Submitted To:

Egyptian Electricity Transmission Company

Submitted by:

EcoConServ
ENVIRONMENTAL SOLUTIONS

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR 220 KV DOUBLE CIRCUIT OVERHEAD TRANSMISSION LINE OF LENGTH 20 KM FROM GULF OF SUEZ SUBSTATION (500/220 KV) TO 250-MW BOO WIND POWER PLANT

ESIA STUDY/Final

March, 2019

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March, 2019

LIST OF ACRONYMS AND ABBREVIATION

ACI	American Concrete Institute
BOO	Build Own Operate
EEAA	Egyptian Environmental Affairs Agency
EEHC	Egyptian Electricity Holding Company
EETC	Egyptian Electricity Transmission Company
EHS	Environmental Health & Safety
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMoP	Environmental and Social Monitoring Plan
ESMP	Environmental and Social Management Plan
IEC	International Electrotechnical Commission
IFC	International Financial Corporation (World Bank Group)
IRENA	International Renewable Energy Agency
km	Kilo meter
kV	kilo Volt
MW	Mega Watts
NREA	New and Renewable Energy Authority
NRIAG	National Research Institute of Astronomy and Geophysics

OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
PAPs	Project Affected Persons
PPA	Power Purchase Agreement
RGWE	Ras Gharib Wind Energy
SCADA	Supervisory Control and Data Acquisition
SEP	Stakeholder Engagement Plan
WB	World Bank
WCPS	West Canal Project Sector

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1.0 INTRODUCTION

Egypt is witnessing a rapid expansion in urbanization and population, paralleled with a surge in demand for electricity. The rate of electricity coverage in 2016; was approximately 100 percent; according to the World Bank collection of development indicators (trading economics, 2016). This rate is among the highest rates in Africa with 100 percent connection rates at urban areas and 99.3 percent at rural areas. However, with the growing population, it is expected that the demand for energy will rise over the coming years.

According to a report by the International Renewable Energy Agency (IRENA), up to 53% of Egypt's total energy could derive from mix renewable energy source by 2030. The report shows the advantages that could be gained by the use of renewable energy in Egypt in providing jobs and reducing the national energy bill by around $900 million annually (IRENA, 2018).

Consequently, a consortium composed of Orascom Construction Limited, ENGIE (France) and Toyota Tsusho Corporation/Eurus Energy Holdings Corporation (Japan) has signed a contract to develop, construct and operate a 250 MW wind farm in Ras Gharib, Egypt. The project will be executed on a build-own-operate (BOO) basis under a 20-year Power Purchase Agreement (PPA) with the Egyptian Electricity Transmission Company (EETC) (IRENA, 2018).

The wind farm, Ras Gharib Wind Energy (RGWE), will be located in Ras Gharib on the Gulf of Suez, an optimal site with more than 60% of gross capacity factor. The energy will be sold under a 20-year Power Purchase Agreement (PPA) to the EETC (Energy Egypt, 2017).

The EETC is one of sixteen affiliated Companies under the Egyptian Electricity Holding Company (EEHC). The main role of the EETC is the management, operation and maintenance of electric power transmission grids of high voltage and extra-high voltage capacity all over the country, for the optimal economic usage of those grids. EETC's goal is to meet the growth in electricity demand while optimizing the use of all resources and maximizing the profit.

The project aims at introducing an Over-Head Transmission Line (OHTL) to increase the electricity capacity in Ras Gharib area, using clean source of energy (wind energy). The Egyptian company for the transformation of electricity in collaboration with New Renewable Energy Authority (NREA) are planning to construct the OHTL between Gulf of Suez substation and RGWE station. The Project is funded by the World Bank.

In line with national legislations and World bank policies, EETC is committed to carrying out an Environmental and Social Impact Assessment (ESIA) for the construction of Over Head Transmission Line (OHTLs). EcoConServ has been contracted to carry out the ESIA study in accordance with national legislations as well as World Bank standards; which aims to

investigate the potential impact and/or risks of the project activities. In addition, the management and monitoring plan, including the mitigation measures during construction, operation and maintenance phases are described within the ESIA report.

1.1 The ESIA Objectives

The objectives of the ESIA study are as follows:

- Identify and assess the potential environmental and social impacts of the each project components on the surrounding areas (during construction and operation phase).
- Compare the impacts in relation to the relevant national and international legal requirements and guidelines.
- Develop an environmental and social management plan for the mitigation of the potential negative impacts of each project components and for monitoring compliance with the relevant environmental laws and regulations during construction and operation.
- Carrying out stakeholder engagement activities during the scoping phase of the assessment and public consultation session after the end of assessment.
- As a requirement, in parallel with the consultations activities, the disclosure will be conducted in accordance with the World Bank standards. The disclosure shall take place to ensure that the information about the project was well conveyed to the stakeholders and the community involved in the decision processes.

1.2 The ESIA Methodology

The ESIA focused on identifying and assessing the negative and positive impacts of the project on the environment and the socioeconomic characteristics of the impacted groups in addition to developing necessary mitigations for the negative impacts. The identifications and assessments were conducted for each of the project components during construction and operation phases. The mitigation measures were developed and presented in Environmental and Social Management Plan matrix. In addition, the monitoring plan was developed to monitor implementation of the ESMP as well as identifying the necessary capacity building activities for the implementation team. The consultant proposed the necessary budget, to implement the ESMP and the monitoring plan. Similarly, the monitoring plan is presented in the form of a matrix.

The ESIA methodology included reviewing the secondary data sources from previous reports and studies about the environmental and socio-economic characteristics of the project area. The literature review (included both reports provided by the client as well as web based resources), contributed to elaborating the ESIA study's objectives mentioned above by assessing:

- The environmental and socio-economic characteristics of the project areas

- Project background and proposed interventions
- The legal, institutional and organizational framework and background of the electricity sector and the historical background
- Environmental and social standards and guidelines for related environmental and social issues

In addition to the literature review, structured site visits were undertaken to collect primary data from the site. The visits also were used as a tool to identify stakeholders' perceptions regarding some issues (especially social issues), such as:

- The current environmental and socioeconomic characteristics on the site and at the surrounding area
- The current electricity supply at the area and its impact on the families' livelihoods;
- Gender issues related to energy management on the level of household,
- The perception of the local community towards the existing electricity service provider,
- The environmental and socioeconomic short and long term impacts predicted from the project,
- Ideas for maximizing the positive benefits especially on people's livelihoods and the economic development of the project.

1.3 Outline of the ESIA:

- **Chapter 1:** Introduction and background on the project for which ESIA is developed as well as the scope and objectives of the ESIA study.
- **Chapter 2:** Description of the local regulatory framework as well as the WBG guidelines applicable to the project activities
- **Chapter 3:** Description of the intended OHTL construction and operation phases
- **Chapter 4:** Description of the nvironment and socioeconomice baseline of the project area
- **Chapter 5:** Discussion of alternatives for different project components
- **Chapter 6:** Assessment of the potential environmental impacts and their mitigation measures
- **Chapter 7:** The environmental mangement and monitoring plan for the OHTL.
- **Chapter 8:** Stakeholder enagament and public consulation

2.0 LEGISLATIVE AND REGULATORY FRAMEWORK

2.1 Preface

This Chapter describes the legal and administrative framework for the proposed project. It lists the national laws and the international requirements pertinent to the project. In addition to an overview of the requirements of international institutions and international conventions. The requirements of Egyptian legislation are compared with those of the World Bank (WB) Environmental and Social Policy, and presented in a tabular form of gap analysis. The WB has defined 10 environmental and social safeguard policies that must be considered for its financed projects. The applicability of such policies to this project are overviewed and discussed in subsequent sections.

In case of any discrepancy between the requirements of Egyptian legislations and the requirements of the WB, the more restricted requirements will be applied. In the case that national requirements are non-existent for specific issues, or pollutants, then the WB requirements will be adopted.

2.2 Egyptian Laws, Regulations and Policies

The following is a brief description of the different national authorities and institutions of relevance with respect to the Environmental and Social Impact Assessment (ESIA).

The Arab Republic of Egypt has, for some time, had in place various laws and regulations related to the environment. Presidential Decree No. 631/1982 led to the establishment of the Egyptian Environmental Affairs Agency (EEAA). The Egyptian Law Concerning the Environment, Law No. 4/1994 was Egypt's first modern and comprehensive law regulating the environment as a whole; in which the law regulates the protection of the land, air and water environment from pollution.

Measures concerning Environmental Impact Assessment (EIA) are stipulated in Articles 19-23, 70, 71 and 73 of Law No. 4/1994. These requirements are complemented by the provisions of Articles 10-19 and 57-60 of the Executive Regulations. Some articles of Law No. 4/1994 were amended by Laws No. 9/2009 and 105/2015, and its Executive Regulations (ERs) amended by Prime Minster Decrees No. 1095/2011, 710/2012, 964/2015, and 75/2017 commonly known as the Environmental Protection Law. The law deals mostly with the protection of the environment against pollution.

Then decree No. 964 of 2015. Law 9 dictates that the EEAA must be notified via registered letter with Environmental Impact Assessment (EIA) study report of the establishment of any new facility from the competent authority (in our case EETC) the category of the EIA report is defined according to the EIA guidelines in October 2010. The EEAA shall be responsible to follow up the data included in the project register, to ensure conformity with the actual conditions, and the project's commitment to the self-monitoring plan.

A self-monitoring plan should be in place as indicated in the Executive Regulation. Annex 3 of Decree 1741/2005, which is a register form for the impact of the facility on the environment, requires information regarding the self-monitoring plan which include the pollutants that are being monitored, sampling locations and schedule, and the standard methods followed for analyses. The facility owner or his representative shall notify the EEAA immediately, by means of registered letter with return receipt requested, of any deviation in the criteria and specifications of emitted or discharged pollutants and the procedures taken to rectify such deviations.

The published Environmental Impact Assessment (EIA) guidelines (October 2001/January 2005/ January 2009/October 2010) form the key regulation on environmental protection.

Provisions for Project Activities

Based on Law 4/1994 and its Executive Regulations, the following are some provisions, pertinent to the activities of the proposed project:

- Preparation of an ESIA study of the project and its presentation to the competent administrative authority, which, in turn shall refer it to EEAA for consultation.
- In terms of EEAA classifications, the project is classified as a Category B Project. For Category B projects, it is not compulsory to submit the full ESIA study including consultations and disclosure. However a social desk study about the project area will be included in the report.
- Obtaining a license for the handling of hazardous materials from the competent administrative authority (Ministry of Housing). Onsite generation rates of hazardous wastes shall be reduced. Safe storage of hazardous waste in solid containers with clear and visible marks for their hazard type and maintenance of an integrated record for waste handling is required by law
- Disposal of excavation/construction waste at licensed locations through the local authority.
- Maintenance of work place noise levels and exposure periods within the regulatory limits. Strict prohibition of ambient noise higher than regulation limits for housing zones.
- Taking precautionary measures to control fugitive dust emissions during excavation and construction works.
- Compliance with the maximum permissible limits of air pollutants in the gas emissions at the project site.

2.3 Applicable Environmental and Social Legislations in Egypt

2.3.1 Air quality

The facility must demonstrate that it will meet air emission standards (Article 34/Decree 338, amended by Decree 1741; Article 35/Decree 338; and Article 36/Decree 338, amended by D1741). The cumulative contaminant levels due to incremental effects when

combined with emissions from all other sources in the area should not exceed the limits in Annex 5 of the Executive Regulation (Decree 338, amended by Decree1741, Decree1095, and Decree710), which are presented in table 2-1.

Table 2-1 Maximum Emission Limit for Gases

Pollutant	Average Period	Maximum Limit for Industrial Zones [µg/m3]
Sulphur Dioxide	1 hour	350
	24 hours	150
	1 year	60
Carbon Monoxide	1 hour	30 000
	8 hours	10 000
Nitrogen Dioxide	1 hour	300
	24 hours	150
	1 year	60
Ozone	1 hour	180
	8 hours	120
Total Suspended Particles	24 hours	230
	1 year	125
Particulate Matter - PM10	24 hours	150
	1 year	70
Particulate Matter - PM2.5	24 hours	80
	1 year	50
Suspended Particles measured as black smoke	24 hours	150
	1 year	60
Lead	1 year	0.5
Ammonia	24 hours	120

Other limits include the allowable limits for pollutants emissions in air from the different sources which are detailed in Annex 6 of the ERs amended by Decrees No. 1095/2011, 710/2012 and 964/2015. The limits relevant to the current project scope are the pollution limits of emissions from power generation units and vehicles which are shown in **Tables 2-2, 2-3, and 2-4**.

Table 2-2 Power generation by diesel engines

Table 2 of Annex 6 of the ER amended by Decree No. 964/2015				
Fuel Type	Maximum Emission Limits (mg/m3)			
	TSP	**CO**	**SO2**	NOx
Natural Gas	**50**	**150**	**100**	600
Diesel	100	250	400	600

- Reference conditions: O_2 is 15% & Temperature 273K & Pressure 1 atm.

Table 2-3 Maximum allowable emissions from vehicles that operate using gasoline fuel

Table 23 of Annex 6 of the ER amended by Decree No. 710/2012						
Pollutants	**Before the year 2003**		**From 2003 to 2009**		**Year 2010 and later**	
	Hydrocarbons HC (ppm)	**CO%**	**HC (ppm)**	**CO%**	**HC (ppm)**	**CO%**
Maximum allowable Limit	600	4	300	1.5	200	1.2
Measurements should be done at the idle speed from 600 to 900 rpm						

Table 2-4 Maximum allowable emissions from vehicles that operate using diesel fuel

Table 24 of Annex 6 of the ER amended by Decree No. 710/2012		
Manufacturing Year (model)	**Before the year 2003**	**From 2003 and later**
Smoke density factor K (m^{-1})	2.8	2.65
Opacity %	30	25

Measurements are done in accordance with the ISO-11614 international standard.

- Opacity measured at light flow device 127 mm.

2.3.2 Noise

Article 42 of the environmental Law No. 4/1994 amended by Law No. 9/2009 states that during the project different phases, the resulting noise levels must not exceed the sound intensity levels given by Table 3 of Annex 7 of the ER when carrying out production, service or other activities, particularly when operating machinery and equipment or using sirens and loudspeakers. Table 2-5 shows the maximum limits of noise level exposure in different areas pursuant to the Council of Ministers Resolution No. 1095/2011 amended by Decree No. 710/2012, while Table 2-6 shows maximum permissible limit for noise intensity specified for vehicles during operation.

Table 2-5 Maximum permissible noise level limits

Table 3 of Annex 7 of the ER amended by Decree No. 710/2012		
Area Type	**Maximum Permissible Equivalent Noise Level [dB(Aeq)]**	
	Day (7am – 10pm)	**Night (10pm – 7am)**
Residential suburb with low traffic and limited activities service	**55**	**45**
Areas overlooking public roads more than or equal 12 meters, or industrial areas with light industries	70	60
Industrial Zone with heavy industries	**70**	**70**

Table 2-6 Maximum permissible limit for noise intensity specified for vehicles during operation

Table 4 of Annex 7 of the ER amended by Decree No. 964/2015	
Vehicle Type	**Maximum Noise Intensity "LAFmax" dB**
Passenger vehicles, 8-passengers, in addition to the driver (private or taxi)	103
Passenger vehicles, more than 8 - passengers, in addition to the driver (taxi or bus)	107
Goods vehicles load up to 3.5 ton	103

Goods vehicles load up to more than 3.5 ton and heavy equipment (Cranes, tractors … etc.)	111
Measurements are done in accordance with the ISO-5130 international standard.	

2.3.3 Waste Management Regulations

The collection, transportation and safe disposal of solid wastes from houses, public places, commercial and industrial establishments is regulated through the public cleanliness Law No. 38/1967 amended by Law No. 31/1976 and its ERs issued by Minister of Housing Decree No. 134/1968, as well as the environmental Law No. 4/1994 and its ERs.

- Public Cleanliness Law Number 38/1967

Law No. 38/1967 amended by Law No. 31/1976 and its ERs issued by Decree No. 134/1968 prohibit the dumping of solid wastes in any location other than those designated by the municipal authorities. This includes solid waste treatment and disposal, in addition to the temporary storage in undesignated containers. Article 1 of the Ministry of Housing and Utilities Decree No. 134/1968 defines solid waste as any waste generated by persons, residential units, and non-residential constructions such as commercial establishments, camps, animal cages, slaughterhouses, markets, public spaces, parks, and transportation methods.

The Public Cleanliness Law and its ERs requires the municipal authority responsible for public cleanliness or the contracted entity assigned by it for the collection, transportation, and disposal of solid wastes, to carry out these processes in accordance with the specifications stipulated in the ERs and any other regulations by the municipal authority.

- Environmental Law Number 4/1994

In general, the law prohibits the disposal of any solid wastes except in areas designated for this purpose through Article 37, and Articles 38, 39 and 41 of the ERs which require that during excavation, construction or demolition activities, the entity undertaking the work must take the necessary precautions to safely store and transport the resulting wastes in accordance with the set procedure.

Regarding the hazardous wastes, and in accordance with the provisions of Articles 29 to 33 of Law No. 4/1994 which is amended by Law No. 9/2009 and Articles 28, 31 and 33 of the ERs, the entity producing hazardous wastes in gaseous, liquid or solid form is committed to collect and transport the generated waste to designated disposal sites which are predetermined by the local authorities, the competent administrative authorities and the Egyptian Environmental Affairs Agency.

The hazardous waste should be collected in specific locations with clear warning signs and oral or written instructions for safety conditions that prevent the occurrence of any damage generally or to people who get exposed to it. Additionally, the workers should be trained on proper handling procedure.

The transportation vehicles used to transport hazardous waste should belong to licensed entities that manage hazardous waste and follows the guidelines included in the executive regulations.

With respect to other non-hazardous materials, the Executive Regulations state that:

"…respective bodies competent to issue a license for their disposal shall be designated by a decree of the Minister for Environmental Affairs on the basis of a proposal by the CEO of the EEAA."

Further, that:

"…an emergency plan is in place to confront any potential accidents which may occur during the production, storage, transportation or handling of such substances, provided the plan is reviewed and approved by the licensing authority after consulting the EEAA and the Civil Defense Department".

Table 2-7 Solid waste specifications and management in the ER of Law No. 38/1967 (Minister of Housing Decree No. 134/1968)

Component	Article	Specifications and Management
Storage containers	6	- Suitable capacity for the waste generated. - Hard metal or similar material and void of holes. - Tight cover and two handles. - The local authority may provide detailed specifications or model names. - Containers must be kept at a designated place except at the time of garbage collection. - They must be kept clean and washed after each use.
Collection containers	12	- Containers used by garbage collectors must be made of resistible material. - Void of holes to prevent spillage and kept clean. - The local authority can make specifications that are more detailed.

Collection vehicles	14	- Adequate capacity. - Good working condition and void of holes. - Tight cover. - Lined with galvanized tin or zinc or other suitable material as determined by the local authority. - Parked, washed and sanitised at designated garages. - Not used for any other purpose.
Construction and demolition debris collection vehicles	15	- Good working condition. - Tight cover to prevent spillage.
Spillage	16	- Contractor must remove any spillage during transfer.
Protective clothing for garbage collectors	10	- Garbage collectors must be provided clothing suitable to provide health protection, as specified by the local council.
Collection frequency	11	- The local council shall determine the period and time for waste collection.
Garbage sorting	13	- Only allowed in designated areas. - Prohibited in vehicles.
Disposal area	17	- Sufficient size and located where there is easy traffic flow. - 250 meters downwind from the nearest residential unit. - Fenced, with a gate suitable for truck access. - Adequate sanitary facilities for workers. - Suitable water source for dust control and firefighting. - Garbage heaped in piles with slopes of 1:2 or put in ditches, depressions, or abandoned canals. - Compacted, covered with 15 cm of soil, and sprayed with water.

Composting	17	- Suitable place provided for sorting waste and removing glass, tin, rubber, rocks, and other non-organic waste. - Prohibit use as animal food unless meeting conditions set by the competent local council.
Incineration	17	- Complete burn. - No air pollution. - Prohibit use as fuel in hearths unless meeting conditions set by the competent local council.

2.3.4 Wastewater Management Regulations

Egyptian Law No. 93/1962, amended by Decree No. 44/2000 regulates the drainage of liquid wastes; in which it prohibits the drainage of liquid wastes; domestic, industrial and commercial wastewater, treated or untreated, in public drainage system without obtaining a prior approval. Article 14 of Decree No. 44/2000 sets the limits and specifications for discharging liquid waste into public sewer networks as shown in Table 2-8 below.

Table 2-8 Standards and specifications of wastewater discharged to public sewage system

Article 14 of Decree No. 44/2000		
Parameter	**Unit**	**Limit of the disposed wastewater**
(pH)	---	6 - 9.5
Temperature	ºC	43
BOD_5	ppm	600
COD	ppm	1100
Total suspended solids	ppm	800
Dissolved Sulphides	ppm	10
Oil and grease	ppm	100
Total nitrogen	ppm	100
Total phosphorous	ppm	25
Cyanide (CN^-)	ppm	0.02

Article 14 of Decree No. 44/2000		
Parameter	**Unit**	**Limit of the disposed wastewater**
Phenol	ppm	0.05
Deposited materials (after 10 minutes)	cm^3/l	8
Deposited materials (after 30 minutes)	cm^3/l	15
Total heavy metals	mg/l	5
Chromium 6	mg/l	0.5
Cadmium (Cd)	mg/l	0.2
Lead (Pb)	mg/l	1
Mercury (Hg)	mg/l	0.2
Silver (Ag)	mg/l	0.5
Copper (Cu)	mg/l	1.5
Nickel (Ni)	mg/l	1
Tin	mg/l	2
Arsenic (As)	mg/l	2
Boron (B)	mg/l	1

2.3.5 Work Environment and Occupational Health and Safety

Several laws and decrees tackle occupational health and safety provisions at the work place, in addition to Articles 41 – 45 of Law No. 4/1994, which address air quality, noise, heat stress, and the provision of protective measures to workers. These laws and decrees apply to the work crew that will be involved during the project's activities.

Law No. 12/2003 on Labour and Workforce Safety and Book V on Occupational Safety and Health (OSH)[1] and assurance of the adequacy of the working environment. The law also deals with the provision of protective equipment to workers and fire-fighting/emergency response plans. Moreover, the following laws and decrees should be considered:

[1] http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/policy/wcms_187043.pdf

- Decree No. 126/2003 replacing Decree No. 75/1993 defining procedures and forms for the notification of work-related accidents, injuries, fatalities and diseases,

- Decree No. 211/2003 replacing Decree No.55/1983 specifying conditions and precautions essential for the provision of OSH measures at the workplace,

- Decree No. 134/2003 replacing Decree No. 116/1991 defining the types of establishments covered, OSH services and committees, and related OSH training institutions.

- Law No. 79/1975 as amended by Law No. 25/1977 defining the Social (and Health) Insurance

- Law No. 12/1996 enacts the Child Law according to Law No. 12/2003, children shall not be employed before attaining 14 complete calendar years of age, nor shall they be provided with training before they attain 12 calendar years of age

- Decree No. 155/2003 identifies works, occupations and industries prohibited for women workers

- Minister of Industry Decree No. 91/1985 for implementing Law No. 21/1985, regulating the production handling and importing chemicals. It also regulates the condition of production and storage areas

- Minister of Manpower Decree No. 48/1967 for implementing Law No. 79/1975, requires employers to inform their employees that they are dealing with hazardous waste, accordingly every worker is required to follow protective measures and observe safety precautions set by the employer. The establishment is authorized to take disciplinary action against a worker who does not follow the safety precautions as prescribed (article 218 of the law, article 57 of Law 79/1975, and Decree No. 48/1967).

The environmental aspects to be taken in consideration for the workplace are noise, ventilation, temperature, and health and safety, which are as follows:

- **Noise**

Annex 7 of the ERs amended in 2012 stipulates the permissible limits for sound intensity and safe exposure times that must be observed by the operators for the work areas and places within the proposed project.

The exposure duration shall be decreased by half if the noise level increases by 3 dB (A) combined with using ear plugs. This is to avoid any impacts on the sense of hearing.

The instantaneous noise level shall not exceed 135 dB (A) during working period.

The noise level is measured inside working areas and closed areas in LAeq according to the international guidelines (Parts 1&2) ISO 9612/ ISO 1996 or the Egyptian specifications No. 2836 part 1 & 2 and No. 5525 concerning this matter.

Table 2-9 Maximum permissible exposure to heavy hammers

Table 2 of Annex 7 of ER amended by Decree No. 710/2012					
Peak Noise Intensity Level [dB(A)] L_{cPeak}	135	130	125	120	115
Number of Allowable Strikes during Working Hours	300	1000	3000	10000	30000

The intermittent noise exposure depends on the noise level intensity presented in the previous table (number of strikes per shift).

The hammer strikes are considered intermittent if the duration between strikes 1 second or more. If the duration is less than 1 second, the strikes are considered continuous and the noise level shall comply with Table 1 of Annex 7 of the executive regulations.

- **Workplace emissions**

According to Article 35 of Law No. 4/1994 amended by Law No. 9/2009 and its Executive Regulations, Annex 8 provide the maximum permissible limits for pollutants inside the work environment especially the total suspended particulates and the PM_{10}.

Threshold limits for dust which only cause annoyance:

(Less than 1% quartz), Threshold limits for total dust = 30 million particles /cubic foot

$= 10\ mg/m^3$

- Threshold limits for inhalable dusts $= 5\ mg/m^3$

Note: If the percentage of quartz exceeds 1%, the Threshold limits for quartz is applicable.

- **Heat stress**

Article 44 of Law No. 4/1994 and 46 of its amended ERs by Ministerial Decree No. 1095/2011 stipulate the conditions and requirements for work place temperature and humidity. Annex 9 of the ERs gives the permissible limits for temperature and humidity, the corresponding exposure times, and safety precautions within the project.

Table 2-10 Permissible thermal (Heat Stress) exposure limits in workplace

Table 1 of Annex 9 of ER amended by Decree No. 1095/2011			
System of work and hourly rest break	**Heat Stress:** **-Wet Globe Thermometer temperature (°C)** **-Average exposure to heat in case of intermittent work**		
	Light work	**Medium work**	**Hard work**
Continuous work	30 °C	26.7 °C	25 °C
75% work, 25% rest	30.6 °C	28 °C	25.9 °C
50% work, 50% rest	31.4 °C	29.4 °C	27.9 °C
25% work, 75% rest	32.2 °C	31.1 °C	30 °C

Table 2-11 Business Description

Table 2 of Annex 9 of ER amended by Decree No. 1095/2011	
Physical Activity	**Business Description**
Light work	**(Light body movement)** Administrative work, office work, washing dishes and utensils, sewing, and machines work either standing or sitting … etc.
Medium work	**(Medium body movement)** Sweeping, cooking, cleaning, shoe industry, the use of remove, install and walking tools, gardening, cars driving, tractors and harvesters driving … etc.
Hard work	**(Violent body movement)** Rowing, blacksmithing, plumbing, horseback riding, running, football playing, ascending the stairs quickly or carrying loads, excavating and loading, climbing up electricity towers, sorting, manual work in the field, construction work, driving heavy equipment … etc.

It should be taken into consideration that these standards are for the healthy acclimatized person and in case that there are no other exposures (chemical, physical … etc.).

2.3.6 Traffic Related Laws

The applicable laws regarding the traffic and work done in relation to roads is governed by Traffic Law No. 66/1973 amended by Law No.121/2008. The Law is concerned with traffic

planning during the construction of projects. Law No. 140/1956 is also concerned with the utilization and blockage of public roads, and Law No. 84/1968 is also concerned with public roads, including Highways, main roads and regional roads.

The governing laws require that no works that could affect the traffic flow be undertaken without prior permission, and specifies that the competent administrative authority could utilize public ways for a fee. The executive regulations of Law No. 140/1956 outlines the specifications for the management of construction and demolition debris, and in general prohibits vehicle drivers to cause any road pollution by dumping wastes, or construction wastes, or any other material.

2.3.7 Antiquities

Law No. 117/1983 concerning the protection of antiquities gives the Supreme Council for Antiquities (SCA) the responsibility of management and protection and management of antiquities and archaeological sites. The law requires prior approval by that authority of plans for construction work on archaeological sites. Any legal person encountering any evidence of archaeological presence is required by law to report his finding to the General Authority for antiquities. The SCA is responsible for:

- Prehistoric, ancient Egyptian and Graeco- Roman sites in Egypt.
- Islamic and Coptic monuments and sites.
- Central and local museums.
- Architecture, restoration, engineering works concerning all antiquities.

According to the Law No. 117/1983, the term antiquity is applied to any building or movable object resulting from the different civilizations that span the totality of the Egyptian History (reflecting human, artistic, technical, military, religious aspects) and of more than one hundred years old. However, a building or a movable object of great cultural value could be listed a national Heritage regardless of its age by a decree of the Prime Minister after the presentation of a specialized report to the permanent committee of the sector concerned and the approval of the committee and the minister of culture. Private owners of listed antiquities are responsible for their preservation.

Article 13 prohibits the demolition of archaeological sites or ruins. Areas adjacent to archaeological sites can be expropriated after approval of the Minister of Culture based on the opinion of the Board of Directors of the SCA.

Article 20 prohibits the use of archaeological land for building and cultivation purposes. The Article prohibits the removal of ruins without the permission of the SCA, and under its supervision.

Article 21 prohibits modification or implementation of new plans or expansions or modification in archaeological sites and its vicinity unless approval is acquired from the SCA.

Article 23 requires the notification of the SCA in case an unrecorded ruin is found by any person. Similarly, Article 83 of Law No. 86/1956 requires that the concessionaire notifies the concerned authorities if artefacts or ruins are found within the concession.

3.8 Biodiversity Legislation

The main law concerned with natural protectorates is Law No. 102/1983. The law was created to allow for the protection of areas of special natural attractions, natural landscape, natural habitats and wildlife. The Prime Ministerial Decree No. 1067/1983 designates the EEAA as the authorized administrative body charged with the implementation of Law No. 102/1983. Article 1 of Law No. 102/1983 denies a Natural Protectorate as "Any area of Land, or coastal or inland water characterized by flora, fauna, and natural features having cultural, scientific, touristic or aesthetic value".

The Law preserves such areas by prohibiting activities susceptible to harm the environment of designated natural protectorates (Article 2), either within the protectorate, or even within the surrounding area (Article 3). In addition, Article 28 of Law No. 4/1994 and Article 23 of its ERs forbid the hunting, shooting or catching the types of birds and wild animals specified in Annex 4 of the Law. The Articles also forbid damaging the nests or the eggs of these birds. The provisions of Article 23 of the Executive Regulations shall apply in all natural reserve areas and also in areas where animals and birds are threatened with extinction, including:

- Nature Reserves as defined in prime ministerial decrees issued in implementation of Law No. 102/1983.
- Regions designated in the international conventions signed by Egypt.
- Any other regions determined in a decree of the competent authority in coordination with the EEAA.
- The protection granted to the animal species listed in Annex 4 of Law No. 4/1994 extends to:
    a) Other animal species determined by international conventions to be ratified by Egypt.

b) Any other birds or animals for which a decree shall be issued by the Minister of Agriculture with the agreement of the EEAA.

For this project, The OHTL route is not located within legally protected areas but within important bird migratory routes.

2.4 Other Relevant Legislation

Electricity Law No. 87 of the Year 2015

In addition to Environmental Impact Assessment requirements, 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.

Electricity Law 87/2015 addresses the limits of distances to be measured from the axis of the OHTL routes as well as the underground cables, which should be kept away from the infrastructures and development areas under article 55 of chapter 5.

Electricity Law No. 67 of the Year 2006

Electricity Law 67/2006 was issued for the sake of protecting the consumer. Article 2 of this law, states that the consumer's rights must not be compromised, including the consumer's right to access to knowledge on the protection of his legitimate rights and interests in order to ensure that he is aware of the party whom he can refer to in case of any complaints. The consumer also has the right to bring lawsuits on all that would prejudice or damage his rights or restrict them. The service provider also must supply the consumer with correct information about the nature and characteristics of the product – which is indicated in this report as "the electricity" - to avoid misleading the consumers or the beneficiaries of the service causing them to fall into error or mistake.

Under this law, an agency should be established for the protection of the consumer and his interests. The Egyptian Electric Utility & Consumer Protection Regulatory Agency is the authority competent for the protection of the consumer in the electricity sector.

In addition to the previously mentioned laws, the following laws and decrees are applicable to the proposed project:

- Guidelines of principles and procedures of environmental impact assessment– Second Edition – issued by the EEAA in January 2009 and its amended lists in October 2010.
- Guidelines for environmental inspection and self-monitoring issued by the EEAA in 2002.
- Decree 458/2007; Egyptian Drinking Water Quality Standards adopted by the Ministry of Health and;
- Law 12/2003, Articles 204-207; Construction Work License.

2.5 World Bank Safeguard Operational Policies

International funding agencies, such as the WB requires that the projects they finance to be in compliance with both the country's national standards as well as their own environmental and social policies. Therefore, in addition to the national regulations, the project aims at complying with the WB safeguard policies and guidelines. The policies help to ensure the environmental and social soundness and sustainability of investment projects. They also support integration of environmental and social aspects of projects into the decision-making process. In addition, the policies promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats.

The World Bank (WB) has identified 10 environmental and social safeguard policies that should be considered in its financed projects. The proposed project is classified as Category B according to the World Bank. This mandates a full Environmental and Social Impact Assessment (ESIA) and public consultation activities. The Project will apply the triggered safeguard operational policies.

Table 2-12: World Bank safeguard operational policies and their applicability to the project

Safeguard Policy	Triggered	Justifications
Environmental Assessment (OP/BP 4.01)	Yes	The project is classified as Category B which requires a full Environmental & Social Impact Assessment as well as public consultations.
Natural Habitats (OP/BP 4.04)	Yes	The Project is far from identified protected areas. Protected Areas, if encountered, will be avoided. However, it is located within important migratory birds (Gebel El Zeit).
Forests (OP/BP 4.36)	No	Proposed project areas contain No forests.
Pest Management (OP 4.09)	No	The proposed project will not involve purchasing or using Pesticides.
Physical Cultural Resources (OP/BP 4.11)	No	No proposed activities will pass through archaeological sites and no cultural resources will be impacted
Indigenous Peoples (OP/BP 4.10)	No	No indigenous people are identified in Egypt.
Involuntary Resettlement (OP/BP 4.12)	Yes	This policy is triggered for the project however this 220 kV OHTL from Ras Gharib to Wind BOO is not expected to have any resettlement impacts.
Safety of Dams (OP/BP 4.37)	No	Not relevant to the proposed project
Projects on International Waterways (OP/BP 7.50)	No	Not relevant to the proposed project.
Projects in Disputed Areas (OP/BP 7.60)	No	Not relevant to the proposed project

OP 4.01 – Environmental Assessment

OP/BP 4.01 Environmental Assessment. Environmental Assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental and social impacts

associated with Bank's lending operations early on in the project cycle. In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted and their concerns addressed. This policy is triggered if a project is likely to have potential adverse environmental and social risks and impacts in its area of influence. The EA has various tools that can be used, including amongst others Environmental & Social Impact Assessment (ESIA) or Environmental and Social Management Plan (ESMP). According to the World Bank Operational Policy OP 4.01, construction of OHTLs is classified among the projects that are likely to have potential adverse environmental and social impacts for which the development of a full-scale ESIA is required.

OP 4.04 Natural Habitat

The Project also triggered OP/BP 4.04 Natural Habitat where is used by WB to promote environmentally sustainable development by supporting the protection, conservation, maintenance and rehabilitation of natural habitats and their function.

The policy is "triggered" if a subproject could result in any one or more of the following four events:

- A loss of natural habitats
- Construction of "linear features" (e.g., roads, transmission lines, pipelines) that might cut through natural habitats
- An effect on the water supply to or drainage from natural habitats
- A direct or indirect result in resettlement or migration of people in a way that would adversely affect natural habitats

The OHTL route is far from identified protected areas. However, it is located within Gebel El Zeit important migratory birds.

World Bank Access to Information Policy

The World Bank Access to Information Policy details the Banks requirements for making operational information available to the public. The Bank reaffirms its recognition and endorsement of the fundamental importance of transparency and accountability to the development process. In addition, timely dissemination of information to local groups affected by the projects and programs supported by the Bank, including nongovernmental organizations, is essential for the effective implementation and sustainability of projects.

2.4.1 WBG-EHS General Guidelines

The EHS General Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. When

host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent.

The General EHS Guidelines include limits and best practices for different environmental aspects such as air quality and noise in addition to occupational health & safety and community health & safety relevant guidance. The main environmental aspects covered by the General Guidelines are presented below, namely the air quality, and noise.

As stipulated in the WBG -EHS Guidelines, discharges of process wastewater (WW), sanitary wastewater, wastewater from utility operations or storm water to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria.

The Guideline states that for sanitation facilities wastewater, it should achieve effluent water quality consistent with applicable national requirements or internationally accepted standards. Additionally, the treated wastewater quality for land application should be consistent with applicable national requirements

Air Quality and Emissions

The EHS General Guidelines provide guidance to facilities or projects that generate emissions to air at any stage of the project life-cycle. It complements the industry-specific emissions guidance presented in the Industry Sector EHS Guidelines by providing information about common techniques for emissions management that may be applied to a range of industry sectors. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts.

According to the EHS General Air Quality Guidelines, the generation and release of emissions of any type should be managed through a combination of:

- Energy use efficiency
- Selection of fuels or other materials, the processing of which may result in less polluting emissions
- Application of emissions control techniques

In general, and as stipulated in the WBG-General EHS Guidelines, air emissions should not result in pollutant concentrations that reach or exceed ambient air quality guidelines presented in **Error! Reference source not found.**.

Table 2-13 WBG Ambient Air Quality Guidelines

Pollutant	Average Period	Guideline Value (µg/m^3)
Sulphur dioxide (SO_2)	24 hours	20

Pollutant	Average Period	Guideline Value (µg/m^3)
		125 (Interim target[2]-1) 50 (Interim target-2)
	10 minutes	500
Nitrogen dioxide (NO_2)	1 year	40
	1 hour	200
Particulate Matter (PM_{10})	1 year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20
	24 hours	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50
Particulate Matter ($PM_{2.5}$)	1 year	35 (Interim target1) 25 (Interim target-2) 15 (Interim target-3) 10
	24 hours	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25
Ozone	8 hours daily maximum	160 (Interim target-1) 100

[2] Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

Noise Emissions

The General EHS Guidelines address impacts of noise beyond the property boundary of the facilities. As stipulated in the Guidelines, noise emissions for residential, institution and educational areas should not exceed 55 dBA (one hour LAeq) for each of the daytime (07:00-22:00) and 45 (one hour LAeq) night-time (22:00-07:00) or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Furthermore, the Guideline provides some noise reduction options that should be considered. These options include:

- Selecting equipment with lower sound power levels
- Installing silencers for fans
- Installing suitable mufflers on engine exhausts and compressor components
- Installing acoustic enclosures for equipment casing radiating noise
- Improving the acoustic performance of constructed buildings, apply sound insulation

The Guidelines state that noise monitoring may be carried out for the purposes of establishing the existing ambient noise levels in the area of the proposed or existing facility, or for verifying operational phase noise levels. Noise monitoring programs should be designed and conducted by trained specialists. Typical monitoring periods should be sufficient for statistical analysis.

2.4.2 WBG-EHS guidelines for Eclectic Power Transmission and Distribution

This Guideline includes industry (Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas) relevant environmental impacts management techniques, environmental performance indicators and Monitoring. The guideline presents applicable limits for general public exposure to electric and magnetic fields published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the limits of exposure represent in the following table. For other environmental monitoring (air and noise) it is the same parameter set at general EHS guidelines.

Table 2-14: Limits for general public exposure to electric and magnetic fields

Frequency	Electric field (V/m)	Magnetic field (μT)
50 HZ	5000	100
60 HZ	4150	83

Occupational H&S

Occupational health and safety performance should be evaluated against internationally published exposure guidelines, such as the Permissible Exposure Limits (PELs), which are published by the Occupational Safety and Health Administration of the United States (OSHA). Other important indicators include the minimum working distance for trained employees and exposure limits for occupational exposure to electric and magnetic field, presented in the following tables:

Table 2-15: The minimum working distance for trained employees to electric and magnetic field

Voltage range (kV)	Minimum working distance (meters)
230 to 242	1.5 [3]
500 to 552	3.35 [4]

Table 2-16: Exposure limits for occupational exposure to electric and magnetic field

Frequency	Electric field (V/m)	Magnetic field (μT)
50 HZ	10 000	500
60 HZ	8300	415

[3] According to OSHA guidelines

[4] The minimum working distance and the minimum clear hot stick distance may be reduced provided that such distances are not less than the shortest distance between the energized part and a grounded surface

2.6 Comparison between Egyptian and World Bank requirements

As stated in WBG general EHS guideline, when host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. Therefore, the following tables are presenting comparisons between Egyptian Threshold, and WBG threshold for the project pertinent impacts. The project will implement the more stringent limits accordingly.

Table 2-2-17: maximum permissible limit for noise intensity in the different areas according to Egyptian and World Bank requirements

	Egyptian Law 4 Requirements				**Requirements of WB**		
Noise		Permissible Limit For Noise Intensity Decibel			Receptor	One Hour Laeq (dBA)	
	Type Of Area	Day 7 A.M. To 10 P.M.	Night 10 P.M. To 7 A.M.			Day Time 7 A.M. To 10 P.M.	Night Time 10 P.M. To 7 A.M.
	Sensitive Areas (schools- hospitals- public parks- rural areas)	50	40		Residential	55	45
	Residential areas with limited traffic and where public services are available	55	45		Industrial	70	70
	Residential areas in the city where commercial activities are available	60	50				
	Residential areas located adjacent to roads which width is less than 12m, and workshops or commercial or entertainments activities are found	65	55				
	Areas located adjacent to roads which width is 12m or more, or light industrial areas.	70	60				
	Industrial areas (heavy industries)	70	70				

Table 2-18 Standards and Limits for Noise Levels in the Work Environment

	Egyptian Law 4 Requirements				**Requirements of WB**		
Noise	Type Of Place And Activity	Maximum Permissible Noise [Level Equivalent To Decibel (A)]	Maximum Permissible Noise [Level Equivalent To Decibel (A)] At The Beginning Of 2014		Location /Activity	Equivalent Level Laeq,8h	Maximum Lamax,Fast
	Work place with up to 8 hour shifts and aiming to limit noise hazards on sense of hearing*	90	85		Heavy Industry (no demand for oral communication)	85 dB(A)	110 dB(A)
	Hospitals, clinics, public offices, etc	80	80		Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
	Administrative offices – control rooms	65	65		Open offices, control rooms, service counters or similar	45-50 dB(A)	N/A
	Work rooms for computers, typewriters or similar equipment	70	70		Individual offices (no disturbing noise)	40-45 dB(A)	N/A
	Work rooms for activities requiring routine mental concentration	60	60		Hospitals	30-35 dB(A)	40 dB(A)

*: If the measured noise at the workplace increased over the maximum allowable limit by 3 dBA, the exposure period shall be reduced to half of the exposure period. In addition, wearing proper ear muffs is a must. Noise level at any time at the work place shall not exceed 135 dBA. Noise shall be measured inside working environment in LAeq unit in accordance with ISO 9612/ ISO 1996 or Egyptian standards

Table 2-19 Standards for ambient air and air emissions

Issue		Requirements of Egyptian legislations µg/m3				Requirements of WB µg/m3			
Air Quality	Ambient air parameters	Ambient air pollutants threshold (Egyptian)				Ambient air pollutants threshold According to WHO			
	Exposure period	1 hr	8 hr	24 hr	1 Year	1 hr	8 hr	24 hr	1 year
	Carbon monoxide CO µg/m3	30	10	N/A	N/A	N/A	N/A	N/A	N/A
	Sulfur dioxide SO2 µg/m3	350	N/A	150	60	N/A	N/A	125	N/A
	Nitrogen oxides NOx µg/m3	300	N/A	150	60	200	N/A	N/A	40
	Particulates PM10 µg/m3	N/A	N/A	150	70	N/A	N/A	150	70
	Particulates PM2.5 µg/m3	N/A	N/A	80	50	N/A	N/A	N/A	N/A
	TSP µg/m3	N/A	N/A	230	125	N/A	N/A	230	80
	Ozone	180	120	N/A	N/A	N/A	160	100	N/A

All parameters (are mg/m3) unless otherwise noted. Nm3 is at one atmospheric pressure, 0 degree Celsius;
- N/A = not applicable; NDA = Non-degraded airshed; DA = Degraded airshed (poor air quality); Airshed should be considered as being degraded if nationally legislated air quality standards are exceeded or, in their absence, if WHO Air Quality Guidelines are exceeded significantly;
***: Egyptian requirements are compulsory for all types, and capacities of boilers which are different than the world bank requirements. According to IFC General EHS guidelines the mentioned limits are for boilers with capacity (3 to 50) MWth.

3.0 Project Description

3.1 Overview:

The EETC is responsible for the construction of the overhead Transmission Line (OHTL) between an existing substation and a windfarm in Ras Gharib area. The estimated budget for the Project is around 56 million Egyptian Pounds. The regional branch of EETC in the area is West Canal Projects Sector (WCPS) which will be responsible to appoint a contractor for the construction of the OHTL and the affiliated towers in the Project area. The land is owned by NREA under the Presidential decree number 116 for the year 2016 (Annex 1).

3.2 Project Location

The project involves the construction of a 220 kV double circuit overhead transmission line of length 20 km from Gulf of Suez Substation (500/220 kV) to a 250-MW BOO Ras Gharib wind power plant. The Gulf of Suez Substation is at a distance of 18 Km from Ras Gharib City located on Ras Gharib- Menya Road, while the windfarm (Ras Gharib Wind Energy [RGWE]) is at a distance of 33 Km from the city. The RGWE.

The following figures show:

- map of the Project in relation to Ras Gharib City and Gulf of Suez (Figure 0-1);
- the location of the transmission line to be constructed in relation to the Gulf of Suez substation and Ras Gharib Wind Energy (RGWE) (Figure 0-2)
- Location of the substation (Figure 3-3)
- Photos of the substation, the nearby roads and the wind farm (Figure 3-4, Figure 3-5, Figure 0-6)
- GPS coordinates of the OHTL lines are provided in Table 3-1

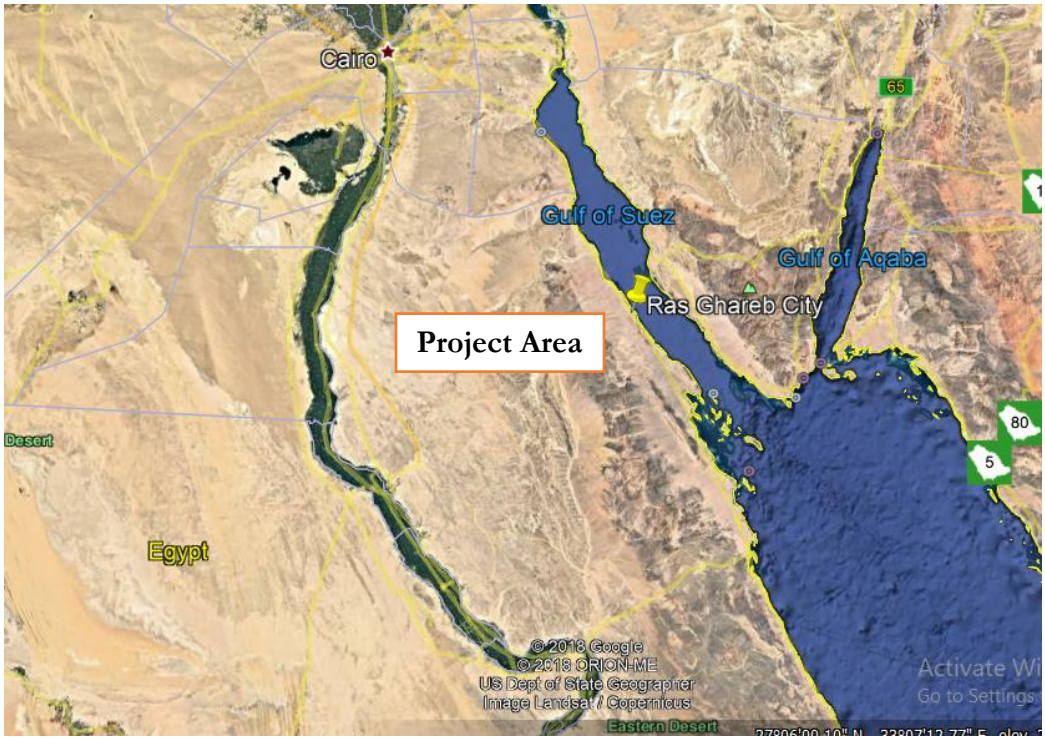

Figure 0-1 Location of the Project area

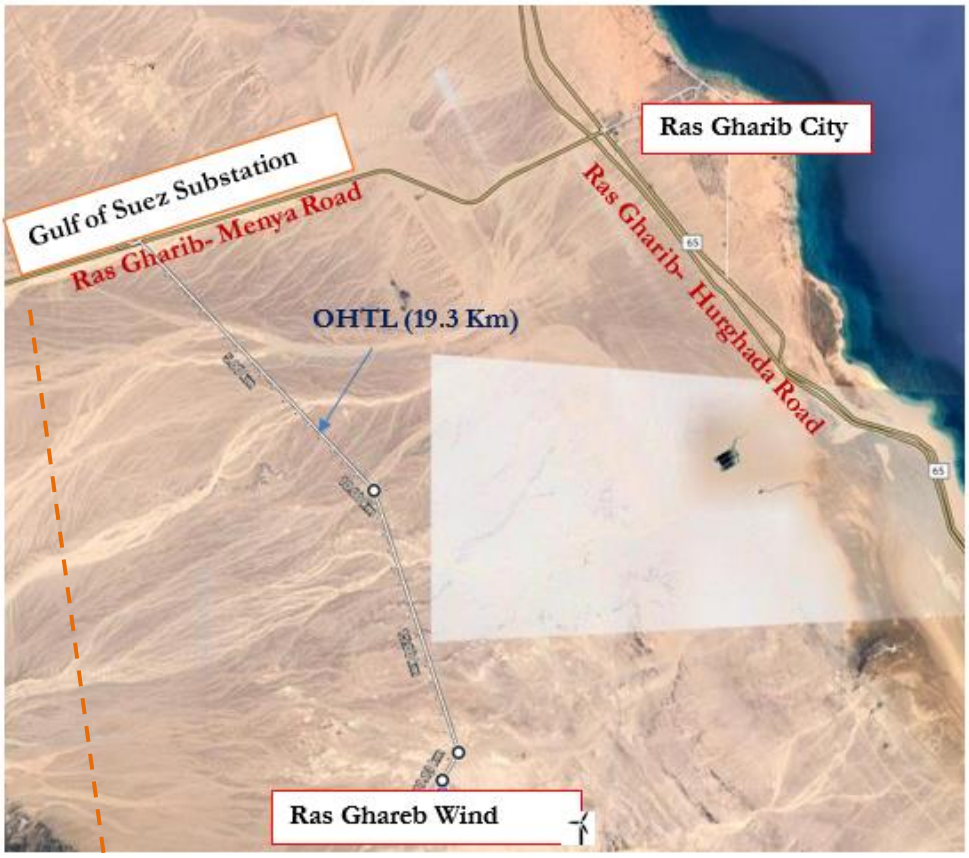

Figure 0-2 Location of OHTL connecting the substation to the windfram

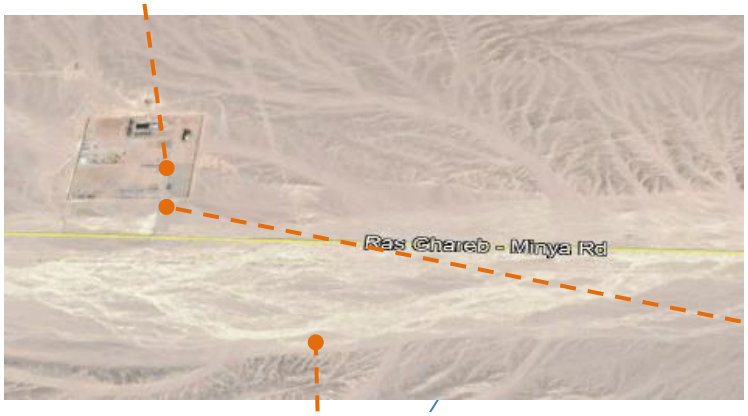

Figure 0-3 Location of the Substation

Figure 0-4 Photo of the front of the substation

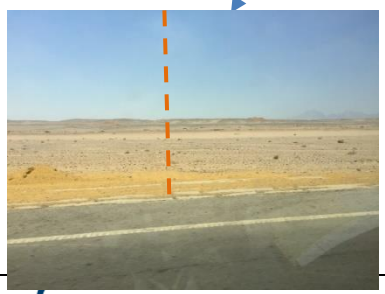

Figure 0-5 Photo of Ras Gharib- Minya Road

Figure 0-6 Photos of Ras Gharib Wind Farm -RGWE

Table 3-1 GPS Coordinates for the OHTL

Point No.	N	E	Remarks
1	28 19 39.73	32 54 55.22	Substation Corner 1
2	28 19 27.75	32 55 00.43	Substation Corner 2
3	28 19 23.09	32 54 46.72	Substation Corner 3
4	28 19 35.07	32 54 41.52	Substation Corner 4
5	28 19 36.75	32 54 58.61	
5	28 19 34.70	32 55 06.51	
6	28 19 23.40	32 55 08.50	Sheikh Fadl Asphalt Road
7	28 19 06.10	32 55 21.30	Top of the hill
8	28 17 41.50	32 56 21.50	
9	28 16 07.60	32 57 40.10	

10	28 13 03.10	33 01 18.00	
11	28 12 10.10	33 01 18.30	
00	28 10 59.20	33 00 00.20	Middle point at the wind farm

Road Network Description

1. The OHTL line will be constructed and located parallel to Ras Ghareb Hurghada road at a distance of 13 km away. The main access roads to the construction locations of the OHTL will be the blue and red lines in the figure below..

Figure 0-7 Access roads to the OHTL (Red and Blue lines)

3.3 Project Components

The main components of the project are the construction of OHTL:

- Double-Circuit Tower: This type of tower is used for voltages ranging between 110 to 315 KV. For this project, the voltage used is 220 KV.

Figure 0-8 Example of the Double Circuit Tower to be used

- Towers consist of a steel framework of individual structural components that are assembled together.

Figure 0-9 Steel framework of the towers

- The transmission lines are designed to carry electricity over long distances at high voltages.

Figure 0-10 Transmission lines designed to carry high voltages

- The conductors are made of aluminum alloy and are arranged according to specifications. They have the following specifications: Din 48201(part 6) & IEC 61089 (1991) & IEC 60104.

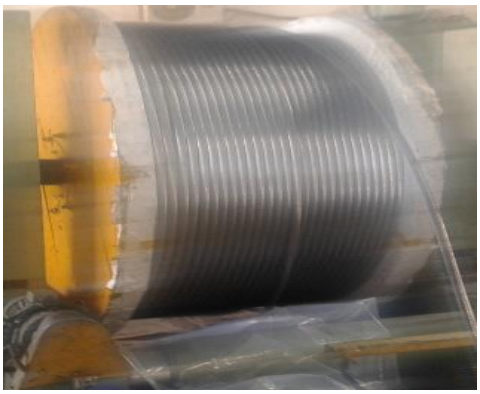

Figure 0-11 Example of conductors used

- Insulators are made of porcelain or silicone rubber. Insulators are used to insulate the live conductor from the transmission towers. The insulators used in transmission and distribution system are also required to carry large tensional or compressive load.

Figure 0-12 Insulators used in transmission tower

The towers constructed are 42 in number and the distances between them range between 235- 380 m. The Table below (Table 3-2) shows the tower type, span distance between the towers, and the cumulative distance from the start of the line.

Table 3-2 Towers Description

Tower No.	Tower Type	SPAN (m)	Cumulative Distance (m)
1	ST**EO	235	0
2	S2	240	235

3	S30	360	475
4	S2	350	835
5	S2	370	1185
6	S2	330	1555
7	S2	300	1885
8	S2	300	2185
9	S2	360	2485
10	S2	350	2845
11	S2	352	3195
12	S30	350	3547
13	S2	330	3897
14	S2	330	4227
15	S2	330	4557

16	S2	330	4887
17	S2	330	5217
18	S2	330	5547
19	S2	330	5877
20	S2	320	6207
21	S30	380	6527
22	S2	230	6907
23	S2	305	7137
24	S2	305	7442
25	S2	305	7747
26	S2	305	8052
27	S2	335	8357
28	S2	338	8692

29	S30	360	9030
30	S2	360	9390
31	S2	360	9750
32	S2	370	10110
33	S2	350	10480
34	SDRII	355	10830
35	S2	370	11185
36	S2E4	360	11555
37	S2	360	11915
38	S2	360	12275
39	S2	360	12635
40	S2E4	345	12995
41	S2E4	364	13340

42	S30	285	13704

3.4 Description of Activities during Construction Phase of OHTL

- **Identifying the right of way (ROW):** As discussed in chapter 2, the Electricity Law 87/2015 has identified the limits of distances to be measured from the axis of the OHTL routes in order to identify the Right of Way (ROW) zone. A distance of 25 meters from both sides for OHTL will be kept as a Right of Way (ROW) or buffer zone for maintaining the public safety from electric hazards and high exposure to electric magnetic fields (EMFs).
- **Tower erection:** The depth of drilling will range from 2.5 to 3.5 m
- **Fixing of Towers:** Ready-made concrete will be used to fix the towers into the ground.
- **Backfilling** will be used for the final fixing of towers.
- **Installation of tower suspension accessories:** they are erected manually by hauling the accessory using chain pulley.
- **Stringing of pulling line over each stringing block for the conductor:** the pilot wire is manually strung over valley in mountainous area which is attached to power cable. The pilot wire is sometimes shot using winch or through drones.
- **Tensioning and sagging of conductor:** tension and sag corrected using manual winch, chain pulleys, bull wheel type pullers and other associated equipment.
- **Waste management:** There is no waste from the construction materials, as ready-made concrete will be used. In case of generated waste, it will be temprariy stored in the WCPS storage areas. It is preferable to include the temporary onsite waste management for the workers in the ToR of the contractor. In Egypt, the common practice is for waste to be segregated and sold to a contractor for reuse or recycling (depending on their classification).
    - Hazardous waste must be managed and disposed in accordance with applicable Egyptian regulations and legislations by a specialized authorized company under the control of the Environmental authorities (EEAA).
- **Water Resources**: No need for water in the execution of works as a ready made concrete will be used.
- **Hand tools** are used in all stages of work and all work is done in the daytime
- **Manpower**: The WCPS shall provide the necessary manpower to complete the works in accordance with the timetable for the execution of the works. A total number between 80-100 workers will be needed for the construction phase, their number and type are divided in the below table.

Type of workers	During Construction	During Operation

Engineers	5%	NA
Admin Staff	5%	NA
Casual Workers	20%	NA
Skilled Workers	70%	NA
Total number	around 80-100 workers	around 9 workers

Working Conditions of workers: The WCPS shall provide a caravan for the workers along the route of the OHTL. It will also provide food to workers from Ras Gharib City. Medical care will be provided and available for any medical emergencies and treatment by Ras Gharib Hospital through an agreement with Ras Gharib City Council. It will also provide personal protective tools such as protective shoes, safety belt, high visibility safety vests and fluorescent helmet.

Duration of the Project: The WCPS shall provide the necessary manpower to complete the works in accordance with the timetable for the execution of the works. The working hours are from 5 am to 5 pm.

3.5 Description of Activities during Operation Phase of OHTLs

On the other hand, regular maintenance and monitoring activities along the transmission lines are minimum, it involves periodically inspecting the OHTL every three month and the safety clearances are maintained

4.0 PROJECT ALTERNATIVES

4.1 No Go Option

The main objective of the project is to collect the power generated from the wind farm and provide a stable electrical supply to meet the steady increase in energy demand in Egypt, in general, and in Ras Gharib city in particular. Environmental and social impacts from the project are assessed and no significant impacts are anticipated. Other objectives of the proposed project includes improving the voltage level and system stability in the Red Sea area, and reinforce the 220 KV national electricity network.

If the OHTL is not built, the consequences would be as follows:

- Energy capacity of the area will not increase,
- The power supply won't be improved to the consumers supplied by the Gulf of Suez substation;
- The consumers financial losses from low quality power supply will not decline;
- and
- As a result, an increase in the economic activities in the region is not expected.

The site of the proposed OHTL is far from residential areas. Therefore, the no project alternative does not fulfil environmental/social requirements.

4.2 Technology Limitation

There is no justification of interconnection underground cables instead of the overhead transmission lines. As most of the routes is far from residential zones and connecting employing OHTL proves technically more feasible and environmentally more beneficial, as the excavation of OHTL is much less in cost as compared to underground cable which would require drilling and more land work.

4.3 Location/Routes Alternatives

The selection of OHTL route should be undertaken according to criteria that fulfills technical, environment as well as socioeconomic objectives in order to achieve the most feasible application.

The OHTL proposed to be built to collect energy from the wind farm and distribute it to the national grid. The OHTL location is far from any sensitive receptors and in best location for interconnection with the wind farm and the Gulf of Suez Substation. The selection and location of the proposed route has been considered by considering and reducing the cost as much as possible, while at the same time the proposed route is close to the existing road network as much as possible for easy access during construction and maintenance. The existing route was also chosen so that it does not pass through the oil concession zone that is in close proximity to army's borders and far away from residential areas.

- The suggested route was only changed when it interfered with oil pipelines near the entrance of the wind farm (**Error! Reference source not found.**). The**orange line** is the old and incorrect route, while the **purple line** is the new and the correct route given by RGWE, and this is the route which EETC followed to finalize the transmission line profile.

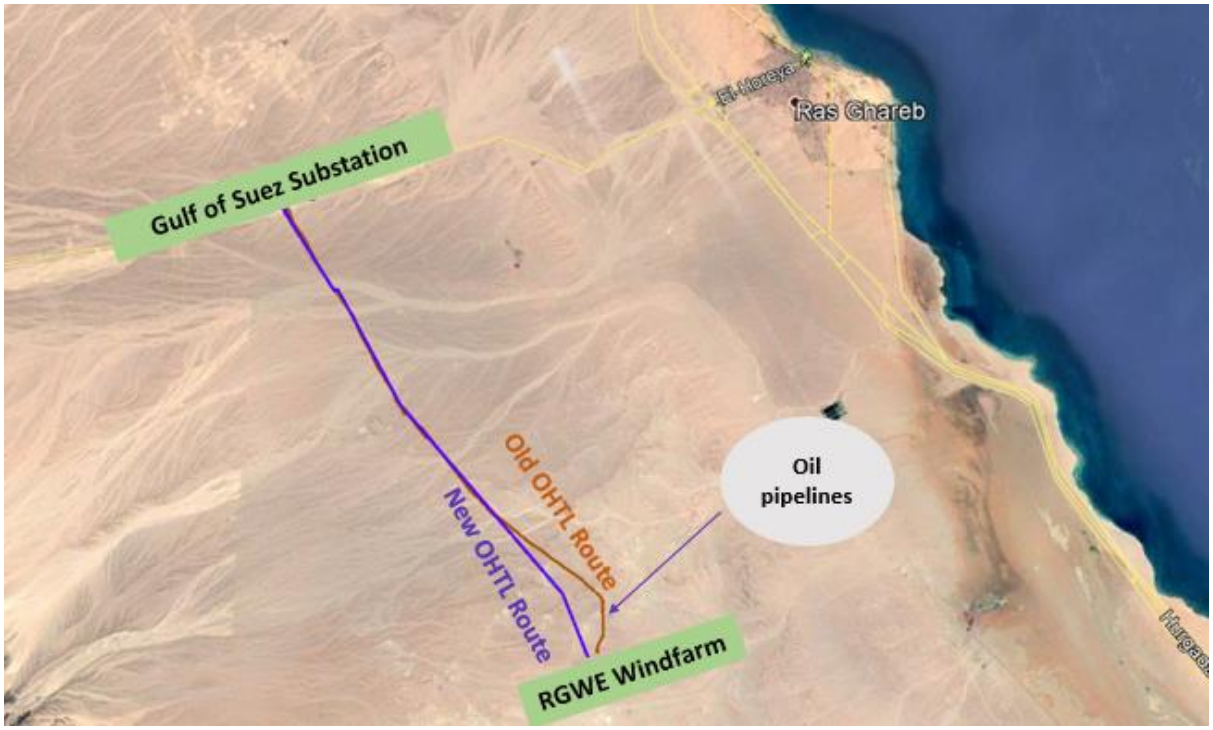

Figure 4-1 Alternative Route of OHTL

5.0 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 Physical Environment

a. Climatic Conditions

This chapter includes the environmental and social baseline conditions at the project's area of influence. The Consultant has reviewed available literature and public sources and visited the site and its surrounding area.

Ras Gharib is considered to have a desert climate. In general, the climate is warm and dry except for infrequent and periodic flash floods during the winter. During the year, there is virtually no rainfall in Ras Gharib. This climate is considered to be **BWh** (hot arid climate) according to the Köppen-Geiger climate classification. The summer is hot and dry, whereas few sprinkles may occur in spring. The average annual temperature is 22.2 °C in Ras Gharib. Precipitation here averages 5 mm. The foremost northwesterly winds dominate.

The following climate diagrams are based on 30 years of hourly weather model simulations (meteoblue). The variation in the precipitation between the driest and wettest months is 3 mm. The below figure (Figure 5-1) shows the "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Ras Gharib. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

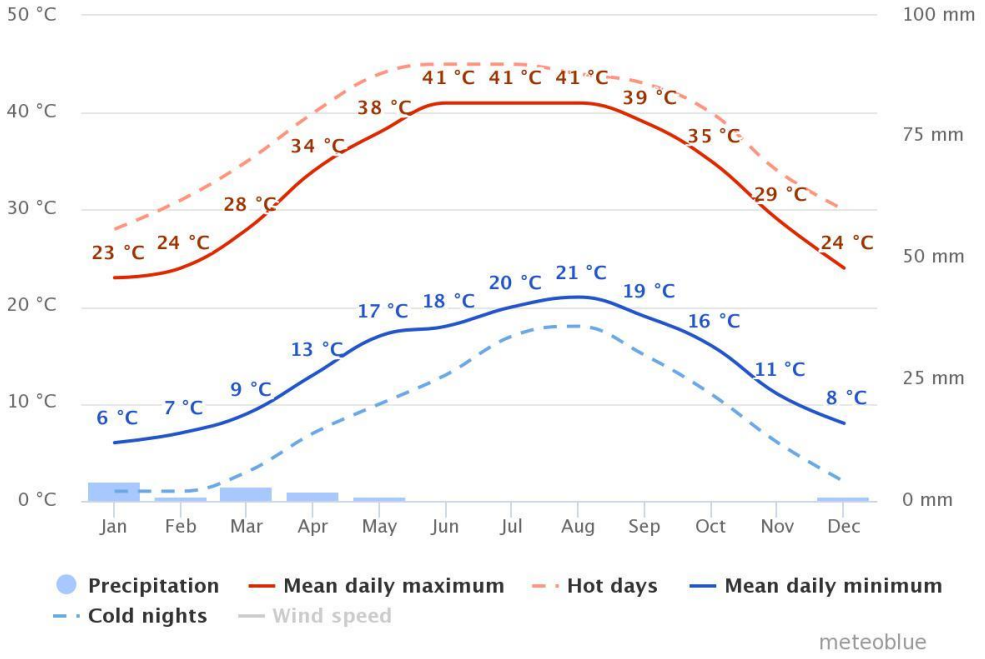

Figure 5-1 Average temperatures and precipitation

Source: Meteoblue

The maximum temperature diagram (Figure 5-2) for Ras Gharib displays how many days per month reach certain temperatures.

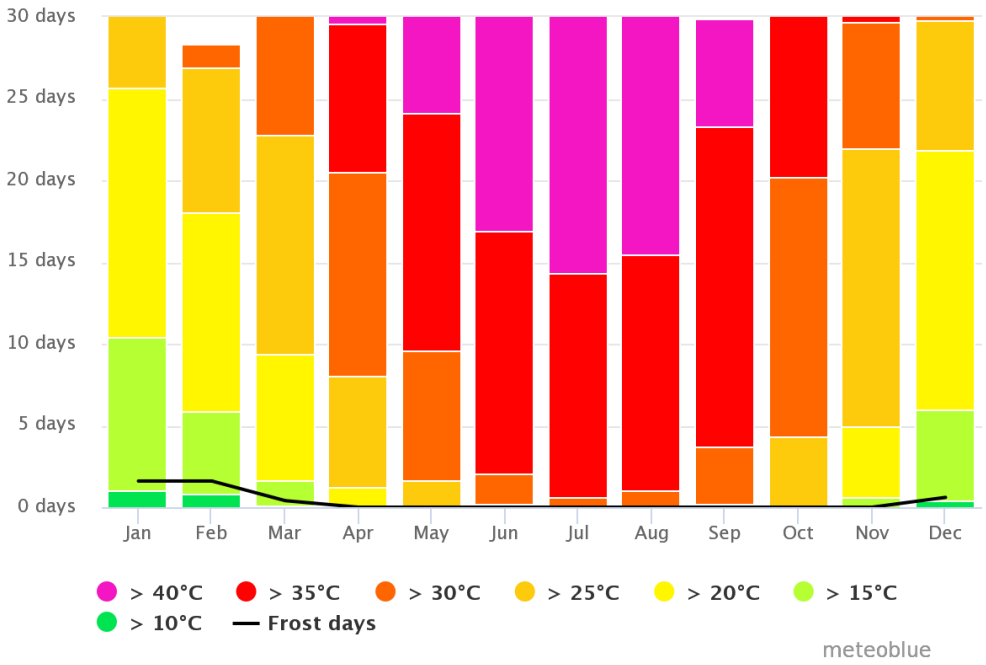

Figure 5-2: Maximum temperatures in Ras Gharib

The precipitation diagram for Ras Gharib (Figure 5-3) shows on how many days per month, certain precipitation amounts are reached. In tropical and monsoon climates, the amounts may be underestimated.

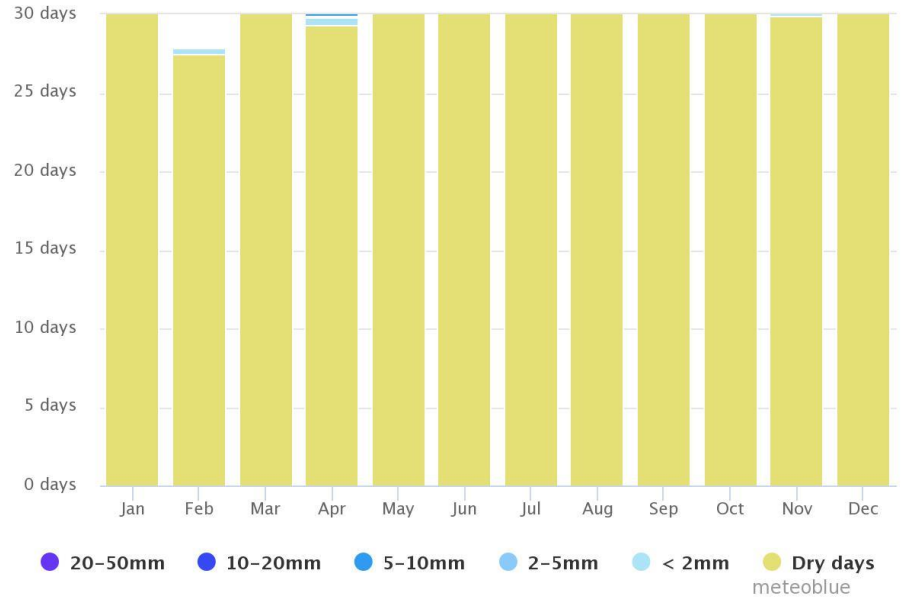

Figure 5-3 Precipitation amounts in Ras Gharib

The following wind speed for Ras Gharib diagram (Figure 5-4) shows the days per month, during which the wind reaches a certain speed.

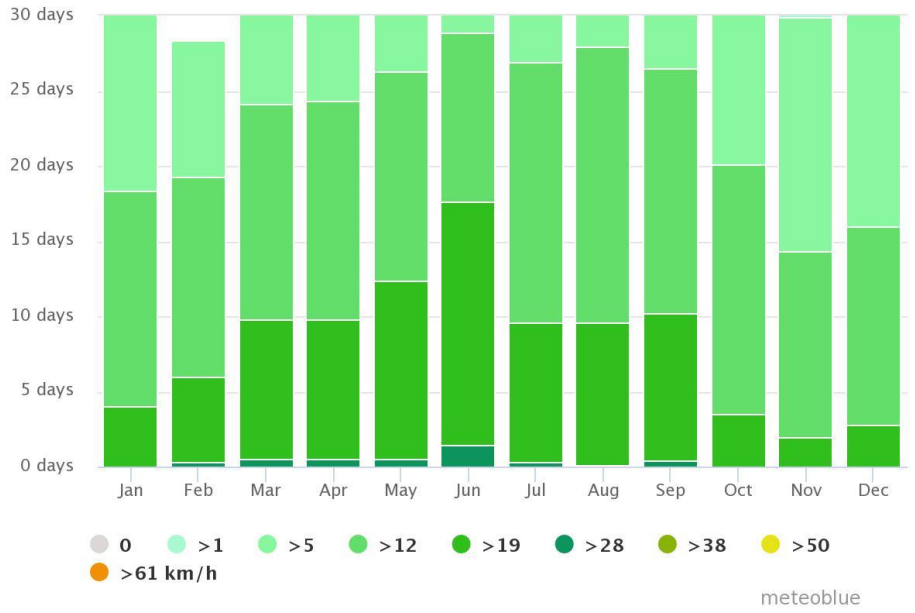

Figure 5-4 Wind Speed in Ras Gharib

The wind rose for Ras Gharib (Figure 5-5) shows how many hours per year the wind blows from the indicated direction. Winds are usually not blowing from the sea side.

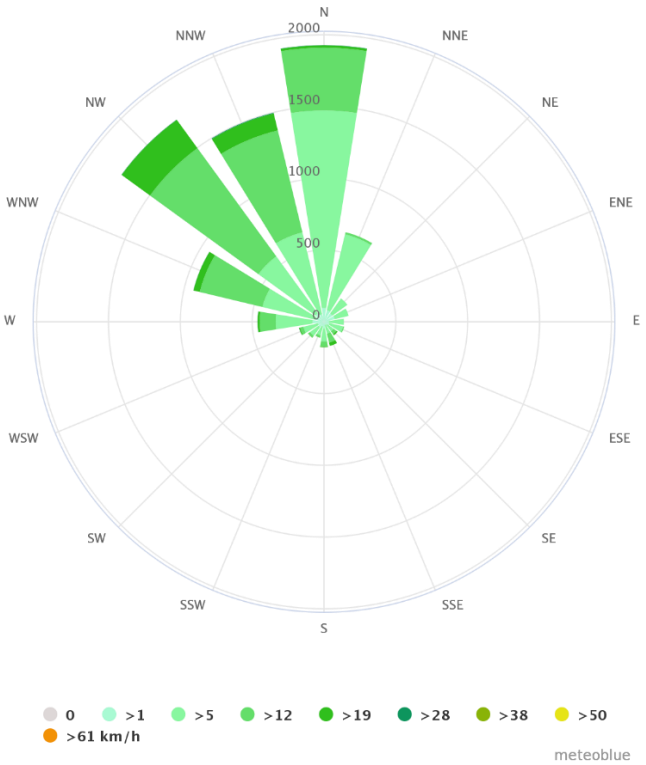

Figure 5-5: Wind rose of Ras Gharib

Source: Meteoblue

It is noteworthy that the natural conditions, especially the drastic dry and windy conditions, are very much limiting the biodiversity of the site:

- In exceptionally rainy years, runoff water is being collected in low parts, what may lead to the growth of some plants. However, these plants are subject to long dry periods leading to their death.
- The high wind speed in the site plays an important role in the severe erosion of the soil. The ground surface in the site is mainly covered by compact layer of pebbles and gravels. They represent desert armor, preventing the permeation of rain water or spilled water to the subsoil. The high wind speed removes the seeds and other prop gules. So, the chance for seeds to germinate and establish themselves is very poor.

b. Air Quality

There are no emissions sources at the Project area that may affect the air quality. Traffic frequency of vehicles along the main roads are minimum and has no relevance to air quality. The air quality is affected during windy days which frequently occur. Due to the desert nature of the area, sand, concentration, and salt concentrations are high in case of speedy winds.

The area also contains "Umm al- Yusr" oil fields belonging to the General Petroleum Company. However, the oil fields are far away from the OHTL at a distance around 20 Kilometers away. To further verify that the air quality is not affected by the minimum traffic or the oil fields, site specific air quality measurements were conducted by an air measurement expert (Annex 2).

Site Specific Ambient Air Quality Measurements

The selection of the active air measurement location is based on the prevailing wind direction; site Topography, the future layout of the proposed project components and the location of the nearest sensitive receptors with respect to the existing substation. Moreover, the selection had based on the guidelines stated in the American Society for Testing Materials (ASTM) reference method[5].

8-hour average measurements were conducted for pollutants of primary concerns, namely, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), Total Suspended Particulates (T.S.P) and particulate matter (PM_{10}).

Table 5-1: Location of Air and Noise measurements

	N coordinates	E coordinates
P5	28°19'9.23.4"N	32°55'08.50"E

The concentrations of measured air pollutants are below national and WB guidelines. All the measurements for the gaseous pollutants were complying with the maximum allowable limits according to law 4/1994 for Environment protection and its amendments by law No.9/2009 and the executive regulation issued in 1995 and its amendments no. 710 in 2012 and 964 in April 2015".

[5] D1357-95 (Reapproved 2000) Standard Practice for Planning the Sampling of the Ambient Air

Table 5-2: Average ambient air pollutants ' concentrations (µg/m3)

Date	Time	SO_2 (µg/m³)*	NO_2 (µg/m³)	CO (mg/m³)**
30/9/2018	10:00	10.6	11.8	1.2
	11:00	10.9	11.1	1.3
	12:00	11.7	9.4	1.2
	13:00	10.2	10.3	1.4
	14:00	9.4	9.2	1.3
	15:00	9.8	13.7	1.4
	16:00	9.2	10.6	1.6
	17:00	8.4	7.9	1.2
Limit Values (Law 4/1994) Annex 5 - 1 hour averaging time		**300**	**300**	**30**

Date	Pollutant	Concentration (µg/m³)	Limit Values (Law 4/1994) Annex 5
30/9/2018	PM10	23.15	**150 (µg/m³)**
	TSP	49.88	**230 (µg/m³)**

Construction engines are certified, i.e., exhaust is below permissible levels. Ambient concentrations of gaseous pollutants, NOx, SOx and CO are unlikely to surpass permissible levels due to operation of construction equipment. Management and mitigation plans for ambient air pollution are further addressed in chapter 7.

Excavation and rehabilitation are done on the same work day. Therefore, the duration of permissible levels being surpassed will be intermittent for the duration of the work day i.e., 8-10 hours. Management and mitigation plans for dust concentration beyond permissible levels are further addressed in chapters 5 and 7.

c. Noise level

There is no more temporary/informal residence near the Project site. The nearest residential area is Ras Gharib City which is more than 25 Km away from the route. The existing sources of noise potentially result from natural ambient noise level in the area resulting from the frequently occurring high speed winds, and the few traffic on the main asphalt roads.

To further verify the low levels of noise, a noise measurement expert carried out a site specific noise measurement in the area (Annex 2).

Site specific noise measurements
Noise level measurements were conducted in the same location of the ambient air quality measurements. The duration of the measurements is 8 hours with one-hour averaging intervals.

Results of Noise measurements

Baseline ambient noise levels are below the national and World Bank permissible limits.

Table 5-3: Ambient noise level measurements

Date	Time	Noise (decibel)	Limit Values (Law 4/1994) Annex 7 tab (3)
30/9/2018	10:00	40.3	**55 (db)**
	11:00	40.7	
	12:00	**41.2**	
	13:00	40.7	
	14:00	39.5	
	15:00	40.2	
	16:00	38.7	
	17:00	39.8	

d. Geology and Geomorphology
The Red Sea coastal plain in Egypt, and consequently the beach and shoreline, varies from place to place in width, sediments, and topography. Along the west side of Gulf of Suez, the coastal plain is a narrow strip of land, only few tens meters in width except where the side western valleys *(wadies)* open into the gulf and in Ras Gharib plain averages 30 km. In general, the East Delta can be characterized by the following Crystalline geomorphologic units:

- **Structure plateau:** (Red Sea Mountains) and ridges underlain both by rugged crystalline rocks and by almost flat carbonate rocks. They occupy the major part of the area of the East Delta
- **Structural plains** (Sandstone Plateau): are mostly sandstone and are particularly represented in the southeast portion of the area
- **Coastal plains:** mostly beach sand and lagoon mud in the north, and stony raised beaches in the south
- **Fluviatile plain**

The area can be characterized by

- Almost flat plains in the northern part (about 95 % of the area) intersected only by two valleys (one narrow at north-east and one wide crossing the southern part of the plot. (figure below)
- The north-west area, which consists of a mix of undulated topography and plains (about 5 % of the area)

Most of the area is covered with compact angular gravels and pebbles forming a so called "desert armor" (see Figure 5-8). The size of the pebbles is around 30 – 50 mm.

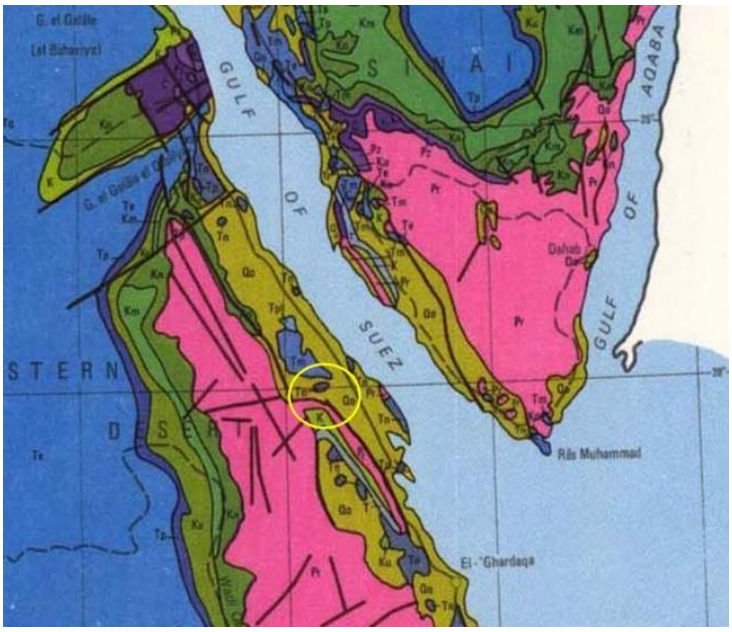

Figure 5-6: Geologic map of the area

The exposed rock units in the area and its surroundings are represented by various lithological associations ranging in age from Quaternary. At the eastern side of the project area, Pliocene marine beds of the Red sea are met. A detailed description of the exposed rock units will be addressed from old to young through the following description.

- **Carboniferous rocks**

The exposed rocks belong to Upper Carboniferous age. They are essentially constituted of clastic sedimentary rocks (argillaceous and arenaceous sandstone) beds with some limestone- rich horizons.

- **Cretaceous Deposits**

The Cretaceous deposits are well exposed just to the west and North West of the site location and constitute the lower part of the northern Galala plateau. Both the Lower Cretaceous clastic and the marine Upper Cretaceous rocks of the Cenomanian-Turonian are exposed in the studied section. Field investigation of the studied succession led to recognition of three rock units.

They are the oldest deposits exposed in the location site where the Peleozoic and Carboniferous deposits are exposed completely outside the location to the south and southwest.

- **Upper Cretaceous Deposits**

These deposits are mainly composed of intercalating beds of shale, carbonate and chalk. These rocks are not recognized at site location where the lower Cretaceous clastics along the scarp of northern Galala plateau to the north west of the area can be found.

- **Quaternary Deposits**

The Quaternary deposits cover almost all the area of the site, Figure 5-7 .They are formed of sand, gravel, clay, sand dunes, aeolian sand and sand accumulation. These sediments cover the most considerable part of the area. They are mainly composed of clastic sediments of different textures ranging from silt to boulder. Wadi sediments comprise various particles of gravel, sand, and silt, and are present in the main courses of the wadis.

Figure 5-7: The Quaternary deposits prevailed in the site location

Figure 5-8: Gravels and pebbles on the area

- **Subsurface Geology**

The project area is dominated by Quaternary alluvial deposits derived from erosion within the Red Sea Crystalline Mountains towards the west. Materials are transported in flash floods and in wadis. The wadis are relative wide in most of the area but towards west they are confined and hence, in the western part, hills of gypsum and layers of weak sandstone protrude the cover of wadi sands and gravel. The gypsum is presumably of Miocene age and covered by Pliocene sandstone dipping east.

In the figure below, tilted satellite images show the main geological features within the area. The features were verified by visiting the site in early 2010, late 2012, 2013, 2017 and 2018 by EcoConServ during conducted site visits for different projects in the same area.

Figure 5-9 Tilted satellite image of the area with major geological features pointed out

- **Topography**

Topographical surveys have been conducted within the sector of the project site. The eastern sector consists of relative flat areas with no significant hills. In the western part of the area the landscape becomes gradually hillier.

- **Surface Soil Conditions**

The Eastern Desert essentially consists of a backbone of high and rugged igneous mountains which runs parallel to, and at a short distance from, the coast and extends south eastwards beyond the border with Sudan. These mountains are flanked to the north and west by an intensively dissected sedimentary plateau. The Red Sea hills do not form a continuous range, but rather a series of mountainous groups (Said 1962). The Eastern Desert differs markedly from the rest of the Egyptian desert in that it is intensely dissected by valleys and ravines which all drain externally. It is also noticeable that wadis drain eastward to the Red Sea via numerous independent wadi systems. Yet, due to the arid climatic condition of this area and to the fact that the desert contains extensive waterless tracts of land, it is far less inhospitable than any other desert area.

As mentioned earlier, the geomorphology of the Eastern Desert is uniquely different to that of other landscapes in Egypt. Its high altitude generates relatively high moisture levels which, in turn, have produced the great water courses of this desert area.

The last period of low precipitation has been too dry to sustain soil development. The uppermost sediment is characterized by depletion of fine material and hence enrichment in coarse materials due to wind erosion.

The gravel and pebbles are often polished by wind. The gravel fraction is dominated by basalt and granite gravel with minor chert (flint). In the northern part, limestone is present. The wind derived deposits are few and thin. Since there is a lack of fine material in the area for dune generation, the placement of the Aeolian deposits (wind derived) is in eroded ravines, at wadi beds and at vegetation. All placements have a low potential for growth and high potential for further erosion. Hence, the Aeolian sediments should be regarded as of minor importance in this area.

The area is also covered by gypsum material. The gypsum is bedded on and sometimes overlain by a thin clay bed. Within the gypsum deposit thin sandstone beds and carbonate beds occur. Rock salt (halite) is not present.

e. Hydrogeology

- **Surface Water**

No sign of surface water was observed in the project area except for some traces of wadi drains.

- **Floods:**

According to a recent report on soil by the RGWE (Annex 3), the project area is classified as a high risk region of flood occurrence in 2011. Based on subsequent investigations in 2012, the site layout and design accordingly, including siting infrastructure (e.g. WTG location, OHTL, and substation) is at a greater distance from flood prone area, using overhead lines to avoid flood paths, and designing roads with additional protection in the event of flooding.

- **Ground Water**

Groundwater Nubian Sandstone is the main water bearing formation in the area, but information on its properties is scarce. The small number of drilled wells in the area shows a piezometric water level starting at 120 m up to 375 m below ground level with salinity range within 1,000-10,000 ppm.

Petroleum companies report high water pressure in wells drilled in the Nubian sandstone and recharged from the existing watersheds in this region. The wadi system discussed earlier, which occupies most of the Eastern Desert, consists mainly of alluvial gravels and sands, which normally have a high storage capacity. However, limited size and reliability of supplies cause variation of storage from season to season and year to year resulting in a relatively moderate storage capacity.

In addition, there are also likely to be runoff losses to the Red Sea. However, this is considered an inexpensive water source and therefore very valuable for the nearby small communities. Some literature reviews (RIGW & IWACO 1987, 1988) indicate the hydraulic parameters of this area to be the following:

- **Saturated thickness:** 200 - 33 m below surface.
- **Transmissivity:** 209 m^2/day

f. Seismic Activities

The data from earthquakes occurring in and around this country during the period 2800 BC to

1984 have been gathered from local and international sources (Said 1962 & 1990). The historical earthquake epicenters are concentrated almost exclusively along the Nile valley. Most authors agree that about 83 seismic events have historically occurred in and around Egypt causing varying degrees of damage in different localities (Said 1962 & 1990).

Seismically, the northern part of Egypt is more active than the southern part.

Seismic Activity within the Project Area

Although the project area is located within the stable belt of Egypt, the region has witnessed tectonic movements throughout its geological history. It has constituted a zone of subsidence and has been the site of immense accumulation of sediments. The earthquakes happened in the past are all limited to the crust (see Figure 5-10 and Figure 5-11).

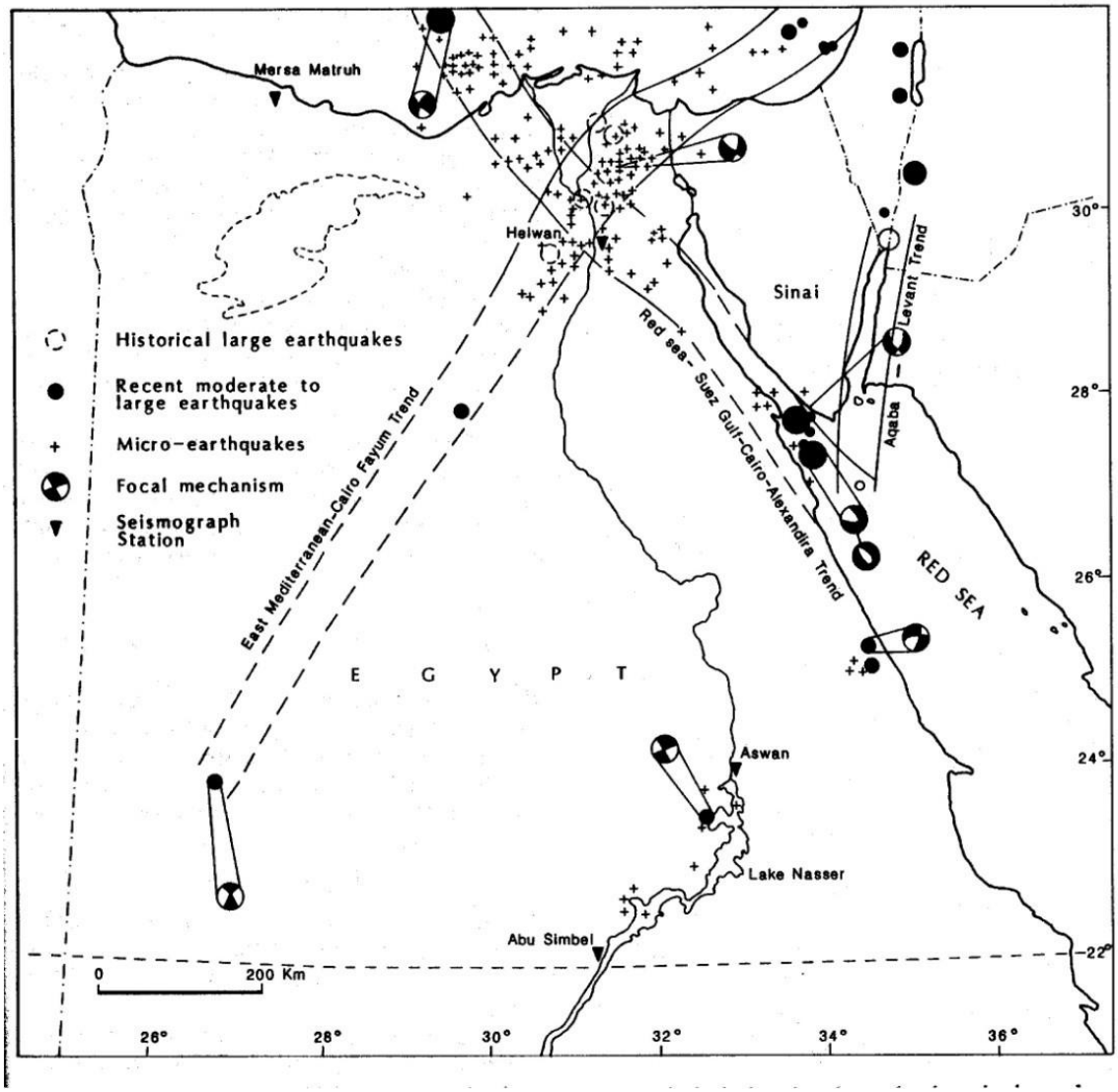

Figure 5-10: Location of trend and distribution of registered earthquakes in Egypt (Said 1990)

The frequency of shallow earthquake occurrences in the Gulf of Suez during the period of 29 years (1953-1981) indicates that the level of earthquake is generally low. However, micro- earthquake activities have been observed in some regions in Egypt. The Helwan Observations Station point out such activity around Cairo, the Nile Delta and around the Gulf of Suez. Using these

observations, a number of micro-earthquakes around Cairo in the period from 1903 to 1950 were located. Also, numbers of micro-earthquakes around Cairo, the Gulf of Suez and the Nile Delta region were located.

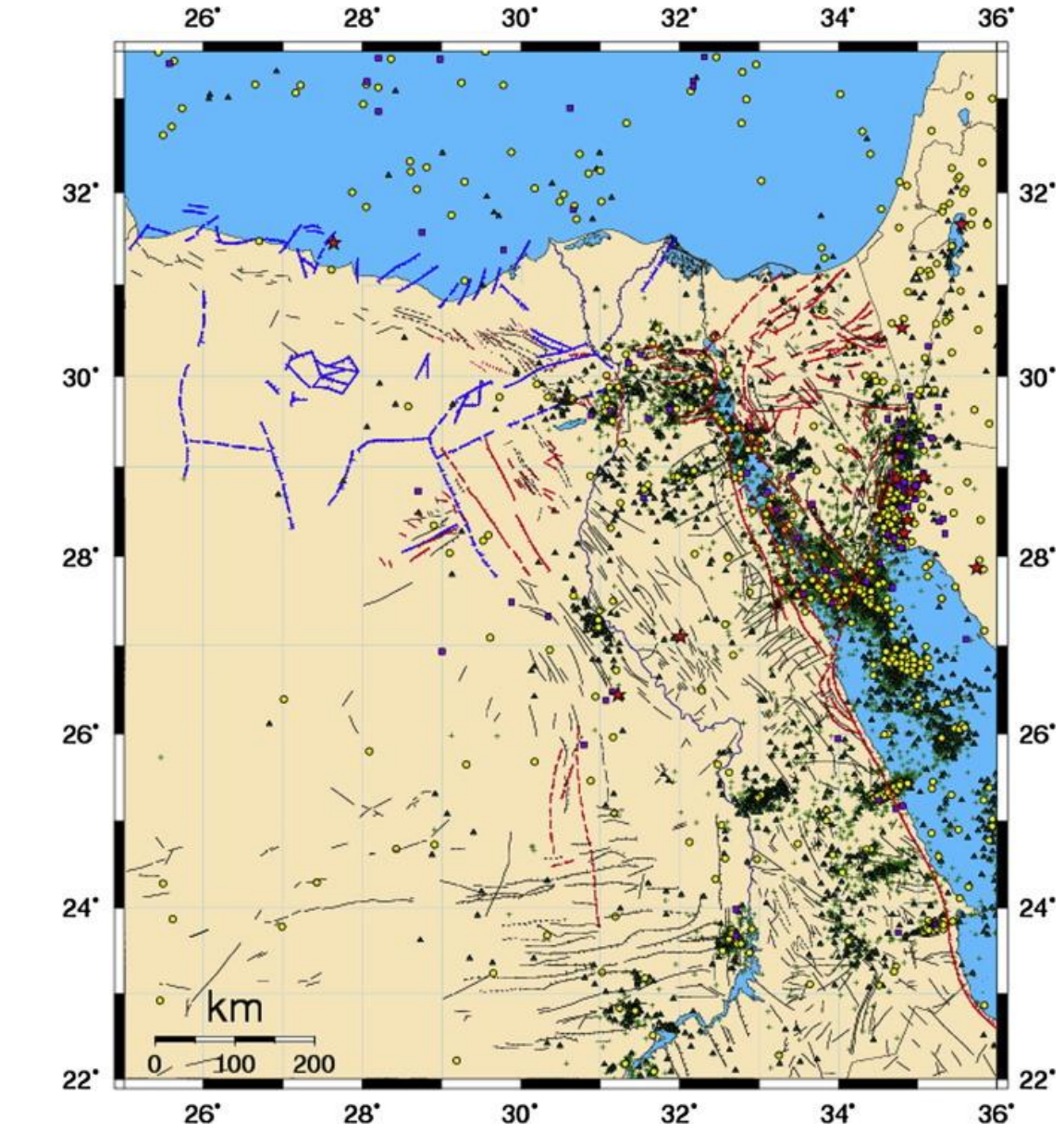

Figure 5-11: Local Seismic activity recorded by Egyptian National Seismic Network (ENSN) during the period from November, 1997 to December 2008.
Source: NRIAG Journal of Astronomy and Geophysics

Tectonically, Egypt can be divided into three units which are the Stable Shelf, the Gulf of Suez geosyncline and the Unstable Shelf. The Gulf of Suez is located in the Stable Shelf of Egypt. It has constituted a zone of subsidence and has been the site of immense accumulation of sediments and fault determined.

5.2 Biological Environment

a. Protected Areas and Important Birds

There are no special features found or known to occur that qualify the studied area or the areas adjacent to it as protected areas. Red Sea Islands Protected Area is located immediately north of Hurghada. The Red Sea Islands are protected due to the presence of islets or patches of mangrove trees (Avicennia marina) (Kassass, Zahran 1967). This protected area poses no conflict with the planned OHTL development at Ras Gharib area.

It is important to note that the depression with salt marshes (mallahat) near Ras Shukeir, around 43 km southeast of the proposed place, is on the list of suggested protected areas to be declared. However, this is not a concern for this OHTL project as it falls in a "no impact" area.

Another proposed protected area, Wadi Qena, is located to the west of the project area. However, Gabal Gharib (Mount Gharib, taller than 1500 m) separates the planned protected area from the proposed project site by an appropriately safe distance.

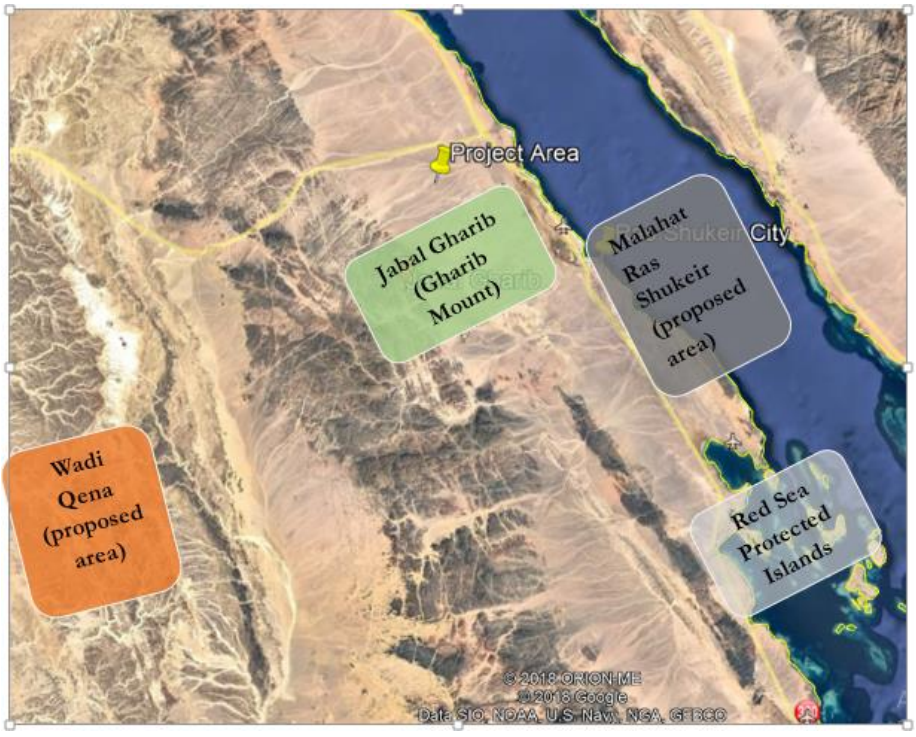

Figure 5-12 Layout of the protected areas around the project site

Source: EEAA (2016) "Egyptian Biodiversity, strategy and action plan 2015-2030"

Offering little food or shelter for wildlife due to the lack of vegetation cover, the project area is generally lacking in biodiversity. Reptiles, mammals and plants represent the typical biodiversity

found in the Eastern Desert area. There is at least one globally threatened native reptile known from the area, the Egyptian Dabb Lizard (Uromastyx aegyptia) (Figure 5-13). This species is classified as "Vulnerable" according to the IUCN Red List 2016. [6]

According to reports and other bibliography, it could be present within the studied area. However, the reptile was not encountered during the site visit. Its tracks were not seen either, meaning that probably they are not abundant in the studied area and, hence, they should be a minor concern.

Figure 5-13: Egyptian Dabb Lizard (Uromastyx aegyptia)

Desert environments and habitats are very fragile and vulnerable to man-made structural changes such as the proposed major construction works. The vegetation patches in the wadis make each of these habitats valuable and important for a continuously functioning desert environment for the existing biological species and ecosystems.

It is worth noting that EEAA has identified 34 "important bird areas" in Egypt. The project is located in the Gulf of Suez area. According to Birdlife International, the area of Gulf of Suez represents an important zone for soaring birds. The "important bird areas" along the Gulf of Suez are represented in the figure below (Figure 5-14).

[6] IUCN is the International Union for the Conservation of Nature (www.iucn.org)

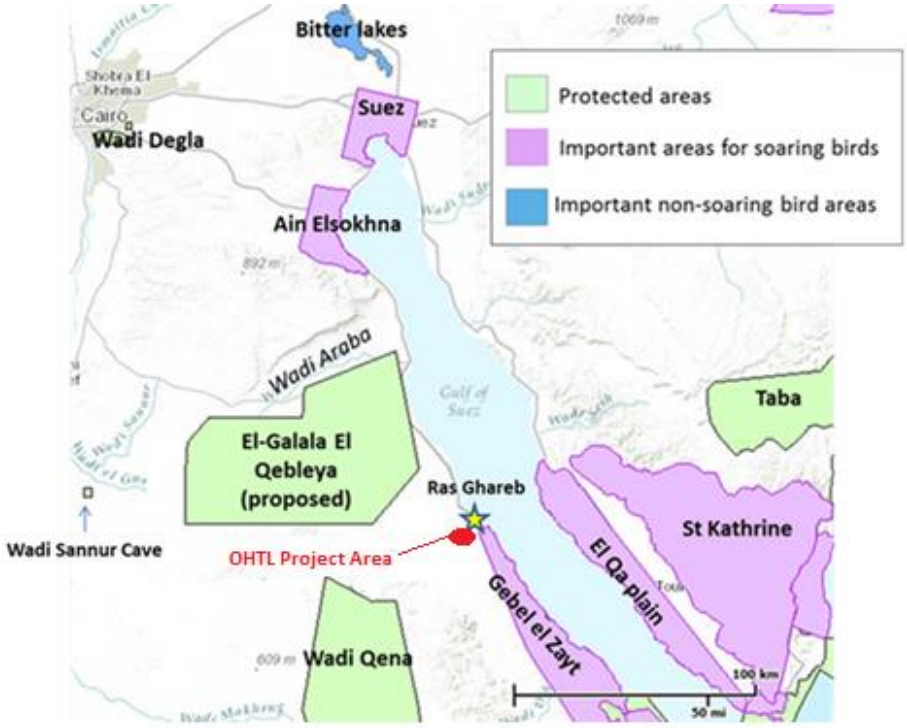

Figure 5-14 Proposed and confirmed protected areas and important bird areas along the Gulf of Suez

b. Flora

The project site is located in an arid area characterized by very low diversity of both plant and animal species. A few natural shrubs were spotted during the site visit.

Only few plant species occur in low numbers of specimen in the area of the planned OHTL, mainly restricted to Wadis. Plants found in the monitored area were mostly limited to loose groups of Ochradenus baccatus (a. Figure below) or single individuals of Zygophyllum coccineum (b. Figure below) and Haloxylon salicornicum. (c. Figure below)

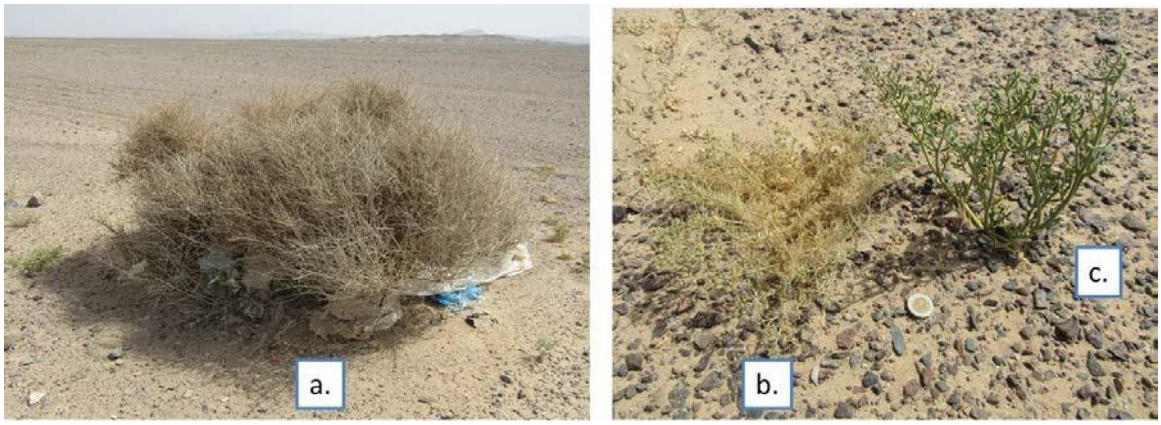

Figure 5-15: Plants present in the project site

In addition to the natural vegetation, there is agriculture land around Wadi Dara village, where irrigated land is planted with typical farmland plants like date palms, olives, Ziziphus as well as a few fields with alfalfa etc. Near the main road along the project area a few patches of vegetation could be observed due to minor leaks from the fresh water pipeline. The slightly increased humidity forms a basis for patches of vegetation that consists of several native and introduced species.

Endangered Flora

There is no known endangered plant species to be found at the project site.

c. Fauna (Excluding Birds)

No terrestrial animals were observed during a site visit on April 2017 conducted by EcoConServ for another project, in the same area. However, there were sightings of a few terrestrial species in the area as mentioned in previous report and surveys.

Animal species were registered continuously during different fieldwork conducted by EcoConServ in 2008 (spring and autumn), 2009 (spring), 2012 (autumn), 2013 (spring) and 2018. The findings are summarized below.

The surveyors visited the area during the day and obtained night fauna observations from the residents of Wadi Dara to include nocturnal animals. Surveyors used several techniques to count and determine fauna species in the area, through searching for holes under shrubs and rock caves at hill sides, animal footprint tracking, observing of fauna pellets/scats.

- **Mammals**

The records of mammals (observations, specimens, and tracks) were collected during comprehensive bird monitoring program in autumn 2008/2012 and spring 2009/2013 conducted by EcoConServ. A walkthrough survey of mammals was performed within the project area, while a regular monitoring of bats was done at the Ras Shukair sewage farm (2008/2009 only). A couple of limitations in the data set are:

- Most species of mammals, that potentially inhabit the area, are night active. Therefore. The data does not offer a complete survey of mammals, because the main fieldwork focused on day site visits and bird observation.
- The field activities related to bird observations mainly occurred in the flat gravel desert. No fieldwork was done in the low rocky area at the western border of the concessionary. This very different habitat may offer living conditions for at least three additional species of rodents (Sekeetamys calurus, Acomys cahirinus, and Acomys russatus). Crevices in rocks may potentially offer possibilities for the presence of bats.

Only three species of native mammals were recorded with certainty in the area, two rodents and one fox. Tracks of rodents were often recorded around the scatted patches of sparse vegetation in the wadis. Within the area, this habitat is presumed to be the most important for resident mammals. At least two additional species are likely to occur in the area (cf. Osborne & Helmy 1980, Hoath 2003), the rodent lesser Egyptian Gerboa Jaculus and Cape hare Lepus capensis. The former

species could occur in numbers, while it is estimated that the latter needs more vegetation than currently found.

In addition, species that are dependent on human activities within or near their habitats were recorded. One of these species, the domestic dog Canis familiaris, was seen regularly, and it was expected that this predator may have a negative impact on the occurrence of the native species in the wadis. No grazing was observed due to the sparse vegetation but some domestic animals like donkeys and camels were found around the waterholes where some cultivation was available.

Regarding bats, according to UNEP/EUROBATS (2015) there are various reasons for bat presence. There is no evidence of cave-dwelling insectivorous bats in the project area and there are no feeding areas for bats within and around the plot (such as tree plantations) or shelters (such as caves or abandoned structures/tall buildings). This is confirmed in the survey conducted in 2011, where two inspections restricted to the surrounding of an artificial oasis were done at night (near the project area allocated land and because of the characteristics, presumably presence of bats may be detected). In order to investigate the presence of bats a bat- detector (Pettersson 240x) was used allowing both the detection of bats sounds and the identification of species. A stationary voice box (System Laar TDM 7C) was installed near the oasis during some nights. The voice box records ultrasonic signals and stores them digitally. Using these systems, data on bat activity during the whole night could be obtained. The results showed that no bats were detected. Moreover, no bat calls were recorded by the used voice box.

In addition, in 2014, a bat survey conducted at Ras Shukair documented the occurrence of four species around the permanent ponds in the sewage farm (about 34 km away from the studied area). It is likely that these bat species can be found within the project area, in particular in the western parts near the human settlements in Wadi Dara and in the rocky areas. It is worth noting that the bat survey did not indicate occurrence of any bat migration in the area.

- **Herpetofauna**

Two species of reptiles were recorded with certainty within the project area. All records were near scattered patches of sparse vegetation in wadis. Tracks of snakes were recorded, but none were ever seen.. It is estimated that the reptile species recorded in the present data include a portion of the species actually present in the area. Two obvious limitations in the present data are:

- Most species of reptiles are night active, and hence need active search to be recorded. The data is by far a complete survey of the reptiles, as the main fieldwork focused on day field visits and bird migration observations.
- Activities within the project area were concentrated in the flat gravel desert. A reduced fieldwork was done in the area of low rocky hills by the western border of the area: a habitat which may offer living conditions for a number of reptile species.

One of the identified species, the Egyptian dabb lizard, is formally protected by Egyptian legislation (Baha el Din 2006). The species is classified as "Vulnerable" as was mentioned before.

Table 5-4: Records of the reptiles during different surveys in the area

English name	Scientific name	Camp	Project area	Ras Shukier	Comments
Geckos – Gekkonidae					
Keeled rock gecko	Cyrtopodion scabrum	-	1 record of identified small gecko	Common	
Gerbil					
Turkish gecko	Hemidactylus turcicus	-	-	1 record	
Agamids – Agamidae					
Egyptian dabb lizard	Uromastyx aegyptia	1 record	10+ records	-	Recorded in five separate areas (incl. camp) within the project area. All records were from autumn 2008
True Lizards – Lacertidae					
Acanyhodactylus boskianus	Hemidactylus turcicus	1 record	1+ record	1+ record	

Note: Records of reptiles during the field project at Gulf of Ziet in 2008 (spring and autumn) and 2009 (spring). The camp referred to is the stationary radar camp used during baseline studies during autumn 2008 and spring 2009.

- **Insects**

The presence of insects in desert is highly linked to the vegetation growth. Field surveyors were observing insects through visual observation or searching for any evidence for insect exoskeleton released from molting process.

- **Migratory insects**

Two migratory insect species, desert locust Schistocerca gregaria and the dragonfly vagrant emperor Anax ephippiger (see photo), were encountered during the fieldwork. Both species are characterized by mass migratory movements from their breeding grounds. The nearest breeding grounds for both species are probably in the Nile region.

Figure 5-16 Migratory insects a) desert locust Schistocerca gregaria b) dragonfly vagrant emperor Anax ephippiger

- **Birds**

There are no birds nesting on the planned OHTL project area itself or in the area. Because of the main bird migratory routes pass through the area where the project site is located, several migratory bird surveys have been conducted around the project area including:

  - ***Bird monitoring performed on Windfarm area (40 km south from the Project area):***

.Two migration seasons are very well identified:

  - *Spring Migration.* During this season (March-May) birds migrate from wintering ground in high concentration, many following the Red Sea. Some birds congregate along the western side of Gulf of Suez where most of soaring birds cross the Gulf at Gabal El-Ziet (narrowest point), to the eastern side of the Gulf of Suez at south Sinai near El Tortomid Sinai through Saint Katherine to the eastern Mediterranean. Numbers of soaring birds prefer to continue north along the western side of Gulf of Suez to cross Sinai to the eastern Mediterranean through Suez area. Relatively few migrants, especially birds originating from central Africa, fly along the Nile River and continue in north eastern direction through Suez to the eastern Mediterranean. (Abdou, W. 2010, Meyburg, et al., 2000, 2002 and 2011)

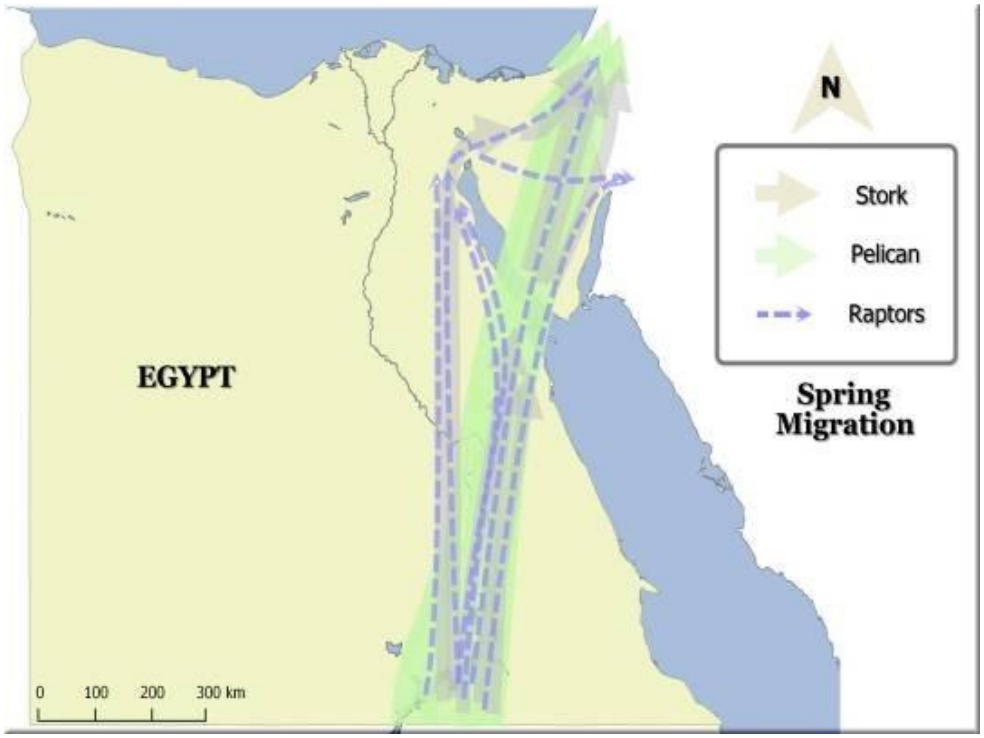

Figure 5-17: Migration flyway of soaring birds during spring season[7]

- Autumn Migration. During this season (August to November) soaring birds migrate through eastern Mediterranean southward, following the Gulf of Aqaba to mid Sinai Peninsula through Saint Katherine, El Qa Plain, and reach Ras Mohamed national park, where birds are concentrated in a huge numbers waiting favourable weather condition to cross the Gulf of Suez north near El Tor, to Gabal El-Ziet area (mainly Storks, Pelicans and birds of Prey). Some raptors species, mainly eagles, prefer to fly northward from South Sinai following the eastern side of Gulf of Suez to Suez, then fly southward again to Sudan to their wintering ground through the Nile River. However, the majority of soaring birds following the main flyway, some other raptors may fly directly to Suez through north Sinai and join other birds southward to their wintering ground following Nile River. (Abdou, W. 2010, Meyburg, et al., 2000, 2002 and 2011).

[7] Reference: Abdou W. & Shouhdy, W., 2015, after INBICON, 2013, Birdlife online sensitivity tool

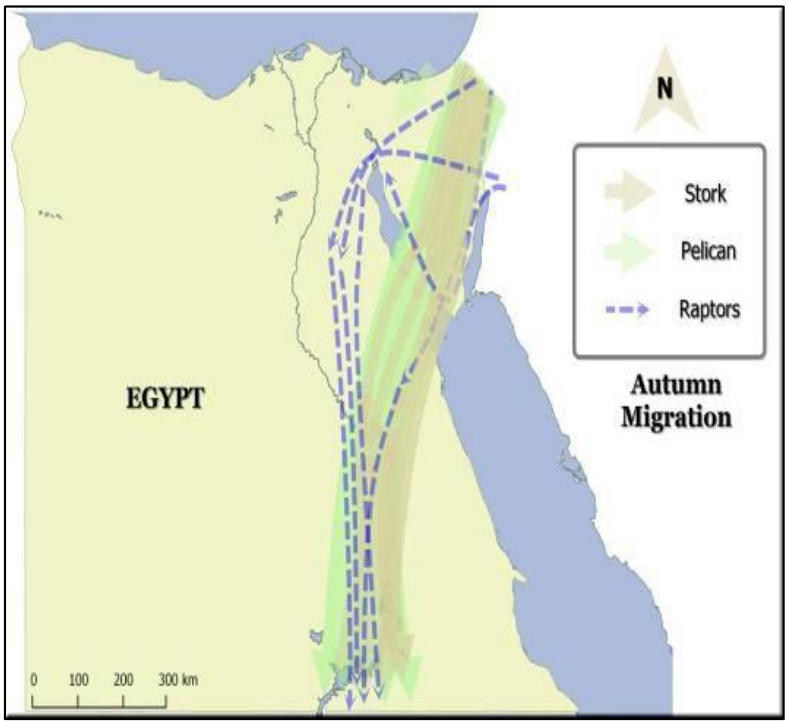

Figure 5-18 Migration flyway of soaring birds during autumn Season

According to Birdlife international's bird sensitivity mapping tool, Great White Pelican (Pelecanus olocrotalus) and white storks (Ciconia ciconia) were observed via satellite tracking within the project site. Both species are not listed as endangered.

Figure 5-19: Great White Pelican (Pelecanus olocrotalus)

Figure 5-20: White storks (Ciconia ciconia)

Other key avian species that are expected to pass through the area around the project location, but have not been observed, are listed in the following table.

Table 5-5: List of key avian species that are expected to be in the project area but are not observed

Name	Status
Eurasian Hobby Eagle	**Low Concern**

Eastern Imperial	**Vulnerable**
Steppe Eagle	**Low Concern**
Black Stork	**Low Concern**
Pallid Harrier	**Near Threatened**
Montagu's Harrier Eagle	**Low Concern**
Greater Spotted Eagle	**Vulnerable**
Lesser Spotted	**Low Concern**
Lanner Falcon	**Low Concern**
Saker Falcon	**Endangered**
Lesser Kestrel	**Low Concern**
Peregrine Falcon	**Low Concern**
Eurasian Sparrowhawk	**Low Concern**
Common Kestrel	**Low Concern**
Red-footed Falcon	**Near Threatened**
Common Crane	**Low Concern**
Bearded Vulture	**Near Threatened**
Griffon Vulture	**Low Concern**
Osprey	**Low Concern**
Dalmatian Pelican	**Vulnerable**
Great White Pelican	**Low Concern**
European Honeybuzzard	**Low Concern**

Black Kite	**Low Concern**
Long-legged Buzzard	**Low Concern**

Source: Bird monitoring surveys performed at the project area.

During six seasons, bird monitoring surveys were conducted within project area around 40 Km away (Figure 5-21). EcoConServ was appointed to conduct ornithological studies for a windfarm area for three phases. For each phase, two bird monitoring surveys were conducted. The surveys consisted of standardized field observations during Spring and Autumn Migrations Seasons with the main objective to have comprehensive information on bird patterns and compare different aspects mainly phenology (seasonal migration dynamics), migration intensity and spatial distribution within the project area. The studies conducted are:

- EcoConServ & ENBICON, Autumn 2008 / Spring 2009
- EcoConServ & ENBICON, Spring and Autumn, 2013
- EcoConServ, Autumn 2016 / Spring 2017

The following table presents a summary of the main findings during the studied seasons. The detailed information can be found in the annex related to the overall analysis of the bird monitoring.

Figure 5-21 Location of the OHTL route in relation to the wind farm area where the 6 bird monitoring surveys were conducted

Table 5-6: Summary of main findings of Bird monitoring (6 Seasons) in the studied area

Survey	Temporal distribution of migrating birds	Spatial distribution of migration birds	Migration pattern	Flight Altitude
Autumn 2008	Start: Mid-August, early September Peak: mid-September to mid-October End: November	• NW: 38% • C: 35% • SW: 36%	Under the influence of prevailing northwestern tailwind the main migration direction of soaring birds along the study area was south to southwest	about 30% of birds migrating at risk altitude
Spring 2009	Start: Mid-March Peak: Early April End: Early May	• NW: 34% • C: 28% • SW: 38%	Migration pattern facing north	18-30% of birds migrating at risk altitude
Spring 2013	Start: Mid-March Peak: Early April End: Early May	Relative similar to 2009	Migration pattern facing north	flight altitudes lower than 200 m were recorded for a total of six species
Autumn 2013	Peak: Mid-September, October	Relative similar to 2009	Migration from south to southwest direction as 2009	Migration altitude was investigated in details. Findings confirmed previous studies
Autumn 2016	Peak: Mid-August to early September	• NE: 46% (out of the project area) • SW: 26% (out of the project area) • NW: 12%	Migration from south to southwest direction as 2009	less than 10% migrate in relatively low altitude (<50m) More than 30% of soaring birds

		(within the area) • SW: 16% (within the project area)		migrate in high altitude (50 - 100m)
Spring 2017	Start: Early February Peak: Early March End: Early May	• SE: 22% (out of the project area) • NE: 13% (out of the project area) • W: 16% (out of the project area)	north-east and north-west migration direction	75% of the migrating soaring birds fly in relatively safe altitude (>200m and below 50m)

The information collected during the 6 seasons suggest that during Autumn Season, the migration of soaring birds started from august and about 80% of soaring birds migrate early in the season (mid-August, to beginning of September), where the migration of White Stork is manly coincide with that period. The migration intensity of soaring birds varies between different sectors of the studied area, the south and south eastern sector of the area have higher sensitivity for soaring birds' migration than other sectors, while there is a significant intensity of soaring birds at the northeastern sector of project's area. Regarding the migration pattern during autumn, the results suggest that is generally to South, to South West as shown by the results of 6 seasons conducted within the Project's concession area, where birds are crossing the area from north to north-east direction to south-southwest direction towards the mountain.

During spring season, migration of soaring birds started early in the season (Mid-February), with Eagle, and the migration fluctuate within the whole season with migration peaks in mid-March and Mid-April. Some species are migrating early (late February. early March) as Common Cranes while others migrate late in the season (End of April to the beginning of May) as Honey Buzzard. The intensity of bird migration is relatively similar along the studied area during spring season with obvious significant intensity in the southeastern sector. The migration pattern shows major North East and North West direction of migration along the area in its way to cross the gulf towards Europe. There are other migration patterns that depend on the flight altitude when birds are entering into the area.

- ***Bird monitoring performed in 2010 at the RGWE wind farms area(part of the Project area).***

This survey conducted within the Ras Ghareb wind farms area consists of standardized field observations during Spring and Autumn Migrations Seasons.

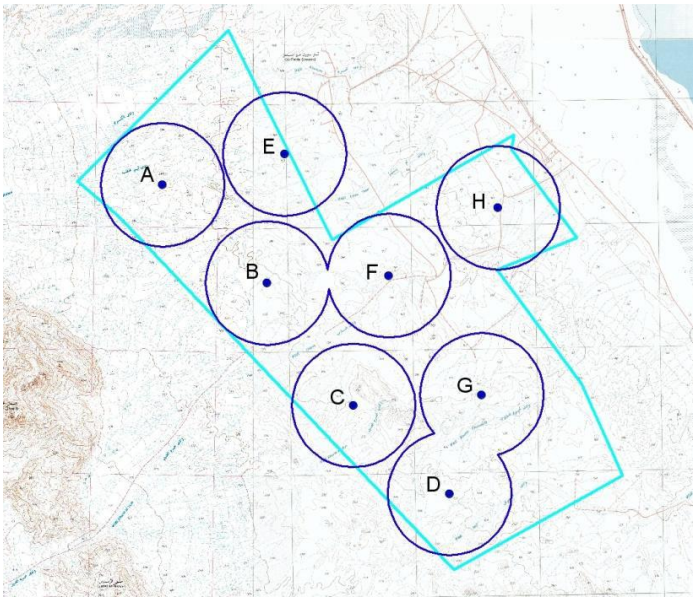

Figure 5-22 Observation points for bird monitoring, 2011

During **spring season**, a total of 177,516 birds from 27 relevant species were recorded within the studied area. White stork and Steppe buzzard, each constituting almost 38 % of all birds, were the dominant species.

Figure 5-23 The location of RGWE windfarm in relation the OHTL route

The total number of birds observed in spring 2010 within the studied area exceeded 1 % of the total flyway population for 13 species (This is a commonly used criterion, developed by Birdlife International, for assessing the significance of an area: if the 1 %-threshold is met an area is regarded to be of international importance). More than 15 % of the flyway population of White stork, and more than 5 % of the flyway population of Levant sparrow hawk, Steppe eagle, White pelican, Booted eagle and Steppe buzzard were recorded. More than 3 % of the flyway population of Egyptian vulture classified as globally endangered in the worldwide Red List of Threatened Species (by IUCN, Cox et al. 2006) was recorded here. Further four species of conservational concern (due to their Red List-Category) occurred in comparably low to very low numbers: Spotted eagle, Eastern imperial eagle, Pallid harrier and Lesser kestrel.

During observations performed in the **autumn season**, 25,942 birds from 22 relevant species were recorded within the studied area. Again, White stork, constituting about 54 % of all birds, was the dominant species. It is noteworthy that all recorded White storks referred to only 17 flocks, indicating that the studied area is not located within a main migratory route of White storks in autumn. The only other frequently occurring species were White pelican and Honey buzzard but all at markedly lower numbers. More than 70 % of all migrating birds refer to only six flocks indicating that migratory activity was comparatively low during most periods of the investigation.

The observed numbers of White stork and White pelican refer to about 3 % and 12 % of the total flyway population of each species, respectively. The proportion for all other species observed in the studied area by far did not reach 1 % of the flyway population (which is a commonly used criterion for assessing the importance of an area). Three species of conservational concern (due to their IUCN-Red List Category) occurred in low to very low numbers: Pallid harrier, Lesser kestrel, Red-footed falcon and Egyptian vulture. Thus, migratory activity in autumn 2010 was low or predominately very low in the whole studied area.

Eastern Imperial, Greater Spotted Eagle, Dalmatian Pelican (considered as Vulnerable species) and **Saker Falcon** (considered as Endangered species) listed as Avian species expected around the Red Sea by the Birdlife International were not recorded during the mentioned monitoring activities in the studied area, where RGWE's plots is part of, accordingly they should not be a major concern for the project.

The results of the survey of 2010 clearly show that the studied area is very important for spring migration and less important for autumn migration.

5.3 Cultural Heritage

There are no signs of cultural heritage or adjacent to the project area.

5.4 Socio-Economic Characteristics

a. Ras Gharib City

The 220 KV OHTL project lies within the jurisdiction of Ras Gharib Local Governmental Unit (LGU). The city of Ras Gharib is the second largest city in Red Sea Governorate. It is located on the Suez Gulf coastline, 150 km north of Hurgada, bordering Suez Governorate. The total area of

Ras Gharib is 14,890 km^2.

Administrative Structure

The Red Sea Governorate is one of the largest governorates in Egypt; with an area of approximately 119,000 km^2, the governorate covers around 11.8% of the country. It stretches over 1,080 km east to the Red Sea Coastal line and to its north lies the Suez and Giza Governorates and to its south lies the country of Sudan. To its western borders there are the governorates of Beni Suef, Menya, Assiut, Souhag, Qena, Luxor, and the Red Sea.[8] Within the governorate, Ras Gharib is the administrative district that hosts the project. The district covers an area of 7.2 km.^{2}

According to the official website of Red Sea Governorate, the jurisdiction of the city of Ras Gharib extends northward from the borderline with Suez Governorate to 80 km south of Gabal El Ziet area, eastward, along the Suez Gulf coastline, from Zaafarana to Gabal El Ziet; and westward to 70 km from Sheikh Fadle-Menia road.

There are two villages administratively affiliated to the city of Ras Gharib: Zaafarana, and Wadi Dara. Zaafarana village is located 106 km away from Cairo, and Wadi Dara is located 45 km south of Hurghada's road.

Basic Demographic Characteristics

Population Characteristics

According to Red Sea Governorate's official website (2014), the total population of Ras Gharib is 60,000 people. The majority lives in the urban center, and only a small portion lives in rural areas in Zaafarana and Wadi Dara. The Bedouin communities in Ras Gharib are from Al Ma'ayza, Al Bashareya, and Al Ababdeh tribes. They are mostly unsettled, and live deeply into the desert, away from the city and the villages. The demographic trend, also, includes migrant workers from neighboring governorates. The predominant majority of these migrant workers work for oil companies located in the area, and very small fraction of the people work in the farms in Wadi Dara village.

Age and Gender Distribution

Figures from CAPMAS Statistical Yearbook 2015 reflect that the population in Red Sea Governorate is predominantly young. Based on the final results of 2006 population consensus, up to 86.7% of the population of Red Sea governorate is below 45 years old.

In regards to gender, statistical data shows that the female ratio is disproportionate compared to male ratio in Red Sea Governorate. According to CAPMAS statistical yearbook 2015, male population in the Red Sea Governorate reached 206,760 individuals, while female population stood at 139,015 individuals.

Rate of Natural Increase

According to CAPMAS statistical yearbook 2015, the rate of natural increase in Red Sea Governorate stood at 25.4% in 2014. Birth rate is 30.2%, while mortality rate is 4.8%.

Living Conditions

Household Size and Density

[8] Red Sea Governorate General Information www.redsea.gov.eg

Household is defined as family (and non-family) members who share a residence and operates as one social and economic unit. The average family size in the city of Ras Gharib is composed of 4 individuals, based on figures from CAPMAS poverty mapping 2013.

Access to electricity

Access to electricity in the city of Ras Gharib is high. According to CAPMAS poverty mapping data, 99.3% of individuals use electricity for lighting. In Zaafarana the percentage of individuals who use electricity for lighting stands at 73.65%.

As for Wadi Dara, access to electricity is very limited. The village is not connected to the National Electricity Grid, and diesel-based generators are the only available source of electricity.

Access to water and sanitation network

Ras Gharib is connected to Beni Suef's water pump station via Kuraymat-Zaafarana-Gharib line. CAPMAS poverty mapping 2013 shows that 100% of individuals have access to the public water network in the city of Ras Gharib. Access to the public water network in Zaafarana reaches approximately 69.4%.

Access to sanitation and Sewage network is low; specifically, the percentage stands at approximately 6.66% of individuals living in the city of Ras Gharib, and at 6.1%. in Zaafarana (CAPMAS, 2013). However, the Environmental Department's representative at Ras Gharib's city council stated that the completion of the sewage and sanitation network is underway, and that up to 90% of the city's households will soon have access to sanitation and sewage systems.

Human Development Profile

Education

The city of Ras Gharib has 18 schools covering the three basic education phases (primary, preparatory and secondary), which include two experimental schools. Additionally, there are two secondary vocational training schools. According to Ras Gharib's city council representatives, interviewed by the field research team, the main focus of the two secondary vocational training schools is to provide their students with the necessary basic skills that allow them to work for oil companies.

CAPMAS poverty mapping 2013 shows that 19.22% of the male population of the city of Ras Gharib received basic education, while the percentage of female members of the community with basic education stands at around 19.44%. Likewise, the percentage of male individuals who finalized their basic education in Zaafarana is approximately 18%, and the percentage of females who finalized their basic education is 16%. The following table details the education status of people of Ras Gharib and Zaafarana.

Table 5-7: Education mapping of Ras Gharib and Zaafarana

Information about Education	The city of Ras-Gharib	The village of Zaafarana
Males holders of university degrees	16%	8%
Female holders of university degrees	13.45%	0%
Male school enrollment, (6-18) years	99.26%	71.4%

old		
Female school enrollment, (6-18) years old	99.35%	73.3%
Male school drop-outs	0.22%	0%
Female school drop-outs	0.25%	0%

Source: CAPMAS Poverty Mapping 2013

According to CAPMAS poverty mapping 2013, the male illiteracy rate in the city of Ras Gharib stands at 23.3%, and the female illiteracy rate is 18.1%. Zaafarana's illiteracy rate among men is 40.17%, and the illiteracy rate among women is 48%.

Labor Status

According to officials at Ras Gharib's city council, the type of work carried out by the majority of the work force can be divided into three basic categories: government/public sector, oil companies' crews and wage-workers. Agriculture activities are minor, compared to activities related to oil and gas.

Table 5-8 Labour Status of Ras Gharib and Zaafarana

Information about employment	The city of Ras Gharib	The village of Zaafarana
% of male labor force ages 15+ from total population	48%	55.5%
% of female labor force ages 15+ from total population	23.2%	12%
% of adult 24+ employed from the total labor force	56%	59.3%
Distribution of labor force by sector		
% of self-employed, among males	48%	20%
% of self-employed, among females	23.2%	33.3%
% of male agriculture workers	1.7%	39.7%
% of female agriculture workers	0.05%	83.3%
% of persons working for public sector	54%	19.04%

Source: CAPMAS Poverty Mapping 2013

According to CAPMAS poverty mapping 2013, the unemployment rate in the city of Ras Gharib stands at 13.6% among males and 21.4% among females.

As mentioned above, Ras Gharib attracts many migrant workers from neighboring governorates such as Beni Suef, Menya, Assiut, Souhag, Qena and Luxor. Workers also come from Delta governorates and Sinai. The majority of these workers serve in the oil companies. A very small

fraction of them serve as farmers, particularly in the village of Wadi Dara.

Economic Activities and Well-being

Economic activities in the city of Ras Gharib and its affiliate villages include: oil and gas production activities and agriculture. According to Ras Gharib's city council representative, tourism is not active in Ras Gharib, compared to other regions in Red Sea Governorate.

According to officials at Ras Gharib's city council, government/employees earn between 1,200 EGP to 3,000 EGP per month. Oil and gas companies' crews earn between 6,000 EGP and 20,000 EGP per month. As for wage-workers (i.e. plumbers, electricians and service workers), they earn between 80 EGP to 120 EGP per working day.

Family expenses, according to the city council's officials, reach up to 5,000 EGP which are disproportionate to the current level of income. CAPMAS poverty mapping 2013 shows that consumption in the city of Ras Gharib reaches 7320.52 per capita and 6066.47 in the village of Zaafarana.

Health Care Facilities

The city of Ras Gharib has one central hospital and one ambulance station. The central hospital serves all the areas and villages, administratively affiliated with Ras Gharib LGU. The hospital is equipped with ER section, and has outpatient clinics.

Figure 5-24: Ras Gharib Central Hospital

As for oil companies' crews, they provide their employees with on-site health care facilities.

b. Gabal El Ziet

Description of Gabal El Ziet project area

Gabal El Ziet project area is situated near the city of Ras Gharib. There are no inhabitants near the project area. The latter comprises desert tracks, gravel roads, and the national electricity grid transmission towers. The Zaafarana-Hurghada highway is around 13 km to the east of the project area..

Zaafarana- Hurghada road is the main road used by the inhabitants of these areas or tourists traveling by car south to touristic destinations in El Gouna, Hurghada, and Marsa Allam.

There are minimal services provided in the area, such as education, recreational and health services, which are only found in the cities. On the Zaafarana-Hurghada road three security points/units can be observed. Public transportation is unavailable in the area. People rely on private cars. Those who do not have cars either walk or get drives from car owners. The absence of services in the area creates a daily need for transportation.

Demographic trends in Gabal El Ziet

Gabal El Ziet area is mostly an uninhabited desert area. The villages or cities that are closest in proximity are:

- The City of Ras Gharib: 15 km north east: with population of 60,000 people.
- The village of Ras Shukeir: 33 km south east and on the Red Sea coast line; it has an unknown number of oil company crews and workers, but could be estimated at around a few thousand.
- Village of Ras Gamsha: south east of the project area; it has a community of fishermen.
- Village Wadi Dara: 40 km south east of the project; it has around 200 persons.

The community gatherings in Gabal El Ziet consist, primarily, of people seeking work opportunities, in activities such as:

- Oil field excavation
- Agricultural activities
- Livestock and poultry rearing
- Mining activities
- Fishing

These community gatherings are mostly inhabited by migrant workers from neighboring governorates. The social composition consists of Bedouins and non-Bedouins. The characteristics of the Bedouin communities in the area include settlements from Hurghada, Ras Gharib, or Upper Egypt. There are also non-settled Bedouins living in the desert. They only come to the city or the villages for water or to buy their needs.

The gender distribution of the population in the Gabal El Ziet vicinity is disproportionate. It is predominantly comprised of male workers seeking job opportunities. At the current stage, women and children are less likely to move to these areas given the lack of facilities which are only available in the cities of Ras Gharib.

The main community clusters surrounding the project area include the following:

- Residents and Non-Residents of the village of Wadi Dara
  Wadi Dara is a newly reclaimed village located on the southern east border of the project site. There are permanent and non-permanent residents in the area. The village has around 200 permanent residents, mostly men attending the lands. There are only five families living in Wadi Dara, with an average size of 4 members. The village is highly dependent on the city of Ras Gharib for public services, especially in regards to its medical services.

- Residents of the city of Ras Gharib
  Ras Gharib is the second largest city in the Red Sea Governorate, with a population of 60,000. The residents of Ras Gharib are mostly oil companies' crews.

- Quarry men
  A Feldspar quarry exists north of the project site with an unknown number of workers coming from Upper Egypt. Those workers work and reside on the quarry site, where the working conditions are considered to be extremely harsh.

- Bedouins
  As mentioned above, the Bedouin communities in the area including people affiliated with Al Ma'ayza, Al Bashareya, and Al Ababdeh tribes. There are settled Bedouins close to Wadi Dara. While deep in the desert, with a distance that varies from 20 to 60 km from the main road, there are some non-settled Bedouins. However, they tend to move around near to the oasis. These Bedouins are affiliated to Al Sewelam and El Meayza tribes.

- The oil companies crew of the Gabal El Ziet Oil Ports
  Oil field called Umm Yusr are present in the vicinity of the Project area and plenty of oil companies exist in the Suez Gulf region. The oil companies are extended along the coastal strip of Gabal El Ziet with numerous ports (Gabal El Ziet Port, Ras Shukeir Port, Ras Gharib Port, and PetroJet Port). To the north of the project site GUPCO (Gulf of Suez Petroleum Company) exists near Ras Shukeir port. It has thousands of crew members in a large complex. It is followed by GASCO, which has a large company complex. To the south and around 50 km form Wadi Dara, there are seven companies. Oil companies normally provide housing and services to their crews living without their families.

The whole surrounding area of the project is critical in assessing the potential socio-economic impact. These key population gatherings are predicted to sense the project impacts, yet to different degrees.

c. Wadi Dara Village

Village Significance

Wadi Dara is a newly reclaimed village, administratively affiliated to the city of Ras Gharib local governance unit, under the jurisdiction of the Red Sea Governorate. In the 1940s, Bedouins discovered the area of Wadi Dara and its precious ground water reserves. They started to settle in the area and engage in land activities. In the 1990s, the Governorate of Red Sea allocated 4,000 feddans to the Wadi Dara Cooperative Association for Land Reclamation (WDCALR). Later this land area was increased to 5,000 feddans.

The purpose of Wadi Dara is to provide job opportunities for the youth and improve their socio-economic status through desert reclamation activities. They are employed as farmers using the latest agricultural techniques and irrigation methods to grow crops. However, socio-economic development and growth of Wadi Dara is currently being stalled. The inadequacy of basic public

utilities, namely electricity, is cited as the main reason for slowing down the growth and development of Wadi Dara, demographically and economically.

The village has a population of 200 residents and occupies an area of 25 km^2. There is only one main road that is paved out, and it has plantations on both sides. Most of the population of Wadi Dara came from Upper Egypt Governorates. Bedouin communities can be noticed close to the area. They include settled and unsettled Bedouins. In Wadi Dara itself there are only 5 families. The average family size is 4 members. In regards to the physical structures in Wadi Dara, all buildings observed and documented by the field research team had no concrete foundation and their height did not exceed the ground level. The walls are made of light white bricks, and the ceilings are made of wood.

Wadi Dara village is 40 km away from the project area. Sustainable access to electricity is much needed in Wadi Dara, as expressed by various stakeholders interviewed by the field research team. The next section shall highlight how crucial this project is for the development of Wadi Dara, as perceived by the village residents.

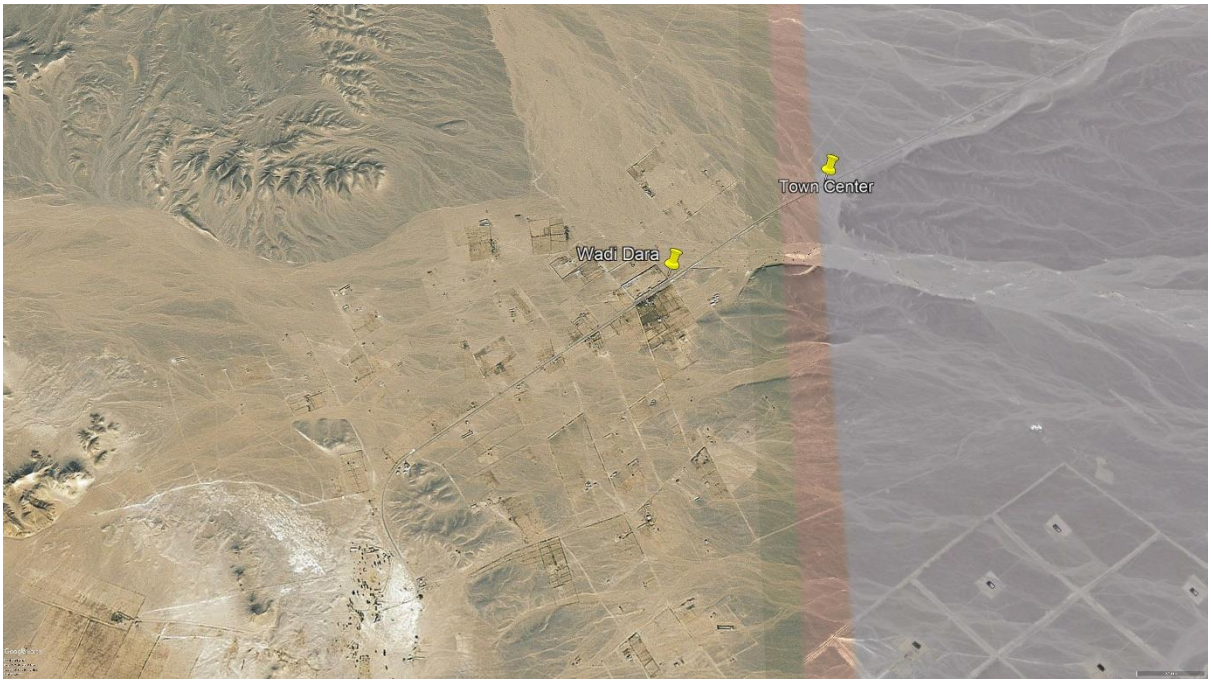

Figure 5-25: Overview of Wadi Dara

Figure 5-26: Typical housing in Wadi Dara

Figure 5-27: Roads at Wadi Dara

Figure 5-28: Wadi Dara town center

Figure 5-29: Wadi Dara water tank

Socio-Economic Conditions in Wadi Dara

The socio-economic conditions of the Wadi Dara village vary according to the individuals' level of income. There are middle income members, namely the land-owners, to low income members, who are mainly Bedouins and non-Bedouins (migrants), who serve as farmers and guards. There are also a small Bedouin gatherings living in the desert near Wadi Dara. They live on raising livestocks, and serve as guards for the mines located nearby.

According to the head of Wadi Dara's village council, the village bears a significant economic potential, but currently only 650 feddans out of total 5,000 feddans are being cultivated. There are up to 6 poultry farms in addition to other farms producing vegetables and other crops. The head of Wadi Dara's village council reported that there are other plans for investment projects in the village, there are limitations due to the lack of basic infrastructure, which hinders their materialization.

Economic Activity

The economic activity in Wadi Dara is focused on agriculture and poultry breeding. Poultry breeding farms is the most successful project in the village, since the aggregate production of the available six poultry breeding farms reaches 134,000 chicks per breeding cycle. According to the farmers interviewed by the field research team, the production of all the breeding farms is being transported and sold all over the country at prices set by the Poultry Bourse.

The kind of crops that Wadi Dara produces include jojoba (also known as wild hazel), olives, tomatoes, onions, peppers, and other leafy vegetables. Additionally, they grow palm trees and sell the dates they produce. There are many challenges facing agriculture activities in Wadi Dara, according to farmers interviewed by the field research team. These challenges are imposed by the soil quality, and also for the high salinity of the ground water used. Hence, the agricultural production is minimal and the potential for increasing production is stalled.

Figure 5-30: Poultry farm

Figure 5-31: Jojoba seed

Plans for new investment projects include mineral water bottling, soft drinks manufacturing plant, and livestock (i.e. cattle and goat) rearing. The head of Wadi Dara's village council and a number of farmers reported that there are visions to develop poultry breeding farms, and establish slaughterhouses and packaging sectors. However, these visions are have till now failed to materialize due to lack of adequate power sources.

Basic Utilities and Infrastructure of Wadi Dara

Based on the field research team's observation, and the feedback received from the village council representatives and farmers, the village of Wadi Dara lacks adequate utilities and infrastructure. The following subsections outline the current status presiding in the village with regard to drinking water, irrigation water, sewage and sanitation, access to electricity, and medical services.

Drinking and Irrigation Water

The distance between the village of Wadi Dara and the Kuraymat-Zaafarana-Gharib water feeding line is 11 km. The village is not connected to the National Water Network. Therefore, the village council buys drinking water from Ras Gharib, then, transports it using the village council's tank truck. The water is being sold to the residents at 10 EGP per ton.

Figure 5-32: Tank truck transporting daily provision of drinking water to Wadi Dara's water reservoir

In regards to irrigation water, the village of Wadi Dara is rich with ground water. According to the head of the village council, there are 15 wells being used at the current stage. However, the high salinity of the ground water makes it detrimental for crops, farmers stated. Ground water is being pumped out using water pumps, powered by diesel-based electricity generators. After water is collected in basin-shape reservoirs, it is then transferred to water treatment machines for desalination. With the completion of this process, ground water can be used for irrigation. According to WDCALR representatives, the process is considered as 'arduous' and very costly, citing the problems associated with the diesel-based power generators. These problems, WDCALR representatives reported, lead to disruption of electricity generation, and consequently, negatively impact agricultural production.

Figure 5-33: Desalination plant

Figure 5-34: basin-shape water reservoir

Sewage and Sanitation

The village of Wadi Dara is deprived of sewage and sanitation network. According to the representatives of the village council, septic tanks are used by the community members.

Electricity

According to the head of Wadi Dara village council, the village needs between 6 MW to 10 MW in order to guarantee the sustainability and development of all economic activities and livelihood. The only source for electric power, however, is diesel-based electricity generators. There are up to 15 diesel-based electricity generators used for pumping ground water, and powering water treatment machines. The capacities of these generators range between 20 kW to 50 kW. Village council representatives, farmers, and land-owners reported many problems associated with diesel-based electricity generators.

Figure : Generator rooms at Wadi Dara

Figure 5-35:Diesel-based electricity generator

The problems of the diesel-based generators include the cost and transportation of diesel, and maintenance. Due to lack of available technicians in Wadi Dara, land-owners have to call technicians from other Governorates in order to undertake the necessary maintenance. This process is definitely time consuming, and lead to disruption of agricultural production.

As for street lighting, the village council officials reported that there are up to 200 street lighting poles, powered by two diesel generators 600 kW each. As a result, the street lightning can only turn on for 2 hours a day. This makes it impossible to provide adequate street lighting all night. Likewise, providing electricity to the village mosque happens only for two hours.

Medical Services

There are no medical services available in Wadi Dara village, therefore village members are entirely dependent on the city of Ras Gharib for health care. The biggest problem, in this respect, is that no ambulance car is able to reach Wadi Dara due to lack of proper road network. In case of a snake or scorpion bite, which is the most recurrent medical case, the patient has to be transported all the way to the main road, and then transported to Ras Gharib's Central Hospital, via an ambulance car, for treatment.

Officials of the village council reported that there used to be an ambulance station in Wadi Dara. The ambulance station left due to lack of adequate power source. The sustainability of power source is a must for the preservation of antidotes, used for treating snake and scorpion bites. Additionally, there is no veterinarian unit in the village to treat the raised livestock.

d. Bedouin Communities

Due to the fact that Bedouins are a main stakeholder since they are the Project's closest neighbors as well as they are the main buyers and sellers of desert land in the study area, this section presents information on their living conditions and lifestyle.

Housing Characteristics

Housing conditions found among the Bedouin community is satisfactory as the majority of community reside in houses constructed with limestone bricks and cement. There is a general trend of house ownership, i.e. each family owned a separate dwelling that was a few meters away from the others. This is a fairly new development since up to the nineties Bedouins used to live in an expanded family house. The current segregation of dwellings reflects the growing importance of privacy for the Bedouin communities. Furthermore, Bedouins are reluctant to live in multi-floor buildings. Hence, most of the households consist of one floor buildings with several bedrooms and a room to sit with guests. Bathrooms and kitchens are usually in a separate building.

Bedouin Economic Activities

Bedouin economic activities in the study area mainly depends on traditional activities, such as agriculture and animal husbandry (Mahgoub, 2015). These activities involve the following:

Agriculture

- Agriculture is essentially based on growing olive and fig trees, on harvesting crops such as wheat and barley, along with various vegetables.
- Agriculture production depends on seasonality and water availability (rainfall and groundwater). Bedouins rather than being sold. For example, Bedouin women process some produce to make dried figs, fig marmalade, and pickled olive and then they either consume them or sell them.

Livestock

- Men focus on livestock production, specifically sheep and goats. Some men also involved in the animal husbandry of camels, horses and desert falcons.
- Women are in charge of taking care of poultry. This also includes maintenance of pigeon lodges.

Lastly, other non-traditional Bedouin economic activities include working with local companies either as guides, security guards, or contractors. Significantly, it should be emphasized than Bedouins make most of their money from leasing, selling, or acting as a realtor for investors in the

governorate. As such, a small section detailing land ownership among Bedouins is presented below.

"Illegal" Land Ownership (Wada' El Yad)

In the Governorate of Red Sea, local Bedouin tribes do not abide to the legal process required to own land. Generally-speaking, to own and develop land in Egypt, one must obtain permission from the military. After getting said permission, the next step would be to get permission from the ministries involved in land registration. Land registration does require payments and so many try to avoid registering their land. Therefore, contrary to aforementioned mechanism, Bedouins apply a type of illegal ownership which is customary ownership "Wada' El Yad".

Wada' El Yad is the seizure of a piece of land without any legal documents. The phrase comes from Arabic and means "to put a hand on". It is an old custom developed during the Ottoman Empire and the custom is therefore found in all countries once ruled by the Ottomans, not just Egypt. Wada' El Yad is an illegal practice, but Bedouin tribes claim ownership of these lands based on their knowledge of the area and the alleged history of their family living there for generations. This practice is followed up by "Urfi" contracts, which are contracts that claim to evidence possession of a piece of land. However, such contracts are not registered properly with the civil authorities since they are easily forged because wealthy individuals tend to bribe witnesses to of said contracts (Johannsen, et al., 2009). Furthermore, aiming at declaring their legal possession of the lands, separate houses are built and scattered in the Bedouin lands. The residents construct the houses with no legal license.

Hence, companies involved in developmental projects over lands claimed by Bedouins always try to get into certain arrangements with the tribes. This arrangement is locally known as "Ghafra" and it involves paying an amount of money to the Bedouins in exchange for their support in implementing their projects and protecting the area from theft.

Gender Roles

Local communities of the Red Sea Governorate are considered conservative, even by Egyptian standards. Bedouins maintain their inherited knowledge, both material (handicrafts, housing pattern, tools and clothing) and non-material (poetry, singing, dancing and culture). Among the people, living by the traditional Bedouin way still carries a lot of prestige, even for younger generations. That is, maintaining the styles, hierarchy, and customs of past generations is how the Bedouins reinforce their identity. This applies from their dress code all the way to their gender relations.

Bedouins live in a patriarchal society; therefore, this informs their gender relations. Men are the sole bread-winners and their livelihoods are outside the house. Hence, their lives are not only different but also separate from women. While Bedouin women play a crucial role in their communities- they are responsible for maintaining the family affairs, managing the household income and many other related issues- their financial dependence on men places limits on their autonomy (Mahgoub, 2015). These limits can be summarized as the following:

- Female mobility is restricted as they are not to leave the house unless they are accompanied by a male. If and when they travel outside their home, women cover themselves fully.
- Rates of female school achievement were limited to basic education. The main obstacle for Bedouin female school enrolment is the lack of transportation since schools are located far away. Therefore, they could not go to school unless accompanied by a male family member.
- Women carry most of household activities, grazing, cooking, and traditional handicrafts. But, even given their important contribution, they do not partake in much decision-making. Evidently, women's own perception of gender roles is still deeply rooted in the traditional Bedouin way.

6.0 POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

To ensure the accurate determination of project impacts; environmentally and socially, the ESIA study was carried out at different levels. The selection of the most appropriate technology, the most environmental and socioeconomic advantageous and the suitable mitigation measures are presented to minimize the negative impacts and maximize the positive impacts.

As the nature and characteristics of the impacts associated to the project components (overhead transmission lines) are different, the impacts assessment in this chapter is divided into each of the project components. In addition, the impact assessment also differentiates between the phases of the proposed development; i.e. during construction, operation, and the maintenance phase.

The assessment of potential impacts has been done through analyzing different project activities and envisaging possible changes to the environment. Each potential impact was qualitatively analyzed to classify its significance to three degrees: major impacts, medium impacts and minor impacts. Major impacts are impacts with a reasonable likelihood to cause violation of applicable standards. Medium impacts are impacts with a reasonable likelihood that are likely to cause violation of applicable standards only in combination with the impact of other sources. Minor impacts are impacts which are not likely to cause violation of applicable standards whether on its own or in combination with other sources. The likelihood of each impact has been qualitatively evaluated to two degrees: highly probable and low probable.

Furthermore, besides presenting the degree of the impacts, this Chapter will also distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate (or short-term) and long-term impacts during construction, operation and maintenance phases indicating their level of importance and their probability of occurrence. This chapter will identify impacts which are unavoidable or irreversible. Cumulative effects shall be also addressed taking into account other projects or actions planned in the study area. This shall include the socio–economic impact assessment.

Each potential positive and negative impact resulting directly or indirectly from the project will be assessed based on both the Magnitude and Sensitivity of the receptor.

An Environmental and Social Management Plan (ESMP), presented later in Chapter 7, includes mitigation measures that will minimize the negative impacts using available technologies and managerial procedures.

6.1 Magnitude of Impact

The impacts resulting from the project were categorized as a positive or negative impact; then latter were further analyzed and its magnitude assessed as: negligible, low, medium, or high. Various considerations come into play as the experts assessed the impacts, the main parameters are:

- **Duration** - As the time duration of the impact increases, it is weighed more heavily. Special consideration is given to impacts that go beyond the project's anticipated life-expectancy.
- **Time** – The time of which an impact commences or occurs can be vital to construction and maintenance operations.
- **Spatial** – The area impacted is to be considered, as some impacts may extend beyond the project's boundaries or interfere with land regulations, etc.
- **Probability** – The chance of an impact occurring and its frequency is to be assessed

- **Reversibility** - The possibility and extent to which an impact can be intervened or mitigated for a factor to return to the Baseline environment
- **Compliance** – National and international standards and regulations may dictate an impact's maximum allowable consequence.

After an analysis of the various parameters, an impact's magnitude is categorized as follows:

- **Negligible** – No anticipated change to the baseline environment
- **Low** – Minor anticipated change to the baseline environment
- **Medium** – Moderate anticipated change to the baseline environment
- **High** – Significant anticipated change to the baseline environment

The impacts categorized as "Medium" or "High" usually cause a major temporary variance to the baseline conditions or a long-term ongoing modification.

Receptor Sensitivity

Sensitivity of the receptor is based on the relationship between the respective project and present baseline social and physical environment (the receptor); specifically, it is assessed based on the receptor's vulnerability. When the effect of an impact is more readily absorbed and easily mitigated, the impact is regarded as less sensitive. On the other hand, as an impact is more challenging to mitigate and cannot be absorbed by the population or the environment it becomes more sensitive; and thus requires an extensive management plan.

The sensitivity of the receptor is assessed as:

- **Low** - Existing capacity to absorb/mitigate impact
- **Medium** – Limited capacity to absorb/mitigate impact
- **High** – No capacity to absorb/mitigate impact

6.2 Impact Evaluation

The virtual resultant of the magnitude of the impact and sensitivity of the receptor for each impact are evaluated in order to generate the impact's significance and overall assessment. The following Table illustrates how the two factors are coupled:

Where:

- **Level 1** – Nominal (insignificant) impact to the baseline environment (requires no mitigation or management plan)
- **Level 2** – Minimal impact to the baseline environment.
- **Level 3** – Medium impact to the baseline environment.
- **Level 4** – Significant (major) impact to the baseline environment

		Magnitude of Impact			
		Negligible	Low	Medium	High
Sensitivity	Low	Level 1	Level 1	Level 1	Level 2
	Medium	Level 1	Level 2	Level 2	Level 3
	High	Level 2	Level 3	Level 3	Level 4

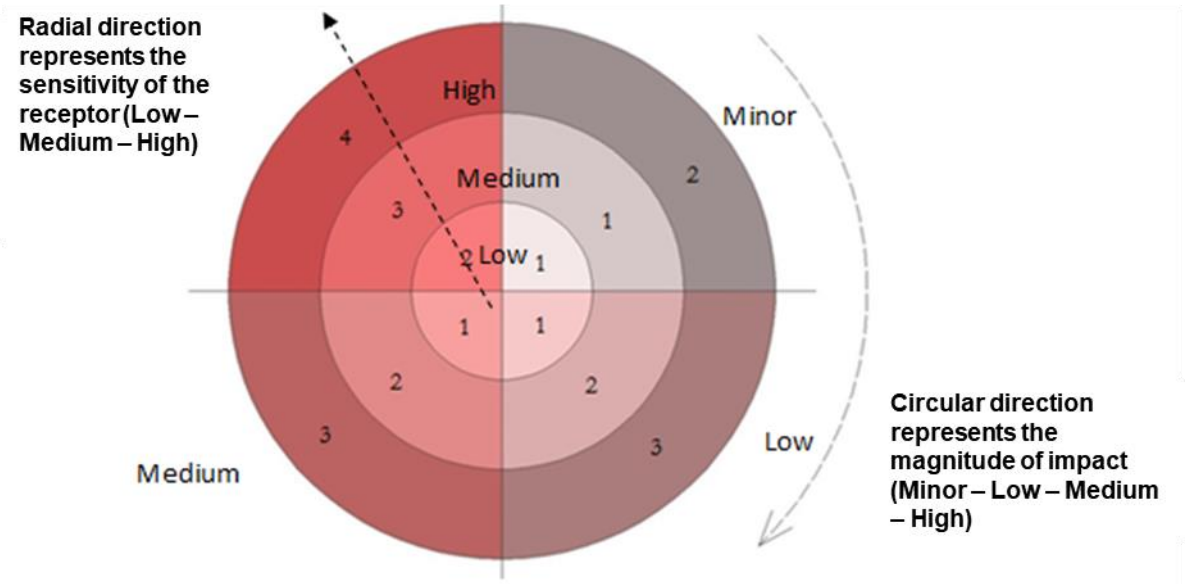

Figure 6-1: Impact Evaluation Diagram

6.2.1 Impact Assessment during Construction of OHTLs

Typical activities of construction phase of the OHTL include site preparation, determining ROW, construction of concrete works, construction of supporting building and erection of the equipment.

Activities conducted in locations other than within the project Right-Of-Way (ROW) include excavation for construction materials (such as sands and gravels), access road and staging area construction.

The impacts potentially may result from construction activities of transmission lines are:

- Noise

Sources of noise during construction would primarily occur from heavy equipment or other resources such as vehicular traffic. Whether the noise levels exceed EEAA guidelines would depend on the distance to the nearest residence. However, the noise impact would be intermittent and extend for only a limited time.

Normally construction works include noisy activities related to the operation of construction equipment, possible hammering and drilling works in addition to the noise generated from construction related trucks. The noise impacts could be analyzed in two main aspects: noise impact within the construction areas, and the noise impact on the neighboring receptors.

During the construction phase, noise would be generated during day time at levels exceeding the currently recorded levels during the baseline study. At the vicinity of all identified receptors, the noise intensity should not exceed 60 Decibel during the day (7am-10pm), and 55 Decibel during the night (10pm-7am) according to the national standards and 70 decibel during day and night according to the international standards.

The potential vulnerable groups who are susceptible to the construction noise during the construction of the OHTLs are the following:

- Onsite Workers and
- Neighboring establishments

Monitoring the noise emissions during the construction phase will ensure that the noise limits are within the allowable limits and there is no any violation of the standard levels.

Impact Significance:

Construction noise is not likely to affect neighboring areas because of the relatively large distance between the source (use of machinery) and the receptors along the line.

For noise impact upon workers, within the construction site, it is possible that construction workers could be exposed to relatively high levels of noise. This could be mitigated through application of the normal precautions normally taken by construction labor. Accordingly, this impact has been classified as a Minor Impact (level 3), which could be further minimized and fully controlled if construction workers used safety gear as recommended in the ESMP.

- Traffic

Power lines routes will be established away from road sides and on the desert land. Compensation will be provided to all individuals whose assets or access to assets is affected or damaged, as a consequence of land acquisition or any other activities undertaken by the projects. The compensation for the loss of physical and nonphysical assets will vary depending on the type of loss, and eligibility of the PAPs. Compensation may come in the form of cash compensation, in-kind compensation, and/or assistance.

Furthermore, the extra traffic caused by construction vehicles is not expected to effectively impact the flow of traffic on the existing roads. The limitations on access to roads during construction are temporary; it will not affect any of the inhabitants. The impacts on access to roads beside the power lines are minor as the power lines will be located on the desert land and on the side of the existing roads.

Impact Significance

The impact is therefore considered to be Minor Impact. Mitigation measures included in the ESMP will effectively control this impact.

- Air Quality

Excavation, filling, loading, transportation and unloading of soil and raw materials cause suspension of airborne dust that raises the particulate matter concentration on ambient air. These emissions are temporary and its severity depends on the construction activity, meteorological conditions, silt content of the soil and moisture content of the soil.

Another source of air emissions during construction is the exhaust emissions of construction machinery and vehicles visiting and leaving the site. The extent of these emissions depends on the number of machinery working at the site at one time, the type and efficiency of the engines and also the climate conditions.

Impact Significance:

The limited excavation works make the expected dust emissions from construction works insignificant. Also, the project construction is not expected to employ intensive machinery input, therefore there will be very limited air emissions/smoke from such machinery. Furthermore, The OHTL route is in desert landscape far from any settlement, in addition at a relatively large distance from receptors such as residential/settlement zone. In addition, the duration of the given impact is short. Therefore this impact has been classified as minor impact. It has been recommended, in the ESMP, to apply water spraying if there were significant dust emissions.

Excavation works expected for fixing line transmission towers are very limited as the steel tower will depend for its support on undisturbed soil, so the excavation will be for a very limited area. The mitigation measures is been prepared to minimize the dust emission, especially at the uncultivated empty land.

Another source of air emissions during construction is the exhaust emissions of construction machinery. The extent of these emissions depends on the number of machinery working at the site at one time, the type and efficiency of the engines and also the climate conditions. The time management for machinery working has to be consider to minimize the emission. However, the impact is consider localized and temporary or for a short period.

- Hazardous Materials and Waste Management

During construction phase, non-hazardous and hazardous waste are expected to be generated. The waste management shall be adequately address to reduce the impacts. Potential wastes generated during the construction phase and the type of waste are described and summaries below:

Non-hazardous waste:

Scrap steel, glass, paper, insulations, scrap metals, sanitary waste, etc.

Hazardous waste:

Empty hazardous waste containers, spent welding materials, solvents, paints or adhesive, light bulbs or fluorescents lamps, and other hazardous waste resulting from operation and maintenance of the equipment and vehicles, i.e. spent oils, spent lube, waste oil filters, batteries, etc.

Most of hazardous waste during the construction phase consist of liquid waste, generated from cleaning fluid, spent oils and solvent. The hazardous solid waste generated is expected, as described above, from welding materials and dried paints as well as the hazardous waste packaging.

Non-hazardous sanitary waste;

Wastewater will be collected in a temporary sanitation (onsite sanitation). The mitigation measures has been prepared for the non-hazardous sanitary waste management.

The generation of the non-hazardous waste, when it is practicable will be recycled. Wastes that cannot be recycled will be disposed in a sanitary landfill nearby periodically (weekly or monthly depending the volume of waste generated). Onsite, the waste shall be stored and separated from the hazardous waste and placed in an appropriate waste collection containers.

Solid (nonhazardous and hazardous) waste would be generated during construction activities. Impacts could result if hazardous wastes were not properly handled and were released to the environment. The management of hazardous waste should be developed in accordance to the EEAA hazardous waste handle, storage, transport and final dispose to the designated landfill.

The domestic wastes (wastewater and solid waste) generated are relatively small as only small number of workers will be employed during the construction. The location of the site is in empty lands (desert area) for the OHTL. Domestic solid waste generated will be managed by the sites under the construction supervisor. However, the management of construction wastes along the transmission line will include mitigation measures to collect and store waste on-site and in disposal sites to ensure that disposal is undertaken in a safe and environmentally acceptable manner.

Generally, construction of the line will involve very limited amount of excavation waste for fixing the towers. Most of the excavated soil (if any) will be filled into each tower footing for fixation. The expected shallow foundations will not, most probably, require any dewatering.

Regarding the hazardous waste, the special section for hazardous waste management has been developed to address the mitigation and management of hazardous waste during construction phase. The mitigation measures is presented in accordance to the Egyptian regulation for hazardous waste storing, handling and transporting to the designated landfill for hazardous waste.

Impact significance:

The effects of improper disposal of conventional construction waste depend on the aesthetic value, and the drainage characteristics of the disposal site. Because of the quantity, quality and

uncertainties about these factors, this impact has been classified as medium significance. By implementing the mitigation measures recommended in the ESMP, including adequate temporary storage, handling, transporting and disposal of construction waste (hazardous or non hazardous waste) to the designated landfill and in accordance to the EEAA regulation for waste management of hazardous and non-hazardous waste, the impact significance could be minimized and could be reduced to minor impact.

- Health and Safety

Potential impacts to worker and public health and safety during construction of transmission lines are the same as those associated with any construction project involving earthmoving, use of large equipment, transportation of overweight and oversized materials, and construction and installation of facilities. In addition, health and safety issues include working at heights. The practices of electricity companies in Egypt reflect that the health and safety procedures are relatively not abided by the workers. That might result in injuries and death. Such impacts are distributed into:

- Community health and safety: It is predicted that the consutrction of OHTL would affect the community people due to moving the vehicles, dust emissions and contamination of water.
- Occupational health and safety: the workers are predicted to get affected by accidents that might occur in the construction sites. There is a low probability of being infected by the Blood Transmission Diseases (BTDs) through several modes of transmission, particularly, sharing the toilets, not following hygienic procedures, and using personal shaving tools.
- Adverse impacts might result in due to the bites of reptiles (snakes, lizards and scorpions)

Impact significance

Health and safety for the sensitive recipient communities surrounding the OHTL is of low and minor significance, as the project is located in a vacant desert land. In addition, the medium to high impact is identified for the health and safety of the workers.

The standard protection of the workers reported in Labor law related to occupational health and safety No. 12 of year 2003, especially for the workers that involved in the risk due to the height has to be put into mitigation measures and in the management and monitoring plan to minimize and reduce the significant impact. In addition, special attention shall be paid for Working at height during crossing towers construction.

- Removing trees on the Right of Way (ROW)

There are no trees to be removed within the ROW zone which is 25 meters from both sides for the high voltage electricity power (220 kV) in accordance to the Electricity Law 87/2015.

- Land Use

Impacts to land use of the OHTL could occur during construction if there were conflicts with existing land use plans and community goals. Long-term land use impacts would occur if existing land uses are not compatible with the transmission project.

As discussed in chapter 2, Electricity Law 87/2015 has identified the limits of distances to be measured from the axis of the OHTL routes in order to identify the Right of Way (ROW) zone. There will be possible effects of electromagnetic fields from the OHTL, which may create certain restrictions in the future on some land uses under the power lines. A ROW of 25 meters from both sides for OHTL (of 220 kV) will be kept as a Right of Way (ROW) or buffer zone for maintaining the public safety from electric hazards and high exposure to EMFs.

Impact Significance:

For the construction of the towers of the OHTL, there will be an affected land due to these constructions. Therefore, since the project area is in a privately owned desert land, the significance of this impact is minor.

There is no potential impact of having involuntary resettlement since the OHTL project components are within the land owned by NREA (Agreement attached as Annex 1)

- Landscape/Visual impact

Potential sources of visual impacts during construction of OHTL along the routes include:

- Visual contrasts in the landscape from access tracks and staging areas
- Small-vehicle traffic for worker access and frequent large-equipment traffic for project and access road construction.

Project component installation would produce visible activity and dust in dry soils. Project construction may be progressive, persevering over a period of time. Ground disturbance (e.g., trenching and grading) would result in visual impacts that produce contrasts of color, form, texture, and line. Soil scars and exposed slope faces could result from excavation, leveling, and equipment movement.

Impact Significance:

The impact associated to the visual intrusion is considered minor, localized and temporary. Therefore, the standard protection for the ground disturbance, dust, wastes generated will be sufficient to mitigate to ensure the proper management and to minimize the impact.

- Archeological and Cultural Sites

The OHTL route is far distance from any cultural or archeological sites. It is not expected that any impacts may appear during construction on any surrounding cultural or archeological sites. This impact is considered: insignificant impact.

- Ecological (Fauna and Flora) – excluding birds

The proposed route of the OHTL line up is mainly located on desert margins, sand areas habitat, and therefore poses no threat to endangered species. The investigated habitats are not unique and are very common and widespread in neighboring areas which would provide alternative habitats for the sympatric faunal species to move to these habitats and continue their life cycle.

The potential impacts of construction are likely to be localized and good site management practices will be implemented, no significant effects are predicted.

Mitigation actions have been developed for each priority biodiversity feature or groups of features to ensure the systematic implementation of the mitigation hierarchy i.e. avoid, reduce (minimize), remedy (restore) and offset. This will allow for the careful management of risk and the best possible outcomes for the project and local communities, without compromising the health, function and integrity of the ecological system.

Impact Significance:

It is considered to be a Minor impact

- Water Resource (groundwater, geology and hydrogeology)

Impacts on groundwater would arise due to activities that cause soil erosion, discharge of sanitary water, contaminant spills (especially oil) and leaching of accumulated/dumped wastes at the event of rainfall or runoff water. Soil contamination could also occur by merely the contact between the waste and the soil. In addition, the climate study also indicated that the rate of rainfall at this specific site is very low (less than 3 mm/year). These will reduce the significance of the impact.

Regarding the surface water and potential pollution on the drinking water, it is not expected that the construction of the OHTL will have any impacts as there are no surface water as well as drinking water exist at the surrounding area.

Impact Significance:

This impact could be classified as Minor Impact which is believed to be fully controlled with the implementation of proposed mitigation measures such as standard construction precaution and prevention measures; including waste management (solid and liquid, hazardous and non-hazardous) in order to avoid accidents, pollution and spillage encountered during the construction. The standard prevention or precaution measures shall be prepared by the contractor prior to the construction. It is preferable to include the waste management plan to be included in the ToR of the contractor.

- Culture Resources and Privacy of Local Communities:

Local communities are expected to be exposed to openness and interaction with the outsiders of the project crew and workers during the construction phase. This impact is expected to be minor and temporary. Since the workers and the contractor are expected to respect the local culture of the community, as well as respect the privacy of the surrounding residential area, these impacts will end upon completion of the construction phase. It has been recommended in the ESMP to maximize the use of local labor to reduce such impact and to maximize the benefits to local communities.

- Creation of Job Opportunities and Flourishing Economies of Construction Sites

The project can benefit from the opportunity of the construction activities to have a better relation with the surrounding community, facilitating later the acceptance of the project operation in the area. The project may participate in creating job opportunities for local people from the neighboring residential areas such as the Bedouins, Ras Gharib City, and Wadi Dara Village described in the social baseline (chapter 5) as construction workers and guards will be needed

during the construction process. The job opportunities offered during the construction phase represent a temporary high positive impact, as it will add to the benefits of nearby resettlements from the project.

6.2.2 Impact Assessment during Operation of OHTLs

- Hazardous Materials and Wastes Management

There shall be different types of wastes generated during the operation phase of OHTL resulting from maintenance, repair and replacement activities. Among these types the following:

- Waste cables that will be replaced along the transmission line. Some of these cables may be covered with PVC insulators, which, if burned, cause harmful emissions including dioxins. Accordingly, waste cables could be of high risk if PVC cables were disposed in open dumps where it could be exposed to open fires.
- Scrap fittings, insulators, cross arms, conductors, and other scrap which are expected to be from inert materials that does not cause high risk in disposal/recycling procedure.

Impact Significance

Non-hazardous wastes which include domestic waste, and scrap associated with relatively low environmental risks. However, certain waste management procedures should be considered in order to avoid situations where scrap occupies large areas of land and causes aesthetic and land-use impacts.

Hazardous waste will be mainly generated from mechanical room during maintenance of equipment along the transmission line. Therefore, it is expected that the amount of generated hazardous waste will not be significant and it will be collected by a licensed waste contractor

The impact is considered of Medium significance due to the small amount of hazardous waste generated. The ESMP includes measures for establishing temporary stores (waste accumulation areas) for scrap at the project site and keeping the tidiness and cleanliness of these stores until scrap is sold for recycling or disposed as shall be detailed in the ESMP. In addition scrap, wastes shall be segregated as recommended according to the ESMP. Implementing the measures could reduce the impact to be of a minor significance.

- Effect of the Electromagnetic Fields (EMF)

Table 6-1: ICNIRP guidelines for EMF public and occupational exposure

Frequency	Public Exposure		Occupational Exposure	
	Electric Field (V/m)	Magnetic Field (mG)	Electric Field (V/m)	Magnetic Field (mG)
50 Hz	5,000	1,000	10,000	5,000
60 Hz	4,150	830	8,300	4,150

OHTL generate electromagnetic fields around the conductors, the intensity of such fields are proportional with the line voltage and electric current which changes in strength over time as the demand for electricity fluctuates. There are some concerns that EMFs could cause health impacts to the general public by prolonged exposure. EMFs have been considered by the International Agency for Research on Cancer (IARC) as possible carcinogenic, this classification was based on some evidences; however, there is no agreement among the scientific community about certain effects of EMFs.

In order to maintain safety of the general public and minimize exposure to EMFs some laws and guidelines require maintaining a suitable ROW distance so that the EMFs would effectively attenuate at the edge of this ROW. As mentioned in Chapter 2, The Egyptian Electricity Law 87/2015 indicates that the guidance ROW distance for transmission lines is 25 meters for high voltages from the center of the transmission

Impact Significance:

The ICNIRP has set a guideline figure that public exposure to EMF should not exceed 830 mG and occupation exposure should not exceed 4,150 mG, these figures for electric fields are 4.2 and 8.3 kV/m for public and occupational exposure respectively. By fixing a ROW distance of 50 meters (divided into 25 meters each from the Centre of the transmission lines(for 220 kV OHTL) and since the distance between the OHT and the nearest community is 15 Km, the impact of EMFs on the inhabitants is expected to have a medium impact significant which will be minimized to Minor Impact if mitigations are applied.

- Risk of Soil Contamination

Risk of soil contamination associated with the operation phase of the transmission lines is minimal. This could only arise if spent parts during maintenance are accidentally dumped at random sites across the line which is totally banned. The severity of such impact will depend on the local conditions where the waste is dumped and whether contaminants migration and propagation would be likely to take place in the event of a rainfall.

Impact Significance:

Along the transmission line the impact is considered minor impact if design precautions are applied. Application of appropriate mitigation will effectively control the impact and minimize it to the maximum possible extent.

- Noise

Noise from OHTL are usually not clearly audible to a person on the ground below; however noise may be emanated due to corona effects. Corona associates with operating OHTL under certain weather conditions, rainy and foggy weather, which does not normally occur within the project area.

The baseline assessment of noise quality along the OHTL indicated that the hourly equivalent sound levels do not exceed the 8-hr maximum limit value of 45 dB as mentioned in the Egyptian law no.4/1994.

The noise impacts could be analyzed in two main aspects: noise impact within the project areas, and the noise impact on the neighboring receptors.

Impact Significance:

Since noise may be emanated from OHTL due to corona effects only which is associated with the operation hours of the OHTL and special weather conditions, the impact is considered minor.

- Archeological and Cultural Sites

Impacts during the operations and maintenance phase for cultural resources as well as visual impact does not have any significant impact and OHTL. Therefore, there are no mitigation measures to be developed.

- Natural disaster risks

The potential environmental impacts of a seismic event are anticipated to be significant in the route of the OHTLs. The risk of floods is high in the area. This impact would be considered as significant impact.

Impact significance:

Hydrological and hydraulic analysis should be carried out to determine the accurate water depth and velocity at each point inside the project area. Flood protection measures should be applied where applicable.

- Impact on Bird Migration

Bird migration as a global major concern can be affected by operation the power line. The bird migration pattern existing on the site and its interconnection lines have been examined.

In general, it's so important for any faunal assessment of any proposed transmission line's route to be studied from the prospective of the impact on bird migration and this is due to the special and unique geographical position of Egypt, in general, and Ras Gharib, in particular, for migratory birds.

As described in the avifauna description of the area (Chapter 5), planned transmission line in Ras Gharib, is located within an important bird migratory routes in the Gulf of Suez area due to the existence of 1% of the total flyway population for 13 species, of which some are endangered and others are of conservational concern. These birds are susceptible to collisions and electrocution.

Impact significance:

Impacts of power lines on the bird migration is medium Mitigation measures and mitigations measures should be implemented along the line to protect migratory birds.

- Health and Safety

There are major safety risks associated with the operation of OHTL: 1) electric shock risks, 2) the probability to fall down the towers, 3) impact of electromagnetic field under the ROW and, 4) fire risks. Electrocution could happen for maintenance operators during repairs or to the general public

because of unforeseen accidents; however the normal safety precautions that are followed in the design and construction of transmission lines, transformers, etc. are generally minimizing such risks both to the general public and to the maintenance workers.

A number of epidemiological studies suggest small increases in risk of childhood leukemia with exposure to low frequency magnetic fields in the home. However, scientists have not generally concluded that these results indicate a cause-effect relation between exposure to the fields and disease (as opposed to artifacts in the study or effects unrelated to field exposure). In part, this conclusion has been reached because animal and laboratory studies fail to demonstrate any reproducible effects that are consistent with the hypothesis that fields cause or promote cancer.

Fire risks could be due to overloading of transmission lines, a risk that is also minimized by adequate safety precautions in the design and operation of the system.

Although electrocution accidents and fires could lead to losses in lives and properties, it is believed that the normal design, construction and operation procedures expected to be followed by the EETC, in accordance to Labor Law, No. 12 of year 2003 will provide sufficient safety precautions so that accidents will be due to unforeseen factors that could not be considered in risk estimation

Impact significance

Health and safety for the sensitive recipient (nearest community surrounding the project site of transmission lines is 15 Km away) does not have a significant impact, as it is described previously that the project site is located in a vacant desert land. Therefore, the impact can be classified as minor.

In addition, the medium to major impact is identified for the health and safety of the workers. The standard protection of the workers, especially for the workers that involved in the risk due to the height has to be put into mitigation measures and in the management and monitoring plan to minimize and reduce the significant impact. The impact has been classified as medium impact that could be reduced, following mitigation measures, to minor impact.

In addition, regarding the safety issues, EETC periodically provide the specific trainings for the operators and the workers who are responsible for the work of operation and maintenance of the transmission line. The training include civil protection, firefighting and smoke detection, besides the operation and maintenance of the transmission lines and its equipment. although EETC is already taking precaution for its operator and workers for safety standard, the ESMP is designated to minimize the impact of such accident.

In addition, the medium to major impact is identified for the health and safety of the workers. The standard protection of the workers, particularly, for the workers who get involved in the risk due to the height has to be put into mitigation measures and in the management and monitoring plan to minimize and reduce the significant impact.

- Visual Intrusion

The overhead transmission lines would be highly visible in natural landscapes. The artificial appearance of a transmission line may have visually intrusion associations for some, particularly in a predominantly natural landscape. Visual evidence of these projects cannot be completely avoided, reduced, or concealed.

Impact Significance:

Major impact will be associated to the visual intrusion that cannot be avoided or mitigated.

- Ecological Resources (Flora and Fauna)- excluding birds

The impact of the OHTLs is insignificant on flora and fauna as already the area don't have any important flora or fauna.

- Creation of Job Opportunities and Flourishing Economies

The availability of stable electricity service may encourage members of the local community to open new business activities. This represents a positive opportunity for members of the local community. The problem that may arise can be related to increasing consumption patterns of electricity with the improvement of the service. It is a positive impact.

Table 6-2: Assessed significance of expected impacts during the construction phase of OHTL

Impact	Likelihood and Severity	Significance	Impact assessment after the implementation of mitigation measures
Impacts during construction phase of the OHTLs			
Impacts due to handling of construction waste	Likely to occur - short term – Highly sensitive receptors include soil and workers. Receptors with low sensitivity include groundwater.	Medium	Reduce impact significance to minor
Construction air emissions	High likelihood to occur – short term – limited to workers.	Medium	Minimizing impact significance – only needed in loose sandy soil
Construction noise	High likelihood to occur – short term - Highly sensitive receptors including workers only along the line.	Medium	Minimizing impact significance
Impacts on Fauna and Flora	Medium likelihood to occur – short term	Medium	Minimizing impact significance
Cultural resources	Low likelihood of major or medium impacts	Minor	Standard mitigation measures of recording and reporting
Human Health and Safety	Low likelihood of major or medium impacts for workers– high likelihood of minor impact for sensitive recipient	Minor to Medium	Minimizing impact significance

Impact	Likelihood and Severity	Significance	Impact assessment after the implementation of mitigation measures
Impacts during construction phase of the OHTLs			
Limitations on land use and risks of involuntary resettlement	Low likelihood of major or medium impacts	Medium	No mitigation measures is needed
Losing environmental benefits of trees along power lines	Low likelihood of major or medium impacts	Minor	Minimizing impact significance
Removing trees on ROW	Low likelihood of major or medium impacts	Medium to Major	No mitigation measures is needed
Culture Resources and Privacy of Local Communities	Low likelihood of medium impacts- short term impact	Minor	Minimizing impact significance.
Impacts on traffic	Low likelihood of major or medium impacts	Medium	Reduce impact significance to minor
Visual intrusion	Low likelihood of major or medium impacts and localized	Minor	Minimizing impact significance
Impacts on soil and Groundwater	Medium likelihood to occur – long term impact – irreversible in case of hazardous waste contaminants (reversible after a very long period).	Medium	Reduce impact significance to minor

Impact	Likelihood and Severity	Significance	Impact assessment after the implementation of mitigation measures
Impacts during construction phase of the OHTLs			
Creation of Job opportunities	Increasing job opportunities for the local community as workers and engineers will be for the construction phase.	Moderate positive impact	No mitigation measures is prepared

Table 6-3: Assessed significance of expected impacts during operation phase of the OHTL

Impact	Likelihood and severity	Significance	Impact assessment after the implementation of mitigation Measures
Impacts during operation phase of the OHTLs			
Risk of Waste generated	Likely to occur - short term – Highly sensitive receptors include soil and workers. Receptors with medium sensitivity include nearby projects/settlements. Receptors with low sensitivity include groundwater.	Medium	Minimizing impact significance Waste management implemented according to EEAA regulations, especially for industrial hazardous wastes (solid and liquid wastes). Regular monitoring for domestic sewage network and provision of waste bins for temporary storage before collected by municipality. Disposal means of the hazardous wastes will be according to the Egyptian laws and regulations regarding the disposal.

Impact	Likelihood and severity	Significance	Impact assessment after the implementation of mitigation Measures
Impacts during operation phase of the OHTLs			
Exposure to EMFs	Likely to occur - long term impact	Medium	Minimizing impact significance In order to maintain safety of the general public and minimize exposure to EMFs some laws and guidelines require maintaining a suitable ROW distance of 25 meters (for 220 kV OHTL) so that the EMFs would effectively attenuate at the edge of this EMF.
Risk of soil contamination	Low likelihood of occurrence - short term impact	Minor	Minimizing impact significance Following standard protection for the soil and proper waste management described on the section of waste management measures
Noise	Low likelihood of occurrence - short term impact	Minor	Minimizing impact significance
Cultural resources	Low likelihood of major or medium impacts	Insignificant	Standard mitigation measures of recording and reporting
Health and Safety	Low likelihood of minor impact for the sensitive recipient and medium to major for the workers	Medium to Major	Standard protection for the workers especially working at elevated heights
Natural disaster risks (Floods)	Medium likelihood to occur	Minor to Medium impact	Standard mitigation measures to avoid/minimize the impact of floods.

Impact	Likelihood and severity	Significance	Impact assessment after the implementation of mitigation Measures
Impacts during operation phase of the OHTLs			
Visual Resources	Low likelihood to occur	Very low impact or negligible impact	No mitigation measure is prepared
Impact on Bird Migration	Medium likelihood to occur	Medium	Standard mitigation measures to avoid/minimize the impact on bird migration.
Ecological Resources(Fauna and Flora)	Low likelihood to occur	No significant impact	No mitigation identified
Creation of Job opportunities	Creating job opportunities for workers needed during the maintenance phase. Increasing the opportunity for opening small business and shops as a result of having a stable electricity service	Moderate positive impact	No mitigation measures is prepared Awareness campaigns for community members to rationalize consumption of electricity service

7.0 ENVIRONMENTAL AND SOCIAL IMPACTS MANAGEMENT PLAN (ESMP)

This chapter presents Environmental and Social Management Plan (ESMP) developed for EETC and the contractor for Ras Gharib OHTL. This chapter consists of the following sections:

- ESMP during construction and operation phase (including detailed mitigation measures of OHTLs
- Guidance on Emergency Response Plans

7.1 Objective of the environmental and social management plan (ESMP)

This ESMP has been prepared as supporting documentation and it includes an Environmental Monitoring Plan. The ESMP is to provide:

- A practical framework for establishing best practice environmental management standards to mitigate potential environmental harm for each activity undertaken.
- Assist managers, supervisors and construction crews from the contractor to comply with applicable legislation.
- A mechanism to reduce the potential impacts of the construction and operation of the facility

7.1.1 Definition of ESMP

The Environmental and Social Management Plan (ESMP) consists of a set of mitigation, management and monitoring measures to be taken during implementation of the project to avoid, reduce, mitigate, compensate or offset any adverse social and environmental impacts analyzed. The ESMP has distinguished between mitigation measures that should be implemented during the construction and operation of the project OHTL.

ESMP defines procedures to ensure that the management of environmental and social issues during the different project phases are undertaken in accordance with national legislation and best practice procedures. The ESMP presented in this reflects the implementation procedures and mechanisms for the mitigation measures and monitoring activities of the potential impacts previously discussed in Chapter 6. The ESMP assigns certain tasks for different stakeholders according to their roles and responsibilities in the project.

The following sections beside the environmental mitigation, it will present the socioeconomic mitigation measures and the social management and monitoring plan as well. The management and monitoring plan mainly involves the EETC technical team. Reference is made to these measures in their place.

The successful implementation of the ESMP will depend on a range of different elements. To ensure the ESMP incorporates and successfully integrates with other interfacing documents, the following elements must be considered and acted upon:

The environmental and Social Management unit should be adequately staffed with competent personal to ensure the proper implementation and monitoring of the ESMP.

The development and management of second tier documentation that facilitates the necessary tracking and performance monitoring all social and environmental risks and complaints will be developed and firmly implemented.

7.1.2 Management Responsibilities

Roles and responsibilities for implementing the ESMP during the construction phase have been proposed based on the following set-up:

- EETC will contract an authorized and specialized consultant to prepare detailed designs and tender documents, for construction of OHTL, which will include the environmental measures that should be undertaken by the construction contractor.
- During tender's evaluation EETC will assure that the winning offer includes the required environmental mitigation measures to be implemented during construction. This will include the management of traffic and management of wastes (solid and liquid; hazardous and non-hazardous wastes).
- EETC will assign supervision staff who will undertake supervision over the contractor to make sure that the mitigation measures specified in the design/tender document are implemented on field.
- The site supervisor consultant from EETC will produce the monthly report about the performance of the contractor in implementing the ESMP measures
- During the operation phase, the OHTLs shall have permanently at least one staff member for health, environmental and safety during operation and maintenance of the substation. HSE staff appointed by EETC (under environmental safety and health department) will be responsible for monitoring the ESMP. He/She will be responsible for implementing the mitigation measures and providing periodic reports to EETC.

7.2 Environmental Management Plan (ESMP) During Construction of the Overhead Transmission Line

7.2.1 Management of Wastes [Hazardous and Non-Hazardous]

During the construction of the OHTL the following mitigation measures shall be applied

Mitigation measures:

- EETCs Contractor should communicate with the local authorities including Ras Gharib City Council for officially assigning location for the disposal of construction waste within the governorate. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.
- A specified location along the proposed routes for the transmission line should be assigned for temporary accumulation of construction waste. This location should be agreed upon with the contractor prior to starting the project.
- Ensure that excavation done for steel towers does not unnecessarily exceed the designed diameter of the butt of the tower and that the excavation is exactly as deep as the foundation design requirements. This will minimize to the extent possible the volume of excavated soil.
- Make sure that the anchors are fixed at the designed depth and at the designed angle so that they provide the required support to the tower and prevent its early failure. It will be required that construction supervisor makes sure that contractors do not fix the anchor vertically and then bend it during the site survey. Premature partial or complete failure, besides the associated risks, would increase the volume of wastes generated and would result in additional construction works/reinforcements.
- Maintain the correct tensioning of the conductor so that it will not have high tension loads, line vibrations and premature failure. During construction phase the supervisor engineer has to make sure that after the conductor has been properly stung, it is brought up to the initial tension within 4 hours, and that it sits in the rollers for at least two hours, after being tensioned, to give it chance to equalize itself prior to tying the conductors to the insulators.
- Construction waste should be hauled at the end of each working day to the officially approved disposal sites or to the specified interim on site accumulation area. Adequately equipped trucks should undertake waste transportation. The supervising Consultant should make-sure that the trucks are not overloaded and that the waste is adequately contained inside the rear box or covered to prevent dust or particles movements from the truck. The supervising Consultant should also occasionally inspect that the truck drivers are disposing of the waste at the approved location, and regular checks to the disposal site.
- The on-site waste accumulation area (WAA) along the transmission lines shall be designed to accommodate the expected amounts and different types of wastes. It shall be covered and provided with adequate flooring for possible access of forklifts and small trucks. The waste officer should keep separate areas for each type of waste, keep internal passages inside the WAA for facilitating access and should order for regular cleansing of the area. Records of the admitted waste shall be kept in a register and before the WAA is full, the waste officer should organize

to sell or dump the scrap to recycling contractors or at the authorized landfill respectively.

- Domestic waste generated on site shall be segregated and not mixed with any other type of waste.
- Construction contractor shall provide portable water cabinets on site to provide hygienic work environment for the work force. The Portable water cabinets shall be equipped with an external tank for sewage storage.
- Construction contractor shall contract competent authority at each governorate premises for safe disposing of generated sewage.

For the management of HW, A hazardous waste management plan (HWMP) is proposed which will direct actions to be undertaken to ensure environmentally sound management of hazardous wastes. The plan identifies the roles and responsibilities for EETC's staff and/or the Contractor's staff, how hazardous wastes can be identified and safely handled, the places where the hazardous wastes could be accumulated and the training requirements for the staff involved. The HWMP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors.

Hazardous waste such as spent transformer oil should be collected/disposed through an authorized contractor

- Other types of hazardous waste (oil filters, contaminated cloth, contaminated soil, used batteries, … etc.) should be collected in separate plastic bags labeled with the type of waste contained. The contractor should arrange for transferring these types of waste to an authorized landfill against documented manifests signed by the transfer truck and the landfill representative.
- Any unforeseen accidents of hazardous waste leakage out of the planned procedures should be reported. Such accident reports should describe how such waste have leaked, and measures taken to contain the leak and to prevent such accident in the future. Monitoring.
- Scrap steep and other salvaged materials to be disposed/recycled off-site by licensed contractor.

Activities:

- No monitoring activities are required for construction waste as long as the above mitigation measures are implemented
- There should be a form prepared by EETC for the storekeeper to keep records of quantities, types of scrap received in the store and the location where it has been received from.
- As mentioned above, the hazardous waste monitoring plan has been developed in a separate report. The hazardous waste and the store keeper should be provided by the contractor

Reporting

- The monthly report of the construction supervisor consultant should include how well does the contractor abide to the above measures and any comments noticed by the site supervisor about mismanagement of construction waste during the month.
- The storekeepers should prepare a quarterly report including received scrap items, sold items and disposed items

7.2.2 Management of Excavations

During the construction of the OHTL the following mitigation measures shall be applied

Mitigation measures:

- All excavations shall be made in accordance with the approved drawings.
- The sides of all excavations, which might expose personnel or facilities to danger resulting from shifting earth shall be protected by providing slope to the appropriate angle of repose or benching in the sides and ends of the excavation or ladders must be used and secured, enough to withstand at least 1 meter above the top of the excavation.
- All excavation deeper than 1.5 meters must have barriers and toe boards around the outside to-prevent persons and material failing into the excavation. Barriers must be of a strength that is capable of withstanding the weight of a person falling against the barrier. Barriers shall be readily visible by day or night.
- All persons in excavation must wear safety helmets and safety boots
- Vehicles and other machineries or construction equipment must not be allowed to come within 2 meters of an excavation unless working in connection with the excavation.

Monitoring Activities

- An inspection must be conducted at the end of the work to ensure that the excavation has been left in a safe manner. Heavy loads shall not be put on the edge of the excavation.
- The observer must conduct monitoring of the safety tools for the workers and the vehicles restrictions along the excavation and trenching sites.

Reporting

The observer should report on the monthly basis of the accident or the worker's obedience.

7.2.3 Management of Ambient Air Emission

During the construction of the OHTL the following mitigation measures shall be applied

Mitigation measures:

- In areas of loose sandy soils the contractor should provide source of water for spraying soil before excavation, filling, loading and unloading. If the site supervisor consultant noticed visual/sensible increase of dust emissions, they should ask for additional spraying of water in the spot generating high emissions.

Monitoring activities:

- Frequent monitoring of dust emissions and the amount of water sprayed on soil, under the supervision of the Consultant.

Reporting

The Site Supervisor Consultant shall prepare a monthly progress report, which would be submitted to EETC, on implemented mitigation measures. The Consultant should report on any incident of high dust emissions or smoke during construction works including the natural dust that might be encountered especially at the site that most of the area is desert land.

7.2.4 Management of Noise

During the construction of OHTL the following mitigation measures shall be applied

Mitigation measures:

- Workers that operate noisy machines and nearby workers should be supplied with earmuffs and should be instructed to put them on when they get into noisy zones. Contractors should be responsible to instruct their workers to abide to this role, and the site supervisor should make sure the Contractor is compliant with this role
- Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits
- Avoid construction activities at night

Monitoring activities:

- No monitoring measures shall be undertaken since the noise emissions are temporary.

Reporting

- The monthly report should include how well does the contractor abide to the above measures and any comments noticed by the site supervisor about high noise levels.
- A monthly report on any observations or complaints about high noise level.

7.2.5 Management of Traffic

During the construction of OHTL the following mitigation measures shall be applied

Mitigation measures:

- Consult with Ras Gharib Traffic Department during the construction phase for the overhead transmission lines that will cross the main roads.
- An agreement between contractors and supervisor consultants should be reached about the suitable location for temporary storage of construction materials, equipment, tools and machinery prior to starting construction of each reach of the power lines. No storage of construction materials or electric tools should be allowed in traffic lanes.
- Find suitable locations for temporary storage of conventional construction wastes.
- The contractors should make sure that the employed drivers of construction machinery (such as trucks and loaders) have received sensitization/training on safety utilization of their machines in order to minimize accidents risks.

Monitoring Activities:

No monitoring of physical indicators is required.

Reporting

Unusual traffic delays or accident caused during construction or any complaints received should be reported in the monthly report prepared by the construction supervisor consultant.

7.2.6 Health and Safety of Construction Workers

Potential impacts to worker and public health and safety during construction of a the proposed project are the same as those associated with any construction project involving earthmoving, use of large equipment, transportation of overweight and oversized materials, and construction and installation of industrial facilities. In addition, health and safety issues include working at heights. The practices of electricity companies in Egypt reflect that the health and safety procedures are relatively not abided by the workers. That might result in injuries and death.

Mitigation measures:

- In accordance with Labor law related to occupational health and safety No. 12 of year 2003 the workers should be oriented about the health and safety procedures.
- All safety procedures reported in the Law should be abided to by the workers and the top management.
- The contractor should assign a health and safety supervisor who ensures the workers are abided to the H&S procedures.
- The Contractor should make sure that onl trained and certified workers to install, maintain, or repair electrical equipment.
- The health and safety supervisor should deactivate and properly ground live power distribution lines before work is performed.
- The contractor should make health and safety facilities available in the project site
- Contracts should be signed with the health facilities close to the construction site (Ras Gharib Hospital);
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers;
- Safety belts should be provided to workers working at height and should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident;
- Workers should wear high visibility belts when working at height;
- When operating power tools at height, workers should use a second (backup) safety strap.
- Testing structures for integrity prior to undertaking work;
- A guard should be assigned to assure that securty of the working areas.

Monitoring Activities:

- The resident health and safety supervisor should follow the commitment of workers to use the protective equipment.
- The lists of injured workers and community people should be documented and reported to the H&S supervisor on daily bases
- The Grievance log should be monitored, particularly, the cases regarding injuries among the community and the workers

- All workers should attend an orientation session about health and safety procedures

Reporting

- Monthly reporting should be prepared by the H&S supervisor and handed to the H&S manager within the Project Management Unit (PMU). The PMU is located at the Gulf of Suez Substation.
- Orientation session reports should be prepared by the H&S consultant
- A report should be prepared by the H&S manager within the PMU and shared with the funding agencies on quarterly basis. That report should include the following parameters:
- Total injured workers distributed by their type of work and project site
- Total injured people among the community people distributed by age category, sex and area
- Total complaints related to H&S procedures. The grievances should be segregated by the type, area and the aggrieved person sex.

7.2.7 Safety of Mechanical Equipment

Mitigation measures:

- All mobile mechanical equipment shall be operated by authorized personnel and has a valid license.
- All equipment shall be checked prior to use by qualified personnel.
- Brakes, lights, tire pressure and battery shall be inspected before using the equipment. Revolving lights must be used for heavy duty vehicles.
- The design capacity of any equipment shall never be exceeded. The equipment shall not be modified to alter its capacity.
- All drivers shall have valid driving license.
- Equipment that could present a hazard to personnel, if accidentally activated during the performance of installation, repair, alteration, cleaning or inspection, work shall be made inoperative prior to state of work.
- Equipment, which is subject to unexpected external physical movement such as rotating, turning, dropping, sliding etc., mechanical and/or structural constraint, shall be applied to prevent such movement.
- All equipment, which is locked or taken out of service, because of potentially hazardous condition, shall be appropriately tagged indicating the reason for being out of service.

Monitoring Activities

- A safety observer during using heavy mobile equipment, which may be hazardous, by its movement. The observer shall ensure that people are kept away of mobile equipment.
- Observer shall appoint specific place for heavy equipment standby area when it is not been used or taken out of service.
- Observer shall ensure the performance of the heavy equipment, tagged the equipment which are locked or taken out of service and reported on monthly basis

Reporting

- Reporting on the monthly basis, the total number and the type of heavy equipment use during the construction phase.

- Reporting on the monthly basis the number of heavy equipment that are locked or taken out of service and the reason of the damages.

7.2.8 Management of Flora and Fauna (excluding birds) Impacts

At the OHTL routes no mitigation measures are required to be implemented to protect endangered species except along the tracks that will be made to facilitate transportation for raw materials and equipment as discussed in the project description chapter.

Mitigation measures

- Minimize noise and artificial lighting at night during construction
- No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation
- Construction and vehicle movement should be made to minimum

Monitoring Activities

- Evidence of provisions for minimizing light and noise practices during construction
- Reported incidents of staff violating the hunting ban to EETC
- Provision of information through staff induction, toolbox talks, leaflets, office posters, wildlife photo competition
- Report on habitats and locations of protected/threatened plant species

Reporting

- No reporting is required

7.2.9 Management of Possible Impacts on Culture and Privacy of Local Communities

Potential impacts on cultural resources include visual impacts resulting from large areas of exposed surface, increases in dust, and the presence of large-scale equipment, machinery, and vehicles for cultural resources that have an associated landscape component that contributes to their significance, such as a sacred landscape or historic trail.

The construction of such projects is usually done through specialized construction firms working in the field of energy. Therefore, local communities are expected to be exposed to openness and interaction with the outsiders of the project crew and workers during the construction phase. This is not a significant concern in urban areas. However, in the conservative rural areas and Bedouin society, this may affect the local people's cultural privacy.

Mitigation measures:

- Minimizing the number of workers from outside the project areas is highly recommended. The contractor should be advised to employ construction labor from the areas where construction works will take place. The incentives to contractors for such measure include reducing accommodation and transportation for his workers.
- The community leaders could take part in the process of employment in terms of informing their local community about job opportunities
- The newly employed persons and non-Egyptian experts should have clear codes of conduct and be oriented about the norms and traditions of the surrounding

communities, particularly, the Bedouin ones. WB Good Practice Note on managing labor influx[9] should be applied as needed.
- In case of any violation of norms, the site engineer should handle meetings with the community leaders in order to settle any disputes
- Enable grievance and redress mechanism in order to receive people concerns about such impact

Monitoring Activities:

- The contractor should provide lists of construction workers and their governorates of origin on quarterly basis.
- The Social Development Officer (SDO) should provide reports about any stakeholder engagement activities (meetings- interviews- group discussions) conducted with the communities in case of any problem occurred with the residence of project areas.
- The SDO should provide reports about any training sessions conducted with the workers and the non-Egyptian personnel.

Reporting

- Reporting on percentage of labor recruited from local governorates should be presented by the contractor to the supervisor consultant and to EETC on quarterly basis
- Reporting on meetings conducted with the community people
- Reports about training sessions conducted with the workers

7.2.10 Management of Land Use Restrictions

The ROW zone as identified by the Electricity Law 87/2015 will restrict the construction of new buildings and planting of high trees on the routes of the OHTL (25 m from the center of the line from both sides) in order to maintain the safety of the line; therefore, in case of OHTL, there will be a limitation on the construction of buildings. Since the OHTL line is in a vacant desert area owned by NREA, limitations on construction and agriculture are not relevant.

Mitigation measures:

- Route of power lines should be placed in vacant desert lands.
- Access roads for the vehicles and storage areas during construction have to be defined during the preparation of the construction phase.
- Inform the local people and raise their awareness about the importance of the project. Mobilizing the community people is essential in terms of raising their awareness about the importance of the project and the compensation mechanism to be adopted if any
- The EETC is responsible for clearing the tower site after completing its work, it shall address any problem with the landowner (NREA) or with any other authority / agency along the line routes would arise.
- Form a committee of local people and involve them in the compensation process.

Monitoring activities:

[9] http://pubdocs.worldbank.org/en/497851495202591233/Managing-Risk-of-Adverse-impact-from-project-labor-influx.pdf

- Conduct regular monitoring visits to verify that no encroachment took place under the ROW.
- Monitoring of ROW maintenance activities to apply proper control methods.

Reporting

- The designer should identify the locations of intersection between OHTL ROW with areas of restricted uses.
- Reporting associated land acquisition problems, if any, could arise along the routes line.

7.2.11 Management of Socio-economic Impact

Direct impacts would include the creation of new jobs for construction workers and the associated income and taxes generated by the project. Such impact is positive in nature; however, it might be a negative impact in case of not managing employing activities efficiently and wisely. As well as, paying attention to employing some of the community members might put limitation to community disturbance. As stated by the representatives of the electricity companies, it is cheaper for the company to find local workers from each community in order to save the costs of transporting workers from outside. The workers who are needed for such construction works are those with low and medium skills, who represent a high proportion of the residents in the targeted areas.

Mitigation measures:

- Job opportunities should be primarily provided to the community people adjacent to the OHTL
- Community leaders should be represented in a Steering Committee. They should be informed about the job opportunities available for the community people.
- The community should voice their concerns through an appropriate grievances and redress mechanism.
- The workers should be fully aware about their nature and duration of their work.
- Reducing the value of residential units is an unavoidable impact along the OHTL routes. However, it is strongly recommended that EETC should provide awareness raising among the community that the EMF impact is limited in case of respecting the ROW.

Monitoring Activities:

- Monitoring the lists of workers and their origins
- Site visits to be paid to the surrounding areas in order to investigate the prices of properties pre and post construction
- Review the grievances log in order to verify whether there are any grievances related to economic impacts

Reporting

- Monthly report should be developed by the contractor including the workers employed during the previous month. Information included should be segregated by: 1) type of work, 2) workers, 3) the living area of workers
- Total complaints related to economic impacts. The grievances should be segregated by the type, area and the aggrieved person sex and age.

The ESMP for OHTL is presented in the following tables.

Table 7-1: Environmental Management Plan (ESMP) during Construction Phase of OHTLs

Potential Impact	Proposed Mitigation Measures	Project Phase	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTL					
Effects of construction waste	• Identify disposal sites for construction waste approved by the local authority • Identify a Waste Accumulation Area (WAA) within the construction site for temporary storage of construction waste, including a secured area for the interim accumulation of hazardous wastes • Adequate transportation and disposal of construction waste in compliance with local laws and regulations. • Allocate and prepare areas for temporary storage of scrap • Keeping tidiness and cleanliness of the WAA • The on-site waste accumulation area (WAA) along the transmission lines shall be designed to accommodate the expected amounts and different types of wastes. Domestic waste generated on the site should be segregated with any other type of waste. • Construction contractor shall provide portable water cabinets on site to provide hygienic work environment for the work force. The Portable water cabinets shall equipped with an external tank for sewage storage.	Pre-construction– construction	EETC- Waste officer nominated by EETC Construction contractor	EETC-Construction supervisor consultant	• Review local authority approvals • Site supervision • occasional inspection of disposal site • Auditing of allocated WAA • Auditing of stores

	• Other types of hazardous waste (oil filters, contaminated cloth, contaminated soil, used batteries, … etc.) should be collected in separate plastic bags labeled with the type of waste contained, disposed and recycled off by lincesed contractor. Any unforseen accidents of hazardous waste leakage of the planned procedures should be reported by the HSE officer.				
Excavation	• Identify the excavation depth and width according to the drawing design • Clear safety signs and boundary for the excavation sites • Safety and clear area around the excavation site • safety helmets and boots compulsory for workers	Pre- Construction	Construction Contractor	Construction supervisor	• Site supervision and occasional inspection
Construction air emissions	• Spraying soil before excavation in loose sandy soil	Construction	Construction contractor	Construction supervisor consultant	• Site supervision
Construction noise	• Provide ear muffs to construction workers usually located near noisy machines • Organize working hours so that noise exposure to workers will be minimized. •	Construction	Construction contractor	Construction supervisor consultant	• Site supervision
Impacts of Flora and Fauna	• Construction and vehicle movement should be made to minimum. • Access road has to be defined prior to the construction phase to	Pre-Construction &	Construction contractor Design consultant	EETC-Construction supervisor	• Site supervision • Access road map and access road management of the vehicles to the towers.

	avoid the resettlement or compensation. • Minimize noise and artificial lighting at night during constructionNo hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation			consultant-EHS officer	• Evidence of provisions for minimizing light and noise practices during construction
Impacts of culture and privacy of local communities	• Maximize the use of local workers as much as possible • Provide information/orientation sessions to the outsider • Engaging community people in employment process • Enable grievance mechanism	Construction	Construction contractor	Construction supervisor consultant	• Review of contractor's reports related to workers • Stakeholder engagement activities • Capacity building reports and orientation sessions reports
Human health and safety	• Restrict application to the health and safety procedures • Contractor should assign a health and safety supervisor • The contractor should make health and safety facilities available in the project site • Contracts should be signed with the health facilities close to the construction site • The Contractor should make sure that only trained and certified workers work with electrical equipment. Drivers should have a certified and valid license	Construction	Construction contractor	Construction supervisor consultant	• Review of contractor's reports related to health and safety measures as well as the lists of injured workers

	• All mechanical equipment should be checked prior to use • Appropriately tag all mechanical equipment that are locked or out of service • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers • Safety belts should be provided to workers working at height and should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident. • A guard should be assigned to secure the project area				
Land use restrictions and possible resettlement	• Avoidance mechanism should be fully adopted • Access roads and storage areas to be defined • Inform the local people and raise their awareness about the importance of the project. • Rehabilitating the construction site • Engaging the stakeholder during the process of compensation	Design, planning and implementation	Design consultant Contractor	Construction supervisor consultant EETC and local authorities	• The design consultant report

Socioeconomic impacts	• Job opportunities to be provided to the community workers • Integration of community leaders during the employment procedures • Workers should be aware about the nature and duration of their work • Appropiate grievance and redress mechansim should be provided fro the community	Construction phase	Contactor and sub-contractors in cooperation with the community leaders	EETC (site engineer and the SDO)	• Reports about the workers employed • Complaints raised about employment
Traffic	• Consult with the relevant traffic department on the route of the OHTL • Prevent storage of construction materials, equipment and machineries on traffic lanes • Capacity building of the drivers about safety utilization should be assured	Preconstruction and Construction	Construction Contractor	Construction supervisor consultant	• Site supervision and grievance log related to traffic impacts

7.3 Environmental Management Plan (ESMP) and Monitoring Plan during Operation and Maintenance (O&M) Phase for the OHTLs

During the operation of the OHTLs (220 kV), the operator of OHTLs (EETC) will be responsible for management and monitoring activities for operation and maintenance phases

7.3.1 Management of the hazardous and non-hazardous waste generation

Mitigation measures:

- Regarding the hazardous waste, it is also considered limited. When the OHTLs need to be replaced
- Temporary storage area will be defined to separate the storage area of the hazardous wastes with the non-hazardous waste before transporting it to the designated landfill.
- In general, a proper waste collection and storage plus regular waste collection by licensed contractors will need to be arranged by site management. To co-ordinate and control this, the site management should develop a waste management plan which is included in the ToR for the Contractor for waste management during construction and operation. For The hazardous waste, it will be managed and disposed in accordance with applicable Egyptian regulations and legislations by a specialized authorized company under the control of the Environmental authorities (EEAA)."

Monitoring Activities and Reporting:

- Implementation of the EEAA regulation for temporary storage, collection, transportation and disposal of hazardous waste
- Record keeping of the admitted waste and their quantity. When the waste is considered sufficient, the management shall dispose it to the designated landfill for solid waste.

7.3.2 Management of Electromagnetic Fields (EMFs)

Energized OHTLs generate electromagnetic fields around the conductors, the intensity of such fields are proportional with the line voltage and electric current which changes in strength over time as the demand for electricity fluctuates. So the only way to know how strong the field is at a given distance, at any particular moment, is to measure it with a magnetic field meter.

Mitigation measures:

- Routes of OHTLs are designed so that maximum possible distances could be maintained between the lines and developed areas
- A suitable ROW should be kept on both sides of power lines were no development buildings should be constructed. The Egyptian Electricity Law 87/2015 indicated that the guidance ROW distance is 25 meters.
- Maintaining standard safety procedures for the transmission lines. The EETC will distribute the safety standard procedures during the operational phase that put in detailed of the safety measurements include:
- Maintain minimum clearance between EMF generators and the ground according to the standard allowed;

- Provide climbing space to allow linemen to work more safely on the structures while they are energized;

Monitoring Activities and reporting:

- EMF should be measured frequently in different locations This monitoring should be undertaken by a specialized expert on quarterly basis. The detailed EMF monitoring plan will be better left to the EETC and local authorities to identify.
- Results of the EMFs monitoring plan should be reported to the head of environmental department on the local authorities, with the ESMP quarterly progress report.
- Design consultant should present the safety precautions, which have been considered, as a separate section of his design report

7.3.3 Management of Natural Risks

Mitigation measures:

Before commencement of construction of the OHTLs, the following mitigation measures shall be applied by EETC.

OHTL route considerations

- Avoid locating any of transmission line towers at flood runoffs routes
- Design of Foundations of the towers shall consider the flood runoffs risks

Monitoring Activities and reporting:

- No monitoring activities are required for the recommended mitigation measure as long as the above they are implemented

7.3.4 Management of Migratory Birds

The impact of the operational phase of the OHTL on the migratory birds is considered of medium significance. The transmission towers' design and distribution can pose fatal risk to birds through collisions and electrocutions. Avian collision can occur with power lines in case of presence of transmissions lines along migratory routes, at night or during low light conditions (e.g. dense fog).

Mitigation measures:

- Depending on the location and topography, it may be suitable to adopt a low-lying power lines that are located beneath bird-travelling altittude.
- Making the site un-attractive for the migrant birsds, by preventing cultiviation or planting of green areas around the site and preventing presence of solid or liquid waste.
- Installing visibility enhancements objects or line markers such as bird detterent, spheres, spiral vibrational dampers, or bird deflectors.

Monitoring activities and reporting:

- Carrying out Bird monitoring surveys including caracass observations and mortality surveys, as part of the seasonal monitoring, during spring and autumn seasons.

7.3.5 Management of Soil Contamination

Mitigation measures:

- In case a leakage occurred, the soil should be removed and sent for disposal as hazardous waste to a certified hazardous waste landfill as previously mentioned.

Monitoring activities and reporting:

- The amount and management methods of contaminated soil, should be undertaken by the Contractor include locations and reasons for such incidents.

7.3.6 Management of Noise Impacts

Noise impact on workers, and along the OHTLs route will occur during maintenance only. Workers could be exposed to relatively high levels of noise. This could be mitigated through application of the normal precautions normally taken by operator.

Mitigation measures:

- Workers that operate at the OHTLs should be supplied with earmuffs and should be instructed to put them on when they get into noisy zones. Operator EHS officer should be responsible to instruct their workers to abide to this role.
- Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits

Monitoring activities and reporting:

Measuring noise levels at on quarterly to assure that noise levels within the work environment within the transmission lines is complying with legal limits (kindly refer to chapter 2)

7.3.7 Management of the Land Use limitations

Land use impacts would be minimal since the land is owned by NREA. However, surrounding Bedouin families claim that these desert lands fall under their protection. In collaboration with the project and to ensure the sustainability of the project for EETC, a Ghafra (guarding) system is agreed upon with the Bedouins whereby a number of them are recruited to work as security personnel to guard the land from outside interventions and theft.

Mitigation measures:

- Recruit members of Bedouin families, which are affiliated to the project area, to work as security personnel.

Monitoring activities and reporting:

- Confirmation of employing members of surrounding Bedouin families as security management.

7.3.8 Management of Socioeconomics impact

The potential loss of economic wellbeing might occur due to:

- The temporary workers who will lose their jobs after the construction; consequently, their source of income will be affected. That might result in severe impact on their social status. Additionally, the workers might resort to raising conflict with the project.

Mitigation measures:

- Workers should be fully informed about the duration of work.
- The key issue for mitigating this impact is the community participation in all phases of the project. The consultation activities conducted during the ESIA were key point that stretched communication channels with the community. Continuous dialogue with the community might provide a better idea about the impacts of the project.

Monitoring activities and reporting:

- Total number of workers who complain due to losing their temporary work.
- Type of compensation to be provided to these groups.
- Quarterly report of the grievances received by the Social Development Officers
- Consult community through different meetings, Focus Group Discussions, and workshops on the current situation, perceived impacts, service providers, etc. This is being undertaken through the activities of the ESIA.
- The grievance and redress mechanism should be adequately reviewed, particularly, in case of any complains are raised due to the misconceptions. Reviewing GRM log will be useful as a monitoring tool.

7.3.9 Health and Safety

Possible impacts to health and safety include exposures to electromagnetic fields (EMF), accidental injury to workers during operation and maintenance activities. Additionally, health and safety issues include working at heights, working around energized equipment, working in potential weather extremes, and possible contact with natural hazards and either working at heights or in trenches.

Mitigation measures:

- In accordance with Labor law related to occupational health and safety No. 12 of year 2003 the workers should be oriented about the health and safety procedures.
- All safety procedures reported in the Law should be abided to by the workers and the top management.
- Workers should not approach an exposed energized or conductive part even if properly trained unless:
    - The worker is properly insulated from the energized part with gloves or other approved insulation; or,
    - The energized part is properly insulated from the worker and any other conductive object; or,
    - The worker is properly isolated and insulated from any other conductive object (live-line work).
- The operator should assign a health and safety supervisor who ensures the workers are abided to the H&S procedures

- The operator should make sure that only trained and certified workers are allowed to install, maintain, or repair electrical equipment. This includes making sure that workers are able to distinguish live parts, determine voltage of live parts, understand that minium approach distances outlinges for specific live line voltages, proper use of safety equipment and procedures;
- The health and safety supervisor should deactivate and properly ground live power distribution lines before work is performed.
- The Contractor should train workers in the identification of occupational EMF levels and hazards;
- EETC should establish and identify safety zones to differentiate between wok areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers.
- When possible, the contractor should enable work rotation to minimize exposure time to EMF or use of shielding materials for the workers.
- The operator should make health and safety facilities available in the project site
- Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers
- Safety belts should be provided to workers working at height and should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident.
- When operating power tools at height, workers should use a second (backup) safety strap
- Testing structures for integrity prior to undertaking work
- A guard should be assigned to assure that the community people are not stepping into the project sites. He should pay attention to children and old people.
- Identification of potential exposure levels in the workplace, including the use of personal monitors during working activities;
- Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers.

Monitoring Activities and reporting:

- The resident health and safety supervisor should follow the commitment of workers to use the protective clothes.
- The supervisor should follow on a day to day basis the accidents occur among the community people.
- The lists of injured workers should be documented and reported to the H&S supervisor on daily basis
- The Grievance log should be monitored, particularly, the cases regarding injuries among the workers
- All workers should attend an orientation session about health and safety procedures
- Monthly reporting should be prepared by the H&S supervisor and handed to the H&S manager
- A quarterly report should be prepared by the H&S manager and shared with the funding agencies on quarterly bases. That report should include the following parameters:

- Total injured workers distributed by their type of work and project site
- Total injured people among the community people distributed by age category, sex and area
- Total complaints related to H&S procedures. The grievances should be segregated by the type, area and the aggrieved person sex.

Table 7-2 Environmental Management Plan Matrix during Operation Phase

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
Hazardous and non- hazardous waste	• During maintenance, a storage area will be defined • A clear collection, storage, and transportation of waste will be included in the subcontractor waste management plan.	EETC Operator Waste Management Contractor	Budget to be defined by the subcontractor	• Site visits reports
Exposure to EMF	• Maintaining standard safety procedures for the trasmission lines	Design consultant/ Specialized Engineering Consultant	Budget to be part of monitoring plans	• Review design reports • Review consultant reports and implementation of measures
Natural Risks	• Avoid locating any of transmission line towers at flood runoffs routes or exits. • Design of Foundations of the towers shall consider the flood runoffs risks • Consider other mitigation measures factors	Designer contractor	Budget to be part of the designer Contractor contract	• Review the design of the towers • Ensure implementation of proposed measures

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
Impact on Birds	• Maintaining of 1.5 meter spacing between energized componenets and grounded hardware • adopt a low-lying power lines that are located beneath bird-travelling altittude. • Making the site un-attractive for the migrant birsds • Installing visibility enhancements objects or line markers such as bird detterent, spheres, spiral vibrational dampers, or bird deflectors. • installing of visibility enhancement object such as marker balls, bird deterrents, or diverters	EETC operator staff	Operation Cost	• Ensure implementation of mitigation mesures within the design
Soil Contamination	• In case a leakage occurred, the soil should be removed and sent for disposal as hazardous waste	▪ EETC Operator ▪ Waste management Contractor	Operation Cost	• Reports on contamination incidents

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
	to a certified hazardous waste landfill.			
Noise	• Workers that operate at the OHTLs should be supplied with earmuffs • noise exposure periods do not exceed the safe limits	EETC operator	Operation Cost	Quarterly measurements of nosie level
Land use restrictions and possible resettlement	▪ Recruit members of Bedouin families, which are affiliated to the project area, to work as security personell. •	EETC Operator Staff Compensation committee	Operation Cost	• Confirmation of employing members of surrounding Bedouin families as security management. •

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
Socioeconomic impacts	• Workers should be fully informed about the duration of work • Inform the community about the different stages of the project, safety measures and transportation route	EETC operator staff with the community leaders	Operation Cost	• Reports about the workers employed • Complaints/grievances raised about employment • Reports about information dissemination
Health and safety	• Restrict application to the health and safety procedures • Workers should not approach an exposed energized or conductive part even if properly trained unless they are taking the right precautions: • The contractor should make health and safety facilities available in the project site • Contracts should be signed with the health facilities close to the construction site • The operator should make sure that only trained and	EETC operator	Operation Cost	• Review of EHS officer reports related to health and safety measures as well as the lists of injured workers • Capacity building reports and orientation sessions related to health and safety measures

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
	certified workers are allowed to install, maintain, or repair electrical equipment. • Drivers should have a certified and valid license • The operator should make sure that only trained and certified workers are allowed to install, maintain, or repair electrical equipment. • The health and safety supervisor should deactivate and properly ground live power distribution lines before work is performed. • When possible, the contractor should enable work rotation to minimize exposure time to EMF or use of shielding materials for the workers. • All mechanical equipment should be checked prior to use • Appropriately tag all mechanical equipment that are			

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
	locked or out of service • Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers • Safety belts should be provided to workers working at height and should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. • Identification of potential exposure levels in the workplace, including the use of personal monitors			

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
	during working activities; • Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers • A guard should be assigned to keep community people out of the construction site			

8.0 STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION

The purpose of stakeholder engagement and public consultation during the ESIA process is to ensure that all relevant stakeholders are aware of the project and have the opportunity to comment on issues of relevance to them. The objective is to develop and maintain avenues of communication between EETC and stakeholders in order to avoid and/or reduce negative impacts and enhancing benefits from the project. Consequently, consultations were conducted with the local community and other relevant stakeholders to ascertain their priorities and recognize the effects associated with the project which may require management. The feedback received was an important component to the formulation of mitigation measures and outcomes presented in this report.

Accordingly, this chapter describes the stakeholder engagement and consultation activities that have been undertaken to date, and those planned for the future. It aims to focus on key stakeholder interactions and analyze their outcomes. These key stakeholder interactions include the following:

1) A scoping public consultation session was held on the 6th of September in Ras Gharib;
2) A final public consultation session was held on the 10th of October in Ras Gharib;
3) Multiple consultation activities in Ras Gharib and Wadi Dara that were conducted over the course of three months.

In terms of methodology, consultation activities were conducted in the form of in-depth face-to-face interviews, focus group discussions, and public meetings. These activities were performed in compliance with all national regulations relevant to public consultation as well as World Bank policies relevant to disclosure and public consultation (namely, the WB Policy on Disclosure of Information). As a result, the key principles of effective engagement that guided stakeholder consultations include:

- Ensuring that all interactions are free of intimidation or coercion;
- Providing meaningful information in a format and language that is understandable and tailored to the needs of the target stakeholder group(s);
- Being inclusive in the representation of views, i.e. including different ages, genders, and incorporating vulnerable and/or minority groups;
- Respecting local traditions in the decision-making processes;

In order to hold accountability and transparency with the targeted groups, the information and findings of the first draft of the report were disclosed in a non-technical Executive Summary (in Arabic) and distributed at the public consultation events. Subsequently, the outcomes of the two public consultations were integrated into the contents of this report.

8.1 Stakeholder Identification

The first step in the process of stakeholder engagement is stakeholder identification; that is, determining who the project stakeholders are and what they should be grouped under. According to IFC Guidance Note 1 (2012), a stakeholder is defined as "Persons, groups or

communities external to the core operations of a project who may be affected by the project or have interest in it. This may include individuals, businesses, communities, local government authorities, local nongovernmental and other institutions, and other interested of affected parties". Therefore, aiming at understanding surrounding social context of the proposed project area, the Consultant conducted site investigation visits for the proposed route of the transmission line.

Once stakeholder groups are identified, an individual is selected to represent each group. Their engagement was key in carrying out consultations seamlessly. These representatives not only informed this study with their valuable input, but they also served as a communication channel to disseminate information to large numbers of community members and receive feedback from them. It was then possible to suitably understand the social context and map out all the relevant stakeholders, as presented in the next section.

8.2 Stakeholder Mapping and Analysis

Following stakeholder identification, a primary analysis is applied to distinguish each stakeholder's impact on project development so to plan their respective level of engagement in the future. This stakeholder mapping and analysis exercise is used to group stakeholders according to their role and influence pertaining to the project. Accordingly, the following table lists the identified stakeholders and states their effect over the project:

Table 8-1 Mapping of Project Stakeholders

Project Stakeholder	Role/Influence over the Project
Project owner	Egyptian Electricity Transmission Company (EETC): EETC is the project owner and is responsible for providing the wind farm with transmission line and substation and for the transmission of produced electricity to the electricity grid. They are responsible for the preparation of ESIAs for associated OHTL connections
Windfarm owner	Ras Gharib Wind Energy (RGWE): RGWE is a consortium of companies; namely Toyota, Engie, and Orascom. RGWE is the owner and the windfarm owner; accordingly, it generates the electricity that is to be recalibrated at the substation to be delivered on the OHTL.
District, city, and village councils	These institutions have high authority for the delivery of services in the geographic boundaries of Districts. Permissions for the road cut during the implementation. Permissions for the lands needed for the project, rehabilitation of roads, which is one of the major issues raised by the community, will be performed by the local governmental unit.

Ras Gharib residents	Ras Gharib is the second largest city in the Red Sea Governorate, with a population estimate of 60,000 citizens. The residents of Ras Gharib are mostly oil company crew members. These crew members are mainly migrant workers from governorates of Upper Egypt such as Assiut, Qena, or Sohag. They provide the project with the detailed technical and geographical information about the local context.
Wadi Dara community members (migrants)	Wadi Dara is a newly reclaimed valley located on the boarder of the selected site from the south. The reclamation efforts include employing farming techniques to grow crops through various irrigation methods. The village has around 250 permanent residents, who mostly attend to farming activities for several land owners. These residents are originally migrants from Upper Egypt brought to Wadi Dara to farm, hence they did not bring along their families. The village is highly dependent on the city of Ras Gharib for its commercial activity as well as its basic services. They are the direct receptors of the project impacts. Thus they are ranked as one of the most important stakeholders. They might also benefit from job opportunities and might be affected by community resources overconsumption.
Bedouins	Bedouins are often involved in conflicts over newly reclaimed land in the desert because they claim these areas belong to them according to customary law. Therefore, they will need to be compensated by the project owner to satisfy their custom Ghafra system. It should be noted companies involved in developmental projects over lands claimed by Bedouins[10] always try to get into certain arrangements with the tribes. This arrangement is locally known as "Ghafra" and it involves paying an amount of money to the Bedouins in exchange for their support in implementing their projects and protecting the area from theft.
Vulnerable groups **(women, the elderly, and the disabled)**	Women in the context of the Project suffer a lack of proper social and economic inclusion. Therefore, they should be included as an important group to be promoted. The elderly and disabled need to be appropriately engaged and accommodated by the project, if needed. . Accordingly, EETC is to ensure that after advertising vacancies, there is no discriminations towards applicants from

[10] This claim over land is not recognized by the Egyptian state and is considered illegal, for more information see 'Illegal' Land Ownership on page 77.

	vulnerable groups. Also, members of this group have to be informed of the project and encouraged to utilize the grievance mechanism, if needed.
Business and industries	They will benefit from supplies contracts for the project side. This includes food supplies, transportation, craftsmen, artisans, etc.
Civil society organizations	They can consult with the local communities during the project implementation and act on their behalf. They can also provide information to poor and marginalized groups.
Environmental agencies	Environmental Affairs Agency (EEAA): EEAA is responsible for reviewing and approving ESIAs, and for monitoring of the implementation of any agreed Environmental and Social Management Plan. Environmental Office of Red Sea governorate: This office is responsible for monitoring compliance with environmental requirements; it also attends consultation activities
International financial institution i.e. WB	Their safeguards will influence the implementation of the project.
Oil companies of Gulf of Suez	Oum El Yusr oil field exist in the immediate vicinity of the project site and plenty of oil companies exist in the Gulf of Suez region. The oil companies are extended along the coastal strip of Gabal El Ziet with numerous ports (Gabal El Ziet Port, Ras Shukeir Port, Ras Gharib Port, and PetroJet Ports). They serve as neighbors to the Project Owner, therefore, having good relationship with them is required for project's success.

8.3 Rounds of Stakeholder Consultations

In the preparation of this ESIA, consultation activities have taken place over the course of four separate rounds Structured consultation events and communication occurred during each round in order to:

1) disclose information on the project
2) ensure that all issues and concerns raised by relevant stakeholders are considered in all future planning for the project.

Disclosure of relevant project information helps stakeholders understand the risks, impacts and opportunities of the project. Significantly, the study team was keen to responding to all questions posed by stakeholders and provide information about the project. The topics discussed with stakeholders are outlined below:

- The purpose, nature, scale and duration of the Project activities;
- Risks to, and potential impacts on, stakeholders and proposed mitigation plans;
- The time and venue of any envisaged public consultation meetings, and the process by which meetings are notified, summarized and reported.

EcoConServ's study team visited the city of Ras Gharib and its vicinity over the course of four site visits (on July 30, August 13 September 6, 2018, October 10, 2018) to conduct several rounds of stakeholder engagement activities. The first round involved getting to see the project area and introductory meetings with important stakeholders. The second round involved getting to know the nearest community and analysing their needs. The third involved holding the scoping session at the Ras Gharib City Council. Lastly, the fourth round involved holding the final public consultation session in Orchida Hall in the city of Ras Gharib.

ROUND 1

Site visit conducted on: July 30, 2018

Introductions with Local Stakeholders

The first round sought to introduce, and to raise stakeholder awareness of, the ESIA process and to announce EETC's OHTL project. The method of consultation mostly relied on in-depth face-to-face meeting with key representatives. More information on these interviews are provided below. Overall, initial issues of concern to stakeholders were identified, and feedback was used to refine future consultation method.

Location: Ras Gharib City Council

People met:

- Gamal Saad - General Secretary, Ras Gharib City Council
- Tharwat Milad - Environmental Manager, Ras Gharib City Council
- Taha Hussein - Environmental Officer, Ras Gharib City Council

At the Ras Gharib City Council, the Consultant met with each of the General Secretary, Environmental Manager, and Environmental Officer and explained the project and the benefit it will bring the people of Ras Gharib. Afterwards, the Environmental Officer, Taha Hussein, joined EcoConsServ's study team to guide them to the substation and later on join them in the meeting held at the RGWE wind farm.

Location: Gulf of Suez substation

People met:

- Mahmoud Saad, subcontractor project manager
- Nasser Mubarak, Bedouin security guard

The study team toured the Gulf of Suez substation and discussed the project with on-site project manager. Later, the social team interviewed the Bedouin security guard in order to learn more about the Bedouin families in the area and how project areas are secured.

Location: RGWE windfarm

People met:

- Hans Bruins - Construction Manager, Ras Gharib Wind Energy
- Yoshitaka Iwase - Power and Water Project Department Manager, Toyota Tsusho Corporation
- Amr Sayed – Power and Water Project Department Assistant Manager, Ras Gharib Wind Energy
- Amir Tawfik- HSSE Manager, Ras Gharib Wind Energy

EcoConServ's team visited the Ras Gharib Wind Energy (RGWE) windfarm and met with the management on–site. The study was discussed and RGWE answered all questions posed by the Consultant in regards to the project area.

ROUND 2

Site visit conducted on: August 12, 2018

Bedouin-guided Tour of Wadi Dara Village

The second round of consultations sought to identify further environmental and social issues to assist in developing the baseline for impact assessment. The social impact assessment specific consultation was undertaken to understand the existing community values, how the community operates, what the potential impacts of a new OHTL might be and to obtain mitigations suggested by the community. Accordingly, the second site visit involved EcoConServ's social team meeting with a Bedouin guide to survey the surrounding of the project area. Following this the guide accompanied EcoConServ's team to Wadi Dara in order to study the village and take photos. Lastly, the team headed to the city of Ras Gharib to take more photos and become more familiar with its people and services offered.

The activities included face-to-face discussion with community members to put forward ideas and suggestions about how the potential impacts could be minimised. Discussion was held to determine the preferred mitigation measures of the key stakeholders and members of the Ras Gharib community. As for Wadi Dara villagers, all those interviewed expressed their support to the project. According to the head of the village council, access to sustainable source of electricity shall change the reality of both Ras Gharib city and its

neighbouring village Wadi Dara. It will allow both areas to live up to its true potential. All interviewees expressed their hope that sustainable access to electricity would bring access to other necessary public utilities. Therefore, they link the project with the development of the village economically and demographically. They also stressed the importance of providing a timetable for the completion of the project.

ROUND 3

Site visit conducted on: September 6, 2018

First Public Consultation Session (Scoping)

This round of consultation activities involved holding the first public consultation session on September 8, 2018 at Ras Gharib City Council (Figure 8-1). As such, it enabled stakeholders and the general public to understand and ask about the project and provided the opportunity for the community and other stakeholder to comment on the draft ESIA report. Initially, the study team met with the head of the Ras Gharib City Council, Lieutenant Yasser Shaaban Mohamed to solidify his commitment to the success of the project. After the meeting, the scoping session was held successfully having around 21 attendees (Annex 4) including EcoConServ team.

The session began with Lieutenant Yasser Shaaban Mohamed giving a welcoming speech. Afterwards, EcoConServ's consultants (Zeinab Hafez, Ruaa Elnur, and Heba Elsahn) proceeded with the presentation on the OHTL. The following topics were presented during the scoping session:

- Introduction about EETC
- The proposed OHTL project and its corresponding routes and activities
- Scope and methodology of the ESIA
- Anticipated environmental and social impacts, mitigation measures and monitoring plans

During the open discussions, the concerns voiced by the attendees included the following:

- Researching and mitigating the possible occurrence of floods on the project;
- The possibility of any impact on migratory birds;
- Job creation for the local communities;
- Electric power distribution to the surrounding area and its corresponding timeframe.

In regards to negative impacts on the local community, stakeholders were assured that they are expected to be minimal. At a more detailed level, the scoping session included the following key points:

Figure 8-1 Scoping session photos held in Ras Gharib City Council

Table 8-2 Overview of scoping session discussion

Topic	Questions/Remarks by Attendees	Provided Response
Employment Opportunities	We request from the responsible authorities to prioritize the employment of the city's youth in this project.	Employing the young people of the community is the best option for the project. Therefore, EETC will coordinate with the City Council so to publicize available vacancies.
Height of OHTL	Please pay attention to the height of the transmission tower if the lines crosses over any roads. Specifically, when the intersection lies near the entrance or exit of project sites. The height of the tower should be more than 18 meters since vehicles carrying large equipment usually travel over these roads.	Regarding the steel tower, the EETC already has its own towers design. The towers are lattice steel self-supporting double circuit towers, which means they are designed to carry the line conductors with the necessary insulators. The towers will be located mostly in the desert area, and any intersection with the main roads will include the lines which will be at an appropriate height to prevent collision

		with any vehicles carrying large and long structures.
Community Health and Safety	There are petroleum companies in the area that may release flammable gases, which may interfere with the electromagnetic field of the overhead transmission line in case of poor maintenance. This may cause fires. Therefore, please ensure that proper maintenance is in place.	EETC takes into consideration the distance from the population, areas, and historical places when deciding on the OHTL route, so to avoid negative impacts. Moreover, the project will be compliant to environmental laws and regulations on protection against electromagnetic waves and the situation of the Egyptian legislation. Lastly, there is a connection between good engineering design and limiting electromagnetic waves. That is, EETC's tower design helps protect against electromagnetic interference.
Mining and Quarry Areas	Please ensure that the project is far away from the mining and quarry areas	• According to the Law 63/1974, the Right of Way (ROW) for the construction of the towers is 25 m shall be allowed as a buffer zone from both sides along the transmission line of 220 kV. • This 25 m wide corridor shall be cleared of trees and structures. The area of the ROW for this line is: 25 x 19000m = 475,000 m^2. A number of activities would be prohibited in the ROW including mining, construction and cultivation of some type of trees and crops. However, some vegetable gardening and temporary farming may be permitted inside the transmission lines ROW.

Hazardous Waste	Ensure the existence of contracts with the concerned authorities to remove liquid and solid and hazardous wastes from the site during the construction and operation periods.	• There will be a waste management contractor to handle, transport and dispose hazardous waste to a specified landfill. This will be done according to EEAA requirements.

Closing Remarks:
Overall, the scoping session showed that there is an overwhelming public support for the project. This support is due to local community members wanting greater access to electricity. Moreover, the officials of Ras Gharib's city council associated the project with several positive socio economic impacts. Specifically, they hoped that it would attract more investment opportunities which will, in return, produce a more dynamic economy, creating more job opportunities for young people in the governorate. The Consultant assured the attendees that all stated concerns will be addressed in the study and assured them that a second public consultation will take place in Ras Gharib.

ROUND 4

Site visit conducted on: October 10, 2018

Second Public Consultation Session (Final)

The public consultation was held at the Orchida Hall in the city of Ras Gharib on the 10th of October, 2018. The session presented the findings of the ESIA study. The list of invitees included EEAA regional branches, environmental offices of the governorates, NGOs, governmental media centers, and various government employees. In cooperation with the Consultant, invitees were informed of the date and location of the session at least two weeks in advance. Participants were invited by:

- Invitations sent by EETC via faxes, e-mails, and over the phone;
- An advertisement published in Gomhoriya Newspaper(Figure 8-2);
- Invitations sent by the Consultant to governorate representatives;
- Face-to-face meeting with various local stakeholders.

Figure 8-2 Public Consultation Newspaper Advertisment in Gamhoriya Newspaper

In the end, 221 individuals attended the public consultation. The attendees were diverse as they included:

- Three consultants from EcoConServ
- An EETC representative
- An EEAA Regional Office representative
- 221 people in attendance (Annex 5)
- Representatives of the Ras Gharib City Council
- Representatives of the RGWE wind farm
- Officials representing the Red Sea Governorate
- Religious leaders
- Members of political parties
- Journalists
- Blue-collars workers (both male and female)
- Job seekers (both male and female)
- Representatives of NGOs and youth organizations

An Arabic non-technical executive summary was distributed among the attendees. The public consultation began with a welcoming speech by **Lieutenant Yasser Shaaban Mohamed,** who pointed to the activities and the objectives of EETC. He referred to the importance of increasing the electricity grid in Egypt. Lastly, he emphasized that the project needs to prioritize the residents of Ras Gharib.

Eng. Aref Ahmed, welcomed all the participants and gave a brief on the the aim of the current project. He discussed the categorization of projects according to EEAA, explained the national and international legal framework, and underlined the importance of having this project comply with all relevant laws and regulations.

Eng. Ahmed Salama, described the different phases of the project. He gave an in-depth presentation of the project components and specifications. He ended the presentation by listing the environmental requirements that are to be implemented in the future.

Zeinab Hafez – Social Expert EcoConserv Consulting Firm, presented the objective of the session in the context of the project. She gave a background about the OHTL project and described its routes.

Ruaa Elnur – Environmental Specialist EcoConserv Consulting Firm, pointed to the potential environmental impacts of the project and the methodology of the ESIA report which will include the mitigations of the environmental and social impacts.

Heba Elsahn – Social Specialist EcoConserv Consulting Firm, discussed the objectives of the social study. She described the project areas where the OHTL will pass through and the positive and negative social impacts of the project. This included discussing the methodology of how the negative social impacts will be mitigated.


الغرض من المشروع
1- تقريع الطاقة المولدة من مزارع الرياح المزمع انشاؤها فى تلك المنطقة
2- تشجيع الاستثمارات الداخليه و الخارجية فى مجال الطاقة المتجددة
3- انجاح ورقة الكهرباء المرحلة الإتحاد العالمى فى التوسع فى استخدام الطاقة المتجددة بعيدا عن طرق التوليد التقليدية وذلك للحد من الانبعاثات البيئية


Figure 8-3 Final Public Consultation held in Ras Gharib City (Orchida Hall)

After the presentations, an open discussion took place where the attendees were given the chance to give their feedback about the ESIA and the issues related to the project. The key points are highlighted below:

Table 8-3 Overview of final public consultation discussion

Topic	Questions/Remarks by Attendees	Provided Response
Employment Opportunities	This project is useful to the community not only because of electricity but also because it can help reduce the unemployment rate by providing job opportunities for the young people of Ras Gharib and the Red Sea governorate. Kindly announce all vacancies relevant to the project, stating the job title and minimal qualifications required.	• Relying upon the local community is essential for the project. Prior to the construction we will share information with the community leaders and the city council regarding availability of jobs for young people • Generally speaking, there is an employment plan EETC adheres to. EETC is expected to prioritize and maximize the use of local workers. • It can also be recommended by the Consultant for EETC to offer job trainings for the local community.
Local Infrastructure	The towers must be constructed to avoid the existence of gas or oil pipelines.	• According to the Law 63/1974, the Right of Way (ROW) for the construction of the towers is 25 m shall be allowed as a buffer zone from both sides along the transmission line of 220 kV. • This 25 m wide corridor shall be cleared of trees and structures. The area of the ROW for this line is: 25 x 19000m = 475,000 m^2. • A number of activities would be prohibited in the ROW including

		mining, construction and cultivation of some type of trees and crops. However, some vegetable gardening and temporary farming may be permitted inside the transmission lines ROW.
Community Health and Safety	Please raise the awareness of the local community, especially women and children, of the safety rules related to high voltage transmission lines as well as to all construction activities on the line.	• It is recommended that EETC carries out an awareness campaign about safety precautions, with specific emphasis on vulnerable groups such as women and children.
Mitigation Measures	What are the mitigation measures taken in regard to the high humidity in Ras Gharib (climatic conditions of the area) on the OHTL. This scenario may lead to power outages? Also, are the towers protected against flood waters?	• In regards to the climatic conditions of Ras Gharib, towers shall be self-supported steel lattice designed to carry the line conductors with the necessary insulators. Tower foundations shall be insulated footing because it is in constructed on dessert land. Therefore, this will help protect against power outages that may occur due to high humidity. The same goes in regards to flood waters, EETC's design of the towers help protect them against floods (if they occur).
Bird Migration	Does the OHTL negatively impact the migration of birds?	• The impact of the project on the migration of birds is considered to be of medium significance. Thus, standard mitigation measuers are proposed to minimize the impact on the birds.
Hazardous Waste	Please ensure the safe disposal of solid, liquid and hazardous wastes	• There will be a waste management contractor to handle, transport and dispose hazardous waste to a specified landfill. This will be done according to EEEAA requirements.

CSR Activities	Ras Gharib residents would like to see the local companies to give back to the community. Will any CSR activities take place?	• EETC is not obligated to conduct CSR activities given that it is a national project. However, community engagement activities are expected to take place. • It should be noted that RGWE (the windfarm that generates the electricity that is to be recalibrated at the substation to be delivered on the OHTL) has coordinated with the City Council and has in place a CSR Plan. We were told that they are planning to invest in health and education.

Closing Remarks:
The key message from the consultation events carried out for this project is that the public and government's acceptance and support for the project are strong. The session emphasized that, despite the concerns of some attendees, the project is important to achieving development. Attendees agreed that it is a national project, one that belongs to the public. It is also viewed as a service for the city of Ras Gharib and the Red Sea Governorate. This is due to the fact that it is an important addition to the electricity network, which aims to expand electrical capacity of the city and its neighboring areas.
Many questions have been raised by the attendees during the final public consultation, all of which were answered by the Consultants or present officials. Significantly, the discussion held at the end of the session revealed that many of the attendees are actually young people seeking employment. All the Consultants and the officials assured the youth in the audience that EETC will maximize local employment. This study indeed recommends that the project gives priority to community members in case there is a need for workers. Lastly, head of the Ras Gharib City Council, Lieutenant Yasser Shaaban emphasized that the City Council is willing to coordinate with EETC in order to announce any vacancies throughout the duration of the project.

8.4 Results of Stakeholder Engagement Activities

Based on the above-mentioned engagement activities with stakeholders, this analysis classifies the most affected local groups (listed below) and identifies their primary interests in the project. Such an analysis provides a more in-depth understanding of these groups and should inform future stakeholder engagement throughout the project's duration. Accordingly, the following table displays the interests of select target groups.

Table 8-4 Analysis of Targeted Stakeholders

Stakeholder Group	Primary Interest in Project

District, city, and village councils	• Opportunities for local businesses • Employment opportunities for local people • Impact on local road networks • Impact on lifestyles and livelihoods • Impact on cultural heritage • Community and social cohesion • Workforce behavior in the community • Workforce integration with local activities
Wind farm owner	• Business opportunities • Land access • Workforce behavior with the community • Workforce integration with local activities
Ras Gharib residents (RGWE)	• Employment opportunities • Training programs for the youth • Income-generating activities • Re-construction efforts for schools and hospitals • Waste management system upgrade
Bedouins	• Electricity • Greater availability of potable water • Construction of schools • Health facilities • Employment opportunities • Income-generating activities • Access to markets to sell goods (livestock, poultry, etc.) • Preservation of Bedouin lifestyle and values
Wadi Dara community members	• Electricity • Greater availability of potable water • Construction of schools • Health facilities • Employment opportunities • Training programs • Income-generating activities

8.5 Project Grievance Mechanism

The Project Grievance Mechanism is a key part to engaging stakeholders. The objective of a grievance procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner.

- Registration of GRM will be as follows:

- Grievance received and recorded in a register[11]
- For an immediate action to satisfy the complaint, the complainant will be informed of corrective action
- Implement corrective action, record the date and close case
- For a long-duration corrective action, the complainant will be informed of proposed action
- Implement corrective action, record the date and close case

The Company should keep a grievance log and report on grievance management, as part of annual project progress reports, which will be available on the company website.

Grievance Channels

Comments and concerns regarding the project can be submitted verbally or in writing to EETC through the following channels.

- By telephone:
- By post or hand delivered to: Egyptian Energy Transmission Company, extension of Ramsis st., Abbasiya, Cairo
- During construction Contractors' side, who will be responsible to relay the grievance to EETC's project management:

  Name: HE JING – Business Manager

  E-Mails: guofuxian@cet.sgcc.com.cn

  Mobile: 01156092736

[11] A sample of the grievance forms is provided in Annex 6.

Grievance Evaluation and Logging

- All comments and complaints will be responded to either verbally or in writing, in accordance to preferred method of communication specified by the complainant. The grievance should be responded to within a month maximum of receiving the complaint. Comments will be reviewed and taken into account in the project preparation where applicable; an individual response should be presented to each aggrieved person. The grievances should be documented in a grievance log.
- Individuals have the right to submit their grievance anonymously if they wish to do so, and in case they agree to include their name they have the right for their names to be kept confidential.
- The comments and complaints will be summarized and listed in a Complaints/Comments Log Book, containing the name/group of commenter/complainant, date the comment was received, brief description of issues, information on proposed corrective actions to be implemented (if appropriate) and the date of response sent to the commenter/complainant. A telephone number will be available for the community people to send in their complaints.

It should be noted that a separate grievance mechanism should be made available in the same manner for workers, including employees of both the project-employed and contractor.
In case of unresolved grievances, complainants should be allowed the opportunity to escalate their grievance by resorting to higher level of EETC management (Chairman) or beyond that on the level of the Ministry.

Monitoring and Reporting

Monitoring and reporting measures are to be implemented to ensure compliance with the stakeholder engagement program provided above. In the event that monitoring results identify non-compliance, these instances will be investigated and corrective actions will be determined and carried out.

As a result, stakeholder engagement records will be maintained and kept up to date on all stakeholder-related activities, such as consultation and information disclosure activities that are undertaken throughout the life of the project. Accordingly, for all stakeholder engagement activities, the following information will be recorded on an on-going basis:

- Type of information disclosed, in what forms (e.g. oral, reports, posters, newspapers etc.), and how it was released or distributed
- Locations and dates of meetings undertaken
- Individuals, groups, and / or organizations consulted

- Key issues discussed and key concerns raised
- Response to issues raised, including any commitments or follow-up actions
- Process undertaken for documenting these activities and reporting back to stakeholders.

Future Consultation Activities

In order to ensure transparency and access to information relating to the project, EETC is recommended to take the following measures in the future:

- Firstly, the company's website needs to be utilized to make information on the project available and accessible to the public;
- Secondly, there should be placing of information signs concerning the risks associated with project implementation. This needs to be followed up with an awareness campaign of safety rules and regulations for the surrounding community;
- Thirdly, coordination between EETC and the Ras Gharib City Council is required. EETC is expected to announce its vacancies at the City Council (as stated during the public consultation sessions). Also, EETC can put up a notice board there on which to display the most up-to-date information on the Project developments, and the possible inconveniences to the local population. The City Council can also facilitate for EETC setting up any events in Ras Gharib (and Wadi Dara, if needed);
- Lastly, it should be noted that consultation activities with stakeholders are essential for project success and should be an ongoing feature throughout the duration of the project

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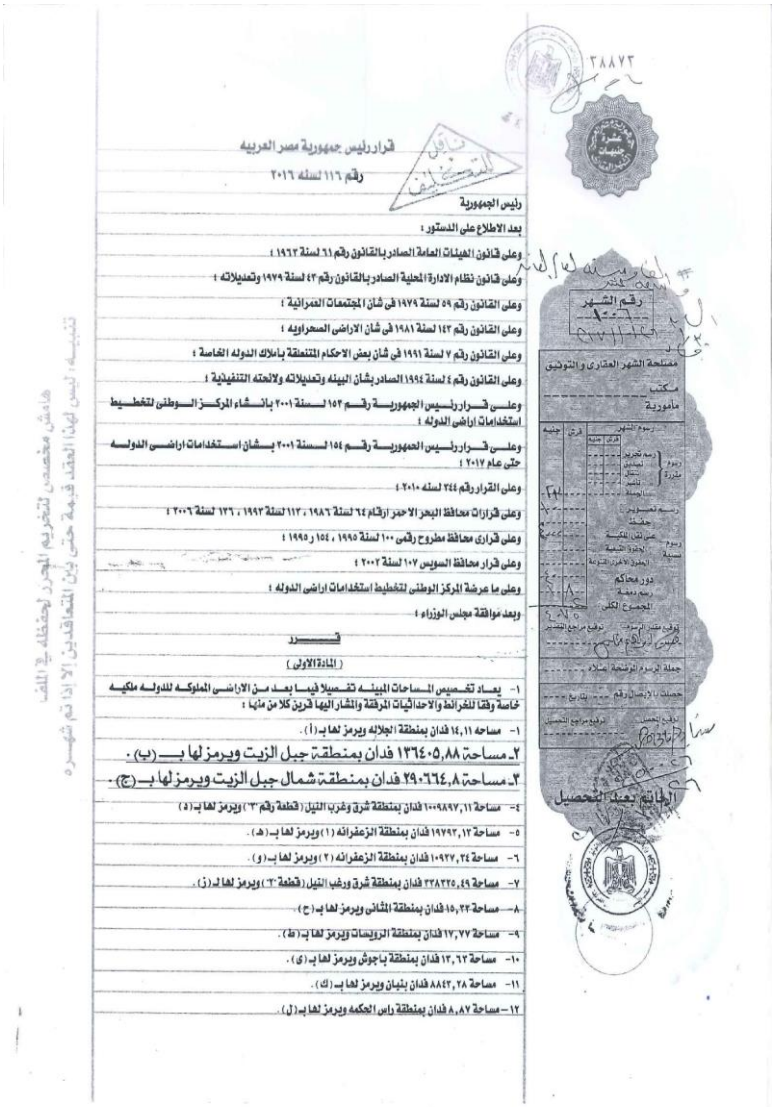
10.0 ANNEXES

10.1 Annex 1: Presidential Decree 116/2016



قرار رئيس جمهورية مصر العربيه

رقم ١١٦ لسنه ٢٠١٦

رئيس الجمهورية

بعد الاطلاع على الدستور ؛

وعلى قانون الهيئات العامة الصادر بالقانون رقم ٦١ لسنة ١٩٦٣ ؛

وعلى قانون نظام الادارة المحلية الصادر بالقانون رقم ٤٣ لسنة ١٩٧٩ وتعديلاته ؛

وعلى القانون رقم ٥٩ لسنة ١٩٧٩ فى شأن المجتمعات العمرانية ؛

وعلى القانون رقم ١٤٣ لسنة ١٩٨١ فى شأن الاراضى الصحراويه ؛

وعلى القانون رقم ٧ لسنة ١٩٩١ فى شأن بعض الاحكام المتعلقة بأملاك الدوله الخاصة ؛

وعلى القانون رقم ٤ لسنة ١٩٩٤ الصادر بشأن البيئه وتعديلاته ولائحته التنفيذية ؛

وعلى قرار رئيس الجمهورية رقم ١٥٢ لسنة ٢٠٠١ بانشاء المركز الوطنى لتخطيط استخدامات اراضى الدوله ؛

وعلى قرار رئيس الجمهورية رقم ١٥٤ لسنة ٢٠٠١ بشأن استخدامات اراضى الدولة حتى عام ٢٠١٧ ؛

وعلى القرار رقم ٢٤٤ لسنه ٢٠١٠ ؛

وعلى قرارات محافظ البحر الاحمر ارقام ٦٤ لسنة ١٩٨٦ ، ١١٣ لسنة ١٩٩٣ ، ١٣٦ لسنة ٢٠٠٦ ؛

وعلى قرارى محافظ مطروح رقمى ١٠٠ لسنة ١٩٩٥ ، ١٥٤ ر ١٩٩٥ ؛

وعلى قرار محافظ السويس ١٠٧ لسنة ٢٠٠٢ ؛

وعلى ما عرضة المركز الوطنى لتخطيط استخدامات اراضى الدوله ؛

وبعد موافقة مجلس الوزراء ؛

قـــرر

(المادة الاولى)

١- يعاد تخصيص المساحات المبينه تفصيلا فيما بعد من الاراضى المملوكه للدوله ملكيه خاصة وفقا للشرائط والاحداثيات المرفقة والمشار اليها قرين كلا منها :

١- مساحة ١٤,١١ فدان بمنطقة الجلاله ويرمز لها بـ (أ) .

٢- مساحة ١٣٦٤٠٥,٨٨ فدان بمنطقة جبل الزيت ويرمز لها بـ (ب) .

٣- مساحة ٢٩٠٦٦٤,٨ فدان بمنطقة شمال جبل الزيت ويرمز لها بـ (ج) .

٤- مساحة ١٠٠٩٨٩٧,١١ فدان بمنطقة شرق وغرب النيل (قطعة رقم ٣) ويرمز لها بـ (د)

٥- مساحة ١٩٧٩٣,١٢ فدان بمنطقة الزعفرانه (١) ويرمز لها بـ (هـ) .

٦- مساحة ١٠٩٢٧,٢٤ فدان بمنطقة الزعفرانه (٢) ويرمز لها بـ (و) .

٧- مساحة ٢٣٨٢٢٥,٤٩ فدان بمنطقة شرق ورغب النيل (قطعة ٣) ويرمز لها بـ (ز) .

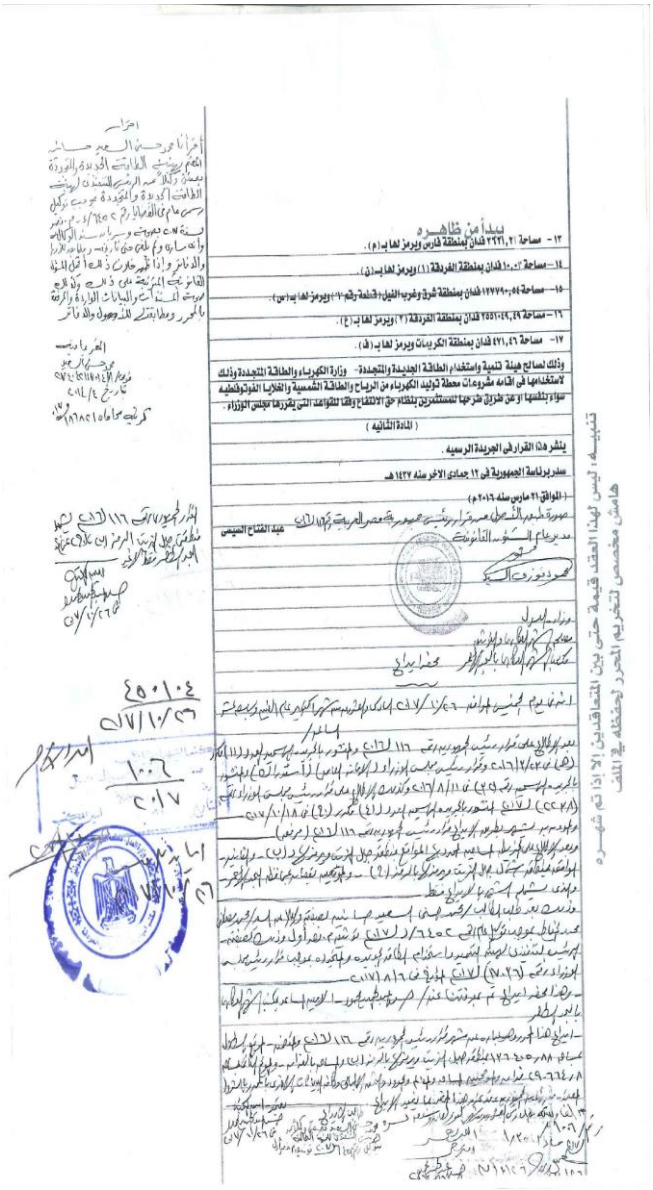
٨- مساحة ١٥,٢٢ فدان بمنطقة المثانى ويرمز لها بـ (ح) .

٩- مساحة ١٧,٧٧ فدان بمنطقة الزيتيات ويرمز لها بـ (ط) .

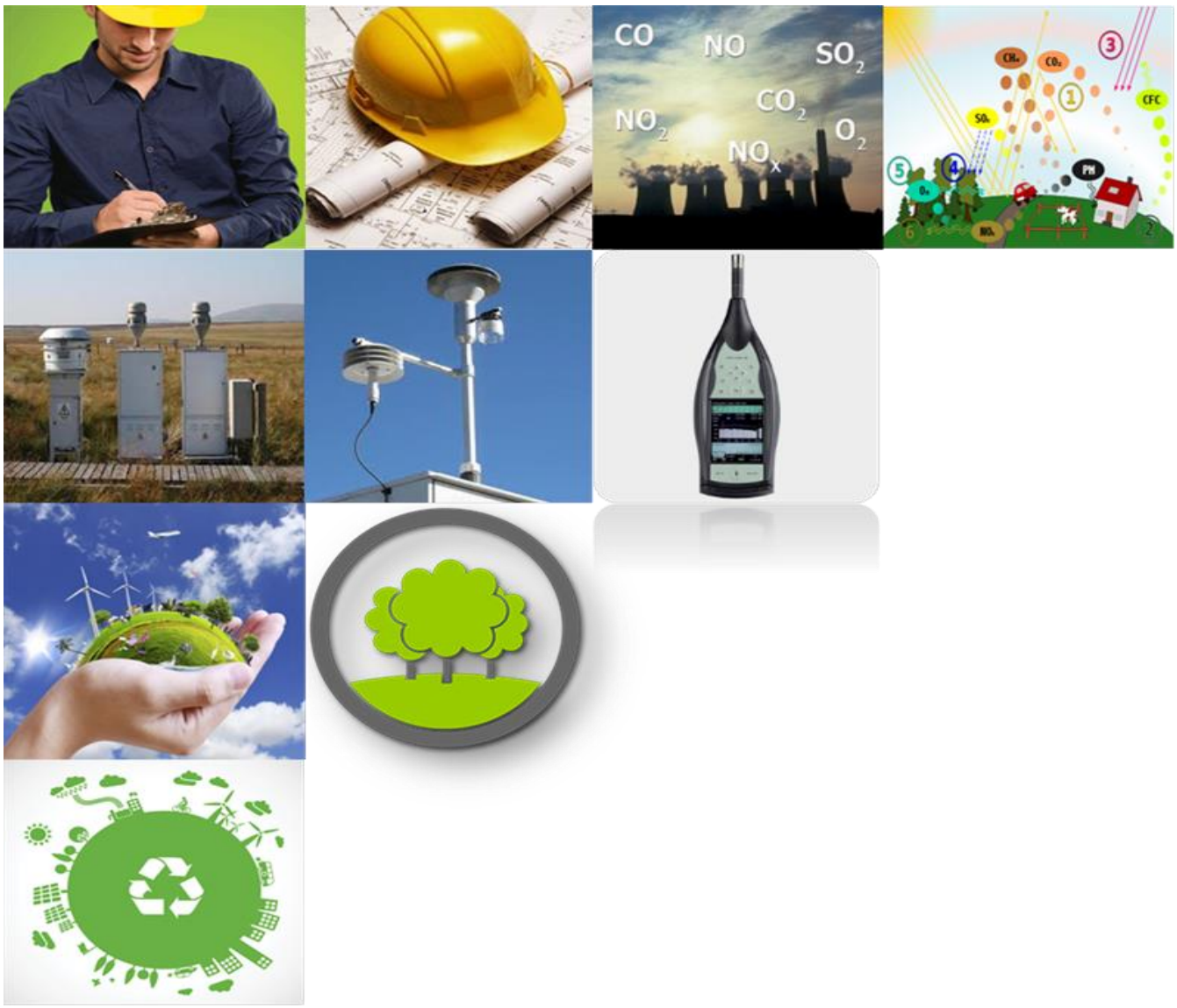
١٠- مساحة ١٣,٦٢ فدان بمنطقة بأجوش ويرمز لها بـ (ى) .

١١- مساحة ٨٨٤٢,٢٨ فدان بنبان ويرمز لها بـ (ك) .

١٢- مساحة ٨,٨٧ فدان بمنطقة راس الحكمه ويرمز لها بـ (ل) .



10.2 Annex 2: Air and Noise Site Specific Measurements



Ambient Air Quality and noise Measurements Report

*For EETC Transm*ission line project at Ras Gharib, *Red Sea Governorate*

EcoConServ Environmental Solutions

September 2018

Introduction

Air quality and noise monitoring have been carried out as part of the description of the existing environment and the base line data for EETC Transmission line project at Ras Gharib, Red Sea Governorate.

Air quality monitoring has been undertaken for the pollutants of primary concerns (NO_2, SO_2, CO, T.S.P and PM_{10}); in order to better characterize the ambient air quality, as part of the environmental measurements required. Where, a one-hour average measurements were conducted for carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), total Suspended Particulates (T.S.P) and particulate matter (PM_{10}), for five specific locations, where the air quality complies with the national guidelines for all the analysed parameters. The site-specific air quality measurements had conducted using Standard ambient air quality monitoring instruments under the supervision of experienced specialists. Noise levels had conducted as per the international standard using type 1 precision noise level meter.

Objectives

The overall objectives of this monitoring round are to:

Assess/confirm compliance of the air quality in the ambient environment with relevant national guidelines;

identify any non-compliance issues, if any; and

Provide general conclusions based on analysis results.

Scope of Work

The scope of work of the present monitoring includes the sampling and analysis of active air and noise in the surrounding area for the proposed project to serve as baseline data.

The measurements will be conduct in one location outside the boundaries of the proposed project.

Sampling strategy

The selection of the active air measurement location has based on the prevailing wind direction; site Topography, the future layout of the proposed project components and the location of the nearest sensitive receptors with respect to the store plots. Moreover, the selection had based on the guidelines stated in the American Society for Testing Materials (ASTM) reference method[12].

The following ambient air pollutants where the target parameters, which will be measured during the monitoring program:

TOTAL Suspended Particulate (TSP)

Thoracic particulate (PM_{10})

[12] D1357-95 (Reapproved2000) Standard Practice for Planning the Sampling of the Ambient Air

Nitrogen dioxide NO_2.

Sulfur dioxide SO_2.

Carbon monoxide CO.

Moreover, location of the measurements has shown in the figure below

Location

The GPS coordinates of the as Ambient Air (**P**) measurement locations

Table 10-1 Locations Coordinates

Locations	N coordinates	E coordinates
P1	28°19'9.23.4"N	32°55'08.50"E

s

Figure 10-1 location map EETC of point of measurements

Legislation and regulatory framework

National and International Legislation

The results of ambient air quality measurements were compared to the national limits set in Annex 5 of the Executive Regulation (D1095/2015) and the guideline values of world health organization (WHO) for the ambient air quality.

Table 10-2 and Table 10-3 lists the corresponding applicable national and international ambient air quality permissible limits.

Table 10-2 Applicable national permissible limits for ambient air quality levels for rural area

Pollutant	Average Period	Egyptian Standards ($\mu g.m^{-3}$)	Egyptian Standards (ppm)
Sulphur dioxide (SO_2)	1 hour	350	0.1337
	24 hours	150	0.0573
	Annual	60	0.0229
Carbon monoxide	1 hour	30,000	26
	8 hours	10,000	9
Nitrogen dioxide (NO_2)	1 hour	350	0.2
	24 hours	150	0.08
	Annual	60	0.032
TOTAL suspended particulate T.S.P	24 hours	230	---
	Annual	125	---
Thoracic particles (PM_{10})	24 hours	150	---
	Annual	100	---
$PM_{2.5}$	24 hours	100	---
	Annual	70	---

Table 10-3 WHO Ambient Air Quality Guidelines13,14

Pollutant	Average Period	Guideline value ($\mu g.m^{-3}$)
Sulphur dioxide (SO_2)	24 hours	125 (interim target 1) 50 (Interim target 2) 20 (guideline)
	10 minutes	500
Nitrogen dioxide (NO_2)	1 hour	200
	1 year	40
Thoracic particles (PM_{10})	24 hrs	150 (interim target 1) 100 (interim target 2) 75 (interim target 3) 50 (guideline)
	1 year	70 (interim target 1) 50 (interim target 2) 30 (interim target 3) 20 (guideline)
Ozone	8 hours daily maximum	160 (interim target 1) 100 (guideline)

Methodology

Ambient air quality

[13] World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile.

[14] Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

Ambient Air Quality Monitoring equipment is an integrated system of which includes several analyzers with data recording devises. A typical system would include gas analyzers for ambient air analysis, data recording, and signal transmission instrumentation.

Figure 10-2 ambient air quality monitoring system

Ambient air pollutants

The most common gaseous air pollutants (also known as "criteria pollutants") are carbon monoxide, sulfur oxides, and nitrogen oxides. These pollutants can be harmful to health and the environment, and cause property damage. To acquire baseline information on background levels of Thoracic Particulates, the team conducted four one-hour active sampling using a dust sampler. The sampler measures the respirable fraction of airborne dust (of particle size 0.1 to 10 μm) with a measuring range of 0.001 to 400 mg/m^3 and an accuracy of ± 5 % of the reading. The levels measured and recorded would serve as baseline values for reference during future monitoring activities.

Ambient air quality monitoring station specifications

General Features

Standard methods of measurement which means:

SO_2 analyzer: ISO 10498 equivalent to(U.S.A EPA Reference method – EQSA-0486-60) – UV Fluorescence

NOx analyzer: ISO 7996 equivalent to(U.S.A EPA Reference method – RFNA-1289-74) – Chemiluminescence

CO analyzer: ISO 4224 equivalent to U.S.A EPA Reference method – RFCA-0981-54) – IR GFC

PM_{10} sampler: Plow volume sampler equivalent to(EPA method, Appendix J-Reference method FR)

T.S.P low volume sampler equivalent to(EPA method, Appendix J-Reference method FR)

Ambient Particulate Matter PM_{10} sampler

Approval and Certification: U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service

Measuring Method: Sequential Particulate sampler

Sampling on filter membranes, which can be used for further Chemical analyses as required by current regulations and standards.

Active flow Control Flow range: 0-10 LPM

Nominal flow: 5LPM Sampler

Dimensions: 10" x 12" x 7" Sampler

Weight: 9.8LBS (fully configured) Transport Case: 19.75" x 12" x 18"

The analyzer should be equipped with batteries in order to avoid possible data losses due to power failures.

Source: Beta Ray Source with appropriate activity

Ranges: 0-500 μg/ m^3 (2.3 m^3/ h operating flow rate); 0-1,000 μg/ m^3 (1 m3/ h operating flow rate)

Lower Detectable Limit: ≤ 1.5 μg/ m3 (24 hour cycle time, 2.3 m3/ h operating flow rate)

Precision: ≤ 0.4 μg/ m^3 (24 hour cycle time, 2.3 m^3/ h operating flow rate)

Correlation Coefficient R > 0.98

Sulphur Dioxide SO_2 Analyzer (Thermo Scientific SO_2 Analyzer model 43i-USA)

Approval and Certification : U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service

Measuring Method : UV Fluorescence Technology

Ranges.: Auto ranging feature, Multiple Ranges to cover from 0 to 10 ppm (especially from 0 to 1 ppm)

Zero Noise: ≤ 0.5 ppb

Lower Detectable Limit: ≤ 1 ppb

Zero drift (daily): ≤ 1 ppb

Span drift (daily): ≤ 1% of full scale

Response time: fast, ≤ 100 seconds

- Precision: ≤ 0.5% of reading

Linearity: ≤ ± 1% of full scale

Operating temperature: not exceed 40 °C

Nitrogen Monoxide, Nitrogen Dioxide and Nitrogen Oxides NO, NO_2 & NO_X Analyzer (Thermo Scientific NOx Analyzer - Model 42i- USA)

Approval and Certification: U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service

Measuring Method.: Chemiluminescence Technology

Ranges.: Auto ranging feature, Multiple Ranges to cover from 0 to 20 ppm (especially from 0 to 1 ppm)

Zero Noise: ≤ 0.2 ppb

Lower Detectable Limit: ≤ 0.4 ppb

Zero drift (daily): < 0.5 ppb

Span drift (daily): < 0.5% of full scale

Response time: fast, ≤ 100 seconds

- Precision: ≤ 0.5% of reading

Linearity: ≤ ± 1% of full scale

Operating temperature: not exceed 40 °C

Carbon Monoxide CO Analyzer (Thermo Scientific Carbon Monoxide CO Analyzer model 48i-USA)

Approval and Certification: U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service

Measuring Method: Non Destructive Infra-Red Gas Filter Correlation (IRGFC) Technology

Ranges: Auto ranging feature, Multiple Ranges to cover from 0 to 200 ppm (especially from 0 to 50 ppm)

Zero Noise: ≤ 0.02 ppm

Lower Detectable Limit: ≤ 0.04 ppm

Zero drift (daily): ≤ 0.1 ppm

Span drift (daily): < 0.5% of reading

Response time: fast, ≤ 100 seconds

- Precision: ≤ 0.5% of reading

Linearity: ≤ ± 1% of full scale

Operating temperature: not exceed 40 °C

Noise Measurement Methodology

The methodology adopted was to record ambient noise levels for one hour, as per the national and international standards, in the location at the proposed transmission line rout. The following devices had used during the first round of noise level measurements:

Two B & K 2238 Mediator, Integrating Sound Level Meters, Type I (precision grade), compliant with IEC 1672 Class 1 standard;

B & K 4198 Outdoor Weatherproof Microphone Kit;

GPS unit (Garmin MONTANA 650); and

Digital Camera.

Noise monitoring measurements included recording the following parameters using a Type 1 precision grade hand-held sound-level meters:

Equivalent continuous noise level (LAeq)

95th percentile noise level (LA95)

90th percentile noise level (LA90)

50th percentile noise level (LA50)

10th percentile noise level (LA10)

Peak sound pressure level (LCpeak)

The following equation[15] is the main equation used to calculated day night equivalent sound pressure level:

$$L_{den} = 10\log\frac{1}{n}\sum_{i=1}^{n}10^{0.1(L_i+D_i)} \qquad \textbf{Where } L_{den} = \text{Day Night Equivalent}, L_i = \text{The hourly } L_{eq},$$

D_i = the addition for the different periods of the day, n = number of measured hours.

The sound level meters have calibrated before sound measurements to ensure reliability and precision. GPS coordinates and meteorological conditions have recorded using hand-held kits at all locations prior to the start of noise measurements. It has anticipated that most of these locations would remain the same for the purpose of pre-construction, construction, performance guarantee tests and operation monitoring. Figure 10-1 shows the locations of the different noise measurement locations; furthermore, Table 10-1 lists the GPS coordinates of measurement locations, measurement dates, location description and a selection of photos at each location.

[15]The equation used to obtain the average noise level of a designated time interval based on weighted readings according to "Long-term Leq errors expected and how long to measure (Uncertainity & Noise Monitoring)", Dietrich Kuehner, Forum Acusticum 2005 Budapest.

Results

The following tables present the results for ambient air quality measurements conducted at the location.

The objectives of the ambient air quality Monitoring activities conducted at the proposed site are:

To verify compliance with authorized discharge limits and any other regulatory requirements concerning the impact on the public and the environment due to the normal operation of a practice or a source within a practice;

to establish air quality baseline which will assist in the estimation of the site impact on the local physical, biological and social and environment;

To check the conditions of operation and the adequacy of controls on discharges from the source and to provide a warning of unusual or unforeseen conditions and, where appropriate, to trigger a special environmental monitoring program.

The air qualities at the current site of the project site in the location are exhibiting acceptable levels of classic air pollutants in fact the levels are way below the national guidelines. Generation and dispersion of dust from increased vehicle traffic, especially during the daily activities, may reduce visibility, relative to baseline levels, and, together with combustion

engine emissions, may affect ambient air quality. Concentration of dust particles, both total suspended particulate and respirable particulate matter and other pollutants from open burning, emissions from equipment and machinery used in transportation, the nearby plant operations and emissions from vehicles used to transport passengers also contribute to air pollution. These impacts may affect the human environment and, typically, arise during the ordinary daily activities and, to a much lesser extent, during the operation phase, requiring monitoring and assessment of the natural and man-made air pollutants.

One-hour average results for 8 hours continuous measurements have shown in Table 10-4 for all the measured parameters

Table 10-4 daily average results (µg/m^3)

Time	NO	NO2	NOx	SO2	CO (mg/m3)	PM10	T.S.P
12:00 PM	16.5	22.7	39.2	15.3	1.4		
1:00 PM	9.3	24.9	34.2	17.9	2.2		
2:00 PM	7.4	27.3	34.7	16.6	1.5		
3:00 PM	16.7	21	37.7	14.6	1.8	80.6	170.3
4:00 PM	11.4	23.3	34.7	14.7	1.8		
5:00 PM	18.9	21.6	40.5	15.9	1.9		
6:00 PM	9.6	26.7	36.3	14.1	1.7		
7:00 PM	10.1	22.2	32.3	13.3	2.3		
Limits	-	300	150	300	30 (mg/m3)	150	230

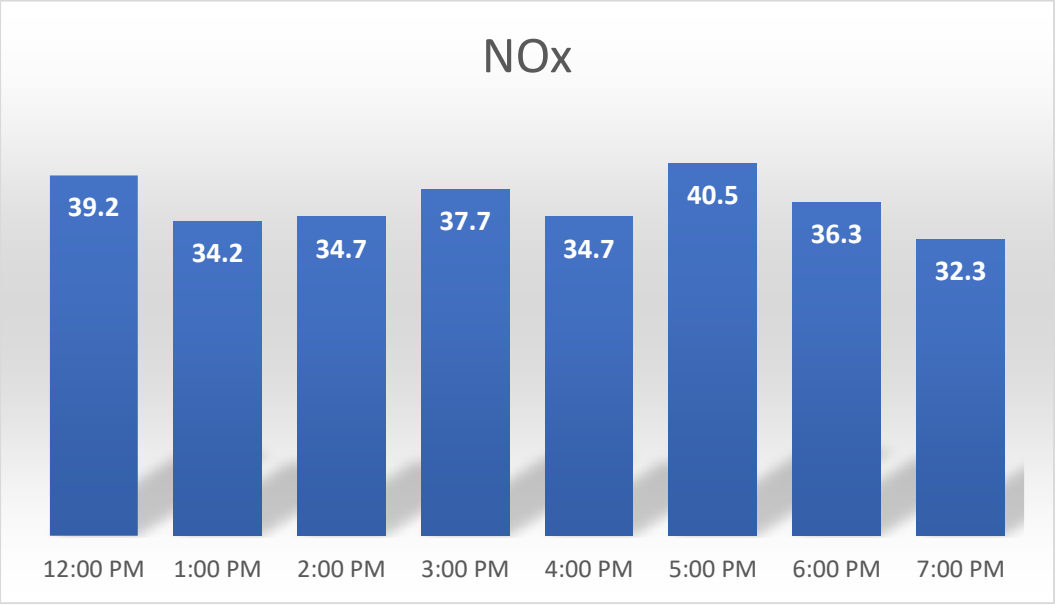


Figure 10-3 NOx variation in the location

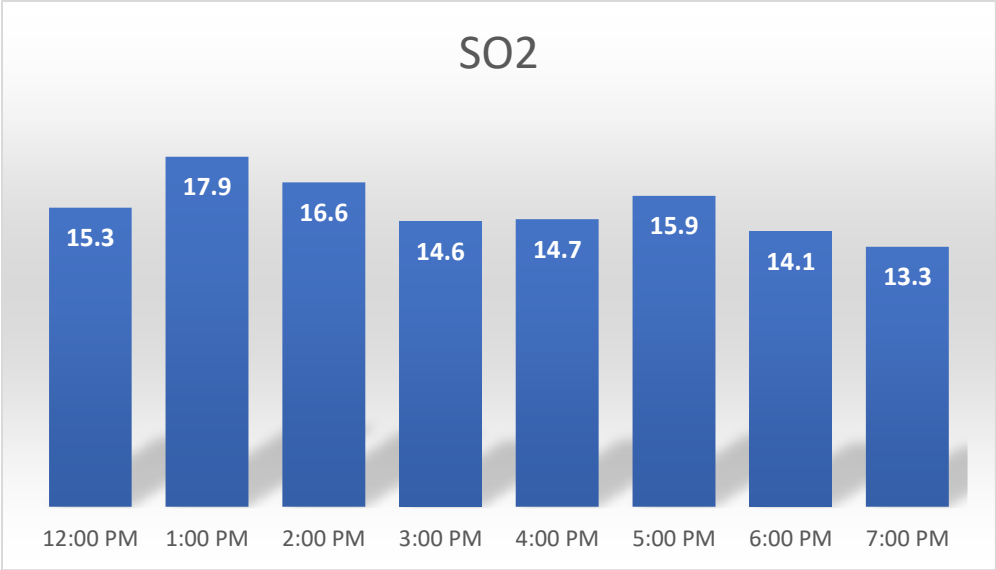


Figure 10-4 SO_2 variation in the location

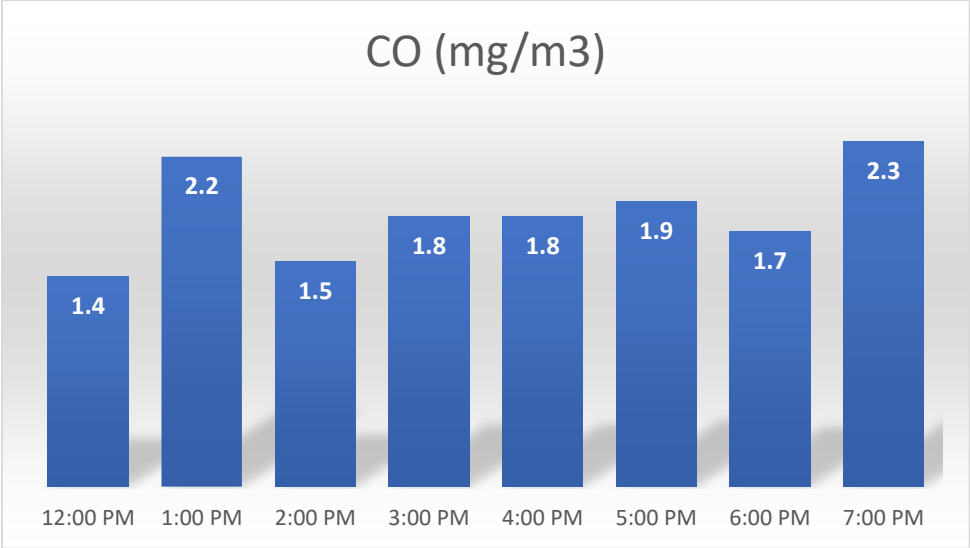


Figure 10-5 CO variation in the location

Analysis of air quality Results

In general, there are two main factors affecting the ambient air concentration of a certain pollutant emitted from a certain source or sources in a selected area:

The intensity of the emissions (e.g. concentration and flow rate) from the source or sources.

The uncontrollable atmospheric dispersion conditions, which include but not limited to (wind speed, wind direction, temperature, humidity, rainfall, atmospheric turbulence, solar radiation intensity and atmospheric pressure).

All the recorded results showed compliance with the national and international guidelines for ambient air quality moreover, most of the data recorded were way below the guidelines, which indicates that the ambient air quality in this area are matching with guidelines of emissions released from proposed sources.

Noise levels Results

Table 5-10-5 presents the results of one-hour average ambient noise measurements and their corresponding national and international permissible limits.

Table 5-10-5 Ambient Noise Levels Readings at First Location P1 8 hours average

Time	Sound Level Equivalent & Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA)	
	LAeq	LA10	LA50	LA90	LA95	LCpeak	National	International
12:00 PM	**51.72**	48.42	43.95	37.83	39.17	101.87	**70**	**70**
1:00 PM	**62.86**	56.96	32.52	30.3	35.73	110.42		
2:00 PM	**71.02**	54.77	45.37	37.6	35.7	130.86		
3:00 PM	**64.42**	55.28	46.9	39.01	36.96	103.67		
4:00 PM	**75.81**	51.44	39.8	34.03	32.67	104.6		
5:00 PM	**59.02**	52.42	40.55	33.76	32.07	103.47		
6:00 PM	**65.79**	58.84	51.34	43.85	42.79	102.83		
7:00 PM	**62.4**	56.57	47.65	36.51	34.07	97.14		

Conclusion

Based on, the environmental monitoring and measurements performed for the ambient air quality. The results showed compliance with all the national and international guidelines

Future Recommendation

It is recommended that monitoring should continue for all the regulated parameters, in order to verify/assure compliance.

References

EU directive 2008 50 EC -ANNEX I Data quality objectives for ambient air quality assessment

D1357-95 (Reapproved2000) Standard Practice for Planning the Sampling of the Ambient Air

Egyptian Law 4/1994 Amended by law 9/2009 and Decree 1741/2005, amended by decree 1095 /2011 Annex 6 (amendments to executive regulations of Law 4).

10.3 Annex 3: Soil Analysis by RGWE

Project Design Review
Introduction

This section of the report reviews the geotechnical site investigations, the WTG foundation design, and the civil and electrical designs of the Project. Comment has been provided on selected WTG technology for the Project and the adequateness of design works to meet performance expectations. Conceptual designs for the electrical BOP and the WTG foundations have been produced. Detailed designs are being carried out by the OE, the BOP Contractor and its subcontractors.

Geotechnical and Civil Design Review

Overview

This section provides a review of the ongoing geotechnical study conducted at the Project site, as well as recommended considerations for the foundation design of the Project WTGs.

Geotechnical Study

This geotechnical review is based on the documentation listed in Appendix B.

Geotechnical Investigations

The following geotechnical ground investigations have been completed for the project:

2011 preliminary geotechnical investigation, comprising 35 boreholes spread across the site to depths between 10m and 25m with associated in-situ and laboratory geotechnical and geo-chemical testing. Downhole seismic survey at 17 locations to 15m depth was also part of the scope.

2016/2017 geotechnical investigation, comprising typically one borehole to a maximum depth of 25m at individual WTG locations with associated Multichannel Analysis of Surface Wave ("MASW") seismic and supplementary Electrical Resistivity Tomography ("ERT") surveys, in-situ and laboratory geotechnical and geo-chemical testing. Geotechnical investigation was also carried out at the location of the substation (eight boreholes) and electrical towers (two boreholes in total, one per tower).

The 2011 preliminary geotechnical investigation carried out across the wider project site encountered variable ground conditions consisting of Wadi deposits (0.3-20.0 m in thickness, described in logs as calcareous sand, silt, gravel, stone pieces and iron oxides), underlain by a combination of one or more of the following strata: dense to very dense well to poorly graded cemented SAND with silt and traces of iron oxides, weak to medium weak, locally hard fragmented poorly graded calcareous

SANDSTONE, hard laminated fat CLAY with thin calcareous sand laminae (present locally of 2.7-3.4m in thickness), medium weak CLAYSTONE (present locally of 0.1-1.6m in thickness), weak to medium weak, locally hard fragmented argillaceous LIMESTONE and medium hard fragmented MARL (present locally in central part of the site). It is noted that clay/claystone deposits are present predominantly across the northern part of the site and localised areas in central and eastern part of the site.

The 2016/2017 geotechnical investigation encountered generally similar ground profiles to the 2011 investigation corresponding to this area; confirming the presence of Wadi deposits underlain by a combination of variable in thickness sand, sandstone, limestone, 'lime mud', siltstone, claystone and clay layers (MASW survey confirms layered soil profile). Marl was not encountered during 2016/2017 investigation; it is considered that this deposit may be present only locally in the central part of the site. Voids/dissolution features were not reported and commented upon in geotechnical investigation reports. However, "vuggy" limestone and sandstone were recorded in places across the site (except northern areas of the site) during 2016/2017 investigation; vuggy describing smaller voids. Loss of drilling fluid was reported in eight boreholes (II02, II04, III20, III21, V01, V18 and V20) and 'hard' material was encountered in two boreholes (B03 and B18), both resulting in short termination of boreholes (between 3m and 13m). Supplementary geophysical surveys (MASW and ERT) were completed at those locations, based upon which ground conditions present at depth were assessed. Hamza Associate concluded also that no large voids are present at those locations and loss of drilling fluid was probably caused by highly fractured rock.

Groundwater was not encountered during fieldworks in both 2011 and 2016/2017 investigations although groundwater monitoring has not been undertaken.

The geotechnical investigation completed to date is considered suitable for a wind power project.

Geotechnical Design

A preliminary foundation design has been completed and comprises shallow founded gravity base foundations. This preliminary design is discussed in more detail in Section 3.2.3 of this report. Both 2011 and 2016/2017 geotechnical investigation reports provide estimates of bearing capacity and settlement for a range of foundation sizes. The 2017 final report indicates that shallow foundations are suitable for all WTG locations; however, the following are recommended by Hamza Associates: ● Base of excavation to be submerged with water at WTG I12, I16, I17, I22, II10, III02 and III04 through 3 cycles and then compacted due to presence of partially cemented sand being present; and ● Material beneath foundation formation level to be replaced with granular fill at WTG A05, B03, B08, B11, B12, B15, B18, B19, C02, II01, II03, II04 and III14 (thickness of recommended replaced material varies between 0.5m and 2.0m at individual WTG locations).

We note that it is the WTG foundation designer's responsibility to select suitable foundation solution for WTGs taking into account WTG manufacturer's performance requirements, structural aspects and outcome of geotechnical assessments (including bearing capacity and settlement). The foundation type selection at the detailed design stage will be subject to the outcome of such assessment.

Detailed geotechnical calculations, including bearing capacity, settlement and soil-structure stiffness are not yet available due to the stage of the Project; however, we understand that these calculations will be completed as part of detailed foundation design and provided for review, which is acceptable.

Seismic Considerations

There appears to be marginal discrepancies between 2011 and 2016/2017 reports with respect to the Peak Ground Acceleration ("PGA") for the project; 2011 report indicate PGA=0.18g and 2016/2017 report indicate 0.2g. However, it is the responsibility of the foundation designer to determine design PGA for the project and undertake seismic design, when considered required at the detail design stage, including geotechnical assessments of foundations and slope stability during a seismic event.

Other Site Information

The 2011 report states that the project area is classified as a high-risk region of flood occurrence. The report states also that a detailed flood study is to be completed for the Project. The Sponsors have since informed us that no detailed flood study will be carried out. Based on subsequent investigations in 2012, the Sponsors adjusted the site layout and design accordingly, including siting infrastructure at a greater distance from flood prone areas (e.g. WTG locations and substation), using overhead lines to avoid flood paths, and designing roads with additional protection in the event of flooding. We consider their response to mitigating the hazard to be acceptable and flood impacts to be of low risk. Ground investigation documents do not comment specifically on the unexploded ordnance ("UXO") risk for the site. The 2011 report states that there is no historical use of the ground and there are no apparent signs of contamination due to military or oil and gas exploration activities. Ministry of Defence documentation provided for review indicates that a large area immediately to the north of the site has been certified to be clear of UXOs, but not necessarily the site itself. Although confirmation would be prudent, we do not consider the UXO risk at the site to be of high significance.

The reports state sulphate resisting cement shall be used in the concrete foundation due to the chemical composition of the soils and the adverse impact upon reinforced concrete. It is the responsibility of the foundation designer to assess sulphate class for concrete, considering project specific ground investigation data.

Conclusions

The geotechnical investigations completed to date at the site are considered appropriate for a wind power project. The ground conditions are considered generally suitable for shallow mass gravity reinforced foundations with ground improvement/replacement utilised at some WTG locations where weaker strata are present locally at shallow depth (subject to detail foundation design assessment). Consideration should be made to the following geotechnical aspects for the project, which would be mitigated by detail foundation design, and inspection of foundation formation levels during construction works:

Variable ground conditions - Ground conditions at the site has been proven variable during both 2011 and 2016/2017 geotechnical investigations. It is the responsibility of the foundation designer to determine ground model/s (including engineering properties of the underlying strata) for the detailed foundation design, taking into consideration ground investigation information;

Localised occurrence of weaker material - Localised areas of weaker ground strata material has been identified during both 2011 and 2016/2017 investigations at the site;

Potential dissolution features/voids - It is noted, that dissolution features/voids have not been recorded during both 2011 and 2016/2017 investigations; the risk associated with dissolution features impacting upon certain locations cannot be fully excluded, but appears to be a low risk;

Groundwater/flooding – Groundwater was not encountered as part of both 2011 and 2016/2017 geotechnical investigations. The 2011 report states that the project area is classified as a high-risk region of surface flood occurrence. Based on subsequent investigations, the Sponsors adjusted the site layout and design accordingly. We consider their response to mitigating the hazard to be acceptable and flood impacts to be of low risk.

UXO - Ground investigation documents do not directly comment on the UXO risk for the site. The 2011 report state that there is no historical use of the ground and there are no apparent signs of contamination due to military or oil and gas exploration activities. Ministry of Defence documentation provided for review suggests that the area immediately to the north of the site has been certified to be clear of UXOs, but not the site itself. Although, confirmation would be prudent, we do not consider the UXO risk at the site to be of high significance;

Seismicity - The reports state Peak Ground Acceleration (PGA) of 0.18/0.2g for the site, which could be low to moderate seismicity. It is the responsibility of the foundation designer to assess PGA for the site and carry out suitable seismic design (see foundation review comments in following section), but it is not considered to be a significant risk; and,

Sulphate concrete classification - The reports state sulphate resisting cement shall be used in the concrete foundation to address aggressive ground conditions. It is the responsibility of the foundation designer to assess sulphate class for concrete, considering project specific ground investigation data.

10.4 Annex 4: Scoping Session List of Attendees (6 Sep. 2018)

جلسة التشاور الخاصة بالدراسة البيئية والاجتماعية
لمشروع لمشروع انشاء خط هوائي من مزارع رياح راس غارب الى محطة محولات خليج السويس
مجلس مدينة راس غارب - مدينة راس غارب
استمارة تسجيل الحضور
٦ سبتمبر ٢٠١٨

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل	التليفون	التوقيع
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Scoping Session list of Attendees
Ras Gharib City Council
List Of Attendees
6 September 2018

No.	Name	Position / Co.	E-mail
1	Major General \ Yasser Shaaban Mohamed		
2	Ahmed ElFerny Hassan Ahmed	Assistant Mayor	
3	Azza Aly Mahmoud	Eng. Planning and follow-up dept.	
4	Nadia Fouad Karim	Boards	
5	Soaad Mohamed Ahmed	Engineering Dept.	
6	Atef Gad El Rab	Serving citizens	
7	Ahmed Abdel Aal Mohamed	Eng. Crisis Management	
8	Amer Mohamed	Follow-up	
9	Tharwat Milad Younan	Director of Environmental Dept.	
10	Aly Ahmed Aly Khattab	Security Officer	
11	Hamada Mohamed Abdel Salam	Private Secretary	
12	Ruaa Ibrahim El Nur	Environmental Specialist	
13	Abdel Nasser Abdel Salam Ahmed	Engineering Dept.	
14	Zeinab Hafez	Social Expert / EcoConServ	
15	Tarek Mahmoud Abdallah	Director of Legal Affairs	

16	Kamal Abbas Ahmed	public relations manager	
17	Ahmed Nabil Saad	Secretary of the President of the City Council	mr.nabilsaad@yahoo.com
18	Mervat Mostafa Hamd	Director of Engineering Management	
19	Moataza Aly Atteya	Director of the mayor's office	
20	Maha Mohamed Kamal	Eng. Engineering dept.	
21	Ashraf Abdel Hamid Soliman	Environmental Inspector	

10.5 Annex 5: List of Attendees Public Consultation (10 Oct. 2018)

جلسة التشاور الجماهيرية لدراسة تقييم التأثيرات البيئية والاجتماعية
لانشاء خط هواء من محطة محولات خليج السويس الى مزرعة رياح راس غارب
قاعة اوركيديا – مدينة راس غارب
استمارة تسجيل الحضور
١٠ أكتوبر ٢٠١٨

Eco Con Serv

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل
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١٠			
١١			
١٢			Wshelgha@gmail.com
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جلسة التشاور الجماهيرية لدراسة تقييم التأثيرات البيئية والاجتماعية
لانشاء خط هواء من محطة محولات خليج السويس الى مزرعة رياح راس غارب
قاعة اوركيدا – مدينة راس غارب
استمارة تسجيل الحضور
١٠ أكتوبر ٢٠١٨

EcoConServ

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل
٢١	[illegible]	[illegible]	Aref_ecaa1975@[illegible]
٢٢	[illegible]	[illegible]	Ahmed.magdy@[illegible]
٢٣	[illegible]	[illegible]	[illegible]
٢٤	[illegible]	[illegible]	[illegible].com
٢٥	[illegible]	[illegible]	bedobox@gmail.com
٢٦	[illegible]	[illegible]	King-Love-[illegible]
٢٧	[illegible]	[illegible]	
٢٨	[illegible]	[illegible]	
٢٩	[illegible]	[illegible]	
٣٠	[illegible]	[illegible]	
٣١	[illegible]	[illegible]	Mahmoud [illegible]
٣٢	[illegible]	[illegible]	
٣٣	[illegible]	[illegible]	
٣٤	[illegible]	[illegible]	
٣٥	[illegible]	[illegible]	
٣٦	[illegible]	[illegible]	
٣٧	[illegible]	[illegible]	
٣٨	[illegible]	[illegible]	
٣٩	[illegible]	[illegible]	
٤٠	[illegible]	[illegible]	
٤١	[illegible]	[illegible]	

2

جلسة التشاور الجماهيرية لدراسة تقييم التأثيرات البيئية والاجتماعية
لانشاء خط هواء من محطة محولات خليج السويس الى مزرعة رياح راس غارب
قاعة اوركيدا – مدينة راس غارب
استمارة تسجيل الحضور
١٠ أكتوبر ٢٠١٨

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	المحمول
٤٢	أماني عبد الوهاب مبارك	مفتش التموين برأس غارب	
٤٣	آمال [illegible]	مدير شئون [illegible]	
٤٤	محمود [illegible]	دبلوم صنايع	
٤٥	محمود أحمد عبدالله	مدير [illegible]	
٤٦	مصطفى محمد [illegible]	مهندس ميكانيكا	
٤٧	جمال أحمد [illegible]	مدير [illegible]	
٤٨	[illegible]	إدارة [illegible]	
٤٩	محمد حسين [illegible]	[illegible]	
٥٠	[illegible] عبد المقصود حامد	[illegible]	
٥١	[illegible]	رئيس قسم [illegible]	
٥٢	[illegible]	[illegible]	
٥٣	[illegible] سعيد [illegible]	[illegible]	
٥٤	أحمد [illegible]	صاحب [illegible]	
٥٥	[illegible]	موظف [illegible]	
٥٦	محمد [illegible] عبد الوهاب علي	حاصل على بكالوريوس تجارة	
٥٧	[illegible] أحمد	حاصل على دبلوم صنايع [illegible]	
٥٨	محمد أحمد أبو [illegible]	حاصل على دبلوم صنايع	
٥٩	مصطفى [illegible]	حاصل على دبلوم صنايع [illegible]	
٦٠	أحمد الحسيني عودة	حاصل على دبلوم صنايع	
٦١	[illegible]	حاصل على دبلوم [illegible]	
٦٢	عبد الله محمد [illegible] أحمد	حاصل على بكالوريوس [illegible]	

جلسة التشاور الجماهيرية لدراسة تقييم التأثيرات البيئية والاجتماعية
لانشاء خط هواء من محطة محولات خليج السويس الى مزرعة رياح راس غارب
قاعة اوركيدا – مدينة راس غارب
استمارة تسجيل الحضور
١٠ أكتوبر ٢٠١٨

EcoConServ

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل
٦٣			
٦٤			khaled_tantawy@EMCorg.com
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جلسة التشاور الجماهيرية لدراسة تقييم التأثيرات البيئية والاجتماعية
لانشاء خط هواء من محطة محولات خليج السويس التي مزرعة رياح رأس غارب
قاعة اوركيدا – مدينة راس غارب
استمارة تسجيل الحضور
١٠ أكتوبر ٢٠١٨

Eco Con Serv

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل
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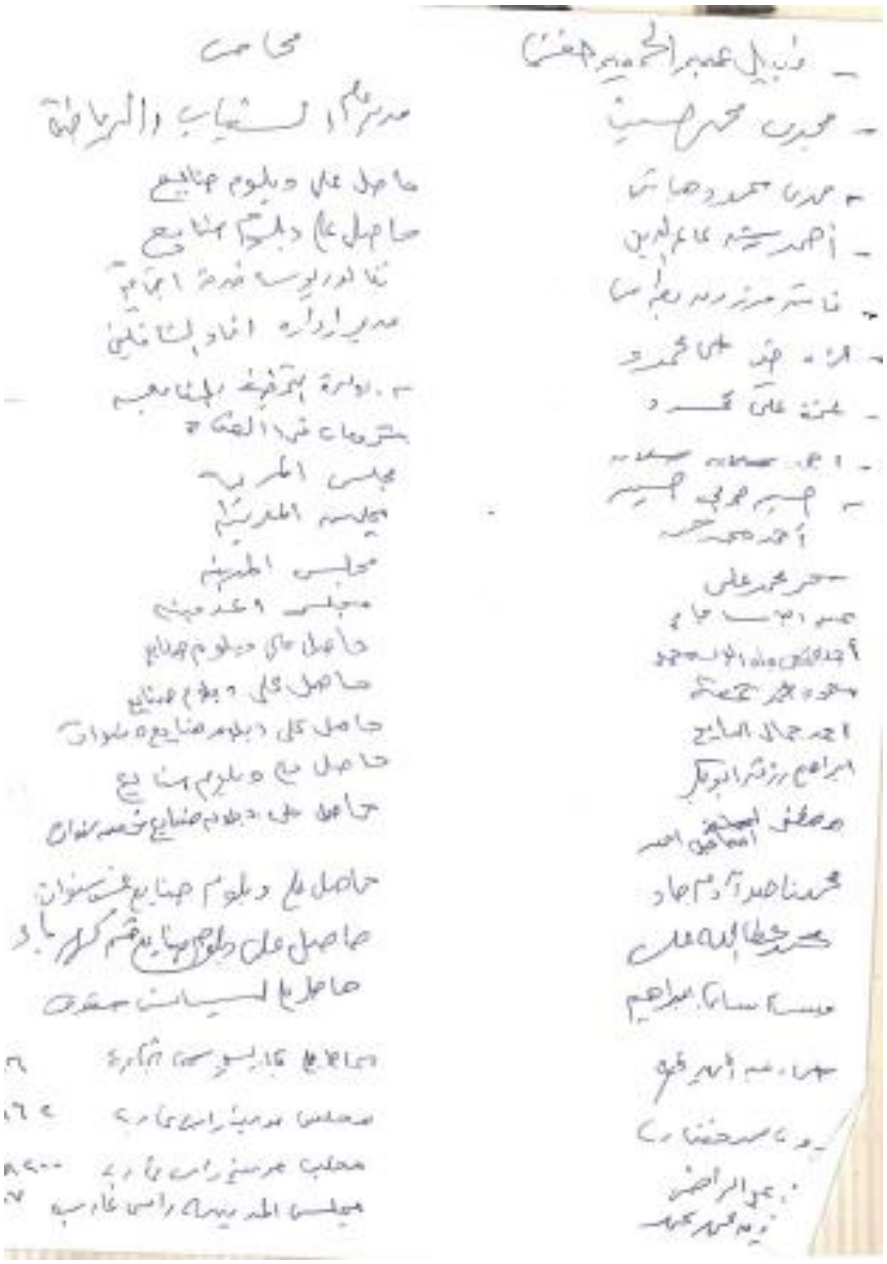

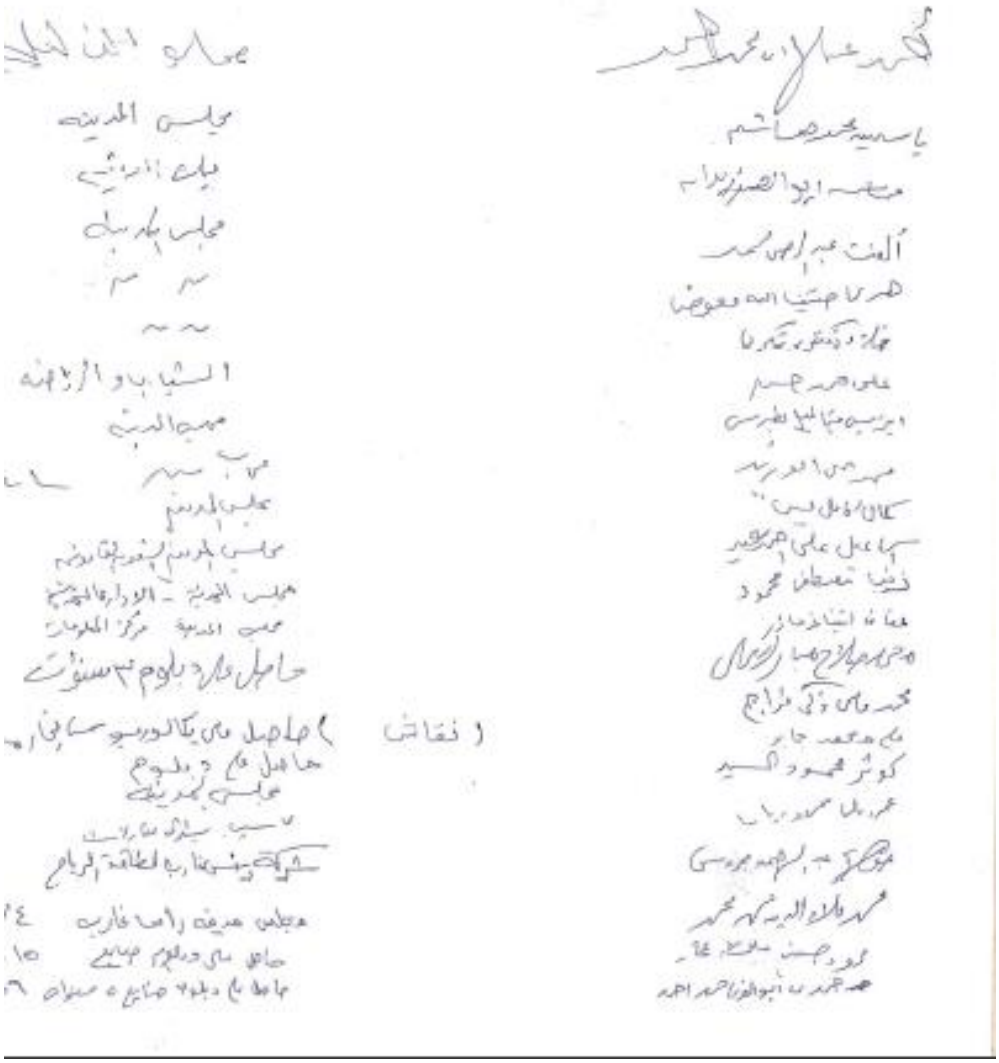

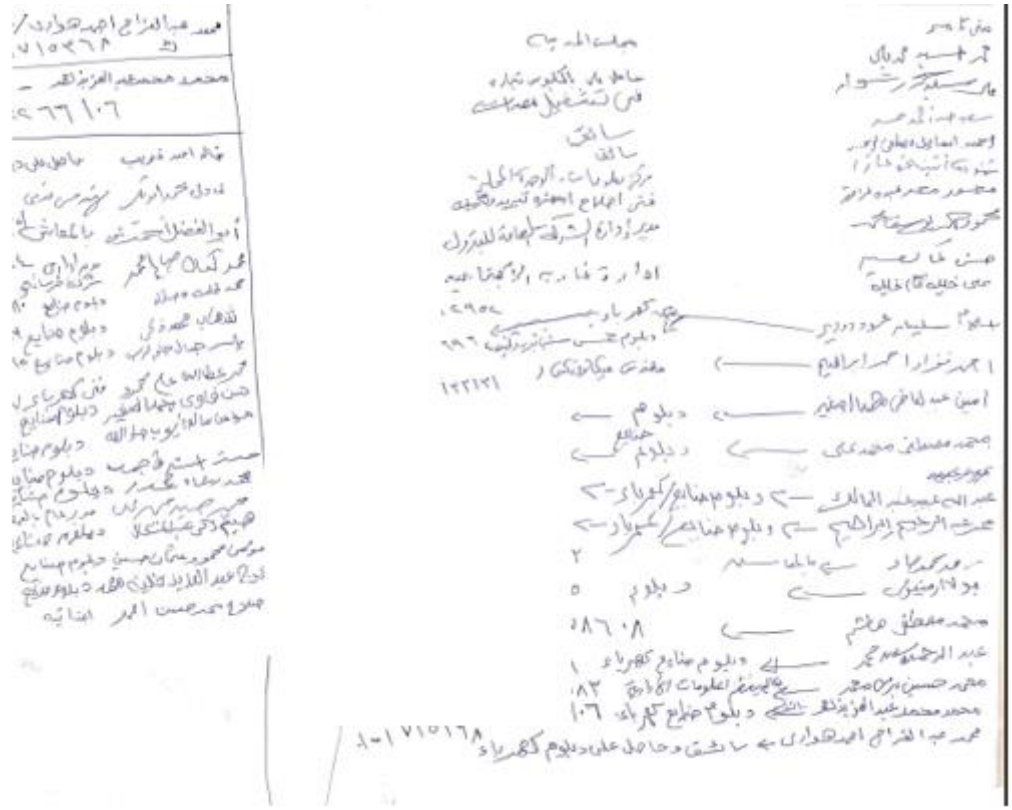

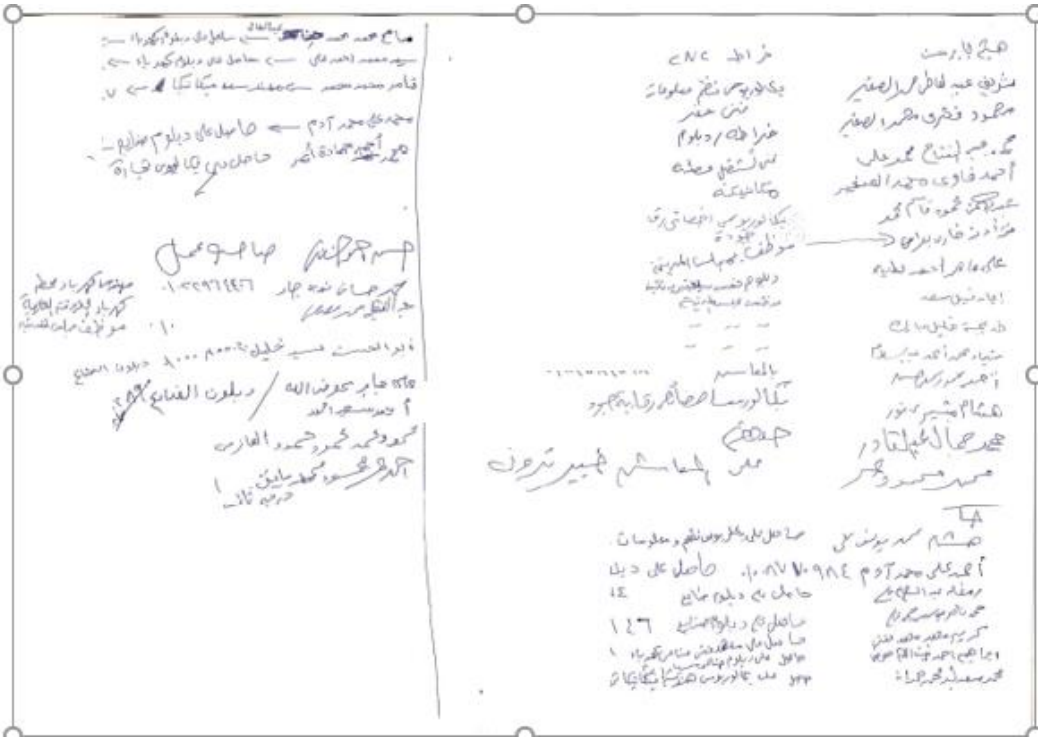

Public Consultation for the Overhead Transmission Line Project
Orkida Hall- Ras Gharib
List Of Attendees
10 October 2018

No.	Name	Position / Co.	E-mail
1	Hamdy Ahmed Mohamed Hussein	General preacher in Ras Gharib	
2	Farid Mohamed Ahmed Mohamed	General preacher in Ras Gharib	
3	Karim Anter Ahmed Mohamed	Vocational Sec. School - Welder	
4	Ahmed Hussein Afify	Vocational Sec. School - Welder	
5	Moamen Mohamed Mahmoud	Vocational Sec. School - Cars	
6	Enas Soliman Kamel	Manager of Veterinary Dept.	
7	Ahmed Abdel Nasser Mohamed Refaai	Bsc. Engineering - Electricity	
8	Mohamed Zakareya Mohamed Ahmed	Bsc. Engineering - Production	
9	Mohamed Salah Zaky Sayed Abdel Salam	Bsc. Engineering - Communications - Computers	
10	Mohamed Saad Mohamed El Nady	Senior Law Researcher - Red Sea Government	
11	Khaled Abo El Haggag Abdel Salam	Dept. Head of Environmental Dept.	
12	Walid Ahmed Aly Shelaih	Quality Control Dept. Manager (West Bakr Co.)	wshelaih@gmail.com
13	Adel Shehata Abdallah	General Manager of Field Security (West Bakr Co.)	
14	Amr Abdel Kader Abo El Magd Mohamed	Manager of production dept. (Petroleum Co.)	
15	Ahmed Gamal Mubarak	Bsc. Hotel Management	

16	Ahmed Khodary Ahmed	Air Conditioner	
17	Karim Ragab Mohamed Ahmed	Vocational Sec. School	
18	Ashraf El Halouna Said	Head of Gharb Unit of the General Authority for Roads and Bridges	
19	Gamal Abdel Nasser Mohamed	Driver	
20	Mahmoud Hussein Bendary	Chairman of Board of Trustees	
21	Dr. Aref Khardl Ahmed	Director of Inspection - EEAA	aref_eeaa1975@yahoo.com
22	Eng. Ahmed Magdy Mohamed	Manager of Maint. Dept - West Bakr	ahmed.magdy@petrobakr.com
23	Badr El Din Mahmoud El Sayed	Shop Owner	a.m.a.n@gmail.com
24	Sayed Ahmed	Manager	
25	Abdallah Ahmed Mahmoud Hussein	Secretary General of Youth Delegation Committee	bedobox@gmail.com
26	Sherif Adel Ahmed Nour	Vocational Sec. School - A/C	
27	Tharwat Milad Younan	Env. Office Manager	
28	Ashraf Abdel Hamid Soliman	Deputy Director of Environment local unit	
29	Mohamed Gaber Mohamed El Araby	Vocational Sec. School - Electricity	
30	Saad Mohamed Ahmed Saad	Vocational Sec. School	
31	Eng. Mahmoud Amrousy	Dept. Manager GPC	
32	Alaa Hassan Mostafa	Dept. Head of Industrial Security Dept.	
33	Refaai Gad Ahmed	Vocational Sec. School	
34	Mohamed Ahmed Aly Mohamed Hamd Allah	Vocational Sec. School	
35	Mostafa Badry Mohamed Salman	Vocational Sec. School	

36	Kamal Abbas Ahmed	public relations manager	
37	Hoda Selim	Dept. Head, Solidarity	
38	Mona Kheir Geneidy	Dept. Head	
39	Hoda Eid El Regal	Dept. Head	
40	Sherif Mohamed Mahmoud Omar	Social Dept. Manager	
41	Shirley Badr Nagy	Dept. Head Women 's Affairs	
42	Amal Abdel Wahab Mubarak	Inspector of Supply	
43	Amal Othman Ashour	Employee Affairs Manager	
44	Mahmoud Selim Bareh Mohamed	Vocational Sec. School	
45	Mahmoud Ahmed Abdallah	Development Co. Manager	
46	Mostafa Mohamed Aly Hamza	Mechanical Eng.	
47	Gamal Ahmed	Electrical Manager	
48	Abdel Kader Atta Mahmoud	Gharib Dept.	
49	Mohamed Hosny Awad	Head of Ibrahim Sons Association	
50	Shaaban Abdel Maksoud Hamed	Head of Teachers	
51	Salah Mohamed Abbas Aly	Services Dept. Head	
52	Osama Marzouk	General Manager	
53	Sameh Said Khalaf	Journalist - Hezb El Wafd	
54	Ahmed Abdel Rehim	Business Owner - Deputy Manager Hezb El Wafd	
55	Khalifa Fekry Mostafa	Telivision Employee	
56	Mohamed Gamal Abdel Wahab Aly	Bsc. Commerce	

57	Mahmoud Abdel Hamid Mahmoud Ahmed	Vocational Sec. School	
58	Mohamed Ahmed Abo El Hamd	Vocational Sec. School	
59	Mostafa Sayed Ahmed Mohamed	Vocational Sec. School	
60	Ahmed El Hussein Auda	Vocational Sec. School	
61	Mohamed Ahmed Abdel Bary	Vocational Sec. School	
62	Abdallah Mohamed Mohamed Ahmed	Bsc. Accounting	
63	Mohamed Abdo Azouz	General Manager (Gupco)	
64	Khaled Abdel Wahab Tantawy	Dept. Manager (San Masr)	khaled.tantawy@emceg.com
65	Osama Mahmoud Ahmed	Follow-Up Dept. Head	
66	Othman Abdel Rady Mohamed	Dept. Office Manager	
67	Abdallah Aly Abo El Hassan Ahmed	Vocational Sec. School	
68	Samir Mahmoud Hassan	Vocational Sec. School	
69	Hoda Ismail El Dessouky	House Wife	
70	Faten Geneidy Fahmy	Treasury Manager	
71	Laila Taher	Population Officer	
72	Nagwa Abdel Hamid	city Council	
73	Neamat Abdel Hady	city Council	
74	Nassra Mousa Ahmed	city Council	
75	Nagat Aly Mostafa	city Council	
76	Nadia Fouad Mahmoud Karim	city Council	
77	Faten Hassan Jahin	city Council	
78	Dr. Nesma Fahmy	Ras Gharib Hospital Manager	

79	Eng. Talaat Hussein El Sayed	Agr. Dept.Manager	
80	Gamal Abdel Nasser Abdel Megid	Storekeeper	
81	Amany Hamza	city Council	
82	Gamalat Abdel Rehim	city Council	
83	Mohamed Mekky Hussein El Sheikh	Head of Real Estate Taxation Office	
84	Sayed Salama	Co. General Manager	
85	Ahmed Abdo Abdel Rehim	GPC	
86	Ahmed Aly Abdel El Megid	Constructor	
87	Mohamed Abo El Hassan Mohamed	Ras Gharib Club Manager	
88	Karam Aly Hassan	Constructor	
89	Yasser Mahmoud Hassan Othman	Vocational Sec. School	
90	Mahmoud Hassan Mahmoud	Electrical Engineer	
91	Moamen Sayed Ashour	Electrical Engineer	
92	Amal Sayed Ismail	city Council	
93	Nabila Ahmed Abdel Rehim	city Council	
94	Samil Elias Hanna	city Council	
95	Afaf Ibrahim Metias	city Council	
96	Nahed Mahmoud Hamed Mahmoud	city Council	
97	Wadiaa Abdel Malak	city Council	
98	Mina Gerges Soliman	city Council	
99	Adel Mohamed Ismail	city Council	
100	Atef Gad El Rab	city Council	

101	Hamdy Ahmed Oraby	Constructor	
102	Ismail Abdel Hamid Hefny	Lawyer	
103	Magdy Mohamed Hussein	Youth And Sports General Manager	
104	Hamdy Mahmoud Habbash	Vocational Sec. School	
105	Ahmed Roshdy Ezz El Din	Vocational Sec. School	
106	Faten Marzouk Botros	BSC. Social Service	
107	Azza Kheir Aly Mahmoud	Director of occupants Federation	
108	Azza Aly Mahmoud	Planning & Follow-Up Manager	
109	Ahmed Salama Salama		
110	Hussein Harby Hussein	city Council	
111	Ahmed Mohamed Hassan	city Council	
112	Sahar Mohamed Aly	city Council	
113	Eid Elias Gaber	city Council	
114	Ahmed Fathy Gad El Rab Mohamed	Vocational Sec. School	
115	Mohamoud Ahmed Gomaa	Vocational Sec. School	
116	Ahmed Gamal El Sayeh	Vocational Sec. School	
117	Ibrahim Rezk Abou Bakr	Vocational Sec. School	
118	Mostafa Ismail Ahmed	Vocational Sec. School	
119	Mohamed Nasser Adam Gad	Vocational Sec. School	
120	Mohamed Atta Allah Aly	Vocational Sec. School	
121	Wessam Samy Ibrahim	Bsc. Of Law	
122	Asmaa Abdel Hamid Taha	Bsc. Commerce	

123	Badawy Mohamed Hefnawy	city Council	
124	Kamal Abdel Rady	city Council	
125	Alaa El Din Mohamed Mohamed	city Council	
126	Ahmed Abdel Hady Mohamed Ahmed	city Council	
127	Yassin Mohamed Hashem	city Council	
128	Mahassen Abo El Hamd Zeidan	city Council	
129	Olfat Abdel Rahman Mohamed	city Council	
130	Hoda Deif Allah Moawad	city Council	
131	Naglaa Victor Shokry	city Council	
132	Aly Mohamed	Youth And Sports	
133	Isis Mekhail Botros	city Council	
134	Mohamed Aly Abo Zeid	Accountant	
135	Kamal Kamel Yassin	city Council	
136	Ismail Aly Ahmed Eid	Legal Affairs - city Council	
137	Zeinab Mostafa Mahmoud	Eng. Dept. - city Council	
138	Afaf Azer	Info. Center - city Council	
139	Mohamed Salah Mobarak Aly	Vocational Sec. School	
140	Mohamed Aly Zaky Farrag	Bsc. Commerce	
141	Aly Mohamed Gaber	Vocational Sec. School	
142	Kawthar Mahmoud El Sayed	city Council	
143	Amr Aly Mahmoud Diab	Accountant	
144	Gawhara Abdel Rahman Mahrous	Ras Gharib For Energy & Wind	

145	Mohamed Alaa El Din Mohamed Mohamed	city Council	
146	Mahmoud Hosny Ammar	Vocational Sec. School	
147	Hamdy Abo El Wafa Hamad Ahmed	Vocational Sec. School	
148	Mohamed Hussein Mohamed Aly	city Council	
149	Aly Sayed Hamad Rashwan	Bsc. Commerce	
150	Said Hassan Ahmed Hassan	Technician	
151	Ahmed Ismail Mostafa Ahmed	Driver	
152	Shenoda Athina Azer	Driver	
153	Mahmoud Mohamed Abdo Azouz	Info. Center - Local Unit	
154	Mahmoud Ahmed Youssef Mohamed	Technician	
155	Hassan Kamal	GPC Dept. Head	
156	Aly Khalil Kassem Khalil	Social Dept.	
157	Islam Soliman Mahmoud	Vocational Sec. School	
158	Ahmed Fouad Ahmed Ibrahim	Mechatronics Eng.	
159	Amin Abdel Aty Mohamed El Saghir	Vocational Sec. School	
160	Mohamed Mostafa Mohamed Aly	Vocational Sec. School	
161	Abdallah Ebeid Abdel Malek	Vocational Sec. School	
162	Mohamed Abdel Rehim Ibrahim	Vocational Sec. School	
163	Saad Mohamed Gad	Pension	
164	Bola Armenioly	Vocational Sec. School	
165	Mohamed Mostafa Hashem		
166	Abdel Rahman Saad Mohamed	Vocational Sec. School	

167	Mohamed Hussein Boraey Mohamed	Bsc. Admin. Info. System	
168	Mohamed Mohamed Abdel Aziz	Driver - Vocational Sec. School	
169	Mohamed Abdel Farrag Ahmed Hawary	Driver - Vocational Sec. School	
170	Khaled Ahmed Gharib	Vocational Sec. School	
171	Adel Mohamed Abo Bakr	Civil Eng.	
172	Abo El Fadl Ahmed	Pension	
173	Mohamed Kamal Saleh Mohamed	Admin. Manager	
174	Mohamed Talaat Mostafa	Vocational Sec. School	
175	Shehab Mohamed Zaky	Vocational Sec. School	
176	Yasser Gamal Gad El Rab	Vocational Sec. School	
177	Mohamed Ata Allah Aly Mahmoud	Technician	
178	Hassan Fawy Mohamed El Saghir	Vocational Sec. School	
179	Moamen Salem Ayoub Gad Allah	Vocational Sec. School	
180	Hassan El Moshir	Vocational Sec. School	
181	Mohamed Rashad Mohamed	Vocational Sec. School	
182	Mohamed Hussein Mohamed Aly	Pension	
183	Haytham Zaky Abdel Motaal	Vocational Sec. School	
184	Moamen Mahmoud Othman Hussein	Vocational Sec. School	
185	Abdel Aziz Khalifa Mohamed	Vocational Sec. School	
186	Salah Mohamed Hassan Ahmed	Primary School	
187	Haytham Gaber Hassan	CNC	
188	Sherif Abdel Aty Mohamed El Saghir	Bsc. Admin. Info. System	

189	Mahmoud Fekry Mohamed El Saghir	Vocational Sec. School	
190	Mohamed Abdel Fattah Mohamed Aly	Technician	
191	Ahmed Fawy Mohamed El Saghir	Mechanic	
192	Abdel Rahman Mahmoud Kassem	Bsc. Quality	
193	Fuad Zakhary Beras	city Council	
194	Aly Maher Ahmed Atteya	vocational Sec. School	
195	Eman Nabil Saad	city Council	
196	Khadiga Khalil Mubarak	city Council	
197	Shaimaa Mohamed Ahmed Abdel Salam	city Council	
198	Ahmed Mahmoud Mohamed Hassan	Pension	
199	Hesham Beshir Anwar	Bsc. Quality	
200	Mohamed Gamal Abdel Kader	Journalist	
201	Mohamed Mahmoud Amr	Pension	
202	Hesham Mohamed Youssef Aly	Bsc. Info. Systems	
203	Ahmed Aly Ahmed Adam	vocational Sec. School	
204	Ramadan Abdel Salam Aly	Vocational Sec. School	
205	Mohamed Nasser Sayed Mohamed Aly	Vocational Sec. School	
206	Karim Mohamed Mohamed Hefny	Vocational Sec. School	
207	Ibrahim Deif Allah Moawad	Vocational Sec. School	
208	Mohamed Saad Mohamed Hemdan	Bsc. Mechatronics	
209	Sameh Mohamed Mohamed Hassan	Vocational Sec. School	
210	Sayed Mohamed Ahmed Aly	Vocational Sec. School	
211	Tamer Mohamed Mohamed	Mechanical Eng.	

212	Ahmed Aly Ahmed Adam	vocational Sec. School	
213	Mohamed Ahmed Hamada Ahmed	Bsc. Commerce	
214	Hassan Ahmed Hossny	Business Owner	
215	Mohamed Hassan Nour Gad	Elec. Eng.	
216	Abdel Fadil Mohamed Mostafa	city Council	
217	Abo El Hassan Sayed Khalil	Vocational Sec. School	
218	Aly Gaber Awad Allah	Vocational Sec. School	
219	Ahmed Said Ahmed	Vocational Sec. School	
220	Mahmoud Mohamed Mahmoud El Hazemy		
221	Ahmed Amr Mahmoud Mohamed	Driver	

10.6 Annex 6: Grievance Mechanism Forms

Grievance Form Receipt

In the region where the complaint is affiliated to

Name of grievance recipient: ----------

Project name	
The region	
Serial number	
Name of aggrieved person	
Date	------/-----/----------
ID	
Governorate	

The following complaint has been received

Signature of the Social Development Officer

Signature of the aggrieved person

Grievance Follow up Form

Project name	
The region	
Serial number	
Date	_____
Governorate	_____
District/ Local Unit	_____
Grievance Source	_____
Name of the aggrieved person	_____
ID	_____
Grievance	---------- ---------- ---------- ----------
Proposed solution	---------- ---------- ---------- ----------
Follow up procedure	---------- ---------- ---------- ----------

Grievances Leaflet

Ministry of Electricity and Energy

Egyptian Electricity Transmission Company

Complaints and grievances mechanism
for project affected persons of

The OHTL

This leaflet explains the procedures to be followed in case of receiving complaints from the project affected persons of the OHTL project. The leaflet was prepared to facilitate recipient, responding and solving the complaint.

Complaints recipient

The aggrieved person can submit a complaint, he/she has the right to select among various methods of complaint submission: by hand, by mail or by e-mail.

He should submit the complaint to

- Site Manager:
- E-Mail:
- Mobile:

Your cooperation is highly appreciated