



RCREEE

Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

ESIA FOR THE 220kV OVERHEAD TRANSMISSION LINE (OHTL) FOR RSWE 500MW WIND FARM PROJECT



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ABBREVIATIONS AND ACRONYMS

BOO	Build, Own, Operate
CHA	Critical Habitat Assessment
DCT	Double-Circuit Transmission Tower
EEAA	Egyptian Environmental Affairs Agency
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EEAA	Egyptian Environmental Affairs Agency
EETC	Egyptian Electricity Transmission Company
EHS	Environment, Health and Safety
EMF	Electric and Magnetic Field
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GoE	Government of Egypt
GoS	Gulf of Suez
GWh	Giga-Watt Hour
HSE	Health, Safety and Environment
IBA	Important Bird Area
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IFC	International Finance Corporation
IFI	International Financing Institutions
ISES	Integrated Sustainable Energy Strategy
KBA	Key Biodiversity Area
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OHSP	Occupational Health and Safety Plan
OHTL	Overhead Transmission Line
PBF	Priority Biodiversity Feature
PR	Performance Requirement
PS	Performance Standard
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
RoW	Right of Way
RSWE	Red Sea Wind Energy
SCA	Supreme Council of Antiquities
SESA	Strategic Environmental and Social Assessment
WWTP	Wastewater Treatment Plant

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1 NON-TECHNICAL SUMMARY

Background to the Project

1. The Renewable Energy Law (Decree Law 203/2014) was issued to support the creation of a favourable economic environment for a significant increase in renewable energy investment in the country. The law sets the legal basis for the Build, Own and Operate (BOO) scheme to be implemented in which private investors are invited to submit their offers for solar and wind development projects.
2. Through the BOO mechanism, the Red Sea Wind Energy (RSWE) has been selected for the development of a 500MW Wind Power Project in the GOS (hereafter referred to as 'the GOSII Project'). An Environmental and Social Impact Assessment (ESIA) study has been completed for the GOSII Project.
3. However, the ESIA prepared for the GOSII Project did not include the Overhead Transmission line (OHTL) that will connect from the Wind Farm to the National Grid, given that no information was available on its route at that time (the OHTL is referred to as 'the Project' throughout the document).
4. This executive summary presents the main outcomes of the Environmental and Social Impact Assessment (ESIA) that was undertaken for the OHTL. The ESIA was prepared in accordance with the Egyptian Environmental Affairs Agency's (EEAA) requirements as stipulated by the "Law No. 4 of 1994". In addition, the ESIA meets international best practice Environmental and Social (E&S) requirements.

Project Description

(i) Project Location

5. The Project is located in the Red Sea Governorate of Egypt, around 200km to the southeast of the capital city of Cairo. More specifically, the Project is located near the Red Sea shoreline and within the Ras Ghareb Local Governmental Unit of the Red Sea Governorate, where the closest villages include Ras Ghareb (located 12km to the southeast) and Zaafarana (45km to the north). Refer to figure below.

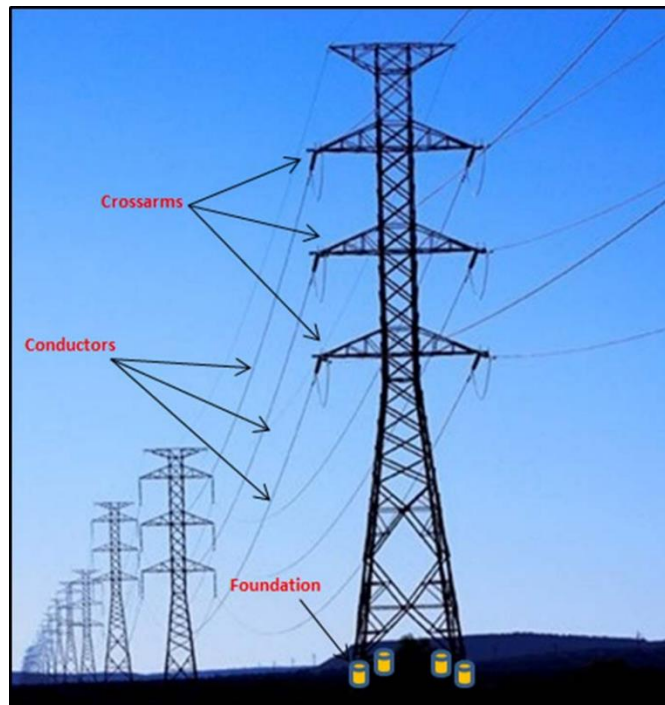


(ii) Project Components

6. The main component of the OHTL is the transmission towers. The transmission tower will be a three (3) phase steel beam Double-Circuit Transmission Towers (DCT), which will transport the electricity from a

substation located within the GOSII 500MW Wind Farm to the High Voltage National Grid. Check figure below.

7. Based on information available from EETC, the OHTL will consist of around 107 towers that will be distributed throughout the route. The height of each tower will around 50m. The total route of the OHTL is around 35km.
8. Each transmission tower will consist of the following: (i) foundations that are fixed and bolted to the ground; and (ii) Cross-Arms where each tower will have six (6) steel beam cross arms (3 on each side) that will carry the 220kV conductor line.
9. Other infrastructure elements will include access roads required for access of construction vehicles and machinery during construction and for maintenance activities during operation.



The Environmental and Social Impact Assessment of the Project

The OHTL is considered a key component for the 500MW GOSII Wind Farm Project as it will supply the electricity produced by the Wind Farm to the National Grid. Without the OHTL, the GOSII Wind Farm Project cannot be realised. The Wind farm project in turn will result in crucial positive environmental and economic impacts on the strategic and national level. Such positive impacts are important to consider and take into account and include the following:

- The Project allows for more sustainable development and shows the commitment of the Government of Egypt to realizing its energy strategy and meeting the set targets for renewable energy sources;
 - The Project will contribute to increasing energy security through reliance on an indigenous, inexhaustible and mostly import-independent energy resource. The expected electricity generation from the Project will serve the annual electricity needs of more than 800,000 local households (ECO Consult and EcoConserv, 2020).
 - The clean energy produced is expected to reduce consumption of conventional petroleum products used at thermal power plants for electricity generation. This will help in reducing greenhouse gas emissions as well as air pollutant emissions – the Project is expected to offset more than 1 million metric tons of CO₂ annually (ECO Consult and EcoConserv, 2020).
10. On the other hand, the Project will result in certain negative environmental impacts. Nevertheless, the ESIA in general concludes that such impacts do not pose any key or major issues of concern, and through

the implementation of the appropriate mitigation and monitoring requirements they are considered not significant. Such mitigation and monitoring measures are presented in details within the Environmental and Social Management Plan (ESMP) in the ESIA document.

11. The table below provides an overview and summary of the key findings of the ESIA.

E&S Attribute	E&S Baseline Assessment	Further Requirements and Actions
Landscape and Visual	No key issues of concern noted. No sensitive visual receptors which could be impacted during construction or operation have been identified within the Project area and surrounding areas.	Routine mitigation and management measures are identified within the ESMMP
Land Use	No physical structures or economical activities were noted within the OHTL route nor any evidence of such activities. The entire route is vacant and runs within unoccupied desert and barren lands.	No anticipated impacts on land use and therefore no mitigation and monitoring measures required.
Geology, Hydrology, Hydrogeology	The OHTL route runs within a key Wadi system in the area (Wadi Hawashiya). In addition, there are several other drainage lines and other smaller Wadi system noted.	Flood risk assessment must be undertaken which provides recommendations to include for example a buffer distance from the wadi systems to mitigate risks, and/or identification of detailed engineering structures/ for the design of the OHTL.
		Routine mitigation and management measures for waste management are identified in ESMP for construction and operation.
Biodiversity	No biodiversity elements of high concern with arid habitats dominating the project site and no species of global concerns are known to be present in significant numbers at the project site and its vicinity.	Routine proper management measures
Birds	High bird migration especially during spring season, including passage of five globally threatened species and other species recorded in remarkable numbers as the project is located along a migration flyway. OHTL crosses Gebel El Zeit IBA (Critical Habitat) but is located away from the habitats/features of the IBA	Fatality and bird migratory monitoring during operation, support IBA conservation management actions as part of net gain since OHTL crosses Critical Habitat (Gebel El Zeit IBA).
Archaeology and Cultural Heritage	No key issues of concern noted. No site-specific archaeology or cultural heritage remains have been identified.	Routine requirements for chance find procedures included in ESMP for implementation during construction
Air Quality and Noise	No key issues of concern noted.	Routine mitigation and management measures for dust and noise control during construction are identified in ESMP
Infrastructure and Utilities	Several road and electricity networks were noted near and/or intersect with the OHTL route	Discussions should be undertaken between EETC and relevant entity to discuss OHTL route design and identify appropriate buffer distance requirements from the OHTL route.
Occupational Health and safety	Baseline assessment considered irrelevant.	Routine requirements for occupational health and safety during construction and operation included in ESMP
Community Health, Safety and Security	No local communities identified within or near the site.	Routine requirements related to public access during operation are included in the ESMP.

2 INTRODUCTION

2.1 Background

Since 2007, Egypt has experienced an energy supply deficit due to the rapid increase in energy consumption and the depletion of domestic oil and gas resources, shifting its position as a net hydrocarbon exporter for the last three decades to that of a net importer.

This has brought a set of challenges to the energy sector, including electricity shortages, caused in part by the decline of domestic gas production, as natural gas is the main source of electricity, accompanied by highly subsidized energy prices, with negative financial implications for already dwindling government revenues.

In response, the Government of Egypt (GoE) has taken bold steps to adopt an energy diversification strategy with increased development of renewable energy and implementation of energy efficiency, including assertive rehabilitation and maintenance programs in the power sector (IRENA, 2018).

To this extent, in 2013, the Arab Republic of Egypt (through the Ministry of Electricity and Renewable Energy) had developed and adopted the Integrated Sustainable Energy Strategy (ISES) 2015 – 2035, which provides an ambitious plan to increase the contribution of renewable energy to 20% of the electricity generated by the year 2020, of which 12% of wind power plants is foreseen, mostly in the Gulf of Suez (GoS) due to the wind characteristics in the area.

In that respect, the GoE issued the Renewable Energy Law (Decree Law 203/2014) to support the creation of a favourable economic environment for a significant increase in renewable energy investment in the country. The law sets the legal basis for the Build, Own and Operate (BOO) scheme to be implemented. With this law, direct proposal submission of renewable energy projects to the Egyptian Electricity Transmission Company (EETC) was allowed, where investors had the opportunity to identify and develop renewable grid-connected electricity production projects such as wind farms and solar systems. In addition, the GoE (through the New and Renewable Energy Authority (NREA)) provides the land for the investors.

Through the BOO mechanism, the Red Sea Wind Energy (RSWE) which is being incorporated by the consortium composed of Toyota Tsusho Corporation (TTC), Eurus Energy Holdings Corporation (EEH), ENGIE Energie Services S.A (ENGIE) and Orascom Construction S.A.E (OC) (hereafter referred to as 'the Developer'), has been selected for the development of a 500 Megawatt (MW) Wind Power Project (hereafter referred to as 'the GOSII Project'). The Project is located in the GoS on a land area of approximately 70km² provided by NREA. An Environmental and Social Impact Assessment (ESIA) study has been completed for the GOSII Project.

The Project will produce between 2,200 and 2,500-Gigawatt Hour (GWh) of electricity that will be supplied to the Egyptian National Electricity Grid. However, the ESIA prepared for the GOSII Project did not include the Overhead Transmission line (OHTL) that will connect from the Wind Farm to the National Grid, given that no information was available on its route at that time (the OHTL is referred to as 'the Project' throughout the document). Therefore, EEAA required an ESIA study to be undertaken at a later stage for the OHTL once the route has been confirmed.

At this stage, the route has been determined by the Egyptian Electricity Transmission Company (EETC), whom is responsible for development of the OHTL. Therefore, the Developer and RCREEE, on behalf of EETC, commissioned the consortium of ECO Consult and EcoConServ (hereafter referred to as the 'ESIA Consultant') to prepare the ESIA study for the OHTL. This report presents the ESIA study for the OHTL.

2.2 Environmental and Social Impact Assessment Report

The environmental clearance for this Project is governed by the Egyptian Environmental Affairs Agency (EEAA) as stipulated by the Law No. 4 of 1994 (Law on Protection of the Environment). Executive Regulations 1995 (Prime Ministers Decree 338) issued in accordance with the Law, classifies this Project as "Category B

Scoped Study”. Additional details on the Egyptian legal E&S framework and requirements for a “Scoped ESIA Study” is provided in “Chapter 4”.

The Developer will be seeking financing for the Project from prospective lenders, including International Financial Institutions (IFIs). Therefore, the Developer wishes to design and manage the project in accordance with good international industry practice. For the purpose of the ESIA this has therefore been developed in accordance with following requirements. “Chapter 4” provides additional details on the IFI E&S requirements.

- IFC Performance Standards (PSs) of Social and Environmental Sustainability;
- IFC General EHS Guidelines (2007);
- IFC EHS Guidelines for Electric Power Transmission and Distribution (2007); and
- EBRD’s 2014 Environmental and Social Policy and associated Performance Requirements (PR).

2.3 Document Structure

The following table provides an overview of the Chapters within this ESIA document.

Table 1: ESIA Document Structure

Chapter	Description of Content
Chapter 2 – Project Description	Provides a detailed description of the Project in relation to its location, the key project components and an overview of the proposed activities that are to take place during the various Project phases.
Chapter 3 – Regulatory & Policy Framework	Provides an overview of the environmental and social regulatory and policy framework applicable to the Project.
Chapter 4 – ESIA Approach and Methodology	Presents the methodology and approach that was adopted for the ESIA study.
Chapter 5 – Project Alternatives	This chapter investigates several alternatives to the Project development and the reasons for the preferred choice. This includes alternatives in relation to the Project site, selected technology and design, and finally investigates the ‘no action alternative’ – which assumes that the Project development does not take place.
Chapter 6 – Chapter 16 Assessment of E&S Baseline Conditions and Impacts	These Chapters first presents the baseline conditions within the Project site and surroundings, and then assesses the anticipated impacts from the Project throughout its various phases on such a receptor. Finally, for each identified impact a set of mitigation and monitoring requirements have been identified which aim to eliminate the impact and/or reduce it to acceptable levels. This includes the following: Landscape and Visual (Chapter 6), Land Use (chapter 7), Geology/Hydrology/Hydrogeology (Chapter 8), Biodiversity (Chapter 9), Avi-fauna (Chapter 10), Bats (Chapter 11), Archaeology and Cultural Heritage (Chapter 12), Air Quality and Noise (Chapter 13), Infrastructure and Utilities (Chapter 14), Occupational Health and Safety (Chapter 15), Community Health, Safety and Security (Chapter 16).
Chapter 17 – Environmental and Social Management Plan (ESMP)	Presents the Environmental and Social Management Plan (ESMP) for the Project; which mainly summaries the impacts identified as well as the mitigation measures and monitoring requirements to be implemented throughout the various Project phases. In addition, this Chapter describes the institutional framework and procedural arrangement for the ESMP implementation.

2.4 Key Involved Entities

Different entities are involved in the planning and implementation of the Project. The responsibilities of each key entity which is of relevance to the ESIA are listed in the text below along with a general description of their roles.

- Red Sea Wind Energy (RSWE) which consists of a consortium of ENGIE, Toyota Tsusho Corporation (TTC), Eurus Energy Holdings (EEH), and Orascom Construction (OC) (the Developer): is the proponent, developer and the owner of the 500MW GOSII Wind Farm Project;

- Regional Center for Renewable Energy and Energy Efficiency (RCREEE): is responsible for managing certain aspects of the overall development process on behalf of the Developer. This includes in specific the overall management of the ESIA process with the Consultant including review of deliverables and submissions;
- Egyptian Electricity Transmission Company (EETC): will be the developer of the OHTL to include selection of the route of the OHTL, preparation of concept design, development of specification and guidelines for detailed design and selection of the Contractor for the construction of OHTL, and finally will also be responsible for the Operation & Maintenance (O&M) of the OHTL;
- Egyptian Environmental Affairs Agency (EEAA): the official governmental entity responsible for protection of the environment in Egypt. The EEAA is responsible for approval of the ESIA and making sure it complies with the “Environmental Protection Law No. 4 of 1994” and granting the environmental clearance for the Project;
- National Renewable Energy Authority (NREA): is the entity responsible for qualification of bids and selection of the Wind Farm Developers. In addition, they are also responsible for allocation of the land for the development of the Wind Farm Projects;
- OHTL Contractor: will be responsible for the preparation of the detailed design of the OHTL Project; supply of the material and equipment; and construction of the OHTL Project and its various components. At this stage, the Contractor has not been selected yet by EETC;
- ESIA Consultant (ECO Consult & EcoConServ): the ESIA Practitioner and the consultant commissioned by the RSWE and RCREEE to prepare the ESIA for the Project in accordance with the requirements of the “Law No. 4 of 1994” as well as the IFI E&S requirements.

3 PROJECT DESCRIPTION

This chapter provides a detailed description of the Project in relation to its location, the key project components and an overview of the proposed activities that are to take place during the planning and construction, operation, and decommissioning phase.

3.1 Project Rationale

The OHTL is considered a key component for the 500MW GOSII Wind Farm Project as it will supply the electricity produced by the Wind Farm to the National Grid. Without the OHTL, the GOSII Wind Farm Project cannot be realised.

Such a Wind Farm Project will result in significant and crucial positive environmental and economic impacts on the strategic and national level given the current challenges the energy sector in Egypt is facing, which have serious implications on Egypt's energy security. Such positive impacts are important to highlight, consider, and take into account and are summarised below.

- The development allows for more sustainable development and shows the commitment of the Government of Egypt to realising its energy strategy and meeting the set targets for renewable energy sources;
- The Project will contribute to increasing energy security through reliance on an indigenous, inexhaustible and mostly import-independent energy resource. The estimated electricity generation from the Wind Farm is 2,200 – 2,500 GWh per year; which will serve the annual electricity needs of more than 800,000 local households (ECO Consult & EcoConserv, 2020); and
- Generating electricity through wind power is rather pollution-free during operation. The clean energy produced is expected to reduce consumption of conventional petroleum products used at thermal power plants for electricity generation. This will help in reducing greenhouse gas emissions as well as air pollutant emissions – the Project is expected to offset more than 1 million metric tons of CO₂ annually (ECO Consult & EcoConserv, 2020).

3.2 Project Location

The Project site is located within the Red Sea Governorate that is bordered by the Red Sea Coast to the east. Administratively, the Red Sea Governorate is divided into 7 Cities (also known as Districts), each headed by a Local City Council. The capital of the Governorate is Hurghada that is located around 150km south of the Project site. The Project site is located within the Ras Ghareb City (or District) and therefore administratively is under the Ras Ghareb City Council.

The GOSII Wind Farm is located within the Red Sea Governorate, approximately 200km to the southeast of the capital city of Cairo (Figure 1). More specifically, the Wind Farm Project site is located in the near the Red Sea shoreline and within the Ras Ghareb Local Governmental Unit of the Red Sea Governorate where the closest villages include Ras Ghareb (located 40km to the southeast) and Zaafarana (45km to the north).

Within the Wind Farm boundary, a 33kV/220kV subordinate substation will be constructed. From the substation, a 220kV OHTL will run to the southeast where the main substation (220kV) is located and which is connected to the National Electricity Grid. The total length of the OHTL is approximately 35km. Similar to the Wind Farm site, the closest village to the transmission line will be Ras Ghareb, located 12km from the OHTL at the closest point.

Figure 2 below presents the OHTL route from the substation until its connection with the National Grid. The route provided below is based on the concept design prepared by EETC.



Figure 1: Overview of the Wind Farm Project Location

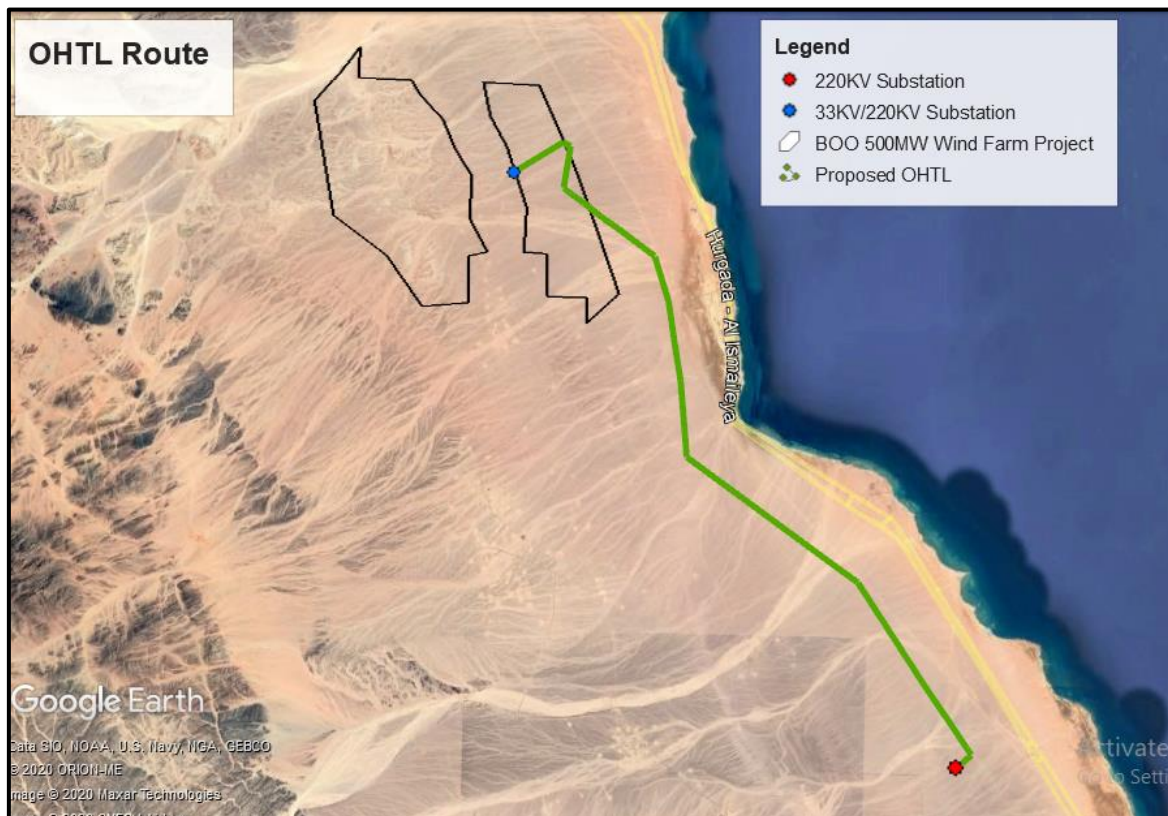


Figure 2: Layout of the OHTL Route

3.3 Project Components

The following describes the main OHTL (Project) components. This has been based on current available information provided by EETC. It is important to note that such available information is preliminary as

more detailed information will be available at a later stage once the detailed design and studies are undertaken by the Contractor.

3.3.1 Transmission Towers

The main component of the OHTL is the transmission towers. The transmission tower will be a three (3) phase steel beam Double-Circuit Transmission Towers (DCT), which will transport the electricity from the substation located within the GOSII 500MW Wind Farm to the High Voltage National Grid. The typical structure of the DCT tower is presented in Figure 3 below.

Based on information available from EETC, the OHTL will consist of around 107 towers that will be distributed throughout the route. The height of each tower will around 50m.

Each transmission tower will consist of the following:

- **Foundations:** each tower will be fixed and bolted to the ground through reinforced concrete foundations. The exact area for each foundation was not provided by EETC but it will be determined at a later stage as part of the detailed design; and
- **Cross-Arms:** each tower will have six (6) steel beam cross arms (3 on each side) which connects the conductors (discussed below) with the towers (refer to Figure 3 below).

3.3.2 Conductors

The conductor is the line used to carry electrical energy from one tower to the next until its connection with the High Voltage National Grid. There will be six (6) conductors, three (3) on each side of the tower that will through the cross-arms (refer to Figure 3 below). The conductor will be a 220kV line.

3.3.3 Infrastructure Elements

The only infrastructure requirements for the Project will be access roads, which might be required in areas where the towers are inaccessible based on existing site conditions. Such access roads are required for access of construction vehicles and machinery during construction and for maintenance activities during operation. The layout of the access roads within the Project site will be determined at a later stage as part of the detailed design to be prepared by the OHTL Contractor.

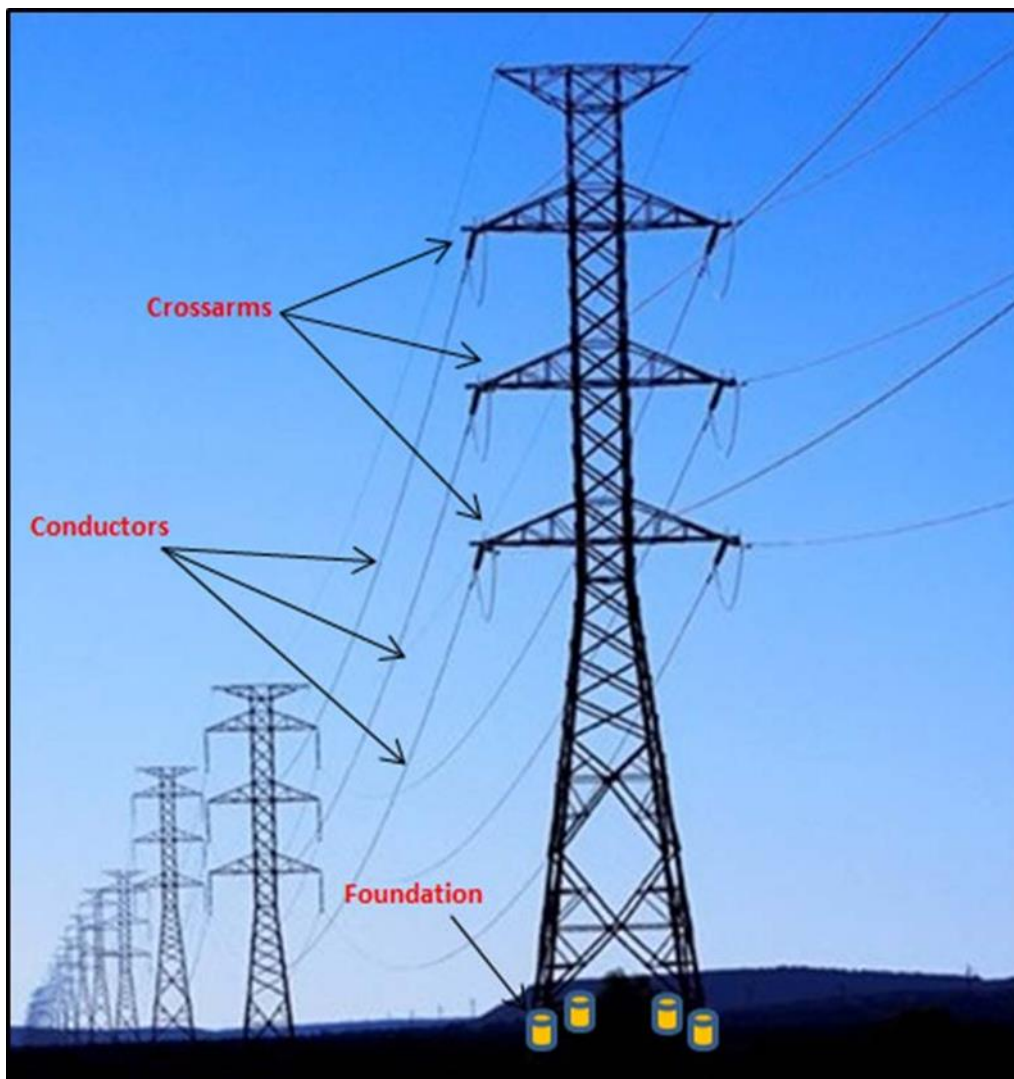


Figure 3: Typical Structural Components of DCT towers

3.4 Right of Way for the OHTL

Electricity transmission and distribution projects require Rights-of-Way (RoW) to protect the system from windfall, contact with trees, branches, utilities, buildings, and other potential hazards that may result in damage to the system, or power failures, as well as public health and safety concerns. RoW are also utilised to access, service, and inspect transmission and distribution systems.

The IFC EHS Guidelines for Electric Power Transmission and Distribution (2007), states that the RoW width for transmission lines ranges from 15 to 100m depending on voltage and proximity to other RoW, but typical range is between 15 and 30m.

Within the local requirements, EETC will take into account the requirements of the Electricity Law 87/2015, which provides requirements for safe distance between the conductors and the neighbouring lands and buildings and other receptors. Based on the law, the requirements of the RoW distances applicable for the 220kV OHTL is 25m horizontal distance from each side (more details are provided in Table 2). Any successive buildings, structures or other receptors to be built shall take into account this safety distance/ RoW.

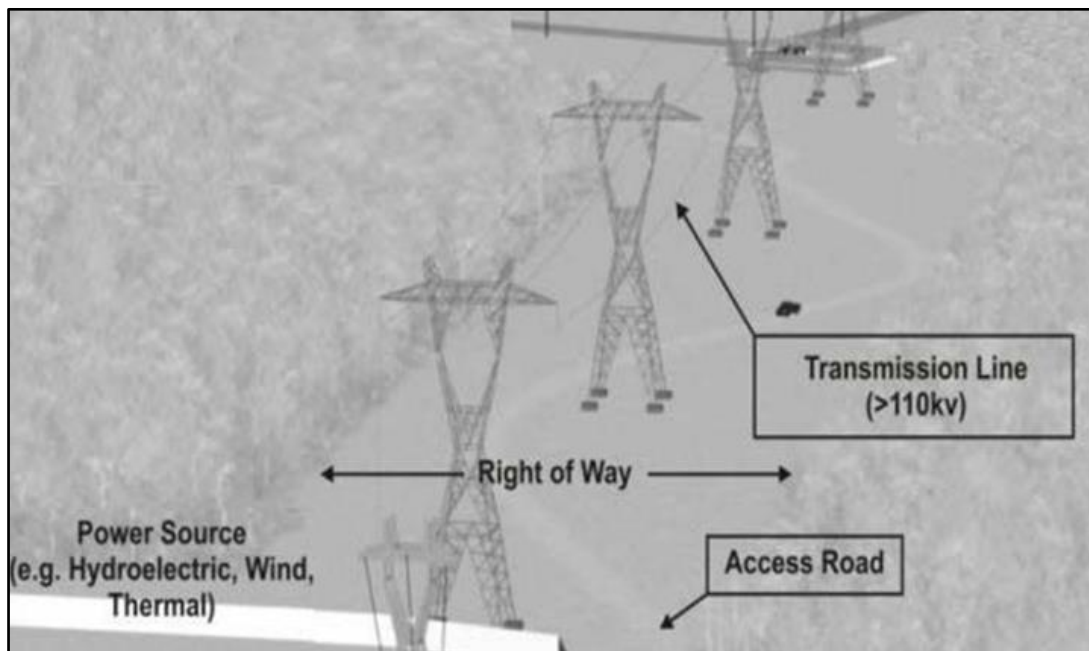


Figure 4: Right of Way and Access Road for OHTL (IFC, 2007)

3.5 Overview of Project Phases

This section presents the likely activities to take place during the Project development and which will include three (3) distinct phases: (i) construction, (ii) operation and (iii) decommissioning each of which is summarised below.

3.5.1 Planning & Construction Phase

Based on information provided by EETC, construction is planned to commence by April 2021 and will be completed by October 2021 (i.e. will require 7 months). Typical activities during the construction phase for the OHTL include the following:

- Transportation of various Project components to the Project site. The components are expected to be transported by road to the Project area;
- Site preparation activities for the tower foundations. Such activities are limited to the individual footprint of the towers and therefore the actual area of disturbance is small. Nevertheless, such activities could include land clearing activities, excavations, and levelling;
- Installation of components such as the DCT towers, cross-arms, and conductors; and
- In addition to the erection of each DCT, there is additional construction work (which could include excavations, land clearing activities, etc.) for the road network that will be developed for access of equipment and machinery onsite.

Throughout the construction phase, the Project will require skilled labour (such as engineers, technicians, surveyors, etc.) and unskilled labour (mainly labourers). It is likely that the OHTL Contractor will have his own team to cover such employment opportunities.

3.5.2 Operation Phase

The OHTL is expected to remain operational throughout the operation period of the GOSII 500MW Wind Farm – which is set for 20 years. The operational phase will be mainly limited to maintenance and repair activities for the OHTL when needed. These could also include some routine maintenance activities (based

on a set schedule) as well as maintenance in case of failure of any of the Project components. Maintenance activities are generally undertaken by a dedicated team of technicians from EETC and do not normally require any permanent staff to be onsite. The EETC Team would undertake required technical activities during any given day and leave the site.

3.5.3 Decommissioning Phase

Decommissioning activities will depend on the GOSII 500MW Wind Farm. As discussed earlier, the Wind Farm Project is expected to remain operational for 20 years after which the Project could be decommissioned. Decommissioning activities will include disassembly of the towers for final disposal. However, most of these materials are salvageable (i.e. recyclable).

4 REGULATORY & POLICY FRAMEWORK

4.1 Egyptian Environmental Clearance Process

ESIA is one of the main requirements of EEAA to assess the impacts of initiatives, projects, or developmental activities, with a view of identifying necessary actions to minimize negative impacts and maximize positive ones. Measures concerning the assessment of environmental impact of projects are stipulated in the Law of Environment No. 4 of 1994 and its amendments in Law No. 9 of 2009.

The Central EIA Department of the EEAA is responsible for supervising the screening process, managing the review of EIA reports, taking decisions on the acceptability of EIA reports, providing feedback on the development and proposals for mitigation measures, and issuing environmental clearances for development projects.

According to the last updated executive regulation and the ministerial decree No. 26 of 2016, the ESIA system classifies the projects into four categories based on different levels of ESIA requirements according to severity of possible impacts and location of the establishment and its proximity to residential settlements. Electricity transmission lines projects in general are categorized as “Category B – Scoped study” (i.e. Projects with limited environmental impacts). The key requirements of the “Category B – Scoped Study” include the direct submission of a scoped ESIA study that includes the following key components:

- Project Description
- Analysis of Alternatives
- Legal review
- Assessment of E&S baseline Conditions (based on secondary data only and does not require site surveys in specific)
- Assessment of E&S Impacts
- Development of an Environmental Management Plan

Based on the submitted study, EEAA either approves it and grants an environmental clearance for the Project, or if it is found that the Project results in significant E&S impacts, could require a comprehensive ESIA study to be undertaken to further investigate such issues.

4.2 Egyptian E&S Regulatory Context

This section lists those legislations that are directly related to environmental and social compliance that must be adhered to by all parties involved in the Project throughout the planning and construction, operation, and decommissioning phase. These legislations include: (i) those issued by EEAA (laws, regulations and instruction), and (ii) the relevant national legislations issued by other line ministries (laws, regulations, instructions, standards).

The table below lists the key relevant legislation to each of the environmental and social parameter being studied and assessed within this ESIA along with the key requirements set out within such legislations.

Table 2: National Legislation and Guidelines Governing the E&S Compliance for the Project

Legislation	Relevant Article	Requirements
Landscape and Visual		
Law of Environment No. 4 of 1994 and its amendments in Law No. 9 of 2009	N/A	There are no key or specific legal requirements that govern landscape and visual. Nevertheless, the “Law of Environment No. 4 of 1994 and its amendments in Law No. 9 of 2009” requires assessment of environmental impact of projects as relevant which could include landscape and visual components as well.
Land Use		
Electricity Law 87/2015	Article 52 – Article 57	Concerning the electricity sector installation, the People Assembly passes the bill of Electricity Law 87 that regulates all activities and developments related to the electricity sector. Of particular importance, the law: (i) identifies and requires a fair compensation process for landowners in which associated facilities such as overhead lines are developed and also identifies an objection process that can be followed by such landowners; (ii) identifies the limits of distances to be measured from the axis of the OHTL routes in order to identify the Right of Way (ROW) zone. With regards to this project (220kV), a distance of 25 meters from both sides for OHTL will be kept as a Right of Way (ROW) or buffer zone that should be free for any obstacles at all times such as buildings, trees, gas pipelines, cables, water pipelines (unless agreed with EETC taking into account health and safety requirements).
Geology, Hydrology, Hydrogeology		
Law 4/1994	Article 33 of the Executive regulations of Law 4/1994	<ul style="list-style-type: none"> ▪ The owner of the project is responsible to decontaminate the area/soil in case of relocation or decommissioning as applicable
Waste Management		
Law 4/1994 amended by Law 9/2009 and ER 1095/2011 amended by Decree 710/2012)	Articles 26, 28, 29, 33, 37, 39	<ul style="list-style-type: none"> ▪ Identification: using the Hazardous waste lists issued by the competent authority. ▪ Minimization: strive to reduce quantitatively and qualitatively the generation of hazardous waste ▪ Segregation: hazardous waste is to be separated from other types of non-hazardous waste. In addition, the different types of hazardous waste must not be mixed together. ▪ On site Storage: hazardous waste to be stored in a designated area, and containers must be made of suitable materials and be properly sealed to avoid any leakages or spills into the surroundings. ▪ Off-site transportation: hazardous waste is to be submitted to authorized contractors. ▪ Obtaining a license from the competent authority to handle hazardous waste ▪ The establishment should maintain a register for the hazardous waste should be maintained as well as record for the hazardous substances used
	Article 22 and Article 17 of the Executive Regulations	<ul style="list-style-type: none"> ▪ The establishment should maintain an environmental register of waste streams in accordance with Annex 3 of the Executive regulations
	Article 39 and Article 41 of the Executive Regulations	<ul style="list-style-type: none"> ▪ Article 39: The establishment should maintain the cleanliness of garbage bins and vehicles. Garbage collection bins shall be tightly covered and waste shall be transported at suitable intervals. ▪ Article 41: The establishment shall undertake necessary precautions to secure the safe storage and transportation of waste. These precautions include the following:

		<ul style="list-style-type: none"> - Construction waste storage is to be carried out at site such that it does not obstruct movement of vehicles and personnel. - waste subject to emission should be covered to avoid air pollution - waste is to be submitted to authorized waste contractors
Ministerial Decree 44/2000, Decree of Law 93/1962	Article 14	<ul style="list-style-type: none"> ▪ The law prohibits the disposal of domestic, industrial and commercial wastewater, treated or untreated, in public drainage system without obtaining a prior approval. ▪ Article 14 of the executive regulations set the parameters required regarding the quality of the wastewater discharged to the public sewage network. ▪ The owner of the project should abide by the limits stated in article 14 of the Executive regulations of Law 93/1962
	Biodiversity, Avi-Fauna and Bats	
Law 4 of 1994	Article 28, as amended by Law 9 of 2009. Annex 4 of the Executive Regulations of law 4/1994, amended by Prime Minister Decree 1095 of 2011	<ul style="list-style-type: none"> ▪ Defines fauna and flora which are forbidden to be hunted or disturbed. ▪ Ensure that no species are being disturbed and implement all mitigation measures needed to reduce the impact on any fauna and flora in the vicinity of the project
Archaeology and Cultural Heritage		
Law 117/1983	Article 1	<ul style="list-style-type: none"> ▪ Defines a monument as a building or movable property produced by different civilizations or by art, sciences, literature and religions from prehistoric era and during successive historical eras until a hundred years ago or historical buildings.
	Article 2	<ul style="list-style-type: none"> ▪ States that any building or movable property that has an historical, scientific, religious, artistic or literary value could be considered as a monument whenever the national interest of the country imposes its conservation and maintenance without adherence to the time limit contained in the preceding Article no.1
	Article 5	<ul style="list-style-type: none"> ▪ States that the Supreme Council of Antiquities (SCA) is the competent authority responsible for antiquities in Egypt.
	Article 20	<ul style="list-style-type: none"> ▪ States that license of construction in archaeological sites or land is not permitted. It is prohibited to make any installation or landfill or digging channels, construct roads, agricultural land or for public benefits in the archaeological sites or land within its approved border lines. ▪ The Article additionally, states that a buffer zone around the monument or the site is defined as 3kilometres in the uninhabited areas or any distance determined by the SCA to achieve environmental protection of the other parts of the monument in the surroundings (article 20-Ch.1). ▪ The provisions of this article (20) apply on land which appears to the SCA - based on conducted studies – that there is a probable existence of monuments in the subsoil. ▪ The provisions of this article are also applied to desert and areas where quarrying work is licensed.
	Article 22	<ul style="list-style-type: none"> ▪ States that license of construction in the immediate vicinity of archaeological sites within populated areas could be delivered by the competent authority, after the approval of SCA.

		<ul style="list-style-type: none"> ▪ The competent authority must state in the license the conditions which the SCA emphasizes to guarantee that the building does not have a negative visual impact on the monument and its direct buffer zone protecting the archaeological and historical surroundings. ▪ The SCA has to pronounce its verdict on the license demand within 60 days of the date of submission. Otherwise, the elapsing of this period is regarded as a decision of refusal.
	Article 23	<ul style="list-style-type: none"> ▪ States that the SCA should take the necessary steps to expropriate land that is found in or kept in place and registered according to the rules of this Law. (Article 23- Ch.1). [These rules are defined in the second chapter of the Law 117 – articles 26-30]. ▪ The Ministry of State for Antiquities must be notified in the event that an unrecorded ruin is found by any person (Article 23).
	Article 24	<ul style="list-style-type: none"> ▪ States that everyone finding by chance part or parts of a monument in its place must promptly inform the nearest administrative authority within forty-eight hours.
Air Quality and Noise		
Law 4/1994 amended by Law 9/2009 and ER 710/2012	Article 42 of Law 4/1994 amended by Law 9/2009 Article 44 of ER 710/2012	<ul style="list-style-type: none"> ▪ Maximum allowable limits for ambient noise that must not be exceed. The maximum permissible noise level limits for the project area (which can be classified as Areas overlooking public roads more than or equal 12 meters, or industrial areas with light industries) is set at 70 dB(A) during daytime (7 AM – 10 PM) and 60 dB(A) during night-time 10 PM – 7 AM).
	Article 38 of ER	<ul style="list-style-type: none"> ▪ Open burning of garbage and non-hazardous solid waste is strictly prohibited, and garbage and solid waste shall only be dumped or treated in designated areas away from residential, industrial, agricultural and waterways. ▪ Transporting waste and dust resulting from excavation, demolition and construction in special containers or using transport vehicles prepared and licensed for this purpose. ▪ The vehicle shall be equipped with a special box or a tight cover that prevents the spread of dust and debris to the air or falling on the road. ▪ The vehicle shall be equipped with special equipment for loading and unloading. ▪ The car should be in good condition according to the rules of safety, durability and lights and equipped with all safety devices. ▪ Ensure that the places to which this type waste transported so that a distance of not less than 1.5 km from the residential areas and be of a low contour level and settled after filling and filling.
ERs (amended by Decree 1095/2011 amended by Decree 710/2012)	Annex 5	<ul style="list-style-type: none"> ▪ Maximum limits of ambient air pollutants in relation to Sulphur Dioxide, Carbon Monoxide, Nitrogen Dioxide, Ozone, Total Suspended Particles (TSP), Particulate Matter less than 10 µm (PM10), Particulate Matter less than 25 µm (PM2.5), Suspended Particles Measured as Black Smokes, Lead and Ammonia
	Annex 6	<ul style="list-style-type: none"> ▪ Allowable Emission levels from Asphalt mixing units in relation to Total Suspended Solids (TSP), Carbon Monoxide, and Total Volatile Organic Compounds (VOCs) ▪ Maximum allowable emissions from vehicles that operate using gasoline fuel in relation to hydrocarbons and Carbon Monoxide

		<ul style="list-style-type: none"> ▪ Maximum allowable emissions from vehicles that operate using diesel in relation to Smoke density factor
	Annex 8 and Annex 9	<ul style="list-style-type: none"> ▪ Maximum allowable limits for air emissions, heat stress, ventilation rates within the work environment
Occupational Health and Safety		
Law 4/1994	Articles 43 – 45 of Law 4/1994, which address air quality, noise, heat stress, and the provision of protective measures to workers.	<ul style="list-style-type: none"> ▪ The owner of the project should abide by the limits stated in Annex 7 of the Executive regulations ▪ In case the limits are exceeded, special protective equipment should be made available (earmuffs, masks...) (Annex 9) ▪ In case the limits are exceeded, the workers should have rests as specified by the limits (especially for noise and vibration from electric jack hammers or any other ramming equipment) ▪ Conduct regular medical check-ups for workers that are facing noise, vibration or heat stress exceeding the limits
Law 12/2003 on Labour and Workforce Safety and Book V on Occupational Safety and Health (OSH) and assurance of the adequacy of the working environment	All	<p>Law 12/2003 on Labour and Workforce Safety and Book V on Occupational Safety and Health (OSH) is the principal law related to Occupational Health and Safety (OHS) in relation to development Projects. The law identifies requires in relation to: (i) overall OHS requirements at the workplace and assurance of the adequacy of the working environment; (ii) Personal Protective Equipment (PPE) to be considered for workers in the workplace; (iii) emergency preparedness and response plan requirements; (iv) workforce management to include contracting requirements, working hours, rest hours, etc.; and (v) other as applicable. Moreover, the following laws and decrees should be considered which also take into account additional details and provisions for workplace OHS requirements</p> <ul style="list-style-type: none"> ▪ Minister of Labour Decree 48/1967. ▪ Minister of Labour Decree 55/1983. ▪ Minister of Industry Decree 91/1985 ▪ Minister of Labour Decree 116/1991.
Decree 458/2007	All	<ul style="list-style-type: none"> ▪ Egyptian Drinking Water Quality Standards should be met for all water bought and stored on site for the workers' use.

4.3 International Agreements

Egypt has signed and ratified a number of international conventions committing the country to the conservation of environmental resources and protection of workers' health & safety and labour rights. The following Table lists the key conventions:

Table 3: Relevant Egyptian International Conventions and Agreements

Name of Multilateral Environmental Agreement	Date
<i>Biodiversity and Natural Resources</i>	
International Plant Protection Convention	1951
Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East	1965
Convention on Wetlands of International Importance Especially as Water Fowl Habitat (RAMSAR)	1971
Convention Concerning the Protection of the World Cultural and Natural Heritage	1972
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1973
Convention on the Conservation of Migratory Species of Wild Animals	1979
Protocol to Amend the Convention on Wetlands of International Importance Especially as Water Fowl Habitat	1982
Convention on Biological Diversity (CBD)	1992
Agreement for the Establishment of the Near East Plant Protection Organization	1993
United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	1994
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	1995
African Convention on the Conservation of Nature and Natural Resources (revised)	2003
International Tropical Timber Agreement	2006
<i>Hazardous Materials and Chemicals</i>	
Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents	1974
Convention on the Prohibition of the Development, Production and Stock-Piling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction	1972
Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal	1976
Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques	1976
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1989
Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	1991
Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1995
Stockholm Convention on Persistent Organic Pollutants (POPs)	2002
<i>Atmosphere, Air Pollution and Climate Change</i>	
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies	1967
Vienna Convention for the Protection of the Ozone Layer	1985
Montreal Protocol on Substances that Deplete the Ozone Layer	1987
(London) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1990
United Nations Framework Convention on Climate Change	1992
(Copenhagen) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1992
Kyoto Protocol	1997
Paris Agreement under the United Nations Framework Convention on Climate Change	2015
<i>Health and Worker Safety</i>	
International Labour Organization Core Labour Standards	1936
Convention Concerning the Protection of Workers Against Ionizing Radiation	1960
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration	1977
Occupational Safety and Health Convention	1979

4.4 Requirements for Project Financing

The Developer will be seeking financing for the Project from prospective lenders, including International Financial Institutions (IFIs). Therefore, the Developer wishes to design and manage the project in accordance with good international industry practice. For the purpose of the ESIA this has therefore been developed in accordance with following requirements which are discussed in further details throughout this section.

- IFC Performance Standards (PSs) of Social and Environmental Sustainability, IFC General EHS Guidelines (2007) and IFC EHS Guidelines for Electric Power Transmission and Distribution (2007)
- EBRD’s 2014 Environmental and Social Policy and associated Performance Requirements (PR)

4.4.1 IFC E&S Requirements

The IFC policy on E&S Sustainability puts into practice IFC’s overall commitments to E&S sustainability. The policy seeks to: (i) enhance the predictability, transparency, and accountability of IFC’s actions and decision making; (ii) help clients manage their environmental and social risks and impacts and improve their performance; and (iii) enhance positive development outcomes on the ground. In addition, the Policy identifies IFC’s commitments, its roles and responsibilities and other as applicable.

The IFC Performance Standards (PS) on Social and Environmental Sustainability set out a framework for managing and improving project performance from planning and assessment, through construction and operations to closure. The Performance Standards requirements are summarized in the table below.

Table 4: IFC Performance Standard Requirements

IFC PS	Key Points
PS1: Assessment and Management of Environmental and Social Risks and Impacts	<p>PS1 underscores the importance of managing social and environmental performance throughout the life of a project by using a dynamic social and environmental management system. Specific objectives of this Performance Standard are:</p> <ul style="list-style-type: none"> ▪ To identify and assess social and environment impacts, both adverse and beneficial, in the project’s area of influence; ▪ To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment; ▪ To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and ▪ To promote improved social and environment performance of companies through the effective use of management systems.
PS2: Labour and Working Conditions	<p>The requirements set out in this PS have been in part guided by a number of international conventions negotiated through the International Labour Organization (ILO) and the United Nations (UN). Specific objectives of this Performance Standard are:</p> <ul style="list-style-type: none"> ▪ To establish, maintain and improve the worker-management relationship; ▪ To promote the fair treatment, non-discrimination and equal opportunity of workers and compliance with national labour and employment laws; ▪ To protect the workforce by addressing child labour and forced labour; and ▪ To promote safe and healthy working conditions, and to protect and promote the health of workers.
PS 3: Resource Efficiency and Pollution Prevention	<p>This Performance Standard outlines a project approach to pollution prevention and abatement in line with international available technologies and practices. It promotes the private sector’s ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources. Specific objectives of this Performance Standard are:</p> <ul style="list-style-type: none"> ▪ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and ▪ To promote the reduction of emissions that contribute to climate change.

PS 4: Community Health, Safety and Security	This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. However, projects can also increase risks arising from accidents, releases of hazardous materials, exposure to diseases, and the use of security personnel. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this PS addresses the project sponsor's responsibility in respect of community health, safety and security.
PS 5: Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the use of renewable natural resources in a sustainable manner. This Performance Standard addresses how project sponsors can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources. Specific objectives of this Performance Standard are: <ul style="list-style-type: none"> ▪ To protect and conserve biodiversity; and ▪ To promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.
PS 8: Cultural Heritage	Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to protect irreplaceable cultural heritage and to guide project sponsors on protecting cultural heritage in the course of their business operations.

Note: PS 7 (Indigenous Peoples) is not considered to be applicable to this Project. The Indigenous World 2018 Report (IWGIA, 2018) states that Egypt is not classified as a country with indigenous people.

In addition, to the Performance Standards, the IFC have sector-specific EHS guideline documents. With regards to the project the following are applicable:

- IFC General EHS Guidelines (2007): identifies detailed EHS management and technical recommendations which are applicable for all development projects
- IFC EHS Guidelines for Electric Power Transmission and Distribution (2007): the Guideline identifies the key E&S impacts that should be investigated and provides detailed management and technical recommendations with regards to Industry-Best Practice. The IFC EHS Guidelines identifies the following key issues:
 - Biodiversity (to include birds and bats)
 - Electric and magnetic fields
 - Hazardous materials
 - Occupational health and safety
 - Community health and safety

4.4.2 EBRD E&S Requirements

In accordance with EBRD's 2014 Environmental and Social Policy, EBRD seeks to ensure, through its environmental and social appraisal and monitoring processes, that the projects it finances:

- Are socially and environmentally sustainable;
- Respect the rights of affected workers and communities; and
- Are designed and operated in compliance with applicable regulatory requirements and good international practice.

To translate this objective into successful practical outcomes, EBRD has adopted a comprehensive set of Performance Requirements (PRs) covering key areas of environmental and social impacts and issues.

EBRD is committed to promoting European Union (EU) environmental standards as well as the European Principles for the Environment, to which it is a signatory, and which are also reflected in the PRs. EBRD expects clients to assess and manage the environmental and social issues associated with their projects so that projects meet the PRs.

The EBRD Performance Requirements applicable to this project are summarised in the table below. As the EBRD PRs are closely linked with the IFC standards, the ESIA response in both cases is similar.

Table 5: Overview of Key Points of EBRD Performance Requirements of Relevance to the Project

EBRD Performance Requirements	Key Points Relevant to the Project
PR 1: Environmental and Social Appraisal and Management	This PR outlines the process of appraising, managing and monitoring environmental and social issues associated with a project consistent with the European Union environmental impact assessment directive (85/337/EEC as amended). This Project is likely to be categorized by EBRD as a Category B Project.
PR 2: Labour and Working Conditions	<p>This PR assures that human resources policies, procedures and standards will meet the following minimum requirements during the life of the Project with regards to labour and working conditions:</p> <ul style="list-style-type: none"> ▪ Establish and maintain a sound worker-management relationship and promote the fair treatment, non-discrimination and equal opportunity of workers; ▪ Promote compliance with any collective agreements to which the client is a party, national labour and employment laws, and the fundamental principles and key regulatory standards embodied in the applicable ILO conventions; and ▪ Protect and promote the health of workers, especially by promoting safe and healthy working conditions. <p>In addition, EBRD requires compliance with applicable EU Occupational Health and Safety requirements and, where such requirements do not exist, applicable IFC Occupational Health and Safety guidelines (IFC PS2).</p>
PR 3: Pollution Prevention and Abatement	<p>Pollution prevention and abatement are key ingredients of a sustainable development agenda and EBRD - financed projects must meet good international practice in this regard. The impacts and issues associated with polluting activities need to be considered in all economic activities, and from effluents and emissions at the facility level, to impacts at a regional and global level where appropriate. This performance requirement assures that all aspects of the Project will meet the following objectives:</p> <ul style="list-style-type: none"> ▪ To avoid or, where avoidance is not possible, to minimise adverse impacts on human health and the environment by avoiding or minimizing pollution directly arising from projects; ▪ To assist clients in identifying project-related opportunities for energy and resource efficiency improvements and waste reduction; and ▪ To promote the reduction of project-related greenhouse gas emissions.
PR 4: Health & Safety	While bringing many positive benefits to local communities, projects can also increase the potential for community exposure to risks and impacts arising from temporary or permanent changes in population; transport of raw and finished materials; construction, operations and decommissioning; accidents, structural failures, and releases of hazardous materials. This performance requirement addresses the project proponent's responsibility to identify and to avoid or minimise the risks and adverse impacts to community health, safety and security.
PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.

EBRD Performance Requirements	Key Points Relevant to the Project
PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	<p>EBRD recognises the need for the protection and conservation of biodiversity in the context of projects in which it invests. In pursuing these aims, EBRD is guided by and supports the implementation of applicable international law and conventions and applicable EU Directives:</p> <ul style="list-style-type: none"> ▪ To protect and conserve biodiversity; ▪ To avoid, minimise and mitigate impacts on biodiversity and offset significant residual impacts, where appropriate, with the aim of achieving no net loss or a net gain of biodiversity; ▪ To promote the sustainable management and use of natural resources; ▪ To provide for fair and equitable sharing of the benefits from project development and arising out of the utilisation of genetic resources; ▪ To strengthen companies' licence to operate, reputation and competitive advantage through best practice management of biodiversity as a business risk and opportunity; and ▪ To foster the development of pro-biodiversity business that offers alternative livelihoods in place of unsustainable exploitation of the natural environment.
PR 8: Cultural Heritage	<p>Cultural heritage is important as a source of valuable historical and scientific information, as an asset for economic and social development, and as an integral part of a people's cultural identity, practices, and continuity. EBRD requires the protection of cultural heritage from project activities.</p>
PR 10: Information Disclosure and Stakeholder Engagement	<p>EBRD considers stakeholder engagement as an essential part of good business practice and corporate citizenship. In particular, effective community engagement is central to the successful management of risks and impacts on communities, as well as central to achieving enhanced community benefits. The specific objectives of this PR are:</p> <ul style="list-style-type: none"> ▪ To identify people or communities that are or could be affected by the Project, as well as other interested parties; ▪ To ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation; and ▪ To maintain a constructive relationship with stake holders on an ongoing basis through meaningful engagement during project implementation.

Note: PR 7 (Indigenous Peoples) and PR9 (Financial Intermediaries) are not considered to be applicable to this Project.

5 ESIA APPROACH & METHODOLOGY

This Chapter presents the approach and methodology that was undertaken for the ESIA study in accordance with the Egyptian Environmental Affairs Agency's (EEAA) requirements as stipulated by the "Law No. 4 of 1994". In addition, the methodology for the ESIA takes into account international good practice – this mainly includes the IFC Performance Standards and applicable IFC EHS Guidelines, as well as the EBRD Performance Requirements.

5.1 Analysis of Alternatives

The Egyptian Regulations to include the "Guidelines of Principles and Procedures for Environmental Impact Assessment" (EEAA, 2009) requires that the ESIA identify and analyse alternatives and present the main reason for the preferred choice. The examination of alternatives is also considered to be a key element of the ESIA process under good international practice, including the: (i) IFC Performance Standard 1 (IFC, 2012) and the associated "IFC Guidance Note 1" (IFC, 2012); and (ii) EBRD Performance Requirement 1.

The analysis of alternatives is presented in "Chapter 6". This chapter investigates and compares several alternatives to the Project development in relation to: (i) the Project site, (ii) the chosen technology and Project design, and (iii) finally investigates the 'no action alternative' – which assumes that the Project development does not take place.

5.2 Delineation of Study Boundaries & Scope of Assessment

5.2.1 Definition of Spatial Study Area

The overall Study Area for the ESIA represents the potential area of influence of the Project. This is 'the area over which significant effects of the Project could reasonably occur, either on their own, or in combination with those of other developments and projects'. In general terms, the study area for the Project ESIA includes the footprint of Project disturbance as demarcated in blue in the figure below. However, for certain environmental and social parameters (such as landscape and visual, air quality, etc.), the study area goes beyond the actual footprint of the Project site, and therefore an appropriate thematic study area is determined for each theme on a case by case basis. Such a thematic study area is clearly identified within the relevant Section it relates to throughout this ESIA. In identifying these thematic study areas, the type and degree of the potential direct and indirect effects were taken into consideration.

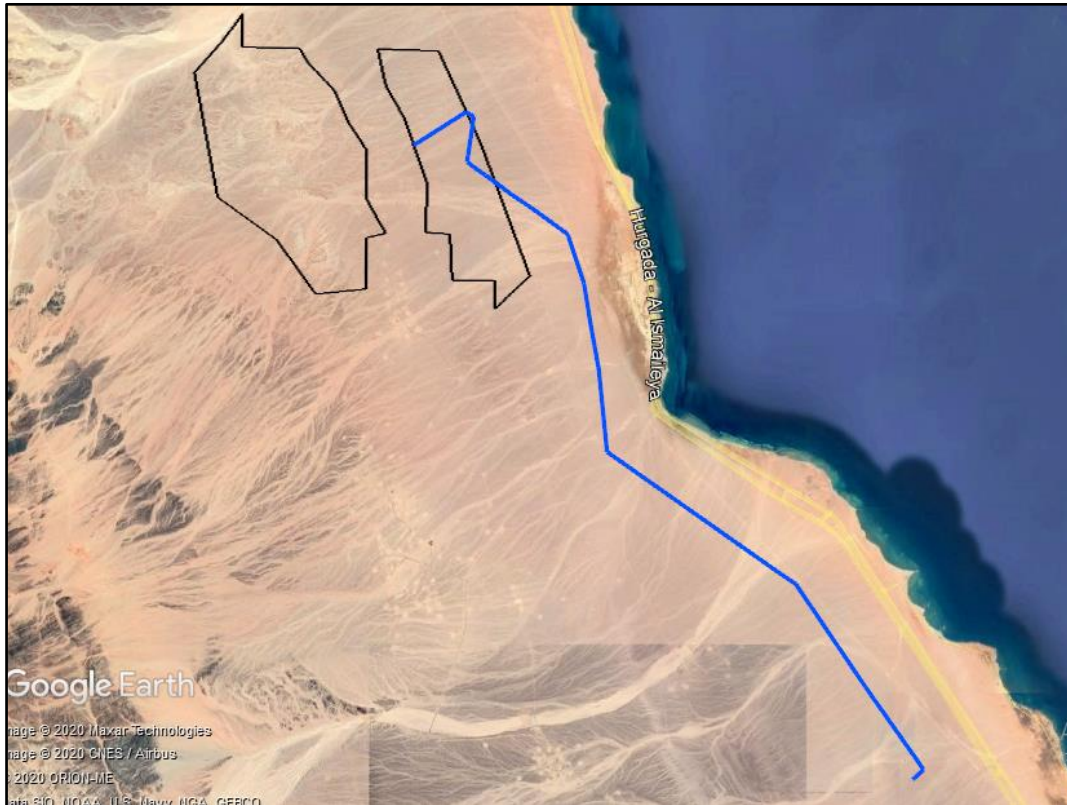


Figure 5: Study Area

5.2.2 Temporal Scope of the Assessment

The Project will be developed in a three-phase sequence as follows. The potential impacts are assessed throughout the various Project phases.

(i) Planning and Construction Phase

This includes onsite construction activities, which will be undertaken by the OHTL Contractor. This mainly includes preparing the detailed design and layout of the Project, transportation of Project components onsite, as well as onsite site preparation and construction activities for installation of the towers, foundations, internal access roads, etc.

(ii) Operation Phase

This includes activities to be undertaken by EETC for O&M. Activities expected to take place mainly include routine and /or emergency maintenance activities which do not require any permanent staff onsite.

(iii) Decommissioning Phase

As discussed earlier, the GOSII 500MW Wind Farm is expected to remain operational for 20 years after which the Project could be decommissioned. The anticipated impacts throughout the decommissioning phase are similar in nature to impacts assessed during the construction phase – and specifically in impacts related to soil and groundwater (from improper management of waste streams), air quality and noise, and occupational health and safety. Therefore, the assessment of impacts for those receptors and mitigation identified during the construction phase is assumed to apply to this phase in particular without the need to reiterate or emphasise this throughout this Section.

5.3 Environment & Social Baseline Conditions

As part of the ESIA process, the baseline environmental and social conditions of the study area were established. Describing the baseline includes identifying and defining the importance and sensitivity of the

various environmental and social resources and receptors likely to be impacted, i.e. within the study area. Understanding the value or sensitivity of the resources and receptors to impacts and changes is an important consideration when determining the significance of effects, and allows for better identification of the most appropriate measures that could be employed to avoid impacts, and to mitigate any adverse impacts. The description of environmental and social baseline conditions has considered a range of data and information gathered from various sources, including:

- Desk-based studies and literature reviews;
- Data from statutory and non-statutory stakeholders; and
- Field surveys and site investigations.

Studies of the environment and social baseline are described under each Section respectively along with the methodology which was undertaken for assessment of the each of those baseline conditions is described in detail. The baseline conditions are treated as those conditions which would prevail in the absence of the Project.

5.4 Impact Assessment Methodology

The assessment of impacts on environmental and social parameters for each receptor are discussed under the relevant Chapter, from Chapter 7 to Chapter 17. The following section provides a description of the approach, methodology and process adopted for the impact assessment presented within this ESIA.

5.4.1 Approach to Assessment of Impacts

The adverse and beneficial environmental and social impacts of the Project have been identified and assessed against the established baseline. A consistent approach to the assessment of impacts was followed to enable environmental and social impacts to be broadly compared across the ESIA. A set of generic criteria were used to determine significance (see below) which were applied across the various environmental social and environmental parameters.

In general, a qualitative assessment was conducted using professional experience, judgment and available knowledge. Where there were limitations to the data, and/or uncertainties, these have been recorded in the relevant Sections, along with any assumptions that were taken during the assessment.

In order to determine the significance of each impact, two overall factors are considered:

- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions; and
- Magnitude and Nature of the impact.

5.4.2 Sensitivity of the Receiving Parameter

Receiving parameter sensitivity was determined using information taken from the baseline description on the importance, significance or value of the social or environmental component under examination. It is important to understand the sensitivity of the receiving parameter, as this is a measure of the adaptability and resilience of an environmental parameter to an identified impact. The following categories of sensitivity were applied to the assessment:

- *High*: The parameter/receptor is fragile and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.
- *Medium*: The parameter/receptor has a degree of adaptability and resilience and is likely to cope with the changes caused by an impact, although there may be some residual modification as a result; and

- *Low*: The parameter/receptor is adaptable and is resilient to change

5.4.3 Magnitude & Nature of the Impact

The magnitude of the impact is the scale of change which the impact may cause compared to the baseline and how this change relates to accepted thresholds and standards. The following categories were applied to the assessment:

- *High*: a large change compared to variations in the baseline. Potentially a clear breach of accepted limits;
- *Medium*: change which may be noticeable and may breach accepted limits; and
- *Low*: when compared with the baseline, change which may only just be noticeable. Existing thresholds would not be exceeded.

Furthermore, in determining the magnitude of the impact it is important to take into account and consider several other factors, which define the nature of the impact. This includes the following:

Type of Impact

- *Positive*: applies to impacts that have a beneficial environmental result, such as enhancement of the existing environmental conditions; and
- *Negative*: applies to impacts that have a harmful aspect associated with them such as loss or degradation of environmental resources.

Type of Effect

- *Direct*: applies to impacts which can be clearly and directly attributed to a particular environmental or social parameter (e.g. generation of dust directly impacts air quality); and
- *Indirect*: applies to impacts which may be associated with or are subsequent to a particular impact on a certain environmental or social parameter (e.g. high levels of dust could entail nuisance and health affects to construction workers onsite).

Duration (how long the stressor or its effect last)

- *Short Term*: applies to impacts whose effects on the environment will disappear within a 1-year period, or once construction activities are completed;
- *Medium Term*: applies to impacts whose effects on the environment will disappear within a 5-year period; and
- *Long Term*: applies to impacts whose effects on the environment will disappear in a period greater than 5 years.

Reversibility

- *Reversible*: applies to impacts whose significance will be reduced and disappeared over time (either naturally or artificially), once the impacting activity ceases; and
- *Irreversible*: applies to impacts whose significance will not be reduced nor disappeared over time (either naturally or artificially), once the impacting activity cease Assessing the Significance of the Impacts.

The concept of 'significance' is central to the ESIA process and aids the identification and categorisation of environmental and social effects. As noted, in order to determine impact significance, the sensitivity of each environmental and social parameter/receptor is considered in combination with the magnitude of the impact. The table below demonstrates how these parameters are considered in the assessment of significance

Table 6: Determination of Significance

Magnitude and Nature of Impact Receiving Parameter/Receptor \ Sensitivity of	Low	Medium	High
Low	Not significant	Minor	Minor
Medium	Minor	Minor	Moderate
High	Minor	Moderate	Major

While the above matrix provides a framework for the determination of significance, and enables comparison across E&S parameters, a degree of professional judgement must be used and some parameter-specific factors to be considered in making the determination of significance. Below provides additional guidance to the degrees of significance used in this ESIA. Note that positive impacts are defined, but are not rated for significance.

- *Major significance*: requires thorough investigation in the ESIA. These impacts have been studied extensively by consulting expertise in the areas of the identified impacts to design needed mitigation and environmental management measures. Moreover, conducting specific studies and assessments to some of the key issues identified;
- *Moderate significance*: requires reasonable investigation in the ESIA. These impacts have been studied by expertise in the areas of the identified impacts to design needed mitigation and environmental management measures.
- *Minor significance*: must be listed, and addressed in some way, but which did not require detailed assessment in the ESIA.
- *Not significant*: for completeness, impacts which have been included in the assessment but determined not to be significant, are rated formally as ‘not significant’.

5.4.4 Management Measures

Based on the impact assessment undertaken a set of management measures are identified for each impact which aims to address it. Management measures could include any of the following:

- Additional Requirements: those are generally regulatory requirements which have been identified and which must be taken into account at a later stage.
- Additional Studies: for certain E&S receptors additional studies must be undertaken at a later stage. Such studies and their scope, timing, etc. have been highlighted were relevant.
- Mitigation Measures: a vital step in the ESIA process is the identification of measures that can be taken to ensure that impacts are mitigated or reduced to acceptable levels. The ESIA will firstly consider the significance of any impacts caused by the Project and then assigned mitigation options through applying the following hierarchy:
 - Avoiding or ‘designing out’ impacts wherever possible;
 - Considering alternatives or modifications to the design to reduce the impacts wherever possible;
 - Applying measures to minimize and manage impacts on the receptor; *then*
 - As a last resort, identifying fair compensation, remediation and offsetting measures to address any potentially significant residual effects.

Some negative impacts can be easily mitigated, whilst others cannot or are too difficult and costly to mitigate. The various potential impacts are described in this ESIA, along with the provision of 'feasible mitigation measures' that can be implemented.

- Recommendations: for positive impacts it is not possible to identify mitigation measures, but rather recommendations have been identified which aim to enhance the positive impact.

5.5 Assessment of Residual Significance

If there are mitigation measures it is then necessary to make an assessment of the 'residual significance' after mitigation has been taken account. A re-assessment of Project impacts is then made, taking into account the effect of the proposed mitigation measures in order to determine the significance of the *residual effects*.

5.6 Development of an Environmental & Social Management (ESMP) Plan

Based on the results of the impact assessment, development of management measures, and development of monitoring plan, an ESMP was compiled into a single table that details all of the above. The ESMP will be a key document and will list the environmental/social requirements and detail the procedures necessary for managing the significant environmental/social issues connected to proposed Project activities. The ESMP will be developed specifically to provide flexibility in the nature and exact location of operations, while ensuring all potential impacts are identified and properly mitigated and monitored throughout the later stages of the Project. This ESMP can be used as a stand-alone document during the different phases of the Project by Developer, OHTL Contractor, EEAA, and other responsible parties. The ESMP for the various project phases is presented in "Chapter 18".

6 PROJECT ALTERNATIVES

The Egyptian Regulations to include the “Guidelines of Principles and Procedures for Environmental Impact Assessment” (EEAA, 2009) requires that the ESIA identify and analyse alternatives, including but not limited to project site location, design, and the no project alternative (which assumes that the Project development does not take place), and present the main reason for the preferred choice.

In addition, the examination of alternatives is also considered to be a key element of the ESIA process under good international practice, to include but not limited to the: (i) IFC Performance Standard 1 (IFC, 2012) and the associated “IFC Guidance Note 1” (IFC, 2012); (ii) EBRD Performance Requirement 1.

6.1 Site Alternatives

As discussed earlier, the OHTL will be developed to connect the GoSII 500MW Wind Farm Project with the National Grid in order to supply grid users in Egypt with Electricity. The OHTL is considered a key component for the Wind Farm Project and without it, the GOSII Wind Farm Project cannot be realised.

Therefore, the site for the OHTL takes into account the location of the GOSII Wind Farm and its closest connection points to the National Grid. Based on that, there are no site alternatives to be considered for the OHTL.

6.2 Design and Technology Alternatives

Several design alternatives were considered by EETC for connection of the GoSII 500MW Wind Farm Project with the National Grid. These design alternatives are mainly related to the route of the OHTL. One the design alternatives is presented in the figure below.



Figure 6: OHTL Route Alternative

However, based on preliminary discussions undertaken between EETC, RCREEE and EEAA such routes were not accepted by EEAA. As discussed earlier, currently an area of around 284km² in the GoS has been allocated by the Government of Egypt to NREA for development of multiple wind farm projects. A Strategic and Cumulative Environmental and Social Assessment (SESA) was undertaken for the 284km² area (was carried out by the RCREEE on behalf of NREA) and the Wind Energy Developers approved by the EEAA in July 2018.

One of the objectives of the SESA was to investigate the cumulative impacts of the wind farm developments and identify constraints to be taken into account by the various developers. The SESA investigated key E&S attributes to include biodiversity, birds, bats, land use, archaeology and cultural heritage, etc. In summary, the SESA does not identify any constraints for the Project area with the exception of recommendation for birds as discussed in further details below.

The SESA recommends that to efficiently reduce potential barrier effects of multiple wind farms in the 284km² area, sufficient space must be maintained between wind farms to enable large soaring birds to safely migrate over the coastal desert plains and continue migration during spring and autumn time and seasons. Therefore, the SESA recommends avoiding installing turbines within the allocated areas presented in red in the figure below, as well as any infrastructure elements such as OHTL.

The route alternatives considered by EETC (such as the one presented in Figure 6 earlier) include a part of the OHTL within the red buffer areas identified within the SESA, and therefore such alternatives were rejected by EEAA. The final layout for the OHTL (as presented previously under Figure 2 earlier), avoids such areas.

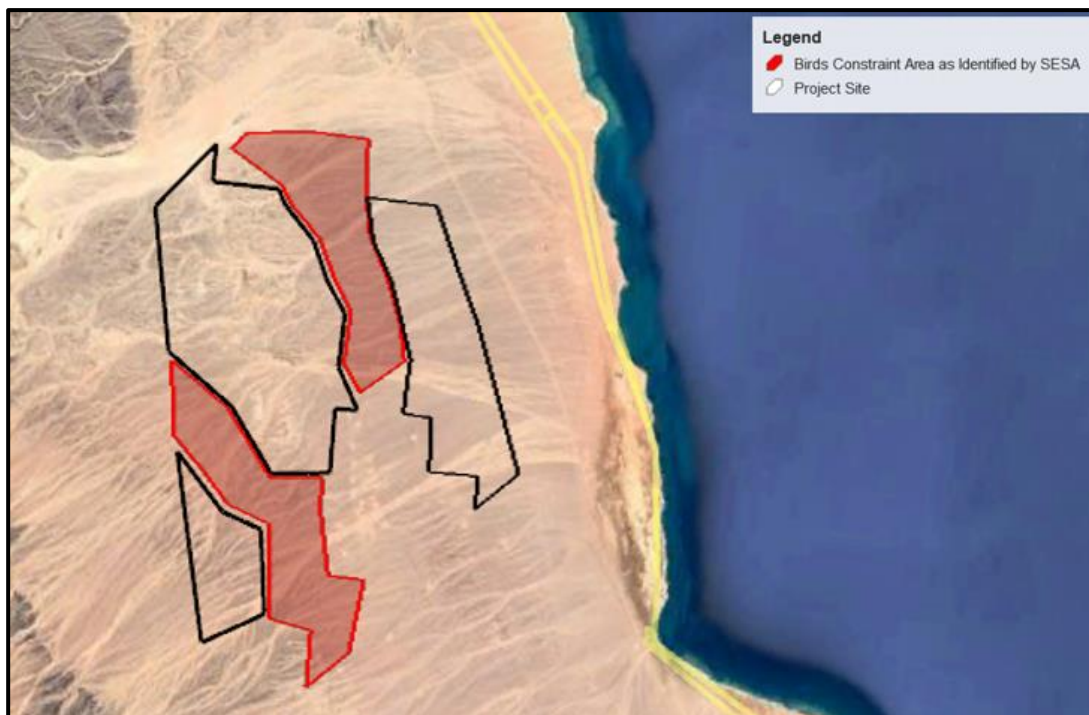


Figure 7: Bird Constraint Areas Identified in the SESA

Apart from the above, it is important to note that EETC have a standardized design and technology for all 220kV lines to be developed in Egypt. As discussed earlier, this mainly includes a three-phase steel beam Double-Circuit Transmission Towers (DCT). Taking this into account, there are other design and/or technology alternatives for the OHTL to be considered.

6.3 No Project Alternative

The 'no project' alternative assumes that the OHTL will not be developed. However, as discussed earlier the OHTL is considered a key component for the GoSII 500MW Wind Farm Project as it will supply electricity 220 kV OHTL for RSWE 500MW Wind Power Plant – Final ESIA Report

produced from the wind farm to the National Grid, which in turn will supply grid users in Egypt. Without the OHTL, the Wind Farm Project cannot be realized.

Should the Project not move forward, then the Project-related negative environmental impacts discussed throughout this ESIA would be averted. However, as noted throughout the ESIA, generally such impacts do not pose any key issues of concern and can be adequately controlled and mitigated through the implementation of the Environmental and Social Management Plan (ESMP). Nevertheless, should the Project not move forward, then the significant and crucial positive economic and environmental benefits of the Wind Farm would not be realized. Such benefits include the following:

- The development allows for more sustainable development and shows the commitment of the Government of Egypt to realising its energy strategy and meeting the set targets for renewable energy sources;
- The Project will contribute to increasing energy security through reliance on an indigenous, inexhaustible and mostly import-independent energy resource. The estimated electricity generation from the Wind Farm is 2,200 – 2,500 GWh per year; which will serve the annual electricity needs of more than 800,000 local households (ECO Consult & EcoConserv, 2020); and
- Generating electricity through wind power is rather pollution-free during operation. The clean energy produced is expected to reduce consumption of conventional petroleum products used at thermal power plants for electricity generation. This will help in reducing greenhouse gas emissions as well as air pollutant emissions – the Project is expected to offset more than 1 million metric tons of CO₂ annually (ECO Consult & EcoConserv, 2020).

7 LANDSCAPE & VISUAL

This Chapter first provides an assessment of baseline conditions within the Project site and surrounds in relation to landscape and visual and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

7.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of the baseline conditions in relation to landscape and visual receptors and presents the outcomes and results.

7.1.1 Baseline Assessment Methodology

The baseline assessment was based on site visit that was undertaken by the 'ESIA Team' to the OHTL route and a 500m buffer on both sides. The objective of the site visit was to characterise the landscape, topography, and visual character and receptors of the Project site and surrounds. In addition, the assessment was also based on secondary data available on landscape and visual character of the area from other available sources – mainly the ESIA for the GoSII 500MW Wind Farm.

7.1.2 Results

The OHTL route can be characterized to be located within a desert area that is barren, with a relatively flat topography with no sudden changes throughout the entire route. The elevation ranges from around 10m to 100m above sea level. The figure below presents the general topography and landscape character of the OHTL route.

In terms of visual character, critical visual receptors are identified as those normally seen as valuable by the human perception and include recreational activities, environmental reserves, local community settlements, remarkable historical or cultural sites, and other.

Based on the site visit undertaken for the Project area and the 500m buffer on both sides, no critical visual receptors were identified. In fact, the route and the buffer area are devoid of any receptors as discussed further in "Chapter 8".

There are several visual receptors within the wider area which include petroleum facilities, oil rigs, an air force defence unit, and wind farm developments, as well as several transmission and distribution lines (as presented later in "Chapter 15") – none of which are considered critical visual receptors. Within the wider area the nearest critical visual receptors that can be identified include (i) closest community settlement (Ras Ghareb town located 12km to the southeast); (ii) closest key archaeology/cultural heritage site (Monastery of Paul located around 20km to north), (iii) key biodiversity areas (Gabal El Zeit Important Bird Area located to the south); and (iv) a touristic resort located 17km to the north.



Figure 8: General Topography and Landscape of the OHTL Route

7.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on landscape and visual during the various phases to include planning and construction phase and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

7.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the OHTL Contractor for the OHTL transmission towers and the various Project components to include foundations, access roads, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Construction activities would create a temporary effect on the visual quality of the site and its surroundings. The visual environment during the construction phase would include the presence of elements typical of a construction site such as equipment and machinery to include excavators, trucks, front end loaders, compactors and others.

However, as discussed, there are no key sensitive visual receptors within the Project site and surrounding vicinity.

The visual environment created during the construction period would be temporary, of a short-term duration, limited to the construction phase only. For the duration of construction, the visual impacts will be of a negative nature and be noticeable, and therefore of a medium magnitude. As there are no key sensitive visual receptors which would be affected, the receiving environment is determined to be of a low sensitivity. Given all of the above, such an impact is considered to be of minor significance.

Mitigation Measures

The following identifies the mitigation measures to be applied by the OHTL Contractor during the construction phase and which include:

- Ensure proper general housekeeping and personnel management measures are implemented which could include:
 - Ensure the construction site is left in an orderly state at the end of each work day.
 - To the greatest extent possible construction machinery, equipment, and vehicles that are not in use should be removed in a timely manner and kept in locations to reduce visual impacts to the area.
 - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in 'Section 9.2.2'

Following the implementation of these mitigation measures, the significance of the residual impact is categorised as not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by OHTL Contractor during the construction phase:

- Inspections of the works should be carried out at all times to ensure the above measures are implemented.

7.2.2 Potential Impacts during the Operation Phase

Visual impacts associated typically concern the OHTL towers themselves (e.g. colour, height, and number) and impacts relating to their interaction with the character of the surrounding landscape and the visual receptor which might be present. Nevertheless, in general, such structures are not considered mega or huge structures that would impose a key change on the landscape and visual character of the area. More importantly, such impacts are considered insignificant due to the following:

- Within the Project area and surrounding there are no key sensitive visual receptors.
- Project area is considered a barren and desert area and in general is located within an industrial area with petroleum activities and wind farm developments for which its aesthetical value loses some importance.
- There are several electricity transmission lines within the area, and therefore the addition of this Project will not be a significant impact to the visual and landscape characteristic of the area.

Given all of the above, the potential impacts on landscape and visual are of a long-term duration throughout the Project operation phase. The impacts will be of a negative nature, and low magnitude given that such elements of the Project will be visible. However, there are no key visual receptors in the project route and its surroundings therefore the receiving environment is considered of low sensitivity. Given all of the above, such an impact is considered not significant.

Mitigation Measures

There are no mitigation or monitoring measures to be considered.

8 LAND USE

This Chapter first provides an assessment of baseline conditions within the Project site and surrounds in relation to land use and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.1 Assessment of Baseline Conditions

The section below presents the methodology that was undertaken for assessment of baseline conditions in relation to infrastructure and utilities and the outcomes and results.

8.1.1 Methodology for Assessment

A field survey was undertaken with the objective of investigating and documenting any land use activities onsite to include physical structures (houses, units, etc.) and/or economical activities (grazing, agriculture, etc.). The survey was undertaken to cover the entire OHTL route as well as 500m buffer on both sides.

In addition, consultations were undertaken with relevant governmental entities to understand formal land uses within the Project area as discussed in further details below.

8.1.2 Results

Based on the site survey, no physical structures were noted within the OHTL route and 500m buffer area on both sides. In addition, no economical activities were noted (such as grazing, agricultural, petroleum activities or Bedouin groups) nor any evidence of any such activities. The entire route is vacant and runs within unoccupied desert and barren lands.

Based on information from EETC, it was indicated that the entire OHTL route is located under state owned lands which include: (i) areas that are part of the 284km² plot allocated to NREA for wind farm developments by the Government of Egypt through a Prime Ministerial Decree; and (ii) areas allocated by the Government of Egypt for petroleum activities to the General Petroleum Company. A "Work Coordination Agreement" has been signed between NREA and the General Petroleum Company for the area.

Consultations were undertaken with the Director of Planning Department at Ras Ghareb Local Unit and Director of the Engineering Department at Red Sea Governorate. Based on such consultations, it was indicated that the OHTL route is not in the City's plan and the route is under state ownership lands that have been allocated to NREA and the General Petroleum Company as discussed above.

Based on consultation with EETC, the procedure for the development of the OHTL was explained. EETC will first obtain an approval for the route from the Egyptian Armed Forces Operations. After the approval is obtained, EETC will enter into an agreement with NREA and the General petroleum Company for passage of the OHTL within their allocated areas. However, given that all entities involved are governmental entities (EETC, NREA and General Petroleum Company), there will be no compensation to be paid by EETC for the OHTL route and its RoW. Therefore, there is no land acquisition or land compensation measures to be undertaken or implemented.

8.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on land use during the various phases to include planning and construction phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

8.2.1 Potential Impacts during the Planning, Construction and Operation Phase

Inappropriate siting of Project components could result in land use impacts related to physical displacement and/or economical displacement or similar. Nevertheless, no such impacts are anticipated from the Project due to the following as discussed earlier in the baseline section:

- The Project site itself (to include the OHTL route and 500m buffer on both sides) in general is uninhabited and vacant and does not include any physical or economical land use activities. Therefore, physical and economical displacement impacts are considered irrelevant.
- The Project site is under governmental ownership and has been allocated to NREA and the General Petroleum Company. Therefore, no land acquisition or compensation process is required.

Taking the above into account, there are no anticipated impacts on land use and there are no mitigation or monitoring measures to be considered.

9 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

This Chapter first provides an assessment of baseline conditions within the Project site and surrounds in relation to geology, hydrology, and hydrogeology and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

9.1 Assessment of Baseline Conditions

The section below presents the methodology that was undertaken for assessment of baseline conditions in relation to geology, hydrology and hydrogeology and the outcomes and results.

9.1.1 Methodology for Assessment

The assessment was based on review of secondary data to include mainly that available from the ESIA study undertaken for the GoSII 500MW Wind Farm Project – which included detailed information on geology, hydrology and hydrogeology within the Project site and surrounding areas (which cover the OHTL route).

9.1.2 Geology

The figure below presents the geological formation within the Project site and surrounding areas which are represented by various lithologic associations ranging in age from Late Paleozoic to Quaternary.

As shown in the figure below, the rock units that could be exposed in the Project location are mainly Quaternary deposits. The Quaternary deposits cover almost all the area of the project site. These deposits are formed of sand, gravel, clay, aeolian sand sheets and sand accumulations. They are mainly composed of clastic sediments of different textures ranging from silt to boulder size. The composition of the Quaternary deposits is mainly the weathering products of the surrounding exposed rocks. The colour of the soil cover (Quaternary deposits) reflects the source of the sediments. As the exposed rocks in the north and north-west directions (the southern part of north Galala plateau) are sedimentary and mainly of carbonates rich in chert bands (Eocene limestone) and evaporates, their withered products are light in colour rich in lime mud, chert nodules, limestone and dolomite fragments. But in the southern direction with the occurrence of the igneous rocks of the Red Sea mountain range in the far west, which consists mainly of granitic rocks rich in feldspars reddish in colour. The soil cover in this region is predominantly reddish as it consists of the weathered products of and fragments of granites.

The Quaternary sediments are the main cover of the project area on which all construction works will be built. The soil covering most of the area of the project site is in the form of chains of alluvium terraces. The terraces differ in their height from the floor of the wadi in addition to the type and size of their components. The terraces near the highlands in the north and west are located at higher altitudes, and the components are very close to those in the source and are large in size.

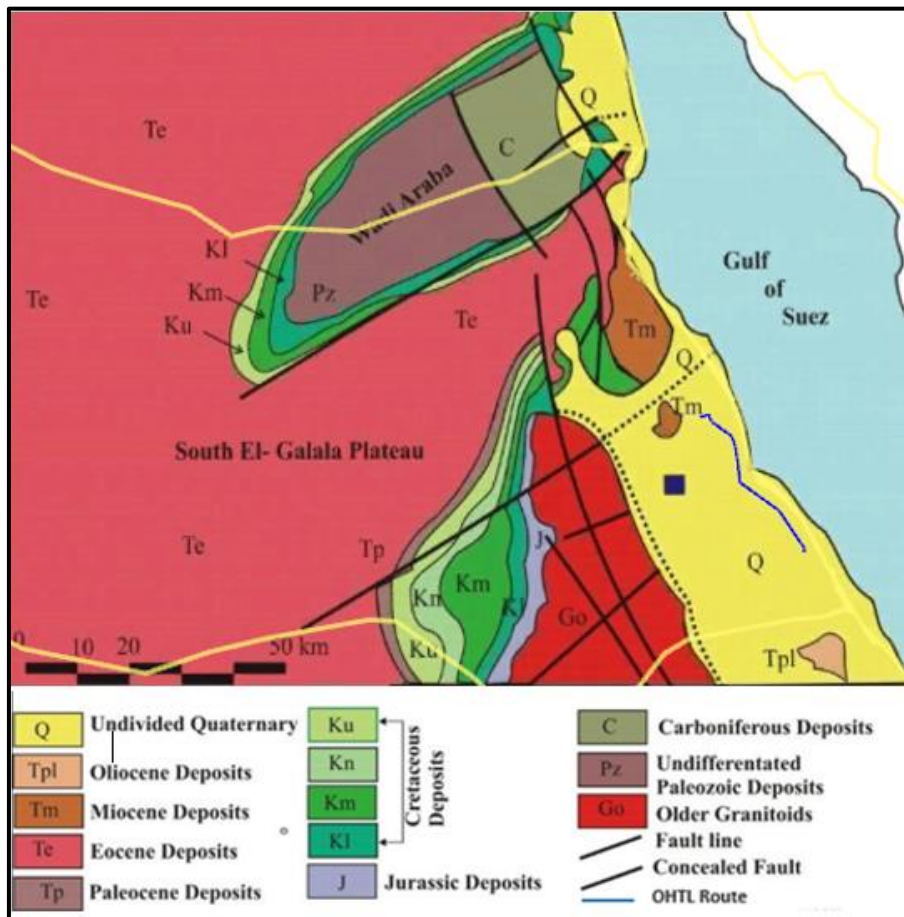


Figure 9: Geological Formations of the Project Area

9.1.3 Hydrology

The key major Wadi systems in the area include Wadi Aldahal located around 3km to the north and Wadi Hawashiya located to the south through which the OHTL runs. The physiographic features of the area that includes the location of the Project site and the surroundings could be differentiated into high, medium and low relief units as noted in the figure and described further below.

- **Low Relief Unit.** This unit consists of thick loose deposits and extends parallel to the shore line of the GoS. Elevation ranges from shoreline to about 350m above sea level (A.S.L) and extends from the hillslope towards the GoS at the east by a distance of about 30 km. This unit is characterised by gentle or very gentle slope toward the GoS with an average slope of about 1% traversed by numerous wide and shallow drainage lines.

There are many different geomorphic features that characterize this coastal plain such as, numerous wide and shallow drainage lines, vague alluvial fans, sabkhas and beaches. The tidal channels are very shallow and have a straight pattern. The sabkhas lies in the low land area near the GoS and completely out of the Project site. The most important notes in this unit are the numerous traversed drainage lines with very wide and shallow courses with limited extension and malformation of the tributaries alluvial fans. This means that the quantity of rain water drained toward south and southeast is too limited. This is because the regional slope of the south Galala plateau is towards the east-southeast, so the main direction of surface flow is toward Wadi Aldahal to the north of the site, which means that no strong surface flow and low elevation of the western and north-western highs leads to accumulation of big quantity of sediments downhill forming alluvial fans.

- **Medium relief unit;** this unit extends from the scarp of the plateau toward the Gulf in the east and southeast direction with a distance of about 10 km and a surface ranging from 350 to 800 m A.S.L. The unit is gently curving, or straight (rectilinear) part of a hillslope, possibly interrupted or replaced by cliffs,

composed of cretaceous rocks. This unit is characterized by the presence of many small, shallow and wide tributaries that drain the plateau scarp towards Wadi Aldahal and wadi Hawashiya to the north and south of the Project location, respectively. This unit is located away from the site borders in the north, North-West and west directions. This unit is characterized by the presence of simple heights (low elevated hills) which are spaced from each other through dry and shallow wadies. The average slope gradient of this unit is about 2% toward the Gulf of Suez.

- **High relief unit:** is located in the northwest at a highly elevated plateau with slightly rough topography of resistant Eocene limestone (south Galala Plateau) and its southern scarp is facing the project from the northwest direction. The surface elevation of this unit is above 800 A.S.L. The average slope gradient of this unit is about 7.5%. This unit is located at a distance of more than 30 km from the northern and western borders of the site.

Taking the above into account, as noted earlier, the OHTL route runs within Wadi Hawashiya considered a key Wadi system in the area. In addition, there are several other drainage lines and other smaller Wadi system noted that run within the OHTL route and the 500m buffer area on both sides.

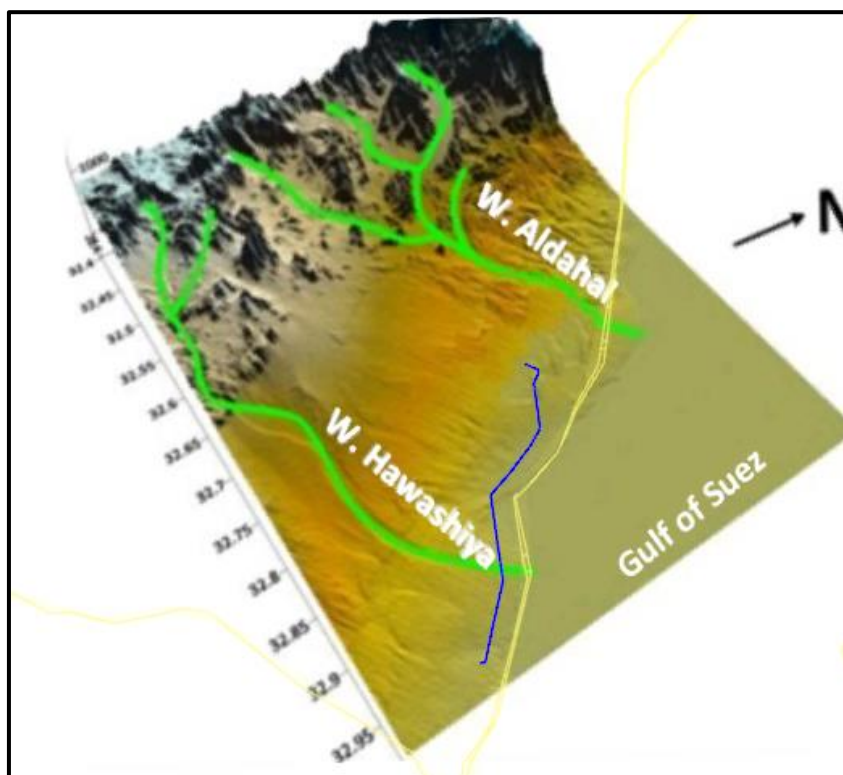


Figure 10: Hydrology of the Area

9.1.4 Hydrogeology

The figure below presents the hydrogeological conditions of the Project site and surrounding areas, based on the hydrogeological map of Egypt of 1999. As noted, the Project site is located in an area of wadi deposits with moderate to low productive aquifers with insignificant surface recharge and limited sub-surface recharge. This entails that there are no shallow groundwater aquifers with a continuous source of fresh water recharge, and this is due to the lack of rain and large drainage basins to collect rainwater.

There is no utilization of groundwater in the Project site, even with the petroleum and oil companies operating in the region.

In the wide area surrounding the site, the recent well inventory and available literature show that groundwater wells are concentrated within Wadi Araba, located about 50 km north of Project site. Wadi Araba was considered as a wadi with high groundwater possibility (Aggour, 1990). Rocks belonging to Carboniferous and Lower Cretaceous sandstone represent the main source of water in the Wadi Araba

Depression. The water is tapped from springs, shallow wells and occasionally deep wells. The collected information from shallow groundwater wells and springs in Wadi Araba reveals that the water salinity varies between 1025 to parts per million (ppm) and 50,233 ppm.

In the GoS, groundwater is used mainly for touristic and industrial purposes. According to the rates of groundwater withdrawal with respect to water requirements, the Gulf province includes areas into which the groundwater represents 10-40% of the utilized water supplies. The daily discharge ranges from 260 to 3000 m³/day at Wadi Araba and El Sukhna-Zafrana localities respectively (Sewidan and Misak, 1992). The continuous use of such water potentially stresses its quantity and quality.

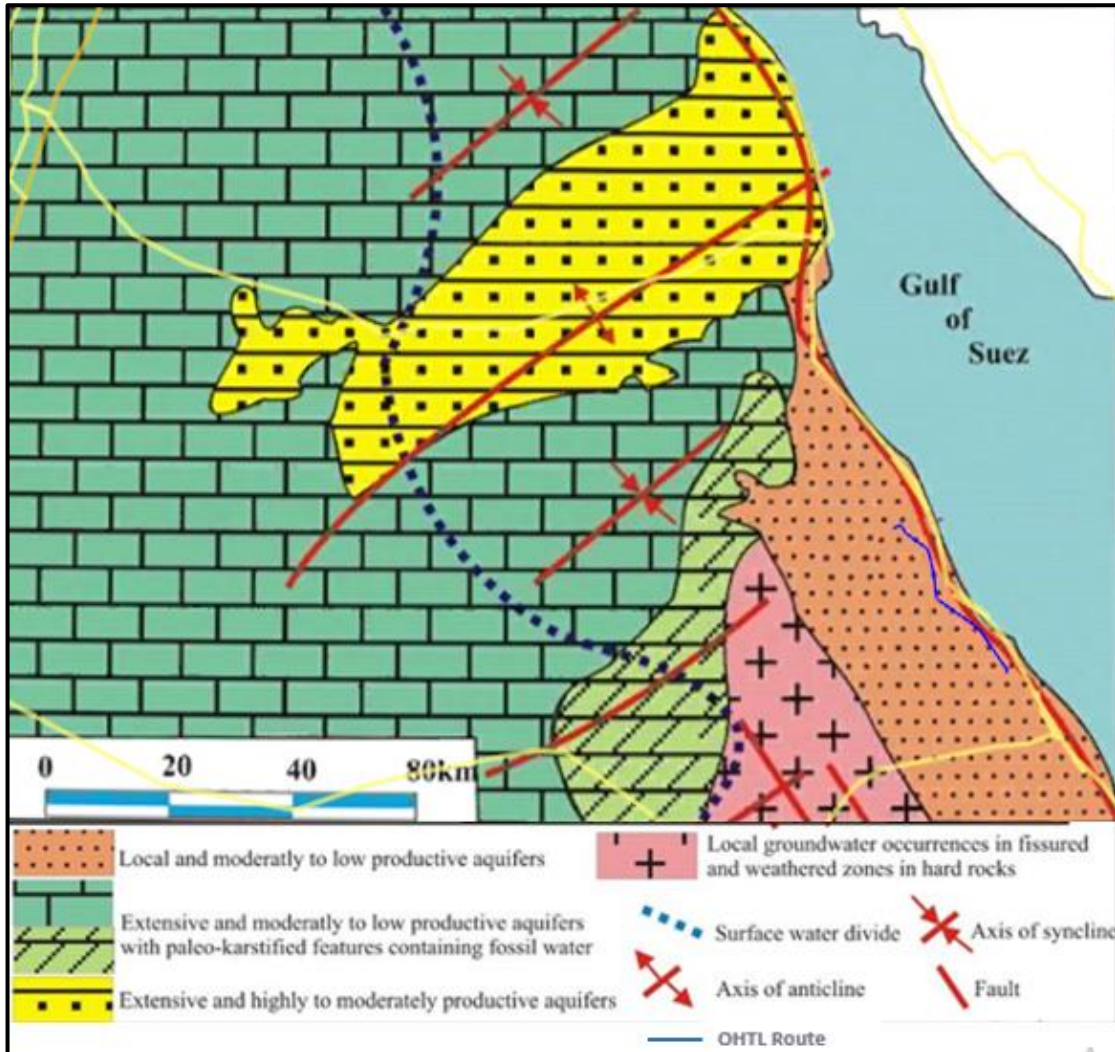


Figure 11: Hydrogeological Formations within the Project Area

9.2 Assessment of Potential Impacts

This Section identifies the anticipated impacts on hydrology and hydrogeology from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

9.2.1 Potential Impacts from Flood Risks on the Project Site

As discussed earlier, the OHTL route runs within a key and major wadi System (Wadi Hawashiya) as well as several other drainage lines and smaller wadi systems. Such wadi systems could entail potential risks of local flood hazards especially during the rainy season and during flash flood events which in turn could affect the Project components. Such risks must be taken into consideration throughout the planning phase of the Project as they could inflict damage to the Project and its various components.

Taking all of the above into account, the anticipated impacts are considered of long-term duration. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of medium magnitude and medium sensitivity. Given the above impact is considered of moderate significance.

Mitigation Measures

The following identifies the mitigation measures to be applied by the EETC and/or OHTL Contractor during the planning phase.

A detailed flood risk assessment must be undertaken for the OHTL route. The assessment should include a hydrologic model for the catchment area to calculate flood flows and volumes onsite for a 20, 50 and 100-year return period. Based on that recommendations should be provided which could include for example a buffer distance from the wadi systems to mitigate flood risks, and/or identification and development of detailed engineering structures/solutions to be considered for the design of the OHTL to take into account such risks.

Monitoring Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by EETC and/or OHTL Contractor during the planning phase.

- Submission of a flood risk assessment study

9.2.2 Potential Impacts from Improper Management of Waste Streams during Construction and Operation

Given the generic nature of the impacts on soil and groundwater for both phases of the Project (construction and operation) those have been identified collectively throughout this section. Generally, this includes potential impacts from improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and of hazardous material, etc.).

Improper housekeeping practices during construction and operation (such as illegal disposal of waste to land) could contaminate and pollute soil which in turn could pollute groundwater resources. This could also indirectly affect flora/fauna and the general health and safety of workers (from being exposed to such waste streams). Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section.

The potential impacts from improper management of waste streams could be of a long-term duration throughout the construction and operation phase. Such impacts are negative in nature, and could be noticeable and are therefore of medium magnitude. However, they are considered of low sensitivity as they are generally controlled through the implementation of general best practice housekeeping measures. Given all of the above, such an impact is considered to be of minor significance.

Following the implementation of the mitigation measures highlighted throughout this section, the residual significance can be reduced to not significant.

(i) Solid Waste Generation

Solid waste is expected to be generated from construction activities. Solid waste generated will likely include construction waste (such as debris) and municipal solid waste (during construction and operation such as cardboard, plastic, food waste, etc.).

Municipal solid waste and construction waste generated will likely be collected and stored onsite and then disposed to the closest approved dumpsite (Ras Gharib Public Dumpsite) or, if possible, reused in the construction activities.

Solid waste is expected to be generated mainly throughout the construction phase. Due to the limited and simple O&M activities, no solid waste is expected during the operation phase.

Mitigation Measures

The following identifies the mitigation measures to be applied by the OHTL Contractor during the construction phase:

- Coordinate with Ras Gharib City Council for the collection of solid waste from the site to the municipal approved dumpsite (the closest dumpsite being Ras Gharib Public Dumpsite);
- Prohibit fly-dumping of any solid waste to the land;
- Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste";
- Distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste.
- Implement proper housekeeping practices on the construction site at all times; and
- Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor during the construction phase:

- Inspection of waste management practices onsite;
- Review of records and manifests for volume of waste generated to ensure consistency; and
- Regular environmental reporting on implementation of the waste management practices onsite.

(ii) Wastewater Generation

Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, showers, etc.) generated from workers during the construction. Wastewater quantities are expected to be minimal. It is expected that wastewater will be collected and stored in fully contained septic tanks and then collected and transported by transportation tankers to be disposed at the closest Wastewater Treatment Plant (WWTP) (being Ras Ghareb WWTP).

Wastewater is expected to be generated mainly throughout the construction phase. Due to the limited and simple O&M activities, no wastewater is expected during the operation phase.

Mitigation Measures

The following identifies the mitigation measures to be applied by all the OHTL Contractor during the construction phase:

- Coordinate with Ras Gharib Water Company to hire a private contractor for the collection of wastewater from the site to the closest WWTP (being Ras Gharib WWTP);
- Prohibit illegal disposal of wastewater to the land;
- Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas;
- Ensure that septic tanks are used during construction that are well contained and impermeable to prevent leakage of wastewater into soil; and
- Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor during the construction phase:

- Inspection of wastewater management practices onsite;
- Review of records and manifests for volume of wastewater generated to ensure consistency; and
- Regular environmental reporting on implementation of the wastewater management practices discussed above.

(iii) Hazardous Waste Generation

Hazardous waste is expected to be generated throughout the construction phase could include consumed oil, chemicals, paint cans, etc. Hazardous waste generated will likely be collected and stored onsite and then disposed at the approved hazardous waste disposal facilities managed by the Hazardous Waste Management Project and supervised by the governorate and the EEAA.

Hazardous waste is expected to be generated mainly throughout the construction phase. Due to the limited and simple O&M activities, no hazardous waste is expected during the operation phase.

Mitigation Measures

The following identifies the mitigation measures to be applied by the OHTL Contractor during the construction phase:

- Coordinate and hire a private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities;
- Ensure that hazardous waste is disposed in a dedicated area that is enclosed; of hard surface; with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste.
- Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available.
- Prohibit illegal disposal of hazardous waste to the land;
- Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste;
- Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing; and
- Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor during the construction phase:

- Inspection of hazardous waste management practices onsite;
- Review of records and manifests for volume of hazardous waste generated to ensure consistency; and
- Regular environmental reporting on implementation of the hazardous waste management practices onsite.

(iv) Hazardous Material

The nature of construction activities entails the use of various hazardous materials such as oil, chemicals, and fuel for the various equipment and machinery. Improper management of hazardous material entails a risk of leakage into the surrounding environment either from storage areas or throughout the use of equipment and machinery.

Hazardous materials are expected to be used mainly throughout the construction phase. Due to the limited and simple O&M activities, no hazardous materials are expected during the operation phase.

Mitigation Measures

The following identifies the mitigation measures to be applied by the OHTL Contractor during the construction phase:

- Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the land in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another;
- Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS) must present at all times. Spilled material should be tracked and accounted for;
- Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.);
- Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material;
- Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose; and
- If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor during the construction phase:

- Inspection for storage of hazardous materials to include inspections for potential spillages or leakages; and
- Report any spills and the measures taken to minimize the impact and prevent from occurring again.

9.2.3 Potential Impacts from Erosion and Runoff during the Construction Phase

Site preparation activities which are to take place onsite by the OHTL Contractor for installation of the various Project components to include wind turbines, substation, cables, etc. are expected to include land clearing activities, excavation, grading, etc.

The nature of construction activities discussed above could disturb soil, exposing it to increased erosion during rainfall events. If onsite erosion and runoff are not controlled, they can result in siltation of surface water. Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures as highlighted throughout this section, and which are expected to be implemented throughout construction phase.

The potential impacts from erosion and runoff is of short-term duration as it is limited to the construction phase. Such impacts are negative in nature, and could be noticeable and are therefore of medium magnitude. However, they are considered of low sensitivity as they are generally controlled through the

implementation of general best practice housekeeping measures. Given all of the above, such an impact is considered to be of minor significance.

Following the implementation of the mitigation measures highlighted throughout this section, the residual significance can be reduced to not significant.

Mitigation Measures

The following identifies the mitigation measures to be applied by all involved entities to include the OHTL Contractor during the construction phase:

- Avoid executing excavation works under aggressive weather conditions.
- Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soils in adjacent areas.
- Erect erosion control barriers around work site during site preparation and construction to prevent silt runoff where applicable.
- Return surfaces disturbed during construction to their original (or better) condition to the greatest extent possible.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by all involved entities to include the OHTL Contractor during the construction phase:

- Inspection for erosion and runoff control to include inspections for implementation of mitigation measures.

10 BIODIVERSITY

This section provides an assessment of baseline conditions within the Project site and its surroundings in relation to biodiversity

It is important to note that biodiversity assessed in this section excludes birds (avi-fauna) and bats, which are discussed separately in “Chapter **Error! Reference source not found.11**” and “Chapter 12” respectively.

10.1 Baseline Assessment Methodology

The baseline assessment of the Project site was based on a literature review and a field survey, each of which is discussed in detail below.

(i) Literature Review

This was based on previous studies, data, surveys, and records available in published scientific papers, books, and journals on flora and fauna species recorded within the study region in general. It is important to note that since the available literature on the Project site and its vicinity is relatively limited, the literature reviewed included a wide spectrum of references including international references that have a wider focus than the region of the Project.

(ii) Field Survey

A field survey was undertaken at the Project site during the spring of 2020. The field survey mainly included the following methods:

- Field observations: the site was examined carefully for the presence of active animals, animal signs and tracts, active burrows, remains or any other vital signs that indicate the activity of animals. Due to the large size of the project site, the research team focused on areas of high priorities; mainly wadis since they are believed to be the main corridors that animals would use in moving around the site. The team carried out route-transects along the wadis searching for any of the above mentioned signs of animal presence. Similar approach was followed for the flora survey where the survey focused on sides of wadis and any areas where vegetation was noticed.
- Interviews with local people: local people of the area were interviewed and asked questions regarding well known fauna species that are likely to be present within the site.

(iii) Fauna and Flora Species status

All species recorded as part of the literature review or on-site during the field survey had their conservation status identified according to International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2019), which provides the global conservation status of evaluated species. Since Egypt does not have national Red Lists for most taxon, the regional assessments of the Mediterranean region and North African region were reviewed for any species that could be of conservation value on the regional level.

10.2 Results

In accordance with the methodology discussed above, the results below discuss the findings and outcomes for flora and fauna based on the literature review and field survey.

(i) Flora

According to Olson et al (2001), the project area is located in the Desert and Xeric Shrublands Biome and more specifically in the Ecoregion of Red Sea Coastal Desert, see Figure 12. Applying the classification elaborated by Harhash et al. (2015) to the 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”. The vast majority of the project area can be classified as “Hamada Desert” (Sub-System: “Plain Land”) that is crossed by “Valleys and Canyons” (i.e. wadis) which belong to the Sub-System “Low Land”.

According to SESA (RCREEE, 2018), the project area consists mainly of flat pebble desert cut by shallow drainage lines; wadis. As typically for desert regions, habitats are limited in diversity and coverage. Wadis, which have a relatively high level of diversity, are marked with fine sand and clay sediments deposited by old, slow surface flows. Vegetation cover in the project area was found to be extremely sparse and restricted to single drainage channels. Vegetation within the project area generally has a low species composition, density and a very patchy distribution. The wadis tend to support the most vegetation due to generally higher soil moisture levels.

According to Abd El-Ghani et al. (2014), the project site is located in what is defined as the Eastern Desert of Egypt. More specifically, the project area is located in the Red Sea Coastal Land. Climatically, the project area lies within the hyper-arid provinces (Ayyad et al., 1993). Generally, the desert vegetation in the project area is characterised by openness and composed of a permanent framework of perennials, the interspaces of which may be occupied by ephemerals after winter rains. The appearance of ephemerals and their duration depend on the irregular rainfall. The modification of the plant cover proceeds in coincidence with the modification of the soil thickness. A thin soil will be moistened during the rainy season but will be dried in a short time. Deep soils allow the storage of some water in the subsoil providing a continuous supply of moisture for the deeply seated roots of perennials.

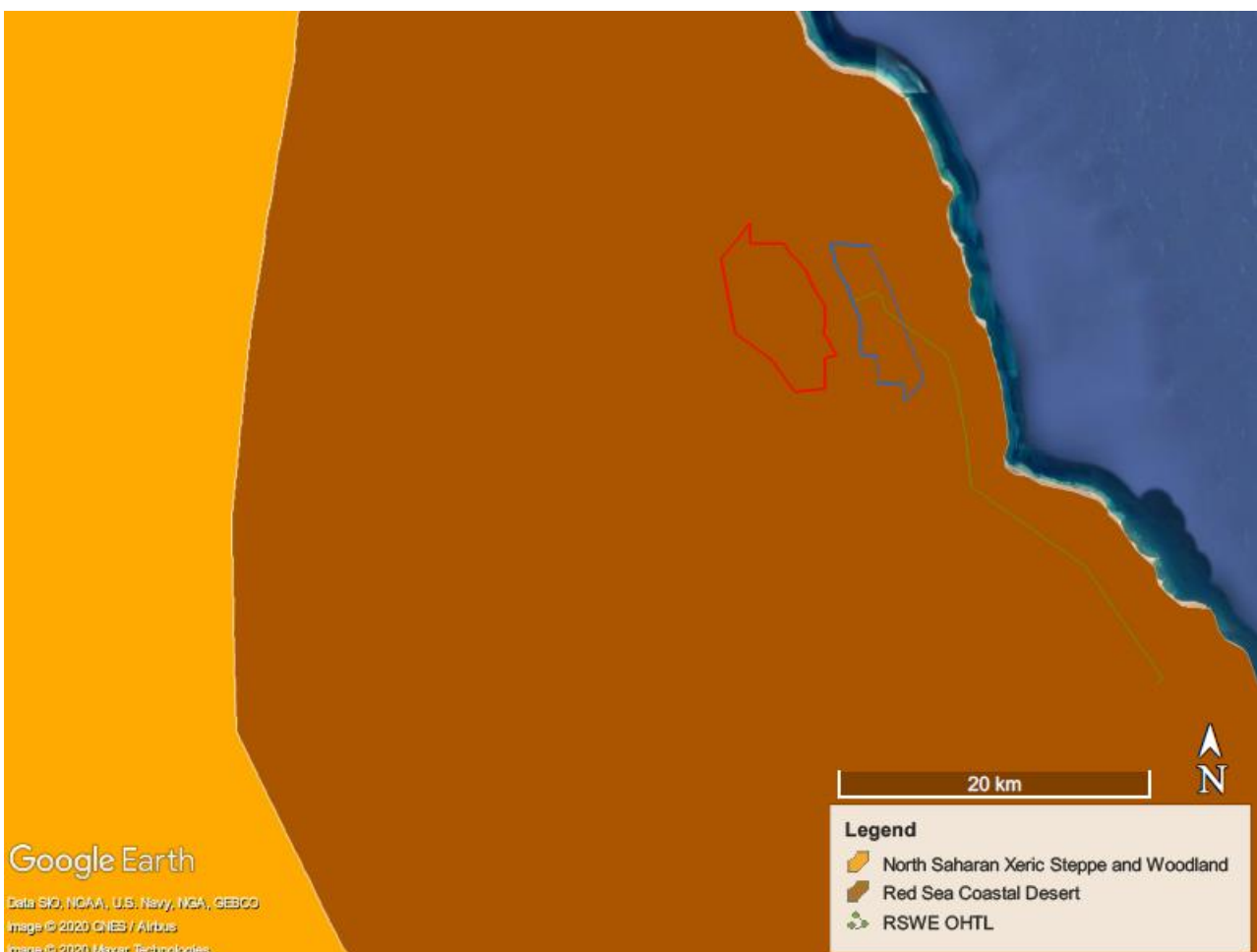


Figure 12: Location of Project in reference to Ecoregions of the world (TEOW) (Olson et al, 2001)

According to literature review of the flora recorded along the coastal desert of the Red Sea, a total of 68 species were recorded in the project site and its vicinity (Abd El-Ghani et al, 2014), see Table 7. During the field survey 15 species were recorded. Out of the 68 species documented to be recorded in the project area and its vicinity from the fieldwork and the literature review, only five were found to be evaluated on the global level of IUCN's Red List of Threatened Species (IUCN, 2019), all of which are evaluated as Least Concern.

Table 7: List of Plant Species Recorded during Field Visit and Literature Review (Consultant, 2019)

Family	Scientific name	IUCN Red List of Threatened Species (2019)	Notes
Ephedraceae	<i>Ephedra aphylla</i> Forssk.	Least Concern	Literature
Amaranthaceae	<i>Aerva javanica</i> (Burm. f.) Juss. ex Schult.	Not Evaluated	Literature
	<i>Amaranthus viridis</i> L.	Not Evaluated	Literature
Apocynaceae	<i>Calotropis procera</i> (Aiton) W.T. Aiton	Not Evaluated	Literature
	<i>Leptadenia pyrotechnica</i> (Forssk.) Decne.	Not Evaluated	Literature
	<i>Pergularia tomentosa</i> L.	Not Evaluated	Literature and field survey
Asteraceae	<i>Artemisia judaica</i> L.	Not Evaluated	Literature
	<i>Centaurea calcitrapa</i> L.	Not Evaluated	Literature
	<i>Centaurea scoparia</i> Sieber ex Spreng.	Not Evaluated	Literature and field survey
	<i>Cotula cinerea</i> Delile	Not Evaluated	Literature
	<i>Echinops spinosus</i> L.	Not Evaluated	Literature and field survey
	<i>Ifloga spicata</i> (Forssk.) Sch. Bip.	Not Evaluated	Literature and field survey
	<i>Iphiona mucronata</i> (Forssk.) Asch. et Schweinf.	Not Evaluated	Literature
	<i>Launaea spinosa</i> (Forssk.) Sch. Bip. ex Kuntze	Not Evaluated	Literature and field survey
	<i>Limbarda crithmoides</i> (L.) Dumort.	Not Evaluated	Literature
	<i>Pluchea dioscoridis</i> (L.) DC.	Least Concern	Literature
	<i>Pulicaria incisa</i> (Lam.) DC.	Not Evaluated	Literature
	<i>Pulicaria undulata</i> (L.) C.A. Mey.	Not Evaluated	Literature
	<i>Reichardia tingitana</i> (L.) Roth	Not Evaluated	Literature and field survey
	<i>Senecio glaucus</i> L.	Not Evaluated	Literature and field survey
<i>Sonchus oleraceus</i> L.	Not Evaluated	Literature	
Boraginaceae	<i>Heliotropium bacciferum</i> Forssk.	Not Evaluated	Literature
	<i>Trichodesma africanum</i> (L.) R. Br.	Not Evaluated	Literature
Brassicaceae	<i>Diplotaxis harra</i> (Forssk.) Boiss.	Least Concern (Europe)	Literature and field survey
	<i>Farsetia aegyptia</i> Turra	Not Evaluated	Literature
	<i>Matthiola longipetala</i> (Vent.) DC.	Not Evaluated	Literature
	<i>Zilla spinosa</i> (L.) Prantl	Not Evaluated	Literature
Capparaceae	<i>Capparis spinosa</i> L.	Not Evaluated	Literature
Caryophyllaceae	<i>Polycarphae robbairea</i> (Kuntze) Greuter & Burdet	Not Evaluated	Literature
Chenopodiaceae	<i>Anabasis articulata</i> (Forssk.) Moq.	Not Evaluated	Literature and field survey
	<i>Arthrocnemum macrostachyum</i> (Moric.) K. Koch	Not Evaluated	Literature
	<i>Atriplex halimus</i> L.	Not Evaluated	Literature
	<i>Chenopodium album</i> L.	Not Evaluated	Literature
	<i>Halocnemum strobilaceum</i> (Pall.) M.Bieb.	Not Evaluated	Literature
	<i>Halopeplis perfoliata</i> (Forssk.) Bunge ex Asch.	Not Evaluated	Literature
	<i>Haloxylon salicornicum</i> (Moq.) Bunge ex Boiss.	Not Evaluated	Literature
	<i>Salsola imbricata</i> Forssk.	Not Evaluated	Literature
	<i>Suaeda monoica</i> Forssk. ex J.F. Gmel.	Not Evaluated	Literature and field survey
Cleomaceae	<i>Cleome amblycarpa</i> Barratte & Murb.	Not Evaluated	Literature
	<i>Cleome droserifolia</i> (Forssk.) Delile	Not Evaluated	Literature
Convolvulaceae	<i>Convolvulus hystrix</i> Vahl	Not Evaluated	Literature

Family	Scientific name	IUCN Red List of Threatened Species (2019)	Notes
Euphorbiaceae	<i>Ricinus communis</i> L.	Not Evaluated	Literature
Fabaceae	<i>Acacia seyal</i> Delile	Not Evaluated	Literature
	<i>Acacia tortilis</i> (Forssk.) Hayne	Not Evaluated	Literature
	<i>Alhagi graecorum</i> Boiss.	Not Evaluated	Literature and field survey
	<i>Lotus hebranicus</i> Hochst. ex Brand	Not Evaluated	Literature
Fabaceae (cont.)	<i>Taverniera aegyptiaca</i> Boiss.	Not Evaluated	Literature
Frankeniaceae	<i>Frankenia hirsuta</i> L.	Not Evaluated	Literature
Geraniaceae	<i>Erodium glaucophyllum</i> (L.) L'Hér.	Not Evaluated	Literature and field survey
Nitrariaceae	<i>Nitraria retusa</i> (Forssk.) Asch.	Not Evaluated	Literature
Orobanchaceae	<i>Cistanche phelypaea</i> (L.) Cout.	Not Evaluated	Literature
Polygonaceae	<i>Calligonum polygonoides</i> L.	Not Evaluated	Literature
Resedaceae	<i>Ochradenus baccatus</i> Delile	Not Evaluated	Literature
	<i>Reseda pruinosa</i> Delile	Not Evaluated	Literature
Solanaceae	<i>Hyoscyamus muticus</i> L.	Not Evaluated	Literature
Tamaricaceae	<i>Reaumuria hirtella</i> Jaub. & Spach	Not Evaluated	Literature
	<i>Tamarix nilotica</i> (Ehrenb.) Bunge	Least Concern	Literature
	<i>Tamarix tetragyna</i> Ehrenb.	Not Evaluated	Literature
Urticaceae	<i>Forsskaolea tenacissima</i> L.	Not Evaluated	Literature
Zygophyllaceae	<i>Fagonia arabica</i> L.	Not Evaluated	Literature and field survey
	<i>Fagonia bruguieri</i> DC.	Not Evaluated	Literature
	<i>Fagonia mollis</i> Delile	Not Evaluated	Literature
	<i>Zygophyllum album</i> L.f.	Not Evaluated	Literature and field survey
	<i>Zygophyllum coccineum</i> L.	Not Evaluated	Literature
	<i>Zygophyllum simplex</i> L.	Not Evaluated	Literature
Junaceae	<i>Juncus rigidus</i> Desf.	Not Evaluated	Literature
Poaceae	<i>Pennisetum setaceum</i> (Forssk.) Chiov.	Least Concern	Literature and field survey
	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Least Concern	Literature

(ii) Fauna

The specific outcomes of the field survey in relation to faunal species are discussed below and which includes mammals and reptiles and amphibians.

a. Mammals

The study site in particular was not studied in detail in previous faunal studies. According to SESA (RCREEE, 2018), mammals distribution is associated with the distribution and abundance of vegetation cover and therefore most species are found in vegetated wadis, rocky hillsides or mountain slopes.

However, literature review has shown that 23 species occur in the project site and its vicinity (Hoath, 2004), see Table 8. It should be mentioned that some of the species are listed since their distribution range maps have shown that they are present in the general area of the project site although no specific studies have confirmed that. Additionally, some of the species listed are known to be present in the highlands to the east of the project site and therefore are considered to be present in the vicinity of the project site, even if small numbers.

Out of the 23 species listed, twenty are listed as Least Concern according to IUCN's Red List of Threatened Species while two are evaluated as Threatened (both Vulnerable); *Capra nubiana* and *Gazella dorcas*, while the remaining species is evaluated as Near Threatened; *Hyaena hyaena*. The *Capra nubiana* and *Gazella dorcas* have the area of the project site as part of their distribution range. Regarding the *Capra nubiana*, the species typical habitats include mountainous areas and is expected to be present, if at all, to the west of the project site in the mountains. As for *Gazella dorcas*, considering the degraded habitats in the general area of the project site and the high level of human disturbance, especially accessibility of the site, it is highly unlikely that the species could be present in the general area of the project site. Finally, regarding the globally

threatened Striped Hyaena (vulnerable), the species is known to have a very wide home range reaching up to 60km. Although it could still be present in the project site, its numbers are believed to be extremely low and would be generally confined to areas with very low human presence. In addition, it is important to note that no mammals were recorded onsite during the field survey undertaken.

Table 8: Mammal species (excluding bats) Recorded in Project Site and its Vicinity (Consultant, 2019)

Family	Scientific name	Common name	Global IUCN status
Erinaceidae	<i>Hemiechinus auritus</i>	Long-eared Hedgehog	Least Concern
Leporidae	<i>Lepus capensis</i>	Cape Hare	Least Concern
Muridae	<i>Jaculus jaculus</i>	Lesser Egyptian Jerboa	Least Concern
	<i>Gerbillus gerbillus</i>	Lesser Egyptian Gerbil	Least Concern
	<i>Gerbillus henleyi</i>	Pygmy Gerbil	Least Concern
	<i>Gerbillus dasyurus</i>	Wagner's Gerbil	Least Concern
	<i>Gerbillus pyramidum</i>	Greater Egyptian Gerbil	Least Concern
	<i>Gerbillus floweri</i>	Flower's Gerbil	Least Concern
Muridae (cont.)	<i>Sekeetamys calurus</i>	Bushy-tailed Jird	Least Concern
	<i>Acomys russatus</i>	Golden Spiny Mouse	Least Concern
	<i>Acomys cahirinus</i>	Cairo Spiny Mouse	Least Concern
	<i>Meriones crassus</i>	Sundevall's Jird	Least Concern
Herpestidae	<i>Herpestes ichneumon</i>	Egyptian Mongoose	Least Concern
Canidae	<i>Felis silvestris</i>	Wild Cat	Least Concern
	<i>Vulpes rueppellii</i>	Ruppell's Fox	Least Concern
	<i>Vulpes zerda</i>	Fennec Fox	Least Concern
	<i>Canis lupaster / Canis aureus</i>	African Wolf / Golden Jackal	Least Concern
	<i>Hyaena hyaena</i>	Striped Hyena	Near Threatened
Procaviidae	<i>Procapra capensis</i>	Rock Hyrax	Least Concern
Bovidae	<i>Capra nubiana</i>	Nubian Ibex	Vulnerable
	<i>Gazella dorcas</i>	Dorcas Gazelle	Vulnerable

b. Reptiles and Amphibians

Virtually no previous specific studies on the reptiles and amphibians were conducted within the boundaries of the project site. According to SESA (RCREEE, 2018), reptiles are the most diverse vertebrate group in the desert habitats like the project area, and consist entirely of typical desert species. This herpetofauna is composed of lizards and snakes that are adapted to rocky and sandy desert habitats. Additionally, according to Baha El Din (2006), there are 34 species that are documented, or at least expected, to be present in the project area and its vicinity, Table 9. Due to the aridity of the area, no amphibian species are known to be present in the project area. On the other hand, the 34 species listed belong to eight families. Out of all those species, twelve are assessed on the global level of the IUCN Red List of Threatened Species. Eleven of these species are evaluated as Least Concern while one species is evaluated as threatened (Vulnerable); *Uromastix aegyptia*.

In addition, it is important to note that no mammals were recorded onsite during the field survey undertaken.

Table 9: Reptilian Species Known to Occur within Study Area (Consultant, 2019)

Family	Scientific name	Common name	IUCN Red List of Threatened Species (2019)
Gekkonidae	<i>Cyrtopodion scabrum</i>	Keeled Rock Gecko Rough Bent-toed Gecko	Least Concern
	<i>Hemidactylus flaviviridis</i>	Yellow-bellied Gecko	Not Evaluated
	<i>Hemidactylus turcicus</i>	Turkish Gecko	Least Concern
	<i>Ptyodactylus guttatus</i>	Spotted Fan-toed Gecko	Not Evaluated
	<i>Ptyodactylus hasselquistii</i>	Egyptian Fan-toed Gecko	Not Evaluated
	<i>Ptyodactylus siphonorhina</i>	Saharan Fan-toed Gecko	Not Evaluated
	<i>Stenodactylus petrii</i>	Sand Gecko	Not Evaluated
	<i>Stenodactylus stenodactylus</i>	Elegant Gecko	Not Evaluated
	<i>Tropicolotes steudneri</i>	Steudner's Pigmy Gecko	Not Evaluated
Agamidae	<i>Agama spinosa</i>	Spiny Agama	Least Concern

Family	Scientific name	Common name	IUCN Red List of Threatened Species (2019)
	<i>Pseudotrapelus sinaitus</i>	Sinai Agama	Not Evaluated
	<i>Trapelus mutabilis</i>	Changeable Agama	Not Evaluated
	<i>Trapelus pallidus</i>	Pallid Agama	Not Evaluated
	<i>Uromastix aegyptia</i>	Egyptian Dabb Lizard	Vulnerable
Lacertidae	<i>Acanthodactylus boskianus</i>	Bosc's Lizard	Not Evaluated
Lacertidae (cont.)	<i>Acanthodactylus scutellatus</i>	Nidua Lizard	Not Evaluated
	<i>Mesalina guttulata</i>	Small-spotted Lizard	Not Evaluated
	<i>Mesalina olivieri</i>	Olivier's Lizard	Least Concern
	<i>Mesalina rubropunctata</i>	Red-spotted Lizard	Not Evaluated
Varanidae	<i>Varanus griseus</i>	Desert Monitor	Not Evaluated
Scincidae	<i>Chalcides ocellatus</i>	Ocellated Skink	Least Concern
	<i>Scincus scincus</i>	Sandfish	Not Evaluated
	<i>Sphenops sepsoides</i>	Audouin's Sand-skink	Least Concern
Colubridae	<i>Lytorhynchus diadema</i>	Diademmed Sand Snake	Least Concern
	<i>Malpolon moilensis</i>	Moila Snake	Not Evaluated
	<i>Platyceps rogersi</i>	Spotted Racer	Least Concern
	<i>Platyceps saharicus</i>	Saharan Cliff Racer	Not Evaluated
	<i>Psammophis aegyptius</i>	Saharan Sand Snake	Not Evaluated
	<i>Psammophis schokari</i>	Schokari Sand Snake	Not Evaluated
	<i>Spalerosophis diadema</i>	Diadem Snake	Not Evaluated
Elapidae	<i>Walterinnesia aegyptia</i>	Black Desert Cobra	Least Concern
Viperidae	<i>Cerastes cerastes</i>	Horned Viper	Least Concern
	<i>Cerastes vipera</i>	Sand Viper	Least Concern
	<i>Echis coloratus</i>	Burton's Carpet Viper	Not Evaluated

(iii) Summary

In summary, based on the survey and literature review undertaken to date, it can be concluded that the Project site in general is considered of low ecological significance due to its natural setting that is characterized by having low vegetation cover in an arid environment with low level of diversity. In addition, no key or sensitive habitats were noted within the Project site, and all floral and faunal species recorded where in general considered common and typical to such habitats and of least concern. Although three species that are believed to be present in the project site are evaluated as globally threatened (Vulnerable), none of them are believed to be present in globally significant number. However special consideration should be given to the globally threatened Egyptian Dabb Lizard *Uromastix aegyptia* since the project site provides a typical habitat for the species, although it is believed not to be present in high numbers due to the low vegetation cover of perennial plants which normally provide major refuge for the species. Finally, as discussed earlier in Section **Error! Reference source not found.** (land use section), the Project site is not located within any current or planned natural protectorates.

10.3 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on biodiversity during the various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

10.3.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor are expected to include land clearing activities, leveling, excavation, grading, etc. Such activities are limited to the relatively small individual footprints of the powerline towers and accompanying facilities and therefore the actual area of disturbance is relatively minimal. Nevertheless, such activities would likely result in the alteration of the site's habitat and thus potentially disturb existing habitats. Other impacts on the biodiversity of the site are mainly from improper management of the site which could include improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.).

During the Critical Habitat Assessment (CHA) that was undertaken for the project under IFC Performance Standard 6 and EBRD Performance Requirement 6 (PR6), criteria for Priority Biodiversity Features (PBFs) were applied to screen any biodiversity elements at the project that could trigger any of the criteria. As a result, the Egyptian Spiny-tailed Lizard *Uromastix aegyptia*, which is a globally threatened species (Vulnerable) triggered PBF criterion ii – Vulnerable Species. During the ecological field assessments that were carried out at the project site in autumn 2019 and spring 2020, the species was not recorded although it was recorded in the project area (Ecoda 2013; RCREEE 2018). Also, the species was recorded in autumn 2016 in the Lekela BOO Project area to the south of the project site (Environics 2018). Despite its broad distribution, the Egyptian Spiny-tailed Lizard is assessed globally as Vulnerable, declining throughout its range, and poorly-known, and thus considered a Priority Biodiversity Feature.

However, as discussed in the baseline section, generally the site is considered of low ecological significance due to its natural setting; characterized by having scattered vegetation cover in an arid environment.

Given all of the above, the potential impacts on biodiversity created during the construction phase would be of a long-term duration as they would result in a permanent change in the natural biodiversity of the site. Such impacts are considered of negative nature and of a low magnitude given that the change in the natural biodiversity of the site will be noticeable in limited individual footprints. However, as the site is considered of medium ecological significance, the receiving environment is determined to be of a low sensitivity. Given all of the above, such an impact is considered to be of minor significance.

Additional Studies/Surveys and Mitigation Measures

The following identifies the additional studies and mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- Undertake a survey targeting the globally threatened Spiny-tailed Lizard prior to construction activities to ensure avoidance and/or minimization of impacts to the species.
- Should as part of the Project any fencing be erected, it must be ensured that it allows for the natural movement of small faunal species within the area. This could include for example a fence with an appropriate gap between the ground level and the first rail or strand (around 30cm).
- Implement proper management measures to prevent damage to the biodiversity of the site. This could include establishing a proper code of conduct and awareness raising / training of personnel and good housekeeping which include the following:
 - Prohibit hunting at any time and under any condition by construction workers onsite;
 - Ensure proper storage, collection, and disposal of waste streams generated;
 - Restrict activities to allocated construction areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances; and
 - Avoid unnecessary elevated noise levels at all times. In addition, apply adequate general noise suppressing measures.

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

10.3.2 Potential Impacts during the Operation Phase

The only impacts anticipated during the operation phase are related to improper management of the site as discussed earlier. This could include improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.).

The potential impacts on biodiversity would be of a long-term duration throughout the operation phase of the Project. Such impacts are of negative nature and of a low magnitude. However, as the site is considered of

low ecological significance, the receiving environment is determined to be of a low sensitivity. Given all of the above, such an impact is considered to be of minor significance.

Mitigation Measures

The following identifies the mitigation measures to be applied by the Project Operator during the operation phase and which include:

- Implement proper management measures to prevent damage to the biodiversity of the site. This could include establishing a proper code of conduct and awareness raising / training of personnel and good housekeeping which include the following:
 - Prohibit hunting at any time and under any condition by workers onsite;
 - Ensure proper storage, collection, and disposal of waste streams generated as discussed in detail in “Section **Error! Reference source not found.**”; and
 - Restrict activities to allocated areas only, including movement of workers and vehicles to allocated roads within the site and prohibit off-roading to minimize disturbances.

Following the implementation of these mitigation measures, the significance of the residual impact is categorized as not significant.

11 BIRDS (AVI-FAUNA)

This Section first provides an assessment of baseline conditions within the Project site and its surroundings in relation to birds (avi-fauna) and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation and monitoring measures, additional requirements, etc.) have been identified to eliminate or reduce the impact to acceptable levels.

Before discussing the outcomes, it is important to state that transmission lines could pose potentially fatal risk to birds through collision. Avian collisions with power lines can occur in large numbers of located with daily flyways or migrations corridors. Electrocutation of birds from high voltage powerlines and is only considered a risk at low and medium-voltage powerlines due to the fact that electric cables of the high-voltage powerlines are distant from each other and the chance of birds getting electrocuted by them while flying or perching is extremely unlikely.

It should be highlighted that no site-specific avifaunal assessments were undertaken for the project. However, the project site has been covered at different seasons over a period of five years as part of the avifaunal assessments that were undertaken as part of wind farm projects that are adjacent to the project site. These assessments of in-flight monitoring were carried out in the wind farm during the autumn and spring migration seasons with the first assessment carried out in autumn 2015 while the latest was carried out in spring 2020.

A series of avifaunal assessments were undertaken along the project site throughout the past five years as part of ESIA that were undertaken for wind farm projects that are alongside and/or adjacent to the project site. Since these avifaunal assessments have applied in-flight avifaunal surveys across wind farm project site using fixed-point monitoring, only the observation points that were alongside and/or adjacent to the project site were considered in the analysis for the project, see Table 10. Additionally, selected observation points that were used through the Strategic Environmental and Social Assessment (SESA) are also included in the current assessment. These include selected observation points from the avifaunal in-flight monitoring that was carried out as part of the SESA in addition to selected observation points that were covered as part of two additional wind farm projects that were included in the SESA; Alfanar WF and ACWA WF.

It should be highlighted that approval from the respective wind power project developers were obtained in order to use the data that was collected in their respective assessments to be used in the analysis of this assessment.

In addition to all of the above, the in-flight monitoring that was carried out in RSWE wind farm as part of the ESIA for the project were also used. The assessments are the most recent ones since they were undertaken over two seasons in autumn 2019 and spring 2020 in the wind farm.

The objective of all above-mentioned surveys was to observe the numbers and behaviour of migratory and resident soaring birds using the targeted areas. However, the level of effort was not consistent throughout the years and/or the seasons and therefore the data presented cannot be compared alongside the project site but it can provide a very good indication about the status of avifaunal passage over the project site as a whole.

Table 10. Avifaunal In-flight Assessments used in the current assessment (ECOConsult, 2020)

Project Name	OHTL Project Part	Season / Year	No. of observation points used	Notes
RSWE WF	Northern	Autumn 2019	3	Observation points along the southeastern part of the RSWE project site (OP-1, OP-6 & OP-7)
		Spring 2020		
Lekela WF	Central	Autumn 2015	1	OP-A (only the southern part of the project was covered)

Project Name	OHTL Project Part	Season / Year	No. of observation points used	Notes
		Spring 2016	1	OP-A (only the southern part of the project was covered)
		Spring 2017	4	All observation points along the eastern side of the Lekela project site OP-1, OP-2, OP-3 & OP-4
		Autumn 2017		
		Spring 2018	3	Southern part of the project site was not covered (OP-2, OP-3 and OP-4)
Autumn 2018				
AMUNET WF	Southern	Spring 2020	4	All observation points along the northern and eastern sides of the AMUNET project site OP-1, OP-2, OP-5 & OP-6
SESA	Overall	Spring 2016	5	Observation points along the eastern part of the SESA study area (OP-5, OP-8F, OP-10, OP-11 & OP-12)
		Autumn 2016		
		Spring 2017		
	Southern	Autumn 2015	1	A single observation point from Alfanar WF
		Spring 2016		
Spring 2016	1	A single observation point from ACWA WF (OP-B)		

11.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of the baseline conditions in relation to birds and presents the outcomes and results. The results are divided into two main parts, an overall summary of the results presenting a compilation of all results from all assessments that took place in the project site. The part is also subdivided into spring and autumn migration seasons. The second part presents the results by dividing the project site into three parts; northern, central and southern. In each part, results are also summarised for each season; spring and autumn, separately.

11.1.1 Overall results

This section is based on the results and findings of the in-flight monitoring that was carried out along the whole project site over the past five years. The results present a compilation of the species recorded, the number of records and number of individuals over the different years and over both seasons of migration; spring and autumn.

Location of Project site

As mentioned, the transmission line runs along the Gulf of Suez coast. It does not overlap with any protected areas; established or proposed. However, a small portion of its southern part overlaps with Gebel El Zeit Important Bird Area (IBA), see Figure 13



Figure 13. The location of the OHTL in relation to Gebel El Zeit IBA (ECOConsult, 2020)

Spring Migration Seasons

Over all the assessments during the spring migration seasons at the project site, a total of 30 species were recorded. Out of these species, five are globally threatened (two endangered and three vulnerable), see Table 12, Table 13, Table 14 and Table 15. The total number of birds recorded over the years ranged from 47,601 (spring 2017) up to 165,190 in spring 2020, see Table 11. The numbers of species, records and individuals fluctuated over the years depending on the locations being surveyed and the level of effort being implemented at the different assessments. Still, it can be noticed that both the northern and southern parts of the project site have significant numbers of passage during the spring season, see Figure 14.

Table 11. Summary of records over the spring migration seasons (ECOConsult, 2020)

	Spring 2016		Spring 2017		Spring 2018		Spring 2020	
	# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
Overall								
Total	3082	112811	1861	47601	1648	56128	4011	165190
Species no.	28		22		26		20	
Threatened	5		4		5		4	
Near Threatened	1		1		1		1	
Northern								
Total	314	21149	91	12604			2626	115677
Species no.	18		13				21	
Threatened	2		1				4	
Near Threatened	0		0				1	
Central								
Total	806	17582	1614	32916	1647	56128		
Species no.	27		21		25			
Threatened	5		4		5			
Near Threatened	1		1		1			
Southern								
Total	1962	74080	156	2351			1385	49511
Species no.	28		14				19	
Threatened	5		3				4	
Near Threatened	1		0				1	

Table 12. A summary of the Bird Observation Records during the surveys of spring migration season along the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2018		Spring 2020	
			# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
Griffon Vulture <i>Gyps fulvus</i>	Least Concern	Passage migrant	1	1	-	-	1	1	-	-
Egyptian Vulture <i>Neophron percnopterus</i>	Endangered	Passage migrant	34	43	18	24	22	26	69	89
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	557	4,210	275	2,573	261	1,285	693	6,600
Osprey <i>Pandion heliaetus</i>	Least Concern	Passage migrant	3	3	2	2	2	2	2	2
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	310	14,988	93	955	179	8,307	223	9,529
Booted Eagle <i>Hieraetus pennatus</i>	Least Concern	Passage migrant	94	470	60	84	60	81	106	136
Golden Eagle <i>Aquila chrysaetos</i>	Least Concern	Resident	-	-	-	-	1	1	-	-
Steppe Eagle <i>Aquila nipalensis</i>	Endangered	Passage migrant / Winter visitor	442	2,643	291	2,675	191	1,364	715	6,163
Eastern Imperial Eagle <i>Aquila heliaca</i>	Vulnerable	Passage migrant	19	23	9	9	12	14	12	16
Greater Spotted Eagle <i>Clanga clanga</i>	Vulnerable	Passage migrant	9	12	3	4	9	12	35	48
Lesser Spotted Eagle <i>Clanga pomarina</i>	Least Concern	Passage migrant	72	282	34	79	47	256	90	328
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	74	113	26	33	30	40	32	37
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	23	40	32	38	3	3	12	13
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	21	28	9	9	9	9	17	17
Short-toed Snake-eagle <i>Circaetus gallicus</i>	Least Concern	Passage migrant / summer breeder	164	359	168	300	63	86	274	449
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	54	71	27	28	10	12	17	22
Levant Sparrowhawk <i>Accipiter brevipes</i>	Least Concern	Passage migrant	8	113	34	1,275	9	12	5	2,005
Long-legged Buzzard <i>Buteo rufinus</i>	Least Concern	Passage migrant / Winter visitor	48	66	17	20	41	64	80	163
Steppe Buzzard	Least Concern	Passage migrant	793	15,564	647	19,889	548	17,627	1,215	25,586

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2018		Spring 2020	
			# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
<i>Buteo buteo vulpinus</i>										
Lanner Falcon <i>Falco biarmicus</i>	Least Concern	Passage migrant	4	4	-	-	-	-	-	-
Barbary Falcon <i>Falco pelegrinoides</i>	Least Concern	Resident	1	2	-	-	-	-	-	-
Peregrine Falcon <i>Falco peregrinus</i>	Least Concern	Passage migrant	1	1	-	-	-	-	-	-
Lesser Kestrel <i>Falco naumanni</i>	Least Concern	Passage migrant	6	8	4	7	4	5	-	-
Eurasian Hobby <i>Falco subbuteo</i>	Least Concern	Passage migrant	5	5	-	-	-	-	-	-
Eleonora's Falcon <i>Falco eleonora</i>	Least Concern	Passage migrant	4	5	-	-	2	2	-	-
Sooty Falcon <i>Falco concolor</i>	Vulnerable	Passage migrant / summer breeder	5	6	-	-	1	1	-	-
Crane <i>Grus grus</i>	Least Concern	Passage migrant	8	320	5	1,391	7	802	-	-
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	25	9,796	1	150	3	63	17	6,103
Black Stork <i>Ciconia nigra</i>	Least Concern	Passage migrant	48	488	15	53	38	297	61	2,314
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	121	62,127	47	17,694	57	24,897	161	103,506
Eagle species <i>Aquila sp.</i>	NA	NA	28	88	14	26	12	29	93	503
Buzzard species <i>Buteo sp.</i>	NA	NA	12	109	6	12	5	405	31	568
Harrier species <i>Circus sp.</i>	NA	NA	18	20	6	6	2	2	6	6
Sparrowhawk species <i>Accipiter sp.</i>	NA	NA	5	6	-	-	-	-	-	-
Falcon sp. <i>Falco sp.</i>	NA	NA	24	24	3	3	4	4	1	1
Raptor species	NA	NA	41	773	15	262	15	419	44	986

Table 13. A summary of the Bird Observation Records during the surveys of spring migration season in the northern part of the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2020	
			# records	# individuals	# records	# individuals	# records	# individuals
Egyptian Vulture <i>Neophron percnopterus</i>	Endangered	Passage migrant	11	15	-	-	55	74
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	48	210	10	333	424	4,532
Osprey <i>Pandion heliaetus</i>	Least Concern	Passage migrant	1	1	1	1	1	1
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	77	6,928	8	50	129	8,510
Booted Eagle <i>Hieraaetus pennatus</i>	Least Concern	Passage migrant	10	11	2	6	76	93
Steppe Eagle <i>Aquila nipalensis</i>	Endangered	Passage migrant / Winter visitor	4	4	18	566	470	4,926
Eastern Imperial Eagle <i>Aquila heliaca</i>	Vulnerable	Passage migrant	-	-	-	-	7	7
Greater Spotted Eagle <i>Clanga clanga</i>	Vulnerable	Passage migrant	-	-	-	-	28	41
Lesser Spotted Eagle <i>Clanga pomarina</i>	Least Concern	Passage migrant	14	33	-	-	69	291
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	7	8	-	-	24	28
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	-	-	1	1	11	12
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	-	-	-	-	9	9
Short-toed Snake-eagle <i>Circaetus gallicus</i>	Least Concern	Passage migrant / summer breeder	14	20	8	13	183	289
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	10	12	2	3	14	19
Levant Sparrowhawk <i>Accipiter brevipes</i>	Least Concern	Passage migrant	5	87	2	3	5	2,005
Long-legged Buzzard <i>Buteo rufinus</i>	Least Concern	Passage migrant / Winter visitor	1	1	2	2	51	106
Steppe Buzzard <i>Buteo buteo vulpinus</i>	Least Concern	Passage migrant	52	2,976	25	8,195	802	16,963
Lesser Kestrel <i>Falco naumanni</i>	Least Concern	Passage migrant	1	2	-	-	-	-
Eurasian Hobby <i>Falco subbuteo</i>	Least Concern	Passage migrant	2	2	-	-	-	-

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2020	
			# records	# individuals	# records	# individuals	# records	# individuals
Crane <i>Grus grus</i>	Least Concern	Passage migrant	-	-	-	-	1	1
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	3	148	1	150	6	707
Black Stork <i>Ciconia nigra</i>	Least Concern	Passage migrant	6	51	-	-	34	546
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	24	10,018	7	3,275	97	75,337
Eagle species <i>Aquila sp.</i>	NA	NA	5	11	2	4	71	397
Buzzard species <i>Buteo sp.</i>	NA	NA	3	18	-	-	29	551
Harrier species <i>Circus sp.</i>	NA	NA	1	1	1	1	6	6
Sparrowhawk species <i>Accipiter sp.</i>	NA	NA	1	2	-	-	-	-
Falcon sp. <i>Falco sp.</i>	NA	NA	1	1	-	-	1	1
Raptor species	NA	NA	13	589	1	1	23	225

Table 14. A summary of the Bird Observation Records during the surveys of spring migration season in the central part of the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2018	
			# records	# individuals	# records	# individuals	# records	# individuals
Griffon Vulture <i>Gyps fulvus</i>	Least Concern	Passage migrant	-	-	-	-	1	1
Egyptian Vulture <i>Neophron percnopterus</i>	Endangered	Passage migrant	7	7	17	23	22	26
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	117	836	249	2,206	261	1,285
Osprey <i>Pandion heliaetus</i>	Least Concern	Passage migrant	1	1	1	1	2	2
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	38	406	72	725	179	8,307
Booted Eagle <i>Hieraetus pennatus</i>	Least Concern	Passage migrant	28	381	54	69	60	81
Golden Eagle <i>Aquila chrysaetos</i>	Least Concern	Resident	-	-	-	-	1	1
Steppe Eagle <i>Aquila nipalensis</i>	Endangered	Passage migrant / Winter visitor	134	719	232	1,987	191	1,364
Eastern Imperial Eagle <i>Aquila heliaca</i>	Vulnerable	Passage migrant	2	3	8	8	12	14
Greater Spotted Eagle <i>Clanga clanga</i>	Vulnerable	Passage migrant	3	3	3	4	9	12
Lesser Spotted Eagle <i>Clanga pomarina</i>	Least Concern	Passage migrant	12	48	33	72	47	256
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	19	29	24	31	30	40
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	14	30	28	32	3	3
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	10	16	9	9	9	9
Short-toed Snake-eagle <i>Circaetus gallicus</i>	Least Concern	Passage migrant / summer breeder	63	204	148	274	63	86
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	11	16	25	25	10	12
Levant Sparrowhawk <i>Accipiter brevipes</i>	Least Concern	Passage migrant	1	5	32	1,272	9	12
Long-legged Buzzard <i>Buteo rufinus</i>	Least Concern	Passage migrant / Winter visitor	12	15	14	17	41	64
Steppe Buzzard	Least Concern	Passage migrant	249	5,156	578	11,456	548	17,627

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2018	
			# records	# individuals	# records	# individuals	# records	# individuals
<i>Buteo buteo vulpinus</i>								
Lanner Falcon <i>Falco biarmicus</i>	Least Concern	Passage migrant	2	2	-	-	-	-
Peregrine Falcon <i>Falco peregrinus</i>	Least Concern	Passage migrant	1	1	-	-	-	-
Lesser Kestrel <i>Falco naumanni</i>	Least Concern	Passage migrant	1	1	4	7	4	5
Eurasian Hobby <i>Falco subbuteo</i>	Least Concern	Passage migrant	1	1	-	-	-	-
Eleonora's Falcon <i>Falco eleonora</i>	Least Concern	Passage migrant	1	1	-	-	2	2
Sooty Falcon <i>Falco concolor</i>	Vulnerable	Passage migrant / summer breeder	1	1	-	-	1	1
Crane <i>Grus grus</i>	Least Concern	Passage migrant	2	2	-	-	7	802
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	3	606	5	1,391	3	63
Black Stork <i>Ciconia nigra</i>	Least Concern	Passage migrant	8	49	12	40	38	297
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	29	8,963	33	12,989	57	24,897
Eagle species <i>Aquila sp.</i>	NA	NA	4	5	12	22	12	29
Buzzard species <i>Buteo sp.</i>	NA	NA	6	47	4	7	5	405
Harrier species <i>Circus sp.</i>	NA	NA	7	7	5	5	2	2
Sparrowhawk species <i>Accipiter sp.</i>	NA	NA	2	2	-	-	-	-
Falcon sp. <i>Falco sp.</i>	NA	NA	8	8	2	2	4	4
Raptor species	NA	NA	9	11	10	242	15	419

Table 15. A summary of the Bird Observation Records during the surveys of spring migration season in the southern part of the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2020	
			# records	# individuals	# records	# individuals	# records	# individuals
Griffon Vulture <i>Gyps fulvus</i>	Least Concern	Passage migrant	1	1	-	-	-	-
Egyptian Vulture <i>Neophron percnopterus</i>	Endangered	Passage migrant	16	21	1	1	14	15
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	392	3,164	16	34	269	2,068
Osprey <i>Pandion heliaetus</i>	Least Concern	Passage migrant	1	1	-	-	1	1
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	195	7,654	13	180	94	1,017
Booted Eagle <i>Hieraetus pennatus</i>	Least Concern	Passage migrant	56	78	4	9	30	43
Steppe Eagle <i>Aquila nipalensis</i>	Endangered	Passage migrant / Winter visitor	304	1,920	41	122	245	1,237
Eastern Imperial Eagle <i>Aquila heliaca</i>	Vulnerable	Passage migrant	17	20	1	1	5	9
Greater Spotted Eagle <i>Clanga clanga</i>	Vulnerable	Passage migrant	6	9	-	-	7	7
Lesser Spotted Eagle <i>Clanga pomarina</i>	Least Concern	Passage migrant	46	201	1	7	21	37
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	48	76	2	2	8	9
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	9	10	3	5	1	1
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	11	12	-	-	8	8
Short-toed Snake-eagle <i>Circaetus gallicus</i>	Least Concern	Passage migrant / summer breeder	87	135	12	13	91	160
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	33	43	-	-	3	3
Levant Sparrowhawk <i>Accipiter brevipes</i>	Least Concern	Passage migrant	2	21	-	-	-	-
Long-legged Buzzard <i>Buteo rufinus</i>	Least Concern	Passage migrant / Winter visitor	35	50	1	1	29	57
Steppe Buzzard <i>Buteo buteo vulpinus</i>	Least Concern	Passage migrant	492	7,432	44	238	412	8,622
Lanner Falcon	Least Concern	Passage migrant	2	2	-	-		

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Spring 2016		Spring 2017		Spring 2020	
			# records	# individuals	# records	# individuals	# records	# individuals
<i>Falco biarmicus</i>								
Barbary Falcon <i>Falco pelegrinoides</i>	Least Concern	Resident	1	2	-	-		
Lesser Kestrel <i>Falco naumanni</i>	Least Concern	Passage migrant	4	5	-	-	-	-
Eurasian Hobby <i>Falco subbuteo</i>	Least Concern	Passage migrant	2	2	-	-	-	-
Eleonora's Falcon <i>Falco eleonora</i>	Least Concern	Passage migrant	3	4	-	-	-	-
Sooty Falcon <i>Falco concolor</i>	Vulnerable	Passage migrant / summer breeder	4	5	-	-	-	-
Crane <i>Grus grus</i>	Least Concern	Passage migrant	6	318	-	-	-	-
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	19	9,042	-	-	11	5,396
Black Stork <i>Ciconia nigra</i>	Least Concern	Passage migrant	34	388	3	13	27	1,768
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	68	43,146	7	1,700	64	28,169
Eagle species <i>Aquila sp.</i>	NA	NA	19	72	-	-	22	106
Buzzard species <i>Buteo sp.</i>	NA	NA	3	44	2	5	2	17
Harrier species <i>Circus sp.</i>	NA	NA	10	12	-	-	-	-
Sparrowhawk species <i>Accipiter sp.</i>	NA	NA	2	2	-	-	-	-
Falcon sp. <i>Falco sp.</i>	NA	NA	15	15	1	1	-	-
Raptor species	NA	NA	19	173	4	19	21	761

Autumn Migration Seasons

Over all the assessments during the autumn migration seasons at the project site, a total of 27 species were recorded. Out of these species, two are globally threatened (one endangered and one vulnerable), see Table 17, Table 18, Table 19 and Table 20. The total number of birds recorded over the years is significantly lower than the numbers recorded during the spring migration season, as it ranged from 3,070 (autumn 2015) up to 14,249 in autumn 2017, see Table 16. The numbers of species, records and individuals fluctuated over the years depending on the locations being surveyed and the level of effort being implemented at the different assessments. Still, it can be noticed that unlike the autumn season, the central part of the project site have significant numbers of passage during the autumn season (Figure 14).

Table 16. Summary of records over the autumn migration seasons (ECOConsult, 2020)

	Autumn 2015		Autumn 2016		Autumn 2017		Autumn 2018		Autumn 2019	
	# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
Overall										
Total	347	3070	165	1820	429	14249	352	13757	209	6391
Species no.	20		17		18		16		20	
Threatened	1		2		1		1		2	
Near Threatened	2		2		2		1		2	
Northern										
Total			89	1248					208	6390
Species no.			13						19	
Threatened			2						2	
Near Threatened			2						2	
Central										
Total	309	2940	40	270	412	14071	369	13935		
Species no.	14		11		18		16			
Threatened	1		2		1		1			
Near Threatened	2		0		2		1			
Southern										
Total	34	125	34	300						
Species no.	13		7							
Threatened	1		1							
Near Threatened	0		1							

Table 17. A summary of the Bird Observation Records during the surveys of autumn migration season along the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Autumn 2015		Autumn 2016		Autumn 2017		Autumn 2018		Autumn 2019	
			# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	9	11	6	7	33	111	16	26	23	57
Osprey <i>Pandion heliaetus</i>	Least Concern	Passage migrant	4	4	-	-	1	1	-	-	1	1
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	179	2,679	96	983	267	4,543	225	2,875	95	2,676
Crested Honey-buzzard <i>Pernis ptilorhynchus</i>	Least Concern	Passage migrant	-	-	-	-	1	1	-	-		
Booted Eagle <i>Hieraaetus pennatus</i>	Least Concern	Passage migrant	-	-	2	2	-	-	-	-	3	3
Bonelli's Eagle <i>Aquila fasciatus</i>	Least Concern	Resident	1	1	-	-	-	-	-	-		
Steppe Eagle <i>Aquila nipalensis</i>	Endangered	Passage migrant / Winter visitor	-	-	2	2	-	-	-	-	1	1
Lesser Spotted Eagle <i>Clanga pomarina</i>	Least Concern	Passage migrant	3	3	-	-	-	-	-	-		
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	67	83	16	18	62	77	42	49	22	26
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	20	21	6	7	9	10	11	13	5	11
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	7	8	4	4	14	20	16	18	10	11
Short-toed Snake-eagle <i>Circaetus gallicus</i>	Least Concern	Passage migrant / summer breeder	-	-	-	-	1	1	-	-	2	2
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	4	4	1	1	1	1	1	1	4	4
Levant Sparrowhawk <i>Accipiter brevipes</i>	Least Concern	Passage migrant	-	-	1	13	-	-	2	4		
Long-legged Buzzard <i>Buteo rufinus</i>	Least Concern	Passage migrant / Winter visitor	-	-	-	-	1	1	1	1		

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Autumn 2015		Autumn 2016		Autumn 2017		Autumn 2018		Autumn 2019	
			# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
Steppe Buzzard <i>Buteo buteo vulpinus</i>	Least Concern	Passage migrant	5	6	1	2	3	4	9	10	3	3
Lanner Falcon <i>Falco biarmicus</i>	Least Concern	Passage migrant	4	5	2	2	-	-	2	3	2	2
Peregrine Falcon <i>Falco peregrinus</i>	Least Concern	Passage migrant	1	1	-	-	1	2	1	1		
Lesser Kestrel <i>Falco naumanni</i>	Least Concern	Passage migrant	3	3	1	1	-	-	4	6	2	4
Eurasian Hobby <i>Falco subbuteo</i>	Least Concern	Passage migrant	-	-	1	1	1	1	2	2		
Eleonora's Falcon <i>Falco eleonorae</i>	Least Concern	Passage migrant	1	1	-	-	1	1	-	-	1	1
Sooty Falcon <i>Falco concolor</i>	Vulnerable	Passage migrant / summer breeder	4	5	6	10	2	2	2	2	1	1
Red-footed Falcon <i>Falco vespertinus</i>	Near Threatened	Passage migrant	2	3	1	2	2	2	-	-	1	1
Crane <i>Grus grus</i>	Least Concern	Passage migrant	1	36	-	-	-	-	-	-	1	6
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	3	151	2	154	1	108	2	260	5	290
Black Stork <i>Ciconia nigra</i>	Least Concern	Passage migrant	-	-	-	-	-	-	-	-	3	37
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	1	3	5	598	4	9,302	5	10,473	5	3,231
Buzzard species <i>Buteo sp.</i>	NA	NA	6	7	-	-	1	1	-	-	2	2
Harrier species <i>Circus sp.</i>	NA	NA	13	22	1	1	15	16	6	7	7	9
Falcon sp. <i>Falco sp.</i>	NA	NA	6	10	2	2	4	4	5	6	4	4
Raptor species	NA	NA	3	3	9	10	4	40			6	8

Table 18. A summary of the Bird Observation Records during the surveys of autumn migration season in the northern part of the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Autumn 2016		Autumn 2019	
			# records	# individuals	# records	# individuals
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	4	5	23	57
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	49	468	95	2,676
Booted Eagle <i>Hieraetus pennatus</i>	Least Concern	Passage migrant	1	1	3	3
Steppe Eagle <i>Aquila nipalensis</i>	Endangered	Passage migrant / Winter visitor	1	1	1	1
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	8	9	22	26
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	4	5	5	11
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	3	3	10	11
Short-toed Snake-eagle <i>Circaetus gallicus</i>	Least Concern	Passage migrant / summer breeder	-	-	2	2
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	-	-	4	4
Steppe Buzzard <i>Buteo buteo vulpinus</i>	Least Concern	Passage migrant	-	-	3	3
Lanner Falcon <i>Falco biarmicus</i>	Least Concern	Passage migrant	1	1	2	2
Lesser Kestrel <i>Falco naumanni</i>	Least Concern	Passage migrant	1	1	2	4
Eleonora's Falcon <i>Falco eleonorae</i>	Least Concern	Passage migrant	-	-	1	1
Sooty Falcon <i>Falco concolor</i>	Vulnerable	Passage migrant / summer breeder	1	2	1	1
Red-footed Falcon <i>Falco vespertinus</i>	Near Threatened	Passage migrant	1	2	1	1
Crane <i>Grus grus</i>	Least Concern	Passage migrant	-	-	1	6
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	2	154	5	290
Black Stork <i>Ciconia nigra</i>	Least Concern	Passage migrant	-	-	3	37
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	3	585	5	3,231
Buzzard species	NA	NA	-	-	2	2

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Autumn 2016		Autumn 2019	
			# records	# individuals	# records	# individuals
<i>Buteo sp.</i>						
Harrier species <i>Circus sp.</i>	NA	NA	1	1	7	9
Falcon sp. <i>Falco sp.</i>	NA	NA	1	1	4	4
Raptor species	NA	NA	8	9	6	8

Table 19. A summary of the Bird Observation Records during the surveys of autumn migration season in the central part of the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Autumn 2015		Autumn 2016		Autumn 2017		Autumn 2018	
			# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	3	4	2	2	33	111	16	26
Osprey <i>Pandion heliaetus</i>	Least Concern	Passage migrant	4	4	-	-	1	1	-	-
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	178	2,678	22	235	247	4,360	245	3,058
Crested Honey-buzzard <i>Pernis ptilorhynchus</i>	Least Concern	Passage migrant / vagrant	-	-	-	-	1	1	-	-
Steppe Eagle <i>Aquila nipalensis</i>	Endangered	Passage migrant / Winter visitor	-	-	1	1	-	-	-	-
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	62	77	6	7	62	77	42	49
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	18	19	1	1	9	10	11	13
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	7	8	-	-	17	25	13	13
Short-toed Snake-eagle <i>Circaetus gallicus</i>	Least Concern	Passage migrant / summer breeder	-	-	-	-	1	1	-	-
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	2	2	1	1	1	1	1	1
Levant Sparrowhawk <i>Accipiter brevipes</i>	Least Concern	Passage migrant	-	-	1	13	-	-	2	4
Long-legged Buzzard <i>Buteo rufinus</i>	Least Concern	Passage migrant / Winter visitor	-	-	-	-	1	1	1	1
Steppe Buzzard <i>Buteo buteo vulpinus</i>	Least Concern	Passage migrant	5	6	1	2	3	4	9	10
Lanner Falcon <i>Falco biarmicus</i>	Least Concern	Passage migrant	2	2	-	-	-	-	2	3
Peregrine Falcon <i>Falco peregrinus</i>	Least Concern	Passage migrant	-	-	-	-	1	2	1	1
Lesser Kestrel <i>Falco naumanni</i>	Least Concern	Passage migrant	3	3	-	-	-	-	4	6
Eurasian Hobby <i>Falco subbuteo</i>	Least Concern	Passage migrant	-	-	1	1	1	1	2	2
Eleonora's Falcon <i>Falco eleonora</i>	Least Concern	Passage migrant	1	1	-	-	1	1	-	-
Sooty Falcon	Vulnerable	Passage migrant / summer breeder	1	1	3	4	2	2	2	2

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Autumn 2015		Autumn 2016		Autumn 2017		Autumn 2018	
			# records	# individuals	# records	# individuals	# records	# individuals	# records	# individuals
<i>Falco concolor</i>										
Red-footed Falcon <i>Falco vespertinus</i>	Near Threatened	Passage migrant	2	3	-	-	2	2	-	-
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	1	100	-	-	1	108	2	260
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	-	-	1	3	4	9,302	5	10,473
Eagle species <i>Aquila sp.</i>	NA	NA	-	-	-	-	1	1	-	-
Harrier species <i>Circus sp.</i>	NA	NA	12	20	-	-	15	16	6	7
Falcon sp. <i>Falco sp.</i>	NA	NA	6	10	-	-	4	4	5	6
Raptor species	NA	NA	2	2	-	-	4	40	-	-

Table 20. A summary of the Bird Observation Records during the surveys of autumn migration season in the southern part of the project site (Consultant, 2020)

Species Name	Status according to IUCN Red List of Threatened Species (2019)	National Status	Autumn 2015		Autumn 2016	
			# records	# individuals	# records	# individuals
Black Kite <i>Milvus migrans</i>	Least Concern	Passage migrant	6	7	-	-
European Honey-buzzard <i>Pernis apivorus</i>	Least Concern	Passage migrant	1	1	25	280
Booted Eagle <i>Hieraetus pennatus</i>	Least Concern	Passage migrant	1	1	-	-
Bonelli's Eagle <i>Aquila fasciatus</i>	Least Concern	Resident	1	1	-	-
Western Marsh-harrier <i>Circus aeruginosus</i>	Least Concern	Passage migrant	5	6	2	2
Montagu's Harrier <i>Circus pygargus</i>	Least Concern	Passage migrant	2	2	1	1
Pallid Harrier <i>Circus macrourus</i>	Near Threatened	Passage migrant / winter visitor	-	-	1	1
Eurasian Sparrowhawk <i>Accipiter nisus</i>	Least Concern	Passage migrant	2	2	-	-
Lanner Falcon <i>Falco biarmicus</i>	Least Concern	Passage migrant	2	3	1	1
Peregrine Falcon <i>Falco peregrinus</i>	Least Concern	Passage migrant	1	1	-	-
Sooty Falcon <i>Falco concolor</i>	Vulnerable	Passage migrant / summer breeder	3	4	2	4
Crane <i>Grus grus</i>	Least Concern	Passage migrant	1	36	-	-
White Pelican <i>Pelecanus onocrotalus</i>	Least Concern	Passage migrant	2	51	-	-
White Stork <i>Ciconia ciconia</i>	Least Concern	Passage migrant	1	3	1	10
Eagle species <i>Aquila sp.</i>	NA	NA	3	3	-	-
Buzzard species <i>Buteo sp.</i>	NA	NA	1	1	-	-
Harrier species <i>Circus sp.</i>	NA	NA	1	2	-	-
Raptor species	NA	NA	1	1	1	1

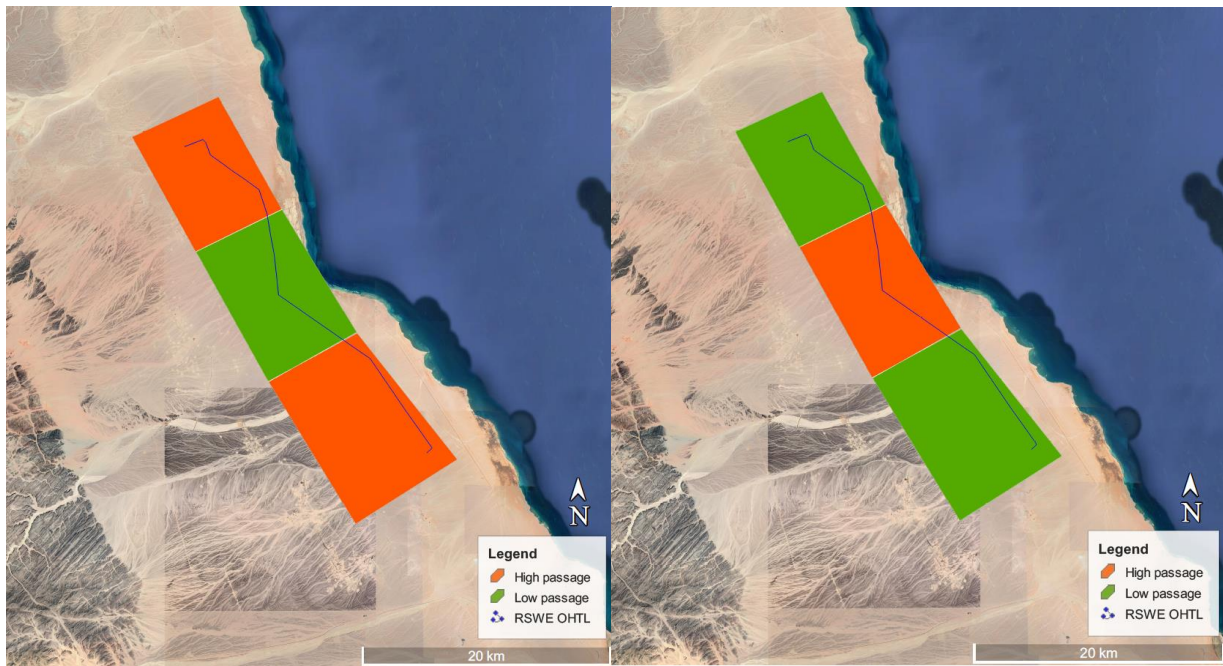


Figure 14. Left: Bird passage during spring migration seasons is higher in the northern and southern parts of the project site, Right: Bird passage during autumn migration seasons is higher in the central part of the project site

11.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on birds during the various phases to include planning and construction phase and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

11.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the transmission line, including the right-of-way are expected to include land clearing activities, levelling, excavation, grading, etc.

Such activities in particular could impact avi-fauna which use the site for foraging and as a breeding ground—to include soaring and non-soaring resident and migratory species. Nevertheless, such construction activities would not result in any major alteration of the site's habitats and thus would not affect the foraging and feeding area of such species, given that such activities are limited to the relatively small individual footprint of these facilities and where the actual area of disturbance is relatively minimal. In addition, the project site does not hold any specific or significant value as a feeding habitat for birds. The Project site is considered of low ecological significance due to its natural setting; characterized by being barren and heavily degraded.

On the other hand, there are additional potential impacts during the construction phase on breeding birds within the site. Construction activities could disturb existing habitats of birds breeding and/or nesting within the Project site. Such potential impacts are created during the construction phase only and thus are of short-term duration. However, such impacts are considered of negative nature and of a low magnitude given that the construction activities' actual area of disturbance is relatively minimal. In addition, given that breeding activities are likely within the Project site, the receiving environment is determined to be of a medium sensitivity. Given all of the above, such an impact is considered to be minor significance.

Additional Studies/Survey and Mitigation Measures

The following identifies the mitigation measures to be applied by the EPC Contractor during the construction phase and which include:

- Implementation of proper housekeeping measures to reduce impacts including:
 - Prohibit hunting of birds at any time and under any condition by construction workers onsite.
 - Implement proper measures, which would prevent attraction of birds to the site. This includes measures such as prohibiting illiterate dumping and ensuring waste streams are disposed appropriately in accordance with the measures identified in "Section **Error! Reference source not found.**".
 - Avoid unnecessary elevated noise levels at all times. In addition, apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

11.2.2 Potential Impacts during the Operation Phase

Transmission lines are associated with impacts on birds from risks of collision for both migratory soaring and non-soaring birds (which could pass over the site during the spring and fall migration seasons) and resident soaring birds in the area. This section provides a qualitative assessment of such impacts. As discussed

previously, to determine the significance of an impact it is important to understand the sensitivity of the receiving environment and the magnitude of the impact both of which are discussed in further details below.

(i) Sensitivity of the Project Site

The baseline assessments have recorded high numbers of migratory soaring birds over the Project site and its vicinity. Some of those recorded species have an important status on the international or national levels. A small portion of the OHTL route crosses Gebel El Zeit Important Bird Area (IBA) for roughly 2km while not exceeding 400m into the borders of the IBA. As defined by the Critical Habitat Assessment (CHA) that was undertaken for the RSWE wind farm project, Gebel El Zeit IBA has been identified as a Critical Habitat due to its international significance for bird migration. It is also de facto a Key Biodiversity Area (KBA). It should be noted that the OHTL area does not trigger any other Critical Habitat criteria.

Gebel El Zeit IBA consists of a narrow, 100-km-long strip extending along the Gulf of Suez/Red Sea coast, from Ras Ghareb in the north to the bay of Ghubbet El Gemsa in the south. One of the main features of the IBA that is located in the northern part of the IBA is a wide coastal plain fringed near the shore by several areas of sabkha (saltpans), the largest of which is Sabkhet Ras Shukheir. The northernmost tip of this sabkha is roughly 23km to the south of the OHTL route. This contains several pools of hyper-saline water and large patches of saltmarsh. Further south, there are two more sabkhas; Ghubbet El Zeit and Ghubbet El Gemsa, two large shallow bays with extensive intertidal mud- and sandflats. These habitats make up the main conservation areas of the IBA that are identified for conservation management.

The Gebel El Zeit area, in general, is a very important migration corridor for soaring migrants, particularly birds of prey and storks. Because of the geography of the Gulf of Suez as a whole and the micro-geographic configuration of the Gebel El Zeit area, which is the narrowest point in the southern part of the Gulf of Suez, over 250,000 *Ciconia ciconia* and many other migrant soaring birds are funnelled through this stretch of coast on both spring and autumn journeys. Birds of prey, storks and pelicans migrate through and usually land, rest or roost near the coastline and on the surrounding desert plains and hills. Resting and roosting storks especially, utilize the two bays of Ghubbet El Zeit and Ghubbet El Gemsa and the saltmarsh at Sabkhet Ras Shukheir. Gebel El Zeit itself serves as a stepping-stone for birds that make the crossing between the western coast of the Gulf of Suez and south Sinai in spring.

The option of avoiding the IBA by the OHTL route is not feasible due to the fact that the OHTL runs in parallel with two other OHTL, one on each side, and one of which is already existing. Therefore changing the route of the OHTL could lead to having it crossing the other OHTL, which could raise technical risks in addition to raise the collision risk for migratory soaring birds in specific and birds in general.

Taking a closer look at the IBA main components, it can be observed that the IBA is part of a continuous landscape that extends along the western coastline of the Gulf of Suez. However, the major geographical features that have identified the IBA are Gebel El Zeit, which is an isolated elongate mountain that reaches up to 457m and overlooks the southern end of the Gulf of Suez. The topography of the mountain with its steep eastern slopes and gentle western slopes makes it a natural barrier that creates a narrow passage for migratory soaring birds, in comparison to the rest of the coastal plain, making the IBA the bottleneck it is for MSBs. The northernmost tip of the mountain of Gebel El Zeit is roughly 64km away from the OHTL route. The other main feature of the IBA are the saltpans and small bays mentioned earlier, which are at least 23km south of the OHTL, see Figure 15. Also, those two features together are believed to be crucial for birds that cross from the eastern coast of the Gulf of Suez into the western coast since these birds arrive at relatively low heights and either use Gebel El Zeit as a 'stepping-stone' to soar and regain height while other birds use the saltpans and the bays to rest and feed. Based on this, it can be concluded that the key features of the IBA are far away from the OHTL route and the majority of birds crossing the Gulf of Suez while flying at low heights are far away from the OHTL and consequently are not at risk of collision with the OHTL.

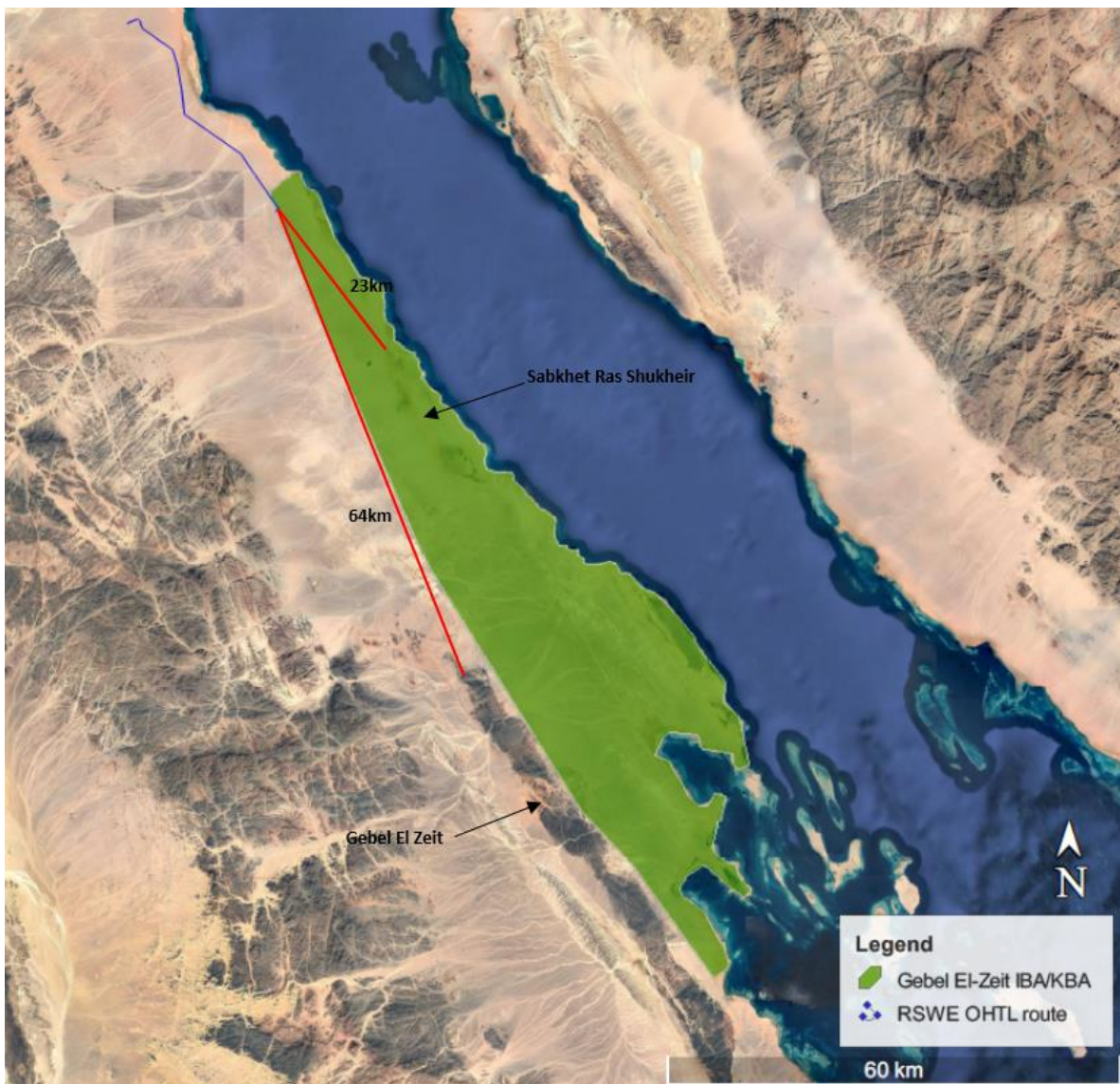


Figure 15. Location of the OHTL route to Gebel El Zeit IBA and its key features

Based on all of the above, the baseline assessment concludes that the site is considered within a highly sensitive area in terms of avi-fauna, although it is away from the key features/habitats of the Critical Habitat of Gebel El Zeit IBA, the OHTL route crossed the boundaries of the IBA. Additionally, the Project site is considered to be located along an intensive migration route. Taking all of the above into account, the receiving environment is considered of high sensitivity.

(ii) Magnitude of the Impact

Collision of all types of birds with power lines are expected. Specifically, migratory soaring birds use the project site for passage, including a few individuals of globally threatened species such as Egyptian Vulture *Neophron percnopterus* (Endangered), Steppe Eagle *Aquila nipalensis* (Endangered) and Eastern Imperial Eagle *Aquila heliaca* (Vulnerable). However, the magnitude of such impacts differs from species to species. However, to determine the magnitude three main factors were considered to include the following:

1. The numbers of birds recorded within the Project site;
2. The conservation status of the species (international IUCN status and local status and importance);
3. The flight behaviour of different species can affect species vulnerability to collisions. For non-migratory birds, collision risk could be higher since individuals could be roaming a specific home range where the

powerline is located. Also gregarious or congregatory species have a higher risk of collision as they fly in larger numbers. Regarding migratory soaring birds, the risk of collision with OHTLs during migration could be considered while birds are on migration since the birds would be flying at high altitudes way above the height of the powerlines. However, birds could be at higher risk if the birds are coming to roost or forage. Also, some raptor species could be vulnerable more than others due to their flight behaviour while on migration such as harrier species.

Out of all the species recorded, there are five species with a high impact magnitude. These include Egyptian Vulture *Neophron percnopterus*, Steppe Eagle *Aquila niaplensis*, Eastern Imperial Eagle *Aquila heliaca*, Greater Spotted Eagle *Clanga clanga* and Sooty Falcon *Falco concolor*, which are the only globally threatened species that were recorded in the project site. The other high magnitude species since they are recorded in large significant numbers during migration are White Stork *Ciconia ciconia* and European Honey-buzzard *Pernis apivorus* where both species have shown significant numbers on passage also flying at low altitudes that would make them vulnerable to collision.

In addition, there are additional five species with a medium impact magnitude. These are Western Marsh-harrier *Circus aeruginosus*, Pallid Harrier *Circus macrourus*, Montagu’s Harrier *circus pygargus*, Common Crane *Grus grus* and Great White Pelican *Pelecanus onocrotalus*. The harrier species in general are known to fly at lower elevations, which would raise the collision risk of such species. As for Great White Pelican and Common Crane, both are large-sized birds that have been documented to collide with powerlines due to their low level of manoeuvrability. Although Common Cranes are recorded in relatively low numbers while Great White Pelican is mainly restricted to spring migration seasons, both species are believed to have a higher potential of collision with powerlines in comparison to other species

The remainder of the species are considered of low impact magnitude, as they have no important international or local conservation status, have high avoidance rates, and were recorded in relatively low numbers within the Project site. Based on the above. Therefore, the magnitude of the impact in general ranges between low – high depending on the species of concern as noted in the table below.

Table 21: Magnitude of Impacts on Bird Species (ECO Consult, 2020)

Species	Magnitude of Impact	Justification
<ul style="list-style-type: none"> ▪ Egyptian Vulture ▪ Steppe Eagle ▪ Eastern Imperial Eagle ▪ Greater Spotted Eagle ▪ Sooty Falcon 	High	<ul style="list-style-type: none"> ▪ High collision rates of such species with power lines ▪ Globally threatened
<ul style="list-style-type: none"> ▪ White Stork ▪ European Honey-buzzard 	High	<ul style="list-style-type: none"> ▪ High collision rates of such species with power lines ▪ High levels of passage on migration
<ul style="list-style-type: none"> ▪ Black kite ▪ Steppe Buzzard ▪ Western Marsh-harrier ▪ Pallid Harrier ▪ Montagu’s Harrier 	Medium	<ul style="list-style-type: none"> ▪ Observed collision rates of this species is medium-low
<ul style="list-style-type: none"> ▪ Remaining species 	Low	<ul style="list-style-type: none"> ▪ All other species are considered of low impact magnitude, as that they have no important international or local conservation status, have high avoidance rates, and were recorded in low numbers within the Project site.

Given all of the above, the potential impacts on birds created during the operation phase would be of a long-term duration as they are as long as the power lines are operating. Such impacts are considered of negative nature and range from a low magnitude to a high magnitude (high magnitude has been taken into account as a worst case scenario). However, the receiving environmental is determined to be of a high sensitivity. Given all of the above, such an impact is considered to be of high significance.

Mitigation and Monitoring Measures

The following identifies the mitigation and monitoring measures to be applied throughout the operation phase of the Project.

- Install bird diverters on the OHTL to reduce bird collisions during the operation phase of the Project. Being located in parallel with two other OHTLs that have the same dimensions, it is believed that this mitigation measure would be of low significance if it was not applied across the other OHTLs. Having the same dimensions, the combined impacts of the three OHTLs on bird collision could be high and might not be mitigated if only one OHTL had diverters installed while the other two did not. It is therefore essential that bird diverters are installed on the existing OHTLs. The OHTL for the Lekela project will, as per its ESIA, include bird diverters. The Project will liaise with the operator of the existing OHTL to install diverters.
- Undertake on-site avifauna fatality and bird behaviour monitoring along the powerlines during migration seasons. Both could be carried out in parallel to document any fatalities/injuries for birds while also documenting the use of the pylons as roosting and resting sites. Both surveys should be implemented as part of the Active Turbine Management Plan that is being undertaken for all wind farms in the Gulf of Suez. As part of the roosting survey, flight behaviour and movements should also be documented so that bird movement, including height, direction and behaviour is documented.
- Since the project's OHTL is partly located inside a Critical Habitat (Gebel EL Zeit IBA), the project needs to ensure that no net loss and net gain in biodiversity. No net loss will be targeted through mitigation including the installation of diverters of existing OHTLs. Effectiveness will be informed through carcass surveys. Net gain will be targeted through Project contributions/support to the conservation management actions of the IBA and studies into migratory bird activity in the wider Gulf of Suez. This could be done through support of conservation research at the IBA, support of site-specific management actions that could include habitat management/rehabilitation and/or provide support to the Egyptian national component of the Migratory Soaring Birds programme that is being implemented by EEAA and the Gulf of Suez is one of its major areas of implementation.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant. Monitoring will inform the need for further mitigation and management actions.

12 BATS

This Section first provides an assessment of baseline conditions within the Project site and surrounds in relation to bats and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

12.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of the baseline conditions in relation to bats and presents the outcomes and results.

12.1.1 Baseline Assessment Methodology

The baseline assessment of the Project site was based on a literature review and a field survey, each of which is discussed in details below.

(i) Literature Review

This was based on previous studies, data, surveys, and records available in published scientific papers, books, and journals on bats of Jordan. All available data known in the study area and adjacent regions were tabulated.

(ii) Bats Species status

The conservation status of the bat species listed from the literature review are based on IUCN's Red List of Threatened Species (IUCN, 2019).

12.2 Results

Based on literature, a total of 22 bat species are known to occur in Egypt as a whole. Out of which, at least ten species are known to have a presence within the Project site and its vicinity as part of their distribution range. In addition to those ten species, there are at least four more species that have their distribution range adjacent to the area of Gulf of Suez. All ten species listed in the literature are species of Least Concern according to the IUCN Red List of Threatened Species, see Table 22.

Table 22: List of Bat Species Recorded in Project Site and Vicinity Based on Literature Review (Consultant, 2019)

Family	Scientific name	Common name	Movement	IUCN Red List of Threatened Species (IUCN, 2019)
Hipposideridae	<i>Asellia tridens</i>	Geoffroy's Trident Leaf-nosed Bat	Resident	Least Concern
Nycteridae	<i>Nycteris thebaica</i>	Cape Long-eared Bat	Resident	Least Concern
Vespertilionidae	<i>Pipistrellus kuhlii</i>	Kuhl's Pipistrelle	Resident	Least Concern
	<i>Pipistrellus ruyffellii</i>	Ruppel's Pipistrelle	Resident	Least Concern
	<i>Nycticeinops schlieffeni</i>	Schlieffen's Bat	Resident	Least Concern
	<i>Eptesicus bottae</i>	Botta's Serotine	Resident	Least Concern
Rhinopomatidae	<i>Rhinopoma microphyllum</i>	Greater Mouse-tailed Bat	Resident	Least Concern
	<i>Rhinopoma cystops</i>	Egyptian Mouse-tailed Bat	Resident	Least Concern
Emballonuridae	<i>Taphozous nudiventris</i>	Naked-rumped Tomb Bat	Resident	Least Concern

It is important to note that bat activity in general is correlated to insect activity. Where insects are present it is likely that bat activity will be present given that they feed on them. Within the site, nocturnal insect activity is expected to be very low, if not absent, due to the arid nature of the Project site and the very low vegetation coverage (as discussed in Chapter 10 Biodiversity). Vegetation coverage is the main source for many insects (e.g. moths) where they breed and feed.

In addition, based on the biodiversity survey undertaken earlier, it does not seem that the Project site supports any roosting sites for bats. Potential areas for roosting sites could be within the mountainous areas to the west of the Project site.

12.3 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on bats during the various phases to include planning and construction phase and operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

12.3.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the EPC Contractor for installation of the power lines are expected to include land clearing activities, levelling, excavation, grading, etc.

Such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal. Nevertheless, such activities would likely result in the alteration of the site's habitat and thus potentially impacts bats; particularly through loss of hunting habitats for bats as well as roosting sites.

However, as discussed in the baseline section, bat activity is correlated to insect activity. Where insects are present it is likely that there will be bat activity given that they feed on them. Within the site, nocturnal insect activity was very low, if not absent, in most of the study area due to the arid nature of the Project site and the very low vegetation coverage. Vegetation coverage is the main source for many insects (e.g. moths) where they breed and feed. Thus, the natural characteristics of the site do not offer an attractive feeding habitat for bats. In addition, as discussed in the baseline section, no roosting sites for bats were recorded within the Project site.

Given all of the above, the potential impacts on bats created during the construction phase would be of a short-term duration as they would result in a permanent change in the natural biodiversity of the site. However, such impacts are considered of negative nature and of a low magnitude given that the site is not used by bats as a feeding ground and no roosting sites were recorded. In addition, given the very limited bat activity, the receiving environment is determined to be of a low sensitivity. Given all of the above, such an impact is considered to be not significant. To this extent, no mitigation measures have been identified.

12.3.2 Potential Impacts during the Operation Phase

The potential impacts from the Project during operation are mainly related to risk of bat strikes and collisions although this is unlikely taking into consideration the size of the species that could be present in the area.

All species recorded from the literature review are insectivorous bats. The natural characteristics of the Project site being arid with very low vegetation coverage do not offer an attractive feeding habitat for these species. Based on such a rationale, bat activity is expected to be low given the arid nature of the site. Additionally, all species identified to be recorded in the area of the project site are resident species that do not follow any migration patterns and their movement are generally limited to movement from roosting to feeding areas. Although some of the species such as Geoffroy's Trident Leaf-nosed Bat *Asellia tridens*, are known to be gregarious but taking all the above into consideration, it would be highly unlikely that such species would be found in high numbers in the project site and its vicinity.

Given all of the above, the potential impacts on bats created during the operation phase would be of a long-term duration. Such impacts are considered of neutral nature and of a low magnitude, given that a risk of collision of the species recorded does not entail any significant impacts (species recorded is very common and considered of least concern). In addition, given the very limited bat activity the receiving environment is determined to be of a low sensitivity. Given all of the above, such an impact is considered to be not significant.

Additional Studies/Surveys and Mitigation and Monitoring Measures

Document and report bat fatalities as part of the avi-fauna carcass search programme and report results accordingly.

13 ARCHEOLOGY AND CULTURAL HERITAGE

This Chapter first provides an assessment of baseline conditions within the Project site and surrounds in relation to archaeology and cultural heritage and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

13.1 Assessment of Baseline Conditions

The section below presents the methodology that was undertaken for assessment of baseline conditions in relation to archaeology and cultural heritage and the outcomes and results.

13.1.1 Methodology for Assessment

A field survey was undertaken by an archaeology and cultural heritage expert. The objective of the field survey was to ascertain the presence of any surface archaeological or cultural heritage remains within the Project site. The survey was undertaken to cover the entire OHTL route as well as 500m buffer on both sites. The surface area was walked by the expert in order to inspect the entire ground surface. Based on the survey, should any sites of interest be recorded the following will be undertaken:

- Sketch plans and /or a photograph as appropriate
- GPS coordinates for the area
- Undertake an analysis to categorize the sites and archaeological features and making an assessment of their significance.

13.1.2 Results

Based on the site survey undertaken, no archaeology and cultural heritage sites were identified or recorded within the OHTL route as well as the 500m buffer area.

13.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on archaeology and cultural heritage during the various phases to include planning and construction phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels. It is important to note that there are no anticipated impacts related to the operational phase of the Project.

13.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the OHTL Contractor for the OHTL transmission towers and the various Project components to include foundations, access roads, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Although such activities are limited to the relatively small individual footprints of these components and the actual area of disturbance is relatively minimal, if such activities are improperly managed, they could damage or disturb archaeological remains present on the surface of the Project site. However, as discussed in the baseline, there are no surface archaeology or cultural heritages sites within the Project area and therefore no impacts are relevant.

Nevertheless, there is a chance that throughout such construction activities, archaeological remains buried in the ground are discovered. Improper management (if such sites are discovered) could potentially disturb or damage such sites which could potentially be of archaeological importance.

Given all of the above, the potential impacts on archaeology created during the construction period would be of a short-term duration as they are limited to the construction phase only. The impacts will be of a negative nature, and medium magnitude as if improperly managed as it is possible once a site is damaged or disturbed it cannot be restored. In addition, due to the lack of archaeological remains in the Project area, the receiving environment is considered of low sensitivity. Given all of the above, such an impact is considered to be of minor significance.

Mitigation Measures

The following identifies the mitigation measures to be applied by the OHTL Contractor during the construction phase and which include:

- Throughout the construction phase, and as the case with any Project development that entails such construction activities, there is a chance that potential archaeological remains in the ground might be discovered. It is expected that appropriate measures for such chance find procedures are implemented. Those mainly require that construction activities be halted and the area fenced along with proper signage, while immediately notifying the Ministry of Tourism and Antiquities/Red Sea and Suez Antiquities Inspection Office. No additional work will be allowed before the Ministry/Inspection Office assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor during the construction phase and which include:

- For chance find procedure, inspection of actions taken in case of new discoveries, including fencing, limiting access to site, and contacting the Ministry of Tourism and Antiquities/ Red Sea and Suez Antiquities Inspection Office. Report should be prepared and submitted to the Ministry in such a case which details the above.

14 AIR QUALITY & NOISE

This Section first provides an assessment of baseline conditions within the Project site and surrounds in relation to air quality and noise and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

14.1 Assessment of Baseline Conditions

Based on the survey undertaken for the Project area as discussed earlier, it is concluded that there are no key nearby sensitive receptors in relation to the Project site. In addition, as discussed in the section below, the Project's nature will not result in any key air quality or noise emissions. Therefore, no air quality and noise monitoring program has been undertaken.

14.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on air quality and noise during the construction phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

14.2.1 Potential Impacts during the Construction Phase

Site preparation activities which are to take place onsite by the OHTL Contractor for the OHTL transmission towers and the various Project components to include foundations, cables, access roads, etc. are expected to include land clearing activities, levelling, excavation, grading, etc.

Such activities are limited to the relatively small individual footprints of these facilities and the actual area of disturbance is relatively minimal. Nevertheless, such activities will likely result in an increased level of dust and particulate matter emissions, which in turn will directly and temporarily impact ambient air quality. If improperly managed, there is a risk of nuisance and health effects to construction workers onsite. In addition, construction activities will likely entail the use of vehicles, machinery and equipment (such as generators, compressors, etc.) which are expected to be a source of other pollutant emissions (such as SO₂, NO₂, CO, etc.) which would also have minimal direct impacts on ambient air quality.

In addition, all the above activities will likely include the use of machinery and equipment such as generators, hammers, compressors, etc. and which are expected to be a source of noise and vibration generation within the Project site and its surroundings. If improperly managed, there is risk of nuisance and health affects to construction workers onsite.

The above impacts are anticipated to be temporary and of short-term nature as they are limited to the construction period only. Such impacts are of a negative nature, and will be noticeable and therefore of medium magnitude. However, the impacts will be dispersed and are reversible as air quality would revert back to baseline conditions after construction works is completed and thus the receiving environment is considered of low sensitivity. Given the above such an impact is considered of minor significance.

Mitigation Measures

The following identifies the mitigation measures to be applied by the OHTL Contractor during the construction phase:

- Based on inspections and visual monitoring undertaken, if dust or pollutant emissions were found to be excessive due to construction activities, the source of such emissions should be identified and adequate control measures must be implemented;

- Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high dust and noise levels, workers are equipped with proper Personal Protective Equipment (e.g. masks, eye goggles, breathing masks, ear muffs, etc.);
- Apply basic dust control and suppression measures which could include:
 - Regular watering of construction active areas for dust suppression;
 - Proper planning of dust causing activities to take place simultaneously in order to reduce the dust incidents over the construction period.
 - Proper management of stockpiles and excavated material (e.g. watering, containment, covering, bundling).
 - Proper covering of trucks transporting aggregates and fine materials (e.g. through the use of tarpaulin).
 - Adhering to a speed limit of 15km/h for trucks on the construction site.
- Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant emissions.
- Based on inspections and visual monitoring undertaken, if noise levels were found to be excessive from construction activities, the source of such excessive noise levels should be identified and adequate control measures must be implemented; and
- Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.

Following the implementation of these mitigation measures, the significance of the residual impact is categorised as not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor during the construction phase and which include:

- Inspection and visual monitoring of the works should be carried out at all times. In addition, periodic inspections should be conducted at nearby sites (e.g. roads) to determine whether harmful levels of dust and noise from construction activities exist; and
- Reporting of any excessive levels of pollutants/dust or noise and the measures taken to minimise the impact and prevent it from occurring again.

15 INFRASTRUCTURE AND UTILITIES

This Chapter first provides an assessment of baseline conditions within the Project site and surrounds in relation to infrastructure and utilities and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

15.1 Assessment of Baseline Conditions

The section below presents the methodology that was undertaken for assessment of baseline conditions in relation to infrastructure and utilities and the outcomes and results.

15.1.1 Methodology for Assessment

A field survey was undertaken with the objective of identifying any infrastructure and utility elements within the Project site. The survey was undertaken to cover the entire OHTL route as well as 500m buffer on both sides.

15.1.2 Road Networks

Based on the survey undertaken on the Project site it was indicated that there are two types of roads in the area which include the following:

- An existing road networks in and around the Project site that is used by the General Petroleum Company for their activities in the area. The existing road network in general runs parallel to the OHTL route (where the closest distance is around 40m) but the route also intersects with the road at 3 locations mainly within the northern parts
- In addition to the General Petroleum Company road network, there is a road currently under construction that links a wind farm project site (under construction) in the area to the main Hurghada-Ismailia highway in the east. The OHTL route intersects with this road at 1 location



Figure 16: Existing Road Networks used by the General Petroleum Company



Figure 17: Road Currently under Construction that Links a Wind Farm Site to Hurghada-Ismailia Road

15.1.3 Electricity Lines

An existing OHTL runs parallel to the Project OHTL for a length of 32.5km all the way until the connection point with the National Grid Substation, and located at a distance of around 50m to the east. As noted, the existing electricity line is under the responsibility of the Egyptian Electricity Transmission Company (EETC).

Another power line is under construction for another wind farm within the area, this line is located around 500m to the west of the project OHTL site.



Figure 18: Existing OHTL

15.1.4 Oil and Gas pipelines

Based on the site visit undertaken, no pipelines were recorded within the OHTL route as well as the 500m buffer on both sides. A natural gas pipeline runs east of the Project site at around 1km, while an oil pipeline was also located 3.5km to the east of the Project site.



Figure 19: Oil Pipeline East of the Project Site



Figure 20: A Natural Gas Pipeline East of the Project Site

15.2 Assessment of Potential Impacts during Planning and Construction Phase

Inappropriate design of the OHTL could affect the infrastructure and utility elements noted onsite to include the road and the electricity networks. This could include for example inappropriate vertical height of the transmission line from roads which could be a public safety concern for vehicles on the road, or inappropriate horizontal height of the transmission lines from other nearby OHTL lines which could also entail public safety concerns.

Apart from the above, as noted in the baseline sections there are no existing infrastructure and utility elements within the OHTL route.

Taking all of the above into account, the anticipated impacts on infrastructure and utility road networks are considered of long-term duration. Such impacts are of a negative nature, and if such impacts are improperly managed, then they are expected to be of medium magnitude and medium sensitivity. Given the above impact is considered of moderate significance.

Mitigation Measures

As discussed earlier, the Electricity Law 87/2018 identifies a 25m buffer distances as Right of Way (ROW) zone for 220kV OHTL, that should be free from any obstacles at all times such as buildings, trees, gas pipelines, cables, water pipelines (unless agreed with EETC taking into account health and safety requirements).

As noted earlier, the road networks and electricity lines recorded within the OHTL route in general adhere to the 25m buffer distance requirements. However, there are certain points where the OHTL crosses over the road networks.

Based on the above, discussions should be undertaken between EETC and General Petroleum Company to discuss the OHTL route design and identify appropriate horizontal distance requirements from the road networks to ensure health and safety measures are maintained.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor and EETC during the planning phase:

- Review of detailed design to ensure appropriate vertical and horizontal buffer distances are maintained for all infrastructure and utility elements recorded within the OHTL route

16 OCCUPATIONAL HEALTH AND SAFETY

This Chapter assesses the anticipated impacts from the Project throughout its various phases on occupational health and safety. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

16.1 Assessment of Baseline Conditions

Assessment of baseline conditions related to occupational health and safety is considered irrelevant.

16.2 Assessment of Potential Impacts during Construction and Operation Phase

This section identifies and assesses the anticipated impacts from the Project activities occupational health and safety. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels. Throughout this section, the impacts during the construction and operation phase have been discussed collectively due to the similarity in nature of the impacts.

Throughout the construction phase, there will be generic occupational health and safety risks to workers, as working on construction sites increases the risk of injury or death due to accidents. The following risks are generally associated to construction sites and apply for the construction of the Project and could include:

- Slips and falls;
- Working at heights;
- Struck-by objects;
- Moving machineries;
- Working in confined spaces and excavations;
- Exposure to chemicals, hazardous or flammable materials; and
- Exposure to electric shocks and burns when touching live components.

Similarly, throughout the operation phase, there are occupational health and safety risks to workers from the various operation and maintenance activities expected to take place for the Project. The following risks are generally associated to such a Project and which could include:

- Working at heights during maintenance activities; and
- Exposure to a variety of hazards such as electric shock, and thermal burn hazards.

Such impacts are considered of short-term duration during the construction phase and of long-term duration throughout the Project operation phase, of a negative nature. OHTL construction and operation activities are associated with an inherently high occupational health and safety risks some of which have considerable consequences (fatality through fall from heights) – but such impacts are generally controlled through the implementation of general best practices; to this extent such impacts are considered of medium magnitude and high sensitivity. Given the above such an impact is considered of moderate significance.

Mitigation Measures

The OHTL Contractor will be required to submit an Occupational Health and Safety Plan (OHSP) regarding the Project's construction activities. The objective of the Plan is to ensure the health and safety of all personnel in order to concur and maintain a smooth and proper progress of work at the site and prevent accident which may injure personnel or damage property of the OHTL Contractor and all involved sub-contractors. It is expected that such a plan provides details on the following:

- Identifies in details information in relation to emergency measures and plans, communication protocols, first aid instructions and facilities, training programs, occupational health and safety culture, inspection programs, monitoring and reporting requirements, incident management, etc.
- Identifies in details the activities that are expected for the Project (e.g. civil works, electrical wiring, tower assembly, electrical installation, commissioning, etc.) and lists the specific jobs which are to be undertaken under each activity and the hazards which may be associated for each (electric hazards, working with machinery, vertical works, etc.);
- For each of the activities above, the OHSP is expected to identify the preventive equipment and systems that must be in place to eliminate or reduce such risks. This includes: (i) collective protective equipment (safety signs, traffic signs, hand signs, marking and signalling of work in progress, etc.); (ii) personal protective equipment (this includes the compulsory equipment for any worker or visitor onsite and obligatory equipment based on the tasks being carried out) (iii) detailed safety measures on how the task should be implemented in a safe manner to reduce any occupational health and safety risks.

In addition, similar to the above, it is expected that EETC has its own OHSP, which is implemented for all their maintenance activities for high voltage electricity lines in Egypt. It is expected that such a plan will be implemented for this Project in specific.

The OHTL Contractor and EETC are expected to adopt and implement the recommendations/provisions of the OHSP throughout the Project construction and operation phase. Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following identifies the monitoring and reporting requirements that must be adhered to by the OHTL Contractor and EETC during the construction and operation phase:

- Inspection to ensure the implementation of the provisions of the Occupational Health and Safety Plan and assess compliance with its requirements; and
- Regular Reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again.

17 COMMUNITY HEALTH, SAFETY AND SECURITY

This Chapter assesses the anticipated impacts from the Project throughout its various phases on community health, safety and security. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

17.1 Assessment of Baseline Conditions

As discussed earlier, the closest community settlements are considered to be located at a distance from the Project site. This includes Ras Ghareb (located 12km to the southeast) and Zaafarana (45km to the north).



Figure 21: Closest Community Settlements to the Project Site

17.2 Assessment of Potential Impacts

This section identifies and assesses the anticipated impacts from the Project activities on community health, safety and security during the operation phase. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels. There are no foreseen impacts on community health, safety and security during the construction and planning phase.

In particular, the potential impacts on community health and safety, which are discussed throughout this section, include the following:

- Potential impacts from public access to Projects components during operation; and
- Potential impacts from exposure of Electric and Magnetic Field (EMF).

17.2.1 Potential Impacts from Public Access to Project Components during Operation

Such an impact is related to public access of unauthorized personnel to the various Project components. Such access could result in safety issues such as unauthorized climbing of the transmission tower, which could result in safety hazards (electric shock, thermal burn hazards and other).

Such impacts are considered of long-term duration throughout the Project operation phase, of a negative nature, and are expected to be of medium magnitude and high sensitivity given that it entails potential public safety concerns which in extreme cases they could entail permanent impacts (e.g. death or permanent disability). Given the above, such an impact is considered of moderate significance.

Mitigation Measures

The following presents the mitigation measures that are to be implemented by EETC during the operation phase of the Project and which include:

- Post informative signs on the transmission towers about public safety hazards and emergency contact information in both Arabic and English language. Signs, especially warnings need to be pictorial as well as written to ensure they are understood by those unable to read

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Monitoring and Reporting Requirements

The following presents the monitoring and reporting requirements that are to be implemented by EETC during the operation phase of the Project and which include:

- Inspections and visual monitoring to ensure above measures are in place.

17.2.2 Potential impacts from Exposure of Electric and Magnetic Field (EMF) during Operation

Electric and magnetic fields (EMF) are radiation associated with the use of electric power such as household wiring, electric appliances and also from OHTL. Electric fields are produced from the voltage in the transmission line while magnetic fields are produced from the electric current. While electric fields can be shielded by objects (such as buildings or trees), magnetic field pass through most objects. Such fields are strongest at the source and decrease significantly with increasing distance from the source.

Extensive scientific research and studies have been undertaken to address potential human health impacts from long term exposure to EMF from transmission lines. The general consensus is that the overall scientific evidence for human health risk from EMF exposure is weak however EMF exposure could not yet be recognized as entirely safe.

Similarly, the EHS Guidelines for Electric Power Transmission and Distribution issued by the IFC also states that although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment. However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern.

The IFC EHS Guideline also requires that exposure level limits to the public should remain below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) limits provided in the table below.

Table 23: ICNIRP Exposure Limits for General Public Exposure to Electric and Magnetic Fields

Frequency	Electric Field (V/m)	Magnetic Field (μ T)
50 Hz	5000	100
60 Hz	4150	83

The National Grid (an international electricity and gas company based in the UK and north-eastern US) provides typical electric and magnetic field limits for various voltage lines (132kV, 275kV, and other). The values indicate that electric and magnetic fields are within the ICNIRP limits and even reach negligible

amounts at around 50m – 100m from the OHTL (source: <http://www.emfs.info/sources/overhead/specific/132-kv/>)

In addition, according to the National Institute of Environmental Health Sciences (NIEHS) at a distance of around 100m EMF from power lines are similar to typical background levels found in most homes (“Electric and Magnetic Fields Associated with the Use of Electric Power” (NIEHS, 2012)). Finally, the IFC EHS guideline also state that transmission lines require RoW to protect the system and also protection from potential hazards and in which RoW for transmission lines are generally from 15m to 100m.

Taking the above into account, as noted earlier in “Chapter 8”, the Project area and 500m buffer on both sides is completely vacant and no activities or receptors were recorded (e.g. permanent settlements or similar) which could be impacted by EMF.

Such impacts are considered of long-term duration throughout the Project operation phase, of a negative nature, and are expected to be of low magnitude and low sensitivity given the distance from the OHTL to the closest village boundaries. Given the above such an impact is considered of not significant.

Mitigation Measures

There are no mitigation or monitoring measures to be considered.

17.2.3 Potential Impacts from Noise during Operation

According to the “IFC EHS Guidelines for Electric Power Transmission and Distribution” (IFC, 2007) noise in the form of buzzing or humming can be often heard around high voltage power lines producing corona – however noise produced by power lines does not carry any known health risks. In addition, such noise quickly dissipates with distance and is easily drowned out by typical background noises.

Noise impacts from the OHTL are expected to be negligible. As noted earlier in “Chapter 8”, the Project area and 500m buffer on both sides is completely vacant and no activities or receptors were recorded (e.g. permanent settlements or similar) which could be impacted by EMF.

Such impacts are considered of long-term duration throughout the Project operation phase, of a negative nature, and are expected to be of low magnitude and low sensitivity given the distance from the OHTL to the closest village boundaries. Given the above, such an impact is considered of not significant.

Mitigation Measures

There are no mitigation or monitoring measures to be considered.

18 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

18.1 Institutional Framework and Procedural Arrangement for ESMP Implementation

Generally, two main pillars govern the successful implementation of any Environmental and Social Management Plan (ESMP):

- Proper identification of roles and responsibilities for the entities involved; and
- Effective control of the process.

All management practices are interlinked, and this section describes how these two pillar criteria could be fulfilled, which in turn helps ensure that the overall objectives of the ESMP are met.

Defining roles and responsibilities of the involved entities in any ESMP identifies where and when each entity should be engaged, their degree of involvement, and the tasks expected of the entity. This in turn eliminates any overlap of jurisdiction or authority and ensures proper communication and effective management of ESMP components. Control processes mainly include training and awareness for entities involved and control of non-conformances that might occur throughout the process.

The aim of this section is to ensure that ESMP recommendations are considered during the construction and operation, as well as examining how environmental resources are influenced. Table 24 shows a matrix of the overall proposed institutional and procedural arrangements to be implemented upon putting the ESMP into effect. Meanwhile, Table 25 identifies the specific roles and responsibilities of each of the concerned entities.

A self-compliance methodology is encouraged, the party undertaking the responsibility for causative action should ensure that the appropriate measures articulated in the ESMP are enforced – the underlying implication points towards the need of appointing an HSE Officer by the OHTL Contractor throughout the Construction Phase, and though the Operational Phase is not majorly labour intensive except for maintenance procedures, the mitigation/monitoring measures can be supervised by a competent staff within the Project Developer Team (i.e. EETC).

Furthermore, it is recommended that the Developer (i.e. RSWE) review and report ESMP practices and undertake an auditing exercise to assess and reinforce requirements of the ESMP are met by the OHTL Contactor (mainly during the construction phase). This can be conducted by appointing an HSE Officer as part of the Developer team or via a third-party Employer representative. The auditing exercise can be conducted on regular basis (e.g. monthly) and at maintenance instances. Most of the responsibilities within the ESMP are for EETC and/or the OHTL Contractor.

Finally, the Regulator (being EEAA), will be responsible for undertaking compliance monitoring to ensure that the responsible entity is adhering to the ESMP requirements.

Table 24: Overall proposed institutional and procedural arrangement for ESMP Implementation

Issue	Self-Compliance	Review/Checks	Compliance Monitoring/ Inspection by Regulator
Construction Phase			
Compliance with ESMP Requirements	OHTL Contractor – HSE Officer	EETC	EEAA
Compliance with environmental legislations	EPC Contractor – HSE Officer	EETC	EEAA
Operation Phase			
Compliance with ESMP Requirements	Project Operator – Project Staff Member	EETC	EEAA
Compliance with environmental legislations	Project Operator - Project Staff Member	EETC	EEAA

Table 25: Roles and Responsibilities of Entities Involved in ESMP

Designation	Entity	Project Role	Environmental and Social Responsibilities
Project Developer (OHTL)	EETC	Developer of the OHTL	<ul style="list-style-type: none"> ▪ Selection of OHTL Contractor ▪ Undertake O&M activities for the Project ▪ Check performance of the OHTL Contractor’s work onsite. Theoretically, this should include ensuring action items under the ESMP are implemented.
500 MW Wind Farm Owner and Developer	RSWE	Owner and Developer of the Wind Farm	<ul style="list-style-type: none"> ▪ Review and report ESMP practices and undertake an auditing exercise to assess and reinforce requirements of the ESMP are met by the OHTL Contactor ▪ The auditing exercise can be conducted on regular basis (e.g. monthly) and at maintenance instances.
OHTL Contractor	TBD	Undertake detailed design and construction of the project	<ul style="list-style-type: none"> ▪ Appoint a competent HSE officer responsible for implementing the ESMP. ▪ Implement mitigation and monitoring requirements as detailed in the ESMP.
Environmental Regulator	EEAA	Granting environmental clearance to the Project	<ul style="list-style-type: none"> ▪ Undertake compliance monitoring

18.2 Training and Awareness Raising

Effective and efficient implementation of any ESMP requires that all personnel involved in the Project (construction/operation staff across all levels) understand its objectives and requirements. A proper training and awareness program ensure that applying mitigation measures is more of a sense of responsibility rather than an enforcing protocol.

Training and awareness is an ongoing process, but most importantly must take place before the commencement of any activity in any phase of the Project. EETC and the OHTL Contractor are responsible, each for his own staff, for conducting inductions, training requirements and awareness raising which should include at a minimum the following:

- Ensure that staff understand all requirements, measures, and protocols stipulated within the ESMP;
- Ensuring that all personnel engaged in activities that may have an impact on the environment are competent to carry out their duties, or, where necessary, arrange for suitable training to be undertaken;
- Cultural change towards environmental perception;
- Waste, wastewater, and hazardous waste management practices as identified throughout the ESMP;
- Occupational health and safety; and
- Emergency response procedures.

18.3 Compilation of Environmental and Social Management Plan

The tables below present the ESMP for the planning and construction and operation phase respectively and which include the following:

- The environmental attribute (e.g. Soil and Groundwater) that is likely to be impacted;
- A summary of the potential impact and/or likely issue;
- The identified management measures that aim to eliminate and/or reduce the potential impact to acceptable levels. Management measures include mitigation actions, further requirements, additional studies, and compensation measures;
- Monitoring actions to ensure that the identified mitigation measures are implemented. Monitoring actions include: inspections, review of reports/plans, reporting, etc.;
- The frequency for implementing the monitoring actions, which include: once, continuously throughout the construction/operation period (depending on the mitigation measure identified this could include daily, weekly, or monthly), or upon occurrence of a certain issue; and
- The responsible entity for implementing the mitigation measures and monitoring actions identified

Table 26: ESMP for the Planning and Construction Phase

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
Landscape and Visual	Visual and landscape impacts due to presence of elements typical of a construction site such as equipment and machinery.	Ensure proper general housekeeping and personnel management measures are implemented which could include: (i) ensure the construction site is left in an orderly state at the end of each work day; (ii) to the greatest extent possible construction machinery, equipment, and vehicles that are not in use should be removed in a timely manner and kept in locations to reduce visual impacts to the area.	Mitigation	Visual inspections	At construction active areas	Daily / Weekly	OHTL Contractor
Geology, Hydrology and hydrogeology	The Project is exposed to flood hazards during rainy seasons since the OHTL route passes through a major wadi system	Develop and submit a detailed flood risk assessment for the OHTL route. The assessment should include a hydrologic model for the catchment area to calculate flood flows and volumes onsite for a 20, 50 and 100-year return period. Based on that, recommendations should be provided which could include for example a buffer distance from the wadi systems to mitigate flood risks, and/or identification and development of detailed engineering structures/solutions to be considered for the design of the OHTL to take into account such risks.	Additional study	Submit flood risk assessment	Not applicable	Once; before construction commences	OHTL Contractor / EETC
	Solid waste management	Coordinate with Ras Gharib City Council for the collection of solid waste from the site to the municipal approved dumpsite (the closest dumpsite being Ras Gharib Public Dumpsite)	Mitigation	Submit contract	Not applicable	Once before commencement of construction	OHTL Contractor
		Prohibit fly-dumping of any solid waste to the land	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste"	Mitigation	Visual inspections	At construction active areas	Once before commencement of construction	
		Distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste	Mitigation	Visual inspections	At construction active areas	Once before commencement of construction	
		Implement proper housekeeping practices on the construction site at all times	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill	Mitigation	Submit manifests	Not applicable	Throughout construction period	
	Wastewater management	Coordinate with Ras Gharib Water Company to hire a private contractor for the collection of wastewater from the site to the closest WWTP	Mitigation	Submit contract	Not applicable	Once before commencement of construction	OHTL Contractor
		Prohibit illegal disposal of wastewater to the land	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Ensure that constructed septic tanks during construction are well contained and impermeable to prevent leakage of wastewater into soil	Mitigation	Visual inspections	At applicable area	Once before commencement of construction	
		Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing	Mitigation	Visual inspection	At applicable area	Daily/weekly	
		Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP	Mitigation	Submit manifests	Not applicable	Throughout construction period	
	Hazardous Waste Management	Hire approved private contractor for the collection of hazardous waste from the site to the approved hazardous waste disposal facilities	Mitigation	Submit contract	Not applicable	Once before commencement of construction	OHTL Contractor
		Ensure that hazardous waste is disposed in a dedicated area that is enclosed, of hard surface, with proper signage and suitable containers as per hazardous waste classifications and that they are labelled for each type of hazardous waste	Mitigation	Visual inspections	At applicable area	Once before commencement of construction	
		Ensure hazardous waste storage area is equipped with spill kit, fire extinguisher and anti-spillage trays and a hazardous waste inventory is available	Mitigation	Visual inspections	At applicable area	Daily / weekly	
		Prohibit illegal disposal of hazardous waste to the land	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
		Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste	Mitigation	Visual inspections	At construction active areas	Daily / weekly	

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity	
		Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing	Mitigation	Visual inspections	At construction active areas	Daily / weekly		
		Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the hazardous waste disposal facilities	Mitigation	Submit manifests	Not applicable	Throughout construction period		
	Hazardous material management		Ensure that hazardous materials are stored in an area that is of hard impermeable surface, flame-proof, accessible to authorized personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another	Mitigation	Visual inspections	At applicable area	Once before commencement of construction	OHTL Contractor
			Maintain a register of all hazardous materials used and accompanying MSDS must present at all times. Spilled material should be tracked and accounted for	Mitigation	Visual inspections	At applicable area	Daily / weekly	
			Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.)	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
			Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
			Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility.	Mitigation	Visual inspections	At applicable area	Daily / weekly	
			If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste	Mitigation	Visual inspection	At applicable area	Upon occurrence	
	Erosion and runoff management		Avoid executing excavation works under aggressive weather conditions	Mitigation	Visual inspections	At construction active areas	Upon occurrence	OHTL Contractor
			Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soils in adjacent areas	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
Erect erosion control barriers around work site during site preparation and construction to prevent silt runoff where applicable			Mitigation	Visual inspections	At construction active areas	Daily / weekly		
Return surfaces disturbed during construction to their original (or better) condition to the greatest extent possible			Mitigation	Visual inspections	At construction active areas	Upon occurrence		
Biodiversity	Disruption of habitats and animals home range, in case of fence erections	Erection of fences with an appropriate gap between the ground level and the first rail or strand (around 30cm)	Mitigation	Visual inspections	At construction active areas	Upon occurrence	OHTL Contractor	
	Damage to the biodiversity of the site	Implement proper management measures	Mitigation	Visual inspections	Not applicable	Upon occurrence	OHTL Contractor	
Avi-fauna	Disturbance to avi-fauna and avi-fauna habitats	Implementation of proper housekeeping measures	Mitigation	Visual inspections	Not applicable	Upon occurrence	OHTL Contractor	
Archaeology and Cultural Heritage	Improper management of construction activities could disturb/damage archaeological remains which could be buried in the ground (if any).	If potential archaeological remains in the ground are discovered, appropriate measures for such chance find procedures are implemented. Those mainly require that construction activities be halted and the area fenced along with proper signage, while immediately notifying the Ministry of Tourism and Antiquities/Red Sea and Suez Antiquities Inspection Office. No additional work will be allowed before the Ministry/Inspection Office assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply	Mitigation	Visual inspections and submittal of chance find report	At applicable area	Upon occurrence	OHTL Contractor	
Air Quality and Noise	Construction activities will likely result in an increased level of dust, particulate matter and pollutant emissions as well as noise which in turn will directly impact ambient air quality and noise levels.	If dust or pollutant emissions were found to be excessive due to construction activities, the source of such emissions should be identified and adequate control measures must be implemented (as identified below)	Mitigation	Visual inspections	At construction active areas and other receptors to include nearby road networks	Upon occurrence	OHTL Contractor	
		Comply with the Occupational Safety and Health Administration (OSHA) requirements and the Egyptian Codes to ensure that for activities associated with high dust and noise levels, workers are equipped with proper Personal Protective Equipment	Mitigation	Visual inspections	At construction active areas	Daily / weekly		
		Apply basic dust control and suppression measures which could include: (i) regular watering of roads for dust suppression; (ii) proper planning of dust causing activities to take place simultaneously in order to reduce the dust incidents over the construction period; (iii) proper management of stockpiles and excavated material (e.g. watering, containment, covering, bundling); (iv) proper covering of trucks transporting aggregates and fine materials (e.g. through the use of tarpaulin); and (v) adhering to a speed limit of 15km/h for trucks on the construction site.	Mitigation	Visual inspections	At construction active areas	Daily / weekly		

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
		Develop a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment to be used throughout the construction phase for early detection of issue to avoid unnecessary pollutant and noise emissions	Mitigation	Submission of maintenance program	Not applicable	Monthly	
		If noise levels were found to be excessive from construction activities, the source of such excessive noise levels should be identified and adequate control measures must be implemented	Mitigation	Visual inspections	At construction active areas and other receptors to include nearby road networks	Upon occurrence	
		Apply adequate general noise suppressing measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery, developing a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues to avoid unnecessary elevated noise level, etc.	Mitigation	Visual inspections	At construction active areas	Daily / weekly	
Infrastructure and Utilities	Inappropriate design of the OHTL could affect the infrastructure and utility elements noted onsite to include the road and the electricity networks.	Establish coordination with the General Petroleum Company to discuss the OHTL route design and identify appropriate horizontal distance requirements from the road networks to ensure health and safety measures are maintained.	Additional requirement	Submit formal communication letter (or similar) with relevant entity	Not applicable	Once before commencement of construction	EETC
Occupational Health and Safety	There will be some generic risks to workers health and safety from working on construction sites, as it increases the risk of injury or death due to accidents.	Develop and submit an Occupational Health and Safety Plan (OHSP) that is project and site specific to ensure the health and safety of all personnel in order to concur and maintain a smooth and proper progress of work at the site and prevent accident which may injure personnel or damage property.	Additional study	Submit OHSP plan	Not applicable	Once before commencement of construction	OHTL Contractor

Table 27: ESMP for the Operation Phase

Environmental Attribute	Potential Impact	Management Action (mitigations, additional requirements, additional studies, compensation measures, etc.)	Type of Action	Monitoring Action	Parameters to be monitored / location	Frequency	Responsible Entity
Biodiversity	Damage to the biodiversity of the site	Implement proper management measures	Mitigation	Visual inspections	Not applicable	Upon occurrence	OHTL Contractor
Avi-Fauna	Bird fatalities due to collision /	Install and bird diverters	Mitigation	Visual inspections	Fatalities	Once before commencement of operation	OHTL Contractor
		Undertake fatality monitoring for birds	Monitoring	Submit monitoring protocol	Fatalities	Weekly during migration seasons by commencement of operation	OHTL Contractor
		Bird flight monitoring	Monitoring	Submit monitoring protocol	Species presence / numbers	Weekly during migration seasons by commencement of operation	OHTL Contractor
Bats	Bat fatalities due to collision	Document fatalities	Monitoring	Submit monitoring protocol	Fatalities	As part of the bird fatality survey of the OHTL	OHTL Contractor
Community Health and Safety	Public access of unauthorized personnel to the various Project components.	Post informative signs on the transmission towers about public safety hazards and emergency contact information.	Mitigation	Visual inspections	transmission towers	Once before commencement of operation	EETC
Occupational Health and Safety	There will be some generic risks to workers health and safety during the repair and maintenance activities of the Project.	Develop and submit an Occupational Health and Safety Plan (OHSP) to ensure the health and safety of all personnel in order to concur and maintain a smooth and proper progress of work at the site and prevent accident which may injure personnel or damage property.	Additional study	Submit OHSP plan	Not applicable	Once before commencement of operation	EETC

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