافات كافية من المناطق المقترحة لمزارع الرياح وبالإضافة إلى ذلك يتم مراعاة مسافات الامان لتوربينات الرياح وهي 150 متر من حدود المناطق المستبعدة ويجب مراعاة ذلك أثناء التخطيط لمزارع الرياح.

<u>إجراءات التخفيف:</u>

- يتم إجراء دراسة أكثر تفصيلاً عن آثار استخدام الأراضي أثناء إعداد دراسة تقييم الأثر البيئي والاجتماعي لمشاريع مزارع الرياح بقدرة 50 ميجاوات.

- يجب اعتبار إمكانية أي نزوح منذ مرحلة التخطيط ومحاولة تجنب تحديد مواقع للمشروع في أي مكان يعتبر تابع للسكان المحليين ويستخدم في بعض الأنشطة.

- إذا كان هذا لا مفر منه فينبغي النظر في خطط تعويض المتضررين وينبغي توفير المخصصات لهذا الغرض.

8-2-2- الأثر على المنظر العام والتأثير البصري:

باعتبار الطبيعة الشاسعة للمنطقة وعدم تواجد لمستقبلات بشرية فلا يلزم اتخاذ تدابير تخفيف محددة أثناء التخطيط لمزارع الرياح باستثناء منطقة المقابر الأثرية للملوك.

8-2-3- 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 توربينة واحدة.

يجب 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.

8-2-4- النفايات المنزلية والخطرة:

يجب اجبار المقاولين على العمل بأسلوب نظيف منظم أثناء التشييد بموجي 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.

8-2-5- جودة الهواء:

إن الآثار على جودة الهواء المحيط خلال مرحلة التشييد ينجم أساسا من تصاعد الغبار في مواقع العمل من جراء حركة المعدات والشاحنات أثناء أعمال الحفر ويجب تخفيفها وفقا لتوجيهات الصحة والسلامة المهنية.

وتدابير التخفيف هي:

- رش التربة بالماء

- يتم وقوف العمال باعتبار حركة الهواء

- ارتداء أقنعة واقية.

8-2-6- الضوضاء والتداخلات الكهرومغناطيسية:

يتم تخفيف آثار الضوضاء على المواقع التي يعمل فيها العمال عن طريق الحفاظ على مسافات لا تقل عن 500 متر من أي نشاط قائم في المنطقة وهذا ينطبق على كل من مرحلة التشييد والتشغيل.

ولتجنب الآثار السلبية على إشارات الإرسال اللاسلكية يجب الحفاظ على ممرات 600 متر (أي 300 متر على كل جانب وتقاس عبى خط مستقيم) بعيدا عن تأثير توربينات الرياح ولتحديد المواقع يجب إضافة دائرة نصف قطر الدوار، وبما أن صواري الهاتف المحمول تقع بجوار صواري الإرسال فإن هذا الممر سيحمي إشارات الهاتف المحمول من الاضطراب أيضا.

8-2-7- التراث الأثري والتاريخي والثقافي:

سيكون الأثر على مقبرة إخناتون التي ترجع إلى 3500 عام بالقرب من منطقة المشروع كبيرا، ويتم التخفيف من التلوث البصري من خلال إبقاء التوربينات الهوائية على مسافة لا تقل عن 3 كم من المقابر وهذا يتوافق مع متطلبات القانون 1983/117 وتعديلاته بموجب القانون رقم 1991/12، المادة 20 المتعلقة بعدم منح تصاريح التشييد في المواقع الأثرية إلا إذا كانت على مسافة تزيد عن 3 كم منها.

8-2-8- تخفيف الأثر على حركة المرور:

يجب كذلك تخفيض آثار حركة المرور الإضافية على الطرق الإقليمية وهو سيكون أثرا طفيفا على كل حال ومع ذلك يمكن النقل بالشاحنات الثقيلة خلال ساعات حركة المرور المنخفض (أثناء المساء والليل).

ويجب على المستثمرين المستقبليين 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.

8-3-البيئة البيولوجية:

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 في حدود مناطق التشييد والتخزين وطرق الوصول والمسارات ويجب تجنب أي استخدام للمناطق المحيطة بشكل صارم.

وللتخفيف الآثار على الطيور المهاجرة والطيور المحلية الناجمة عن مزارع الرياح الكبيرة يجب اتخاذ التدابير التالية أثناء مرحلة التخطيط والتشييد:

- تجنب التوربينات المقامة على أبراج ذات عناصر شبكية لأنها تقدم أماكن لجلوس الطيور عليها وبالتالي تجتذب الطيور الكبيرة إليها مما يزيد من خطر اصطدام الطيور بها.

- تجنب إضاءة توربينات الرياح حيث أن ذلك يؤدي إلي انجذاب الطيور إلى مناطق مزارع الرياح مما يؤدي إلى زيادة مخاطر الاصطدام وإذا كانت إضاءة التوربينات مطلوبة تمامًا (على سبيل المثال لتلبية متطلبات الطيران المدني والعسكري) فيجب استخدام الحد الأدنى لعدد الأضواء البيضاء المتقطعة المتألقة ذات الكثافة المنخفضة (Drewitt & Langston 2006).

- بناء الشبكة الكهربائية داخل مزرعة الرياح وبين مزارع الرياح المختلفة بواسطة كابلات أرضية وإذا كان لا يمكن تجنب استخدام الخطوط الهوائية (على سبيل المثال خطوط 220 كيلو فولت) فيجب أن تصمم هذه الخطوط وفقا للمبادئ التوجيهية المتاحة (على سبيل المثال BirdLife International 2015) من أجل تجنب خطر صعق الطيور بالكهرباء.

وباستثناء مراعاة التدابير المذكورة أعلاه وتطبيقها ليست هناك حاجة إلي مزيد من إجراءات التخفيف فيما يتعلق بالموائل والنباتات والحيوانات لأنه لا يتوقع وجود أية آثار متبقية لمزارع الرياح كما لا توجد حاجة إلي إجراءات تخفيف أخرى للطيور المهاجرة لأن نتائج رصد الطيور تبين بوضوح أن نشاط هجرة الطيور منخفض ولم يتم تسجيل أية أنواع مهددة خلال هجرة الربيع وكان هناك نوع واحد فقط مهدَّد متواجد بأعداد منخفضة للغاية خلال هجرة الخريف.

8-4- 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 أخر من جراء نحريك التربة واستخدام المعدات الكبيرة ونقل المواد ذات الوزن الزائد المتضخم وتشييد المنشآت الصناعية وتركيبها، وبالإضافة إلى ذلك تشمل قضايا الصحة والسلامة العمل على ارتفاعات 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: توجيهات 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 لمعاقبة 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 طاقة الرياح 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 ارشاد 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 تلبي الاحتياجات الأساسية للعمال وفقاً لتوجيهات سكن العاملين في مؤسسة التمويل الدولية والبنك الأوروبي لإعادة التعمير.

- إشراك أصحاب المصلحة والجمهور والإفصاح عن المعلومات المتعلقة وإنشاء آلية التظلم وآلية التعويض عن طريق هيئة الطاقة الجديدة والمتجددة.

8-5- إجراءات التخفيف الخاصة في مناطق الرياح الشرقية الفرعية:

منطقة الرياح الشرقية الفرعية 1:

إلى جانب تدابير التخفيف العامة التي يجب تطبيقها على جميع مزارع الرياح، فقد تم تحديد خصائص خاصة في منطقة الرياح الشرقية الفرعية 1 التي تتطلب إجراءات تخفيف محددة (أنظر الخريطة 8-1).

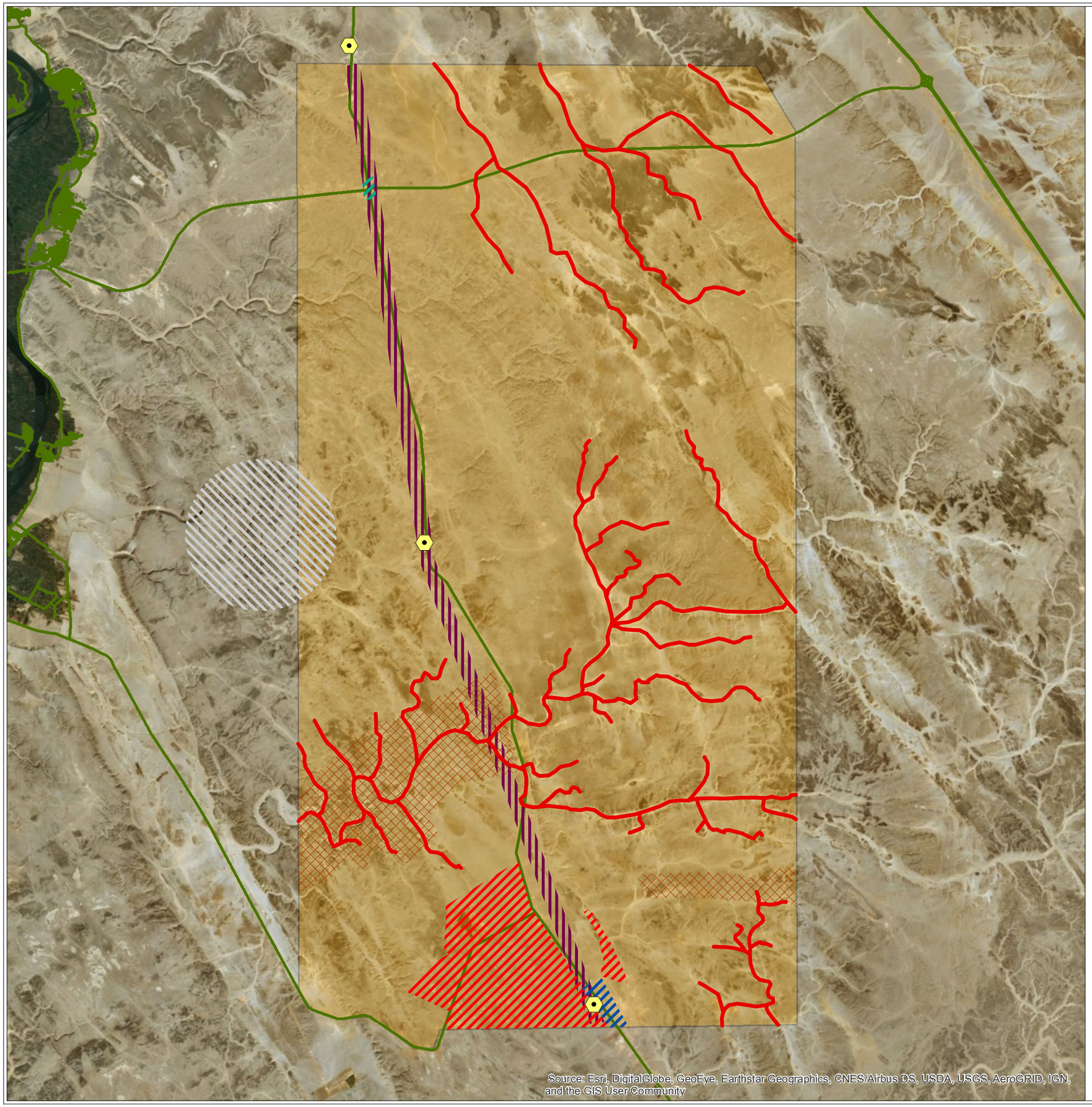
- الأودية الأكبر حجماً التي تحتوي على نباتات متفرقة تشكل عناصر محددة في الصحراء ويمكن استخدامها كموئل لبعض الحيوانات وللطيور المحلية، ومن ثم يجب تقييم أنظمة الأودية الأربعة المحددة على أنها أقل ملاءمة لمشروعات الرياح (أنظر خريطة 8-1) وإجراءات التخفيف المناسبة هي تجنب تركيب التوربينات في الأودية الهامة وتقليص أعمال التشييد في هذه الأودية قدر المستطاع (على أن تكون مقتصرة على عبور الطرق الحصوية وخنادق الكابلات التي تنفذ في مناطق أقل حساسية).

- يجب تطبيق المزيد من القيود بالإضافة إلى المحددة مسبقًا فيما يتعلق بمرسلات الاتصالات الاتجاهية الموجودة ويجب الحفاظ على ممر بعرض 600 متر (300 متر على كل جانب من الصواري) لمنع التداخلات مع توربينات الرياح ويقع الممر بالقرب من طريق المنيا – أسيوط (أنظر خريطة 8-1).

- وعلاوة على ذلك يجب الاحتفاظ بمسافة لا تقل عن 3 كيلومترات من قبر إخناتون لحماية موقع التراث الوطني من تلوث المنظر الطبيعي بواسطة توربينات الرياح وتصل دائرة الخلوص إلى 1.5 كيلومتر في منطقة الرياح الشرقية الفرعية 1 (انظر خريطة 8-1).

منطقة الرياح الشرقية الفرعية 2:

إلى جانب تدابير التخفيف العامة التي يجب تطبيقها على جميع مزارع الرياح فلم يتم تحديد أي سمات خاصة في منطقة الرياح الشرقية الفرعية 2 تتطلب إجراءات تخفيف محددة - باستثناء الأراضي الزراعية في الجزء الجنوبي السفلي من منطقة الرياح الشرقية الفرعية 2 التي يتم استبعادها من مشروعات مزارع الرياح.



JV LAHMEYER INTERNATIONAL ecoda

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

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

Map NTS 8-1:
Restrictions for wind power developments in the East Wind-1 subarea

Bordering of East Wind-1 subarea

East Wind-1 subarea

Main road and telecommunication tower

main road

telecommunication tower

Zones preclusive for wind power development

due to farming area

due to industrial area

due to service buildings

due to transmitter corridor

due to Royal Tombs

Zones unfavourable for wind power development

wadi of importance

due to geomorphology

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1:170.000

N

9- الإدارة البيئية والاجتماعية وخط المراقبة:

من المفهوم أن هيئة الطاقة الجديدة والمتجددة أو هيئة مصرية أخرى ستطرح مناقصة لاختيار مستثمرين من القطاع الخاص لمشروعات طاقة الرياح التي تبلغ قدرتها 50 ميجا وات وستشرف على المستثمرين خلال فترة عمر المشروعات ويجب على هيئة الطاقة الجديدة والمتجددة أن تفكر في جعل خطة المراقبة البيئية والاجتماعية إلزاميةً 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.

وقد تم إجراء مسحين كبيرين للطيور في منطقة المنيا الواقعة في غرب وشرق وادي النيل وكشفت كلتا الدراستين بوضوح أن الصحراء الواقعة على مسافة 10 كيلومترات إلى الغرب والشرق من وادي النيل ليس لها أهمية خاصة لهجرة الطيور - لا في الربيع ولا في الخريف، وحيث أن هذا الاستنتاج يمكن اعتباره نهائيا فإن هناك بيانات أساسية كافية متاحة لتقييم الأثر المستقبلي ولا يلزم إجراء المزيد من دراسات خط الأساس عند إقامة مزارع الرياح أو الطاقة الشمسية الكهروضوئية في منطقة شرق النيل.

وبناءً على ذلك فلا يُتوقع حدوث أي تأثير كبير على الطيور المهاجرة عند تركيب وتشغيل العديد من مشاريع طاقة الرياح في مناطق شرق النيل الفرعية، ومن وجهة نظر تقنية صارمة يمكن اعتبار هذا التقييم على أساس جيد وبالتالي لا يلزم مراقبة ما بعد التشييد للتحقق من هذا التقييم، ومع ذلك فإن مراقبة ما بعد التشييد تعتبر ممارسة دولية جيدة من قبل معاهد التمويل الدولية وقد يتطلب الأمر القيام بمثل هذه المراقبة في مزارع الرياح التشغيلية للتحقق من نتائج هذا النظام وينبغي تحديد النهج الدقيق ونطاق مثل هذه المراقبة بعد التشييد على أساس كل حالة على حدة في سياق تقييم الأثر البيئي والاجتماعي الخاص بالمشروع، فعلى سبيل المثال قد تشمل مراقبة ما بعد التشييد الملاحظات المرئية للطيور المهاجرة وأية طيور ميتة في مزارع الرياح وخطوط الطاقة المرتبطة بها.

ويتطلب تنفيذ تدابير التخفيف اتخاذ إجراءات خلال مرحلة تقديم العطاءات والتخطيط والتشييد ومرحلة ما بعد التشييد لكل مزرعة رياح فردية سيتم إنشاؤها في المنطقة ويمكن تلخيص ذلك في خطة الإدارة البيئية والاجتماعية التالية وتنطبق هذه الإجراءات على جميع مشاريع طاقة الرياح في منطقة المشروع وسيتم استكمالها عند الضرورة بتدابير محددة أثناء تقييم آثار المشروع.

جدول 9-1- خطة الإدارة البيئية والاجتماعية

مرحلة المشروع	السمات البيئية	المتطلبات التريعية ومتطلبات البنك الأوروبي	إجراءات التخفيف
كافة المراحل	التظلمات	توجيهات البنك الأوروبي PR1 & PR10 وأفضل الممارسات	إعداد آلية تظلم تطبق خلال دورة حياة مشاريع مزارع الرياح تديرها السلطة المصرية المختصة.
مرحلة المناقصة والتخطيط	مخاطر الصحة والسلامة	توجيهات البنك الأوروبي PR1 & PR4 وأفضل الممارسات	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.
			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.
	تطبيق إجراءات للتخفيف	توجيهات البنك الأوروبي PR1 وأفضل الممارسات	جعل تحديد إجراءات التخفيف أثناء مرحلة التشييد والتشغيل إلزاميا للمقاولين عند تقديم عروض مزارع الرياح بقدرة 50 ميجاوات

	مسافات السلامة		جعل الاحتفاظ بمسافة 150 مترا من حدود المنطقة إلزاميا.
	الآثار على الموائل الطبيعية والنباتات والحيوانات	توجيهات البنك الأوروبي PR6 وأفضل الممارسات	تجنب تطبيق توربينات الرياح على أبراج بعناصر شبكية. تجنب إضاءة توربينات الرياح. تجنب أعمال التشييد في الأودية الأربعة المحددة قدر الإمكان. تجنب التأثير على سمات معينة (مثل الكهوف أو الشقوق) التي قد تشكل موئلاً مناسبًا للحيوانات (يجب أخذها في الاعتبار في تقييم الأثر البيئي والاجتماعي الخاص بالمشروع). يجب اعتبار وجود الموائل الحساسة على نطاق أصغر في تقييم الأثر البيئي والاجتماعي للمشروع.
			يجب تشييد الشبكة الكهربية داخل مزرعة الرياح وبين مزارع الرياح المختلفة باستخدام كابلات تحت الأرض، وإذا كان لا يمكن تجنب استخدام الخطوط الهوائية فيجب تصميمها وفقًا للتوجيهات المتاحة (على سبيل المثال BirdLife International 2015).
مرحلة التشييد	مخاطر الصحة والسلامة	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	جعل توجيهات الصحة والسلامة لمزارع الرياح IFC 2007 وتوجيهات الصحة والسلامة والبيئة لمزارع الرياح – أغسطس 2015- حد أدنى، هذا مع الامتثال لتوجيهات EBRD 4 الخاصة بالصحة والسلامة.

		توجيهات البنك الأوروبي PR4 & EP3 وأفضل الممارسات	يجب على المقاول تعيين مهندس للصحة والسلامة والبيئة مفوض لإعطاء توجيهات الصحة والسلامة والبيئة.
		توجيهات البنك الأوروبي PR4 & EP3 وأفضل الممارسات	إعداد متطلبات الصحة والسلامة والبيئة قبل البدء في أي نشاط.
		توجيهات البنك الأوروبي PR4 & EP3 وأفضل الممارسات	توفير أدوات ومعدات الصحة والسلامة والبيئة وتدريب العاملين عليها.
		توجيهات البنك الأوروبي PR4 & EP3 وأفضل الممارسات	إقامة مرافق صحية بالموقع.
		توجيهات البنك الأوروبي PR4 & EP3 وأفضل الممارسات	إيقاف العمل في حالات الظروف الجوية الغير مواتية مثل العواصف الرملية.
			التأكد من أن الأعمال على تركيب التوربينات تتم من جانب فنيين متدربين على الصحة والسلامة المتعلقة.
	حماية موارد المياه	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	تركيب خزانات المياه لحماية الآبار من الإفراط في الاستخدام: خزان واحد في محطة خلط الخرسانة بلحد أدنى من الحجم الذي يتوافق مع الطلب على المياه لصنع الخرسانة

			لأساس توربينة واحدة. خزان واحد عند بئر إمداد المياه بحد أدنى لحجم يعادل أكبر شاحنة صهريج. تقليل استهلاك المياه.
	حركة المرور	توجيهات البنك الأوروبي PR4 & EP3 وأفضل الممارسات	يتم القيام بنقل المعدات ذات الأحجام والأوزان الكبيرة في ساعات الحركة المنخفضة للمرور (أثناء المساء أو الليل) مع مرافقة سيارات الأمن لها.
	التلوث	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	ضمان العمل بنظام ونظافة مع مراقبة مشرفين لتقليل المخلفات السائلة والصلبة وللتخلص الصحيح منها.
	التخلص من المخلفات غير الخطرة	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	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 دفنها في الصحراء مع التغطية بالرمال بعمق لا يقل عن 1.5 متر).
	التخلص من المخلفات الخطرة	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	تجنب انسكاب الزيوت والوقود والشحوم على التربة ويجب جمعها وإعادة تدويرها.
	معالجة مياه الصرف الصحي	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	إنشاء محطة معالجة لاهوائية بسيطة من مرحلتين وتصريف المياه المعالجة إلى حصى صحراوي لمرحلة ما بعد المعالجة.
		توجيهات البنك	في نهاية أعمال التشييد يجب أن يجعل

		الأوروبي PR3 وأفضل الممارسات	المقاول الموقع في ظروف مرتبة ويجب أن يتم ردم الحفر وأن يتم تجميع أكوام مواد الحفر وأن يتم التخلص من النفايات بشكل صحيح
	الآثار على الموائل والنباتات والحيوانات	توجيهات البنك الأوروبي PR6 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 موائل حساسة إن وجدت (يتم تحديدها في تقييم الأثر البيئي والاجتماعي الخاص بالمشروع)
		توجيهات البنك الأوروبي PR6 وأفضل الممارسات	تجنب احضار أنواع جديدة من البيئات الحضرية والريفية إلى المنطقة (على سبيل المثال مع مواد البناء والحاويات).
		التشريعات الوطنية	الالتزام بالأنظمة المحددة في المادة 28 من القانون المصري رقم. 1994/4 لحماية البيئة المعدل بالقانون رقم 2009/9.
	العمالة وظروف العميل	توجيهات البنك الأوروبي PR7 وأفضل الممارسات	يجب توظيف أكبر قدر ممكن من عمال البناء من أقرب المناطق أي من أقرب القرى في وادي النيل.
		توجيهات البنك الأوروبي PR2, PR7, PR2 وأفضل الممارسات	الامتثال للمبادئ والحقوق الأساسية للعاملين ومعايير الإقامة التي تلبي متطلبات البنك الأوروبي لإعادة التعمير (PR2) ومؤسسة التمويل الدولية (PS2) وقوانين العمل والعمالة الوطنية.
		توجيهات البنك	يجب أن تكون أي مرافق إقامة مؤقتة

		الأوروبي PR7 وأفضل الممارسات	في الموقع مناسبة وأن تكون نظيفة وآمنة مع تلبية الاحتياجات الأساسية للعمال.
مرحلة التشغيل والصيانة	مخاطر الصحة والسلامة	توجيهات البنك الأوروبي PR4 وأفضل الممارسات	التأكد من أن عمال تشغيل وصيانة مزارع الرياح مؤهلين ومتدربين على أمور الصحة والسلامة.
	المخلفات الخطرة	توجيهات البنك الأوروبي PR3 وأفضل الممارسات	في حالة التوربينات التي تشمل صناديق تروس وتتطلب التغيير المنتظم لزيوتها فيجب تجنب انسكاب هذه الزيوت ويجب جمعها وارسالها لإعادة التدوير.
	التراث الثقافي	توجيهات البنك الأوروبي PR8, IFC PS8 والتشريعات الوطنية	يجب تطبيق قواعد معينة بالنسبة للأثريات التي يتح اكتشافها أثناء أعمال الحفر. يجب تدريب المقاولين ومقاوليهم من الباطن على تطبيق هذه الإجراءات.
مرحلة إنهاء التكليف	استخدام الأراضي واللاندسكيب	توجيهات البنك الأوروبي PR6 وأفضل الممارسات	يجب إزالة تركيبات مزارع الرياح في نهاية عمرها وإعادة اللاندسكيب لحالته الأصلية وتسوية التربة وردم الخنادق.