



Submitted to

Att: Eng. Lamia Abdelhady  
 Head for Studies Sector  
 Ministry Of Electricity Authority  
 Egyptian Electricity  
 Transmission Company (EETC)  
 Tel-Fax (020) 22616531- 22618458



Submitted by



Environmental and Social  
 Impact Assessment (ESIA) for 6<sup>th</sup>  
 of October 500 Substation and its  
 interconnecting Overhead  
 Transmission lines

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Final Report

12 El-Saleh Ayoub St., Zamalek, Cairo, Egypt 11211  
 Tel: + 20 2 27359078 – 2736 4818  
 Fax: + 20 2 2736 5397  
 E-mail: [genena@ecoconserv.com](mailto:genena@ecoconserv.com)  
 URL: <http://www.ecoconserv.com>

**Final**

**Environmental and Social Impact Assessment (ESIA) for  
6<sup>th</sup> of October 500 Substation and its interconnecting Overhead  
Transmission Lines**

**March 2020**

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Annex 2 Bird Life international tool's report

Annex 3 List of participants of the consultation session

Annex 4 Land Allocation letter

**LIST OF ABBREVIATIONS**

EEAA	Egyptian Environmental Affairs Agency
EEHC	Egyptian Electricity Holding Company
EETC	Egyptian Electricity Transmission Company
EIB	European Investment Bank
EMF	Electromagnetic field
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
IEA	International Energy Agency
MW	Mega Watt
NGO	Non-Governmental Organization
PAPs	Project Affected People
PM	Particulate Matter
PS	Pumping Station
ARAP	Abbreviated Resettlement Action Plan
ROW	Right of Way
SDO	Social Developer Officer
SS	Substation
SSI	Semi Structured Interview
ToR	Terms of Reference
WW	Wastewater

## 1 Executive Summary

### I. Project Background

Over the past period, the electricity demand in Egypt has increased forming additional pressure on the already existing and aging electricity infrastructure. Recurrent and persistent power cuts and planned outages on the electrical grid, peaked during 2011 and 2012. Such power cuts affected the daily life of citizens in addition to impacting production facilities. Since 2013 there have been constant efforts to meet the growing demand from the Egyptian government as well as by the private sector.

In order to meet the forecasted demand and secure the electricity stability in addition to the commitment to supply electricity to slum areas and informal buildings, the Egyptian Electricity Transmission Company (EETC) together with the distribution companies need to provide additional substations and their interconnections to evacuate newly produced energy and deliver to the final consumer.

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

In response to the growing demand for electricity and in support for EEHC's plan to expand the existing electricity infrastructure of power stations, substations and interconnecting lines/cables, the European Investment Bank (EIB) is funding the construction of several substations and interconnecting lines in cooperation with the EETC.

In line with EIB environmental and social standards, EETC is committed to carrying out an ESIA of the 6<sup>th</sup> of October Substation and its interconnecting OHTL to different existing substations and a Resettlement Action Plan (RAP) should the project activities trigger Egyptian legislations and/or EIB instruments relevant to resettlement.

EcoConServ environmental services (hereinafter referred to as 'the consultant') has been contracted to carry out the ESIA study and RAP in accordance with national legislations as well as EIB standards.

The consultant proceeded to identify and assess the environmental and social conditions in the project's area. In addition, the management and monitoring plan, including the mitigation measures during construction and operation and maintenance phases are described in the ESIA report for all project components involved.

### II. 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 particularly on the vulnerable groups (children, women, the poor),
- 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,
- Consult with project-affected groups and local non-governmental organizations about potential resettlement issues, and take their views into account.

### **III. Legislative and Regulatory Framework**

#### Laws and Regulations in Egypt

- Electricity Law 87/2015
- Environmental Law 4/1994
- Law 38/1967 on Public Cleanliness
- law 93/63 on Discharge of Liquid Waste
- Law 63/1974 on Electricity Installation
- Law No. 102/1983 on Natural protectorates



- Law 67/2006 Electricity Law for protecting the consumers

### EIB Guidelines

- Environmental Statement, 1996
- Environmental Statement 2004
- Environmental and Social Handbook – 2013 EIB
- Environmental and social standards overview, EIB 07/2014
- Environmental and social practices Handbook, 2010
- IFC book 5, handbook for preparing a resettlement action plan
- EU Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
- EU Directive 2009/147/EC on the conservation of wild birds
- EIA Directive 2011/92/EU of 13 December 2011, amended by Directives DIRECTIVE 2014/52/EU in 2014
- EIB Sourcebook on EU Environmental Law
- EIB Social Guidance Notes

## **IV. Project Objectives**

The construction of 6<sup>th</sup> of October substation (3x750 MVA, 500/220/11 kV GIS) and its overhead transmission lines interconnection (500 kV and 220 kV networks) will improve power capacity at the area with minimum losses of transferred power. The project aims to fulfill the following objectives:

- Improve the voltage level and system stability in 6<sup>th</sup> of October area.
- Reinforce the 220 kV and 500kV national electricity network through the following
  - Evacuate the generated power from Wadi El Natroun substation via 500 kV overhead transmission line;
  - Connect with Maghgha substation through construct 500 kV overhead transmission line; and
  - Connect with the 220 kV through construct 220 kV OHTLs 6<sup>th</sup> of October / Main October, 6<sup>th</sup> of October / North October and 6<sup>th</sup> of October / Motwreen.

Those objectives are in accordance to the EEHC and its affiliated companies' mission toward the society: to provide continuous and safe supply of electricity to all types of consumers. In addition, as the EEHC and its affiliated companies' long term goals, all the implementation of their project is in accordance with international performance standards and taking into consideration all the environmental, social and economic determinants.

## **V. Project Location**

During the preparation of the ESIA report, the ESIA experts conducted several site visits to the proposed SS location. The routes for the overhead transmission line were identified according to the data and maps collected from EETC, including the map showing the general layout of the Substation

and the routes of the overhead transmission lines sorting from 6<sup>th</sup> of October SS. The data provided by the EETC and site reconnaissance visits conducted by the experts gave the team a better understanding of the project site, description of the project locations and its surroundings and the existing environmental and social conditions related to the different perspectives (environmental, social, human being, flora, fauna, cultural heritage sites, etc.).

The site of the proposed substation at 6<sup>th</sup> of October will be constructed in arid area with no vegetation cover, it has a rectangular shape with area of approximately 0.25km<sup>2</sup> and perimeter of 2km as determined in the following coordinates:

**Proposed 6<sup>th</sup> of October SS coordinates**

	UTM Coordinates	
P1	29°53'6.44"N	30°44'45.10"E
P2	29°52'50.18"N	30°44'46.75"E
P3	29°52'49.37"N	30°44'28.18"E
P4	29°53'5.63"N	30°44'26.57"E

The map of the proposed 6<sup>th</sup> of October SS location is presented at Figure 1.



Figure 1-1. Map of proposed SS

## VI. Project Components

The main components of the project according to EETC technical specifications on 27/12/2015 are as following:

1. Construction of 6<sup>th</sup> of October SS 750 MVA, 500/220/11 kV GIS s/st with the following scope:
  - Voltage ratio 500/220/11 kv GIS
  - 500 kv, switch gear 9 GIS bays (6 feeder bays + 3 transformer bays) + 2 spare.
  - 220 kv, switch gear 13 GIS bays (8 feeder bays +transofmer bays) + 2 spare
  - 3 x 750 MVA, 500/220kv transformer ONAN/ONAF1/ONAF2
2. Construction of 500kV overhead transmission line network with the following scope:
  - 500 kv, construction of OHTL double circuit from Wadi El Natroun to 6<sup>th</sup> of October to be around 50 km. The desert segment of the transmission line route is approximately 90% of the total length of the line, while the remaining 10% lies on cultivated lands at Wadi El Natroun area. Accordingly, a RAP study was prepared and determined the types of crops and the way of compensation that had been followed. Meanwhile (first quarter of 2020), the towers located on desert lands (state-owned lands) are constructed but the towers located on agriculture lands haven't been constructed yet.
  - 500 kv, construction of OHTL double circuit from Maghagha to 6<sup>th</sup> of October to be around 150 km. Meanwhile (First quarter of 2020), this line is completely constructed but hasn't been energized yet.
3. Construction of 220kv overhead transmission line network with the following scope(no construction activities have been started yet):
  - 220 kv, double circuit OHTL from 6<sup>th</sup> of October to North October, 40 km
  - 220 kv, construction of OHTL double circuit from 6<sup>th</sup> of October to Main October, 39 km
  - 220 kV construction of OHTL double circuit from Motwreen to 6<sup>th</sup> of October, 38 km

Figure 2 ,3 and 4 presents the routes of 500kV and 220 kV respectively.

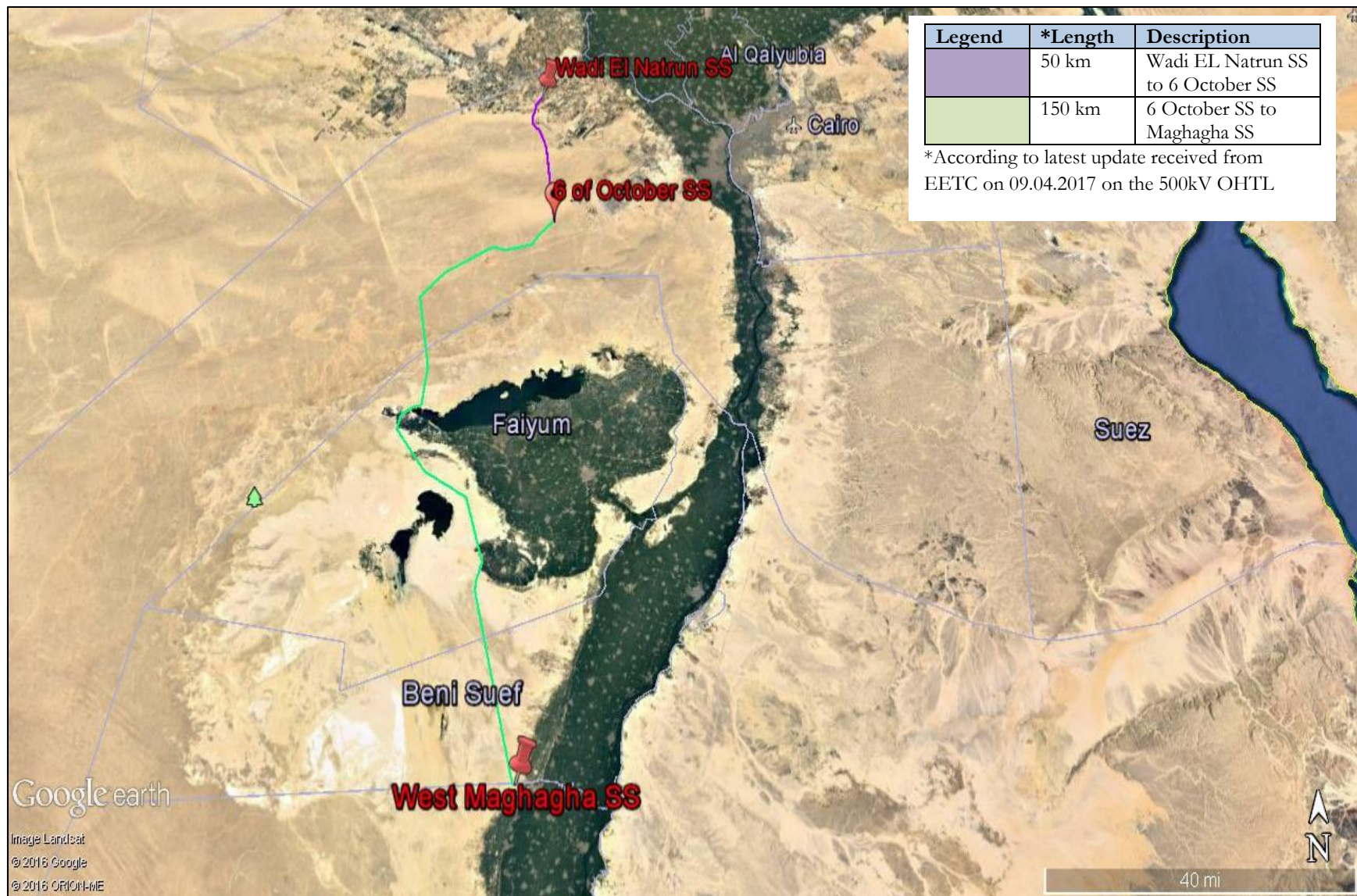


Figure 1-2. 500 kV OHTL routes interconnection for 6<sup>th</sup> of October SS

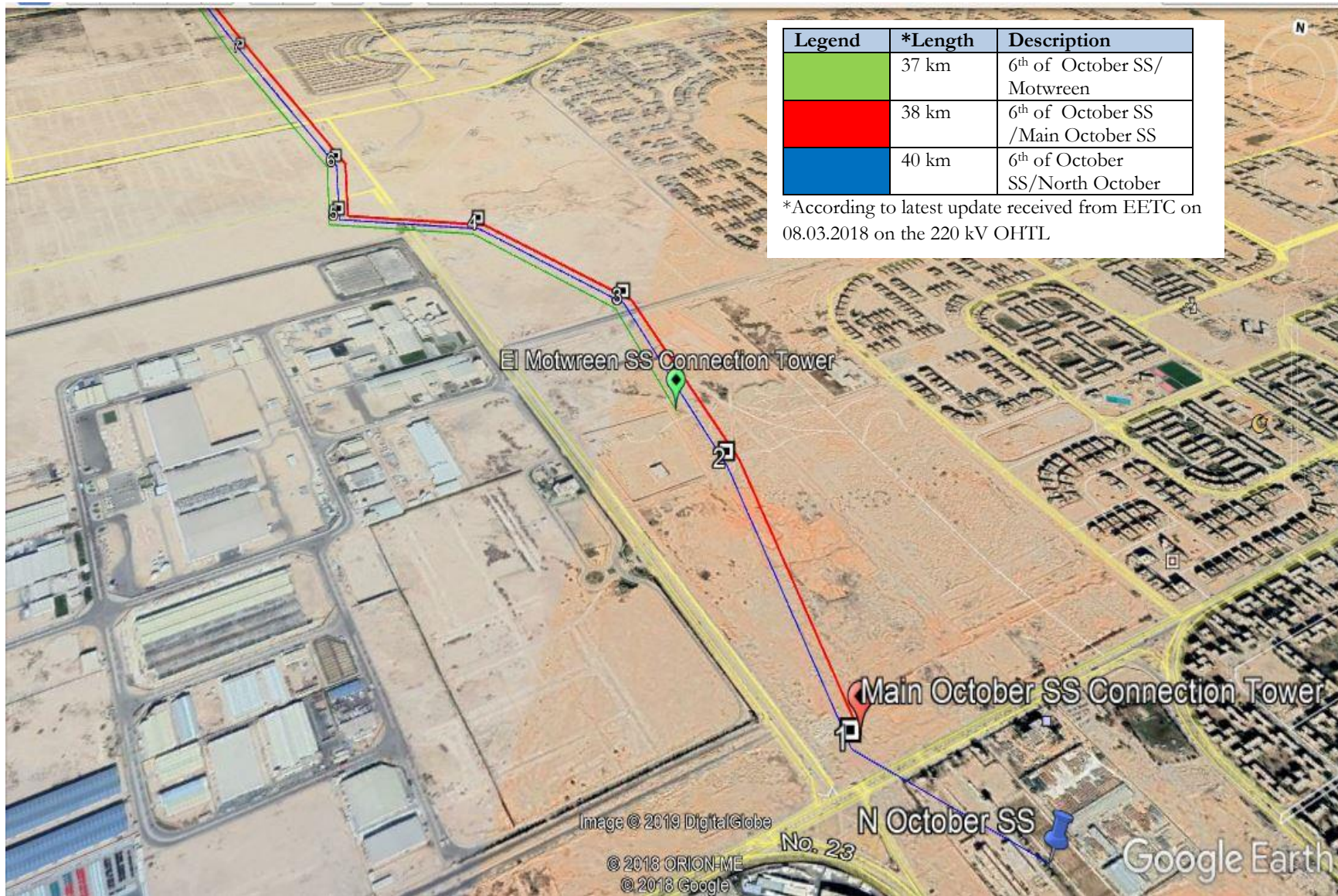


Figure 1-3. 220 kV OHTLs different starting points

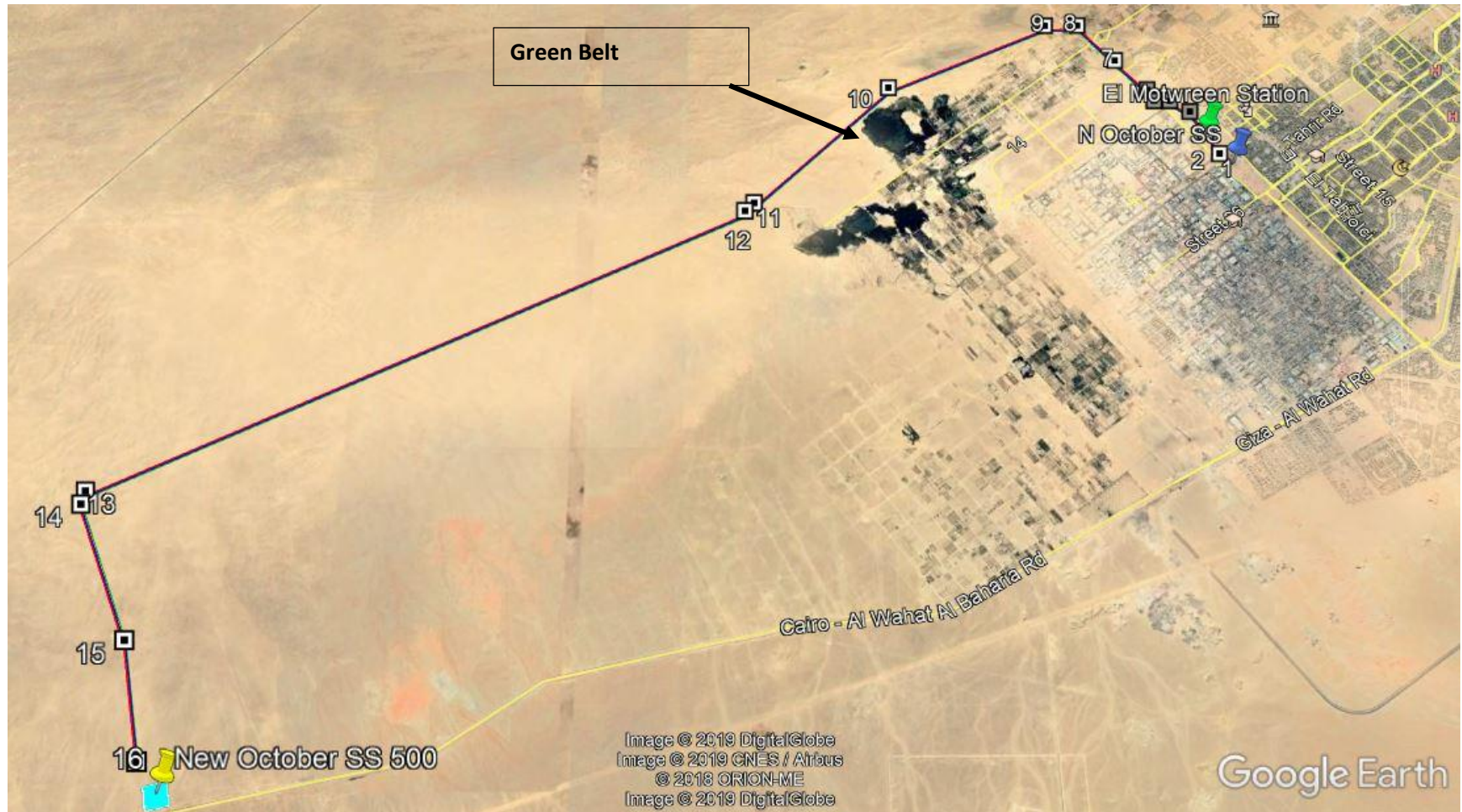


Figure 1-4. 220 kV OHTLs route parallel reaching 6<sup>th</sup> October SS

## VII. Project Alternatives

### No Go Option

The main objective of the project is to meet the steady increase in energy demand and evacuate the power generated from the new power plants. Environmental and social impacts from the project are assessed and no significant impacts are anticipated. Other objectives of the proposed project includes increasing the national energy capacity in Giza and Fayoum cities, improving power supply to customers, decrease the financial loss for low quality power supply and increase the economic activities in Egypt. Recently Egypt has suffered from an energy crisis across the country because of the energy capacity.

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

- Energy capacity will not increase
- The demand of the new establishment as well as the demand increased from the residential / housings will not be secured
- The quality of the power supply to the consumers will not be improved
- The consumers' financial losses from low quality power supply will increase, and
- As a result, an increase in the economic activities in the region would not be possible.

The site of the proposed SS at 6<sup>th</sup> of October city is far from residential area and connected with a main road. Therefore, the no go option for the project is not recommended.

### Technology Limitation

The substation is based on GIS technology with SF<sub>6</sub> gas insulated which is the most appropriate technology to be used based on economically acceptable standards for similar SSs. The limited space (occupies only 1/10 compared to the conventional SS) is required, especially since the site is located at an urban area (due to the aesthetic landscape as the SS will be indoor) and the increased reliability compared to the air insulated SSs. In addition, the risk of flammable materials is reduced, the lifetime is longer and less operation and maintenance is required compared to the air insulated SSs, thus; the SF<sub>6</sub> gas insulated system is selected for this substation at 6<sup>th</sup> of October.

However, if SF<sub>6</sub> is released to the environment will increase the impact on ozone depletion and global warming. Therefore, the check of the insulated gas has to be done properly and periodically in accordance to the specification and operation manuals.

### Location/Routes Alternatives

#### 6<sup>th</sup> of October Substation



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

The SS site at 6<sup>th</sup> of October city is proposed to be built to serve the increase of the electricity demand from the new establishment and demand on new connections to residential area around the substation. The SS location is plotted far from any sensitive receptors and in best location for interconnection with Wadi El Natroun SS and Maghagha SS. The selection of the SS location and the proposed routes have considered length optimization thus reducing the cost as much as possible whilst at the same time the proposed routes are aligned to the existing road network as much as possible for easy access during construction and maintenance and to reduce to a minimum the number of sensitive receptors.

### **Transmission Lines Route Selection**

The preferred route was selected on the below parameters:

- Study Area Identification: Identifying major features in the study area like main roadways, residential and commercial areas to help identify constraints during the selection of the routes.
- Consider the route to be far from residential areas as much as possible;
- Cross roads in appropriate areas;
- Avoid pipe passage from congested areas;
- Accessibility of the construction area and facilitating the implementing of the construction work; and
- Avoid route crossing by any of cultural heritage areas, graveyards and prayers houses.

In addition, there is no justification for using 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 benefit, as the excavation of OHTL is much less in comparison with underground cable which would require drilling and more land work.

### **500kV OHTL Wadi El Natroun/6<sup>th</sup> of October**

The route of this OHTL will run parallel to the south regional ring road, then shift south-east to run parallel to El Dabaa Corridor, afterwards break through unoccupied desert land towards 6<sup>th</sup> of October SS.

Based on the above mentioned criteria for route selection, the route for the proposed OHTL was chosen. Also, there are no environmental sensitive areas along the route. Consequently, no alternative has to be consider for this OHTL.

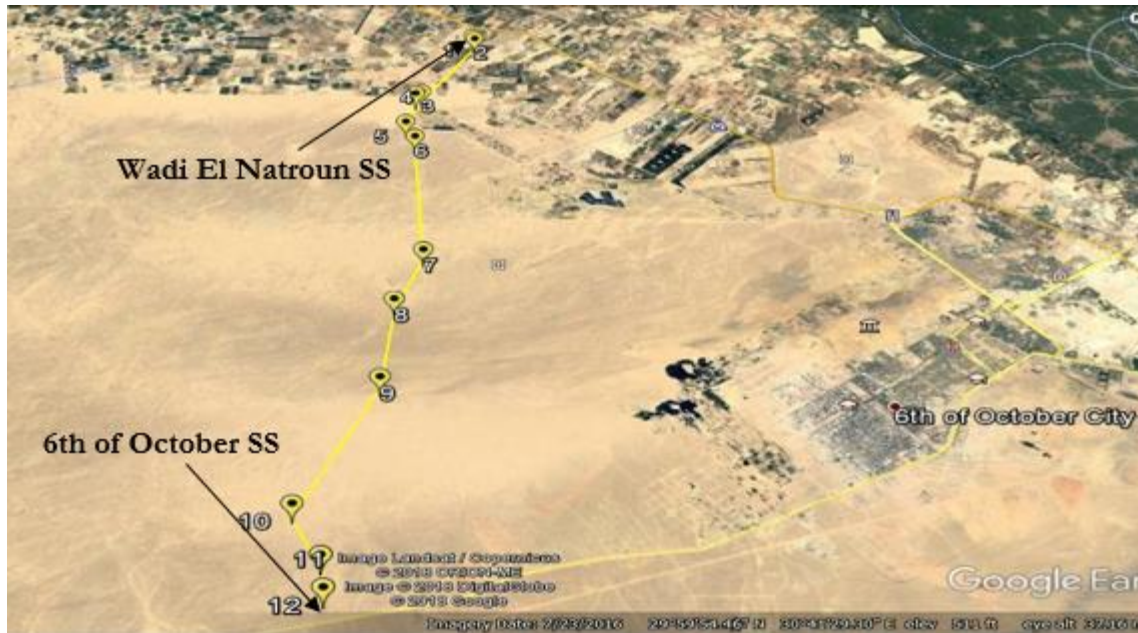


Figure 1-5: Wadi El Natroun/6<sup>th</sup> October 500 OHTL interconnection

### 500kV OHTL Maghagha/6<sup>th</sup> of October

The route of this OHTL runs on a desert land in parallel to Cairo-Al Wahat El Baharia road, then passes parallel to Qaron Lake. After that it passes through agriculture plots (olive trees are planted) then crosses Wadi Al Natroun road and continues its path in agricultural plots (olive and palm trees are planted) to be parallel to Wadi El Rayan Protectorate.

Then it runs through uninhabited, uncultivated western desert in Beni Suf governorate and crosses Wadi El Rayan – Wadi El Hetan road to continue its path in desert lands. After that the line crosses Giza – Luxor road and eventually ending at West Maghagha SS with total length of 150 km .

The selected route of this OHTL is meeting the above mention criteria of transmission lines route selection through avoiding Wadi El Rayan Protectorate and Qarun Protectorate which is the ideal route.

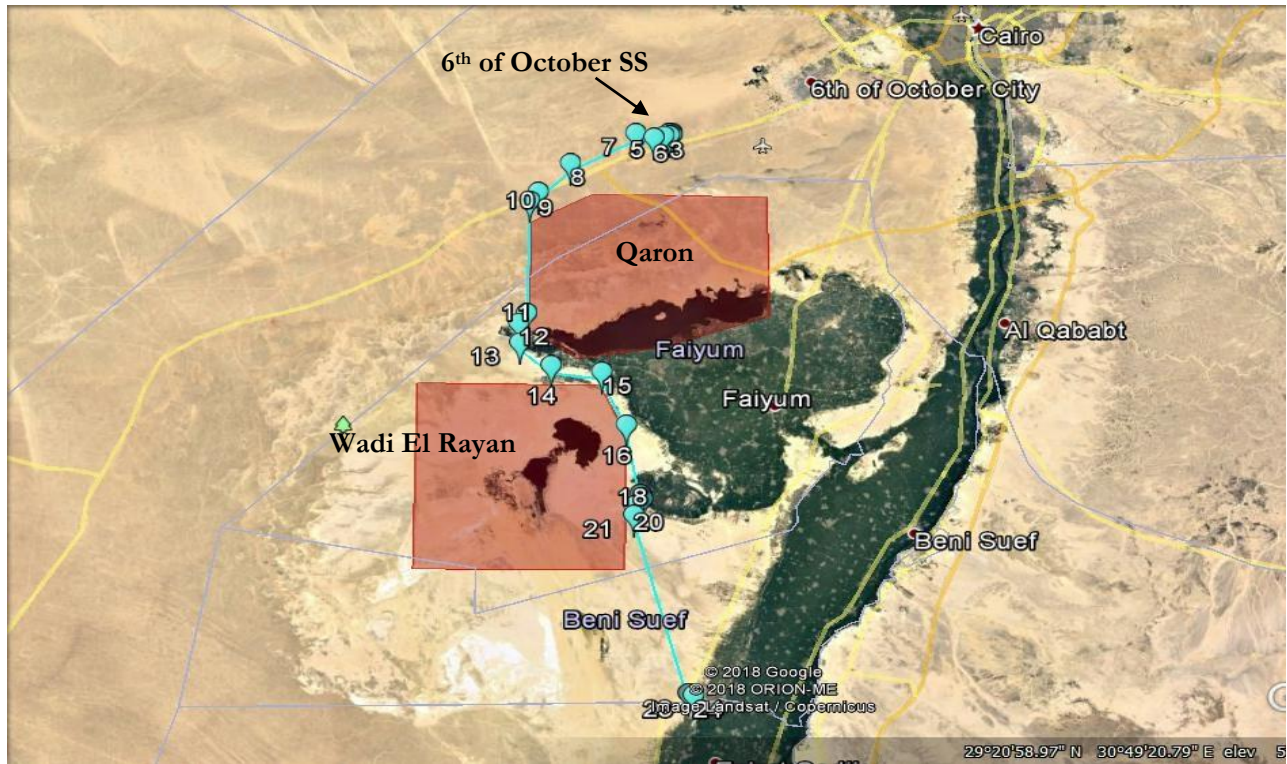


Figure 1-6: Maghagha 500/6<sup>th</sup> October 500 OHTL interconnection

#### 220 kV OHTLs Main October / 6<sup>th</sup> of October SS - North October/ 6<sup>th</sup> of October - Motwreen/ 6<sup>th</sup> of October

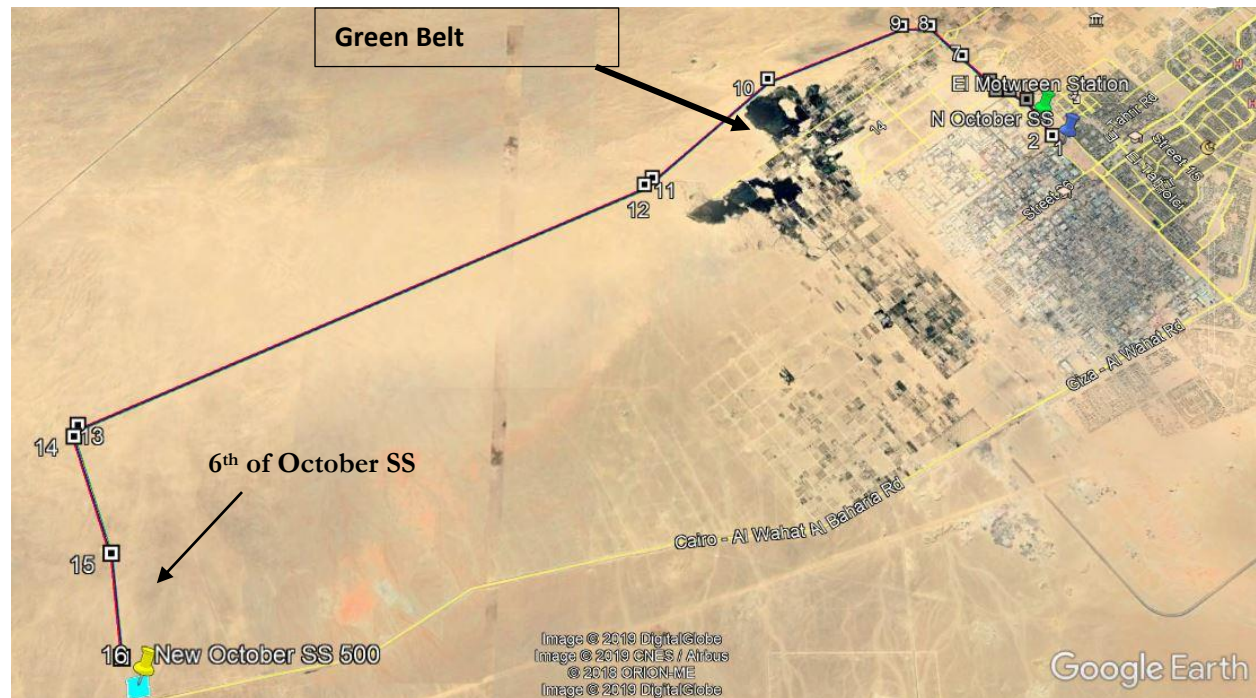
The 3 220 kV OHTLs route originates from different points ( main October electric connection tower, North October SS and El Motwreen connection electric tower ). After 2 km from the starting point, the 3 OHTLs run parallel to each other with 25 meter apart. OHTLs ends at the same point at New 6<sup>th</sup> of October SS with different lengths. Hereunder the route is described in details.

First , North October OHTL initiates from North October SS and runs for 1 km afterwards it crosses Al Mostakbal way to meet connection electric tower of Main October OHTL and starts to run parallel to each other for 1 kilometer. Then, the 2 OHTLs meet the connection electric tower of Motwreen OHTL and at this point the 3 OHTLs run parallel for 38 km other with 25 meter apart to reach new 6<sup>th</sup> of October SS. There is only 0.37 km of the 3 OHTLs route that will pass in the green belt (non-fruit trees are planted) of 6<sup>th</sup> of October city. This land is owned by the 6<sup>th</sup> of October City Authority which is responsible for the coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City to allocate lands for the route of the line within the green belt. The coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City resulted that the selected route is the best route for the 3 OHTLs to cross through the green belt with minimum distance of 0.37 km.

The 3 OHTLs runs in public desert areas ; no sensitive receptors are crossed by the route and NO RAP study is anticipated for these OHTLs. The table below summaries the description of the 3 parallel OHTLs.

Table 1-1 Description of 220 kV OHTLs

OHTL	Starting point	Ending Point	Total length
North October	North October SS	6 <sup>th</sup> of October 220 SS	40 km
Main October	Electric Tower links to Main October SS	6 <sup>th</sup> of October 220 SS	39 km
El Motwreen	El Motwreen SS	6 <sup>th</sup> of October 220 SS	37 km

Figure 1-7: 220 kV OHTL North October/ 6<sup>th</sup> of October

## Conclusion

Generally, there are few environmental constraints for construction of the substation and OHTLs which requiring a set of mitigations described in ESMP (Chapter 8 of this ESIA). Mitigation measures will be followed during the construction and operation phase of the project, there will be no constraints with regard to site selection for SS and route of OHTLs.

## VIII. Baseline Environmental and Social Conditions

The substation is located in uncultivated unoccupied desert land in Giza governorate and the OHTL crosses the western desert of Giza Governorate, Faiyum Governorate and the western desert of Beni Suf Governorate as illustrated in the figures above ( Figure 2 and 3). The description of socio-economic baseline is on the concerned communities that are anticipated to be impacted from the project activities, which are 6<sup>th</sup> of October City and Faiyum Governorate. The mitigation and monitoring plans are developed with respect to the baseline condition covering the construction and operation of the SS and OHTL project. Environmental and social baseline conditions are assessed

through a combination of a desk-based study, site visits, previous projects conducted in the area, and consultation with relevant authorities and stakeholders.

### **IX. Impact Assessment during Construction and Operation of SS and OHTL**

The following tables present significance of expected impacts during construction phase of 6<sup>th</sup> of October substation and OHTLs

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Impact on Noise	High likelihood to occur – short term and temporary - Highly sensitive receptors includes construction workers	Medium Impact on the construction workers	Application of the normal precautions normally taken by construction workers. Notification to the surrounding establishment prior to the construction of the SS Time management and construction schedule according to the IFC regulation provided by the contractor prior to the construction phase. (Residential, Institutional, educational: 55 dB (A) daytime from 07:00 to 22:00; and 45 dB (A) nighttime from 22:00 to 07:00, Industrial, commercial: 70 55 dB (A) daytimes and 70 55 dB (A) nighttime) will be provided by the contractor prior to the construction phase
Impact on traffic	High likelihood to occur – short term, temporary and localized only on the main road	Low to medium impact	Time management for transporting the materials, equipment, debris, etc Clear sign surrounding construction site and the enter / exit gate Coordination with traffic department (ministry of interior) for vehicles routes and movement.
Impact on Air Quality	High likelihood to occur – short term, temporary and localized - Highly sensitive receptors include construction workers. Receptors with low sensitivity include nearby projects/settlements.	Medium impact on construction workers Low impact on the residents, surrounding establishment and pedestrians passing by the construction site	Spraying the sandy soil with water (if needed, especially during the dry period). Maneuver area and the parking area should be well paved Management of the number of vehicles at the same time for specific location and the scheduling the intensity of vehicles
Impact on Vibration	Low likelihood to occur	Minor impact	Schedule and time plan for vehicles movements

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Impact on Hazardous materials and waste generation	<p>Uncertain likelihood – Uncertain impact duration - Highly sensitive receptors include soil pollution and workers.</p> <p>Receptors with low sensitivity include nearby projects/settlements.</p> <p>Physical environment receptors with low sensitivity include groundwater, surface water and drinking water</p>	<p>The impact of uncontrolled waste dumping to groundwater is considered minor along the proposed project as the receptor (groundwater) is situated at a large depth from the source of emissions along the routes.</p> <p>Uncontrolled waste accumulation would be visually unacceptable and would therefore be of high significance especially at sensitive areas (protectorates)</p>	<p>Agreement should be reached prior to commencing construction work between the contractor and landfill for officially assigning a location for the disposal of construction waste.</p> <p>Waste management submitted by the contractor for waste management (solid waste; hazardous and non-hazardous)</p> <p>Protection of spillage including paved site for workshop or maintenance of vehicles</p> <p>Temporary storage of wastes including on site sanitation before the proper connection to the existing sewage network is installed. It is preferable to include the onsite waste management for the construction workers in the ToR of the contractor to ensure their awareness and following it .</p>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Health and Safety	<p>High likelihood to occur for the construction workers</p> <p>Low likelihood to occur for the surrounding establishment and sensitive receptors.</p> <p>Highly sensitive receptors include workers. Receptors with low sensitivity include nearby residents and existing establishments</p>	<p>Minor impact for sensitive receptors and medium to high / major impact for the workers</p>	<p><b><u>Community Health and Safety</u></b></p> <p>Standard protection by placing clear project signs.</p> <p>Time management for vehicles movement; especially avoiding the peak hours</p> <p><b><u>Occupational Health and Safety</u></b></p> <p>Standard protection for the workers especially working at elevated heights as following:</p> <p>a) The Contractor shall be responsible to ensure that its personnel are protected from the risk of falling from any height by applying the following general guidelines.</p> <p>b) The Contractor shall provide training and maintain training records for safe working at height procedures and for the use of any equipment that enables working at height to its personnel assigned to work at height based on risk assessment and Applicable Laws.</p> <p>c) The Contractor shall ensure that all personnel assigned to work at height are physically and medically fit to do so.</p> <p>d) Collective fall protection – guard rails, scaffolds, mobile platform ladders, mobile elevating work platforms (MEWP) or cherry-pickers, safety nets, etc., has priority over individual fall protection.</p> <p>e) When collective fall protection measures are not possible to implement then individual protection, such as a safety harness and life-lines, etc., is compulsory.</p> <p>f) Safe access to all work stations at height must be assured.</p> <p>g) No person is obliged to place themselves at risk of falling; they retain the right to withdraw from any situation, without prejudice, where the risk of falling exists.</p>
Impact on natural disaster risks	Low likelihood to occur	Negligible impact	<p>No mitigation measures is prepared</p> <p>Technical specifications of the equipment is include the standard measures for natural disaster risks</p>



Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Impact on visual Resources	Low likelihood to occur	Minor impact, localized and temporary	Following the standard protection for the ground and soil disturbance, air quality (and dust) measures and proper waste management described on the section of waste management measures Clear sign of the construction activities
Impact on water resource (ground water, surface water and drinking water)	Low likelihood to occur	Minor impact on groundwater, surface water and drinking water	Following standard protection for the ground and soil and proper waste management described on the section of waste management measures
Ecological Resources (Impacts on Fauna and Flora)	Low likelihood to occur	No significant impact	No mitigation measures is prepared
Bird migration	Low likelihood to occur	No significant impact	No mitigation measures is prepared
Impact on landscape	Low likelihood to occur	Negligible or no impacts	No mitigation measures are needed
Impact on land use and Involuntary resettlement	Low likelihood to occur	Very low or no impacts	No mitigation measures are needed
Impact on archeological and cultural sites	Low likelihood to occur	Very low or no impacts	No mitigation measures are needed
Creation of Job opportunities and flourishing Economics of construction site	Creating job opportunities for members of the local community	High positive temporary impact	Coordination with the contractor to employ members of the local community as construction workers and guards

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Culture and Privacy of Local Communities	Construction workers must respect the culture and privacy of members of the surrounding residential area	Minor and temporary	Respect from construction workers to the privacy of the surrounding houses

During the operation of the substation, typically, beside the managerial and administration activities, the most important activities are operation and maintenance of the substation components according to their specifications, monitoring of the substation components and regular trainings (administrative, managerial, emergency plan, etc.). As for the operation of OHTL, there shall be different types of wastes generated during the operation phase of OHTL resulting from maintenance, repair and replacement activities.

The following table presents significance of expected impacts during operation phase of 6<sup>th</sup> of October substation

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 6 <sup>th</sup> of October substation			
Impact on Noise	Low likelihood to occur – receptors include nearby settlements (residential) are far at a distance above 10km.	Low impact on settlement and nearby establishment :Low impact on permanent workers	Application of the normal precautions normally taken such as planting trees reduces the visual impact , increase the air quality and improve the landscapes.. Standard protection for the workers provided at the substation. Several laws and decrees tackle occupational health and safety provisions at the work place, in addition to Article 43 – 45 of Law 4/1994, which address air quality, noise, heat, humidity and the provision of protective measures to workers. These laws and decrees apply to the work crew that will be involved in construction activities.
Impact on traffic	Low likelihood to occur	Low impact	No mitigation identified
Impact on Vibration	Minor or very low likelihood to occur	Very minor	No mitigation identified

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 6 <sup>th</sup> of October substation			
Impact on wastes generated (hazardous and non-hazardous, solid and liquid wastes)	Uncertain likelihood – Uncertain impact duration - Highly sensitive receptors include soil pollution and workers. Receptors with low sensitivity include nearby projects/settlements. Physical environment receptors with low sensitivity include groundwater, surface water and drinking water	Medium impact on industrial wastes generated (hazardous and non-hazardous) Low impact on domestic wastes (solid and liquid wastes)	Waste management implemented according to EAAA 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.
Impact on soil contamination	High likelihood to occur, only during the incident of oil spillage from the transformers and possible vehicles.	Low to medium impact	Standard design of precaution for the site of transformers Paved within surrounding site of substation especially at the area for parking and movement of vehicles
Health and Safety	High likelihood to occur for the permanent workers Low likelihood to occur for the surrounding establishment and sensitive receptors. High risk likelihood impact during the emergency and accident	Minor impact for sensitive receptors (public and residents as well as existing establishment) and medium impact for the workers High risk likelihood impact during the emergency and accident	Standard protection by placing clear project signs. Time management for vehicles movement; especially avoiding the peak hours Standard protection for the workers especially working at elevated heights

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 6 <sup>th</sup> of October substation			
Impact on natural disaster risks	Low likelihood to occur	Negligible impact	No mitigation identified Technical specifications of the equipment is include the standard measures for natural disaster risks
Impact on visual Resources	Low likelihood to occur as the substation is in an indoor facility, and the transformers with GIS technology side will be placed in the area on the middle of the infrastructure, as well as the substation is within enclosed area with entrance gate, there will be no indication that this site is a substation	Very low impact or negligible impact	No mitigation measure is needed
Impact on water resource (ground water, surface water and drinking water)	Low likelihood to occur	Minor impact on groundwater, surface water and drinking water	Proper waste management according to EEA regulations Monitoring for pipeline of sewage network Provision of waste bins for temporary storage
Ecological Resources (Impacts on Fauna and Flora)	Low likelihood to occur	No significant impact	No mitigation is needed
Bird migration	Low likelihood to occur	Negligible impact (no impact)	No mitigation is needed
Impact on landscape and land use	Low likelihood to occur	Negligible or no impacts	No mitigation is needed

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 6 <sup>th</sup> of October substation			
Impact on archeological and cultural sites	Low likelihood to occur	No impacts	No mitigation measures are needed
Socio Economy	Improving living conditions Providing a stable electricity service	High Positive impacts	The distribution company at EETC should have an awareness plan to connect beneficiaries legally. Increase awareness about the importance of having official connections
Creation of Job opportunities and flourishing Economics of construction site	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

The following tables present significance of expected impacts during Construction phase of OHTLs ( 500 and 220 kV)

**Table 1-2. Assessed significance of expected impacts during construction phase of 500kV OHTL Wadi El Natroun/6<sup>th</sup> of October**

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
Impacts due to handling of construction waste	Likely to occur - short term – Highly sensitive receptors include soil at protectorate areas and workers. Receptors with low sensitivity include groundwater.	Medium	<ul style="list-style-type: none"> <li>• EETC should communicate with the local authorities including protectorates for officially assigning location for the disposal of construction waste within the three governorates. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.</li> <li>• A specified (one or multiple) locations 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
			<p>occasionally inspect that the truck drivers are disposing of the waste at the approved location, and regular checks to the disposal site.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Domestic waste generated on site shall be segregated and not mixed with any other type of waste.</li> <li>• 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.</li> <li>• Construction contractor shall contract competent authority at each governorate premises for safe disposing of generated sewage</li> <li>• Mitigation measures for hazardous waste management:</li> <li>• 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 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 and the HWM-SOP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors.</li> </ul>
Air emissions	High likelihood to occur – short term - Highly sensitive receptors including workers.	Medium	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, he should ask for additional spraying of water in the spot generating high emissions.
Noise	High likelihood to occur – short term - Highly sensitive receptors	Medium	<ul style="list-style-type: none"> <li>• Workers that operate noisy machines and nearby workers should be supplied with earmuffs and should be instructed to put them on</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
	including workers only along the line.		<p>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</p> <ul style="list-style-type: none"> <li>• Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> <li>• Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>• Avoid construction activities at night</li> </ul>
Impacts on Fauna and Flora	Medium likelihood to occur – short term	Medium	<ul style="list-style-type: none"> <li>• Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations within protectorates shall be located to avoid impacts.</li> <li>• Minimize noise and artificial lighting at night during construction</li> <li>• Inform construction staff on the importance of natural habitats and notable plant species</li> <li>• No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>• Construction and vehicle movement should be made to minimum</li> <li>• Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>• Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>• Prepare habitat maps for project sites using aerial photography and high resolution satellite imagery</li> </ul>
Bird Migration	Low likelihood to occur	Minor impact	<ul style="list-style-type: none"> <li>• Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>• Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>
Cultural resources	Low likelihood of major or medium impacts	Minor	<ul style="list-style-type: none"> <li>• 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.</li> </ul>



Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
			<ul style="list-style-type: none"> <li>The community leaders could take part in the process of employment in terms of informing their local community about job opportunities</li> <li>The newly employed persons and non-Egyptian experts should be oriented about the norms and traditions of the surrounding communities, particularly, the Bedouin ones.</li> <li>In case of any violation of norms, the site engineer should handle meetings with the community leaders in order to settle any disputes</li> <li>Enable grievance and redress mechanism in order to receive people concerns about such impact</li> </ul>
Human Health and Safety	Low likelihood of major or medium impacts for workers– high likelihood of minor impact for sensitive recipient	Minor to Medium	<p><b><u>Occupational Health and Safety</u></b></p> <ul style="list-style-type: none"> <li>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.</li> <li>All safety procedures reported in the Law should be abided to by the workers and the top management.</li> <li>The contractor should assign a health and safety supervisor who ensures the workers are abided to the H&amp;S procedures</li> <li>The contractor should make health and safety facilities available in the project site</li> <li>Contracts should be signed with the health facilities close to the construction site</li> <li>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</li> <li>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.</li> <li>When operating power tools at height, workers should use a second (backup) safety strap</li> <li>Testing structures for integrity prior to undertaking work</li> </ul> <p><b><u>Community health and Safety</u></b></p> <ul style="list-style-type: none"> <li>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.</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
Limitations on land use and risks of involuntary resettlement	Medium and direct impact to livelihood	Medium	Reduce impact significance to minor following recommendations of RAP/ARAP preparation
Losing environmental benefits of trees along power lines	Low likelihood of major or medium impacts	Minor	In order to compensate the negative impact on the environment, any removed tree should be substituted by planting other trees in other areas away from the ROW by the local stakeholders( Ministry of Agriculture ). The compensation for the owners of these trees should also take place in order to minimize the significance of the impact.
Removing trees on ROW	Low likelihood of major or medium impacts	Medium to Major	Reduce impact significance to minor following RAP
Socioeconomic	Low likelihood of major or medium impacts	Medium to Major Positive temporary	No mitigation measures is needed
Impacts on traffic	Low likelihood of major or medium impacts	Medium	<ul style="list-style-type: none"> <li>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.</li> <li>Find suitable locations for temporary storage of conventional construction wastes.</li> <li>In case a narrow access road needs to be occupied for limited period (for example by loading/unloading trucks or loaders) the occupation time should be minimized. The additional measure is to have a careful turn (if needed) for the heavy trucks or loaders due to the high-speed vehicles passing by the highway.</li> <li>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.</li> </ul>
Visual intrusion	Low likelihood of major or medium impacts and localized	Minor	Visual evidence of these projects cannot be completely avoided, reduced, or concealed.

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
Water Resource (groundwater, geology and hydrogeology)	Medium likelihood to occur – long term impact – irreversible in case of hazardous waste contaminants (reversible after a very long period).	Medium	Standard prevention or precaution measures shall be prepared by the contractor prior to the construction. It is preferable to include the waste management plan in the ToR of the contractor.

**Table 1-3. Assessed significance of expected impacts during construction phase of 500 kV OHTL Maghagha / 6<sup>th</sup> of October**

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
Impacts due to handling of construction waste	Likely to occur - short term – Highly sensitive receptors include soil at protectorate areas and workers. Receptors with medium sensitivity include nearby settlements. Receptors with low sensitivity include groundwater.	Medium	<p>EETC should communicate with the local authorities including protectorates for officially assigning location for the disposal of construction waste within the three governorates. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.</p> <ul style="list-style-type: none"> <li>A specified (one or multiple) locations 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.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>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</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
			<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Domestic waste generated on site shall be segregated and not mixed with any other type of waste.</li> <li>• 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.</li> <li>• Construction contractor shall contract competent authority at each governorate premises for safe disposing of generated sewage</li> </ul> <p>Mitigation measures for hazardous waste management: 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 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 and the HWM-SOP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors.</p>
Air emissions	High likelihood to occur – short term - Highly sensitive receptors including workers.	Medium	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, he

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
			should ask for additional spraying of water in the spot generating high emissions.
Noise	High likelihood to occur – short term - Highly sensitive receptors including workers only along the line.	Medium	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 <ul style="list-style-type: none"> <li>Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> <li>Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>Avoid construction activities at night</li> </ul>
Impacts on Fauna and Flora	Medium likelihood to occur – short term	Medium	Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations within protectorates shall be located to avoid impacts. <ul style="list-style-type: none"> <li>Minimize noise and artificial lighting at night during construction</li> <li>Inform construction staff on the importance of natural habitats and notable plant species</li> <li>No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>Construction and vehicle movement should be made to minimum</li> <li>Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>Prepare habitat maps for project sites using aerial photography and high resolution satellite imagery</li> </ul>
Bird Migration	Low likelihood to occur	Minor impact	<ul style="list-style-type: none"> <li>Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>
Cultural resources	Low likelihood of major or medium impacts	Minor	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

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
			<p>to contractors for such measure include reducing accommodation and transportation for his workers.</p> <ul style="list-style-type: none"> <li>The community leaders could take part in the process of employment in terms of informing their local community about job opportunities</li> <li>The newly employed persons and non-Egyptian experts should be oriented about the norms and traditions of the surrounding communities, particularly, the Bedouin ones.</li> <li>In case of any violation of norms, the site engineer should handle meetings with the community leaders in order to settle any disputes</li> <li>Enable grievance and redress mechanism in order to receive people concerns about such impact</li> </ul>
Human Health and Safety	Low likelihood of major or medium impacts for workers– high likelihood of minor impact for sensitive recipient	Minor to Medium	<p>Occupational Health and Safety</p> <ul style="list-style-type: none"> <li>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.</li> <li>All safety procedures reported in the Law should be abided to by the workers and the top management.</li> <li>The contractor should assign a health and safety supervisor who ensures the workers are abided to the H&amp;S procedures</li> <li>The contractor should make health and safety facilities available in the project site</li> <li>Contracts should be signed with the health facilities close to the construction site</li> <li>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</li> <li>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.</li> <li>When operating power tools at height, workers should use a second (backup) safety strap</li> <li>Testing structures for integrity prior to undertaking work</li> </ul> <p>Community health and Safety</p>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
			<ul style="list-style-type: none"> <li>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.</li> </ul>
Limitations on land use and risks of involuntary resettlement	Medium and direct impact to livelihood	Medium	Reduce impact significance to minor following recommendations of RAP/ARAP preparation
Losing environmental benefits of trees along power lines	Low likelihood of major or medium impacts	Minor	In order to compensate the negative impact on the environment, any removed tree should be substituted by planting other trees in other areas away from the ROW by the local stakeholders( Ministry of Agriculture ). The compensation for the owners of these trees should also take place in order to minimize the significance of the impact
Removing trees on ROW	Low likelihood of major or medium impacts	Medium to Major	Reduce impact significance to minor following RAP
Socioeconomic	Low likelihood of major or medium impacts	Medium to Major Positive temporary	No mitigation measures is needed
Impacts on traffic	Low likelihood of major or medium impacts	Medium	<p>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.</p> <ul style="list-style-type: none"> <li>Find suitable locations for temporary storage of conventional construction wastes.</li> <li>In case a narrow access road needs to be occupied for limited period (for example by loading/unloading trucks or loaders) the occupation time should be minimized. The additional measure is to have a careful turn (if needed) for the heavy trucks or loaders due to the high-speed vehicles passing by the highway.</li> <li>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</li> </ul>
Visual intrusion	Low likelihood of major or medium impacts and localized	Minor	Visual evidence of these projects cannot be completely avoided, reduced, or concealed.

**Table 1-4. Assessed significance of expected impacts during construction phase of 220 kV OHTLs North October/Main October /Motwreen / 6<sup>th</sup> October SS**

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
Noise	High likelihood to occur – short term - Highly sensitive receptors including workers only along the line.	Minor	<p>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</p> <ul style="list-style-type: none"> <li>Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> <li>Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>Avoid construction activities at night</li> </ul>
Impacts on Traffic	Low likelihood of major or medium impacts	Minor	<p>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.</p> <ul style="list-style-type: none"> <li>Find suitable locations for temporary storage of conventional construction wastes.</li> <li>In case a narrow access road needs to be occupied for limited period (for example by loading/unloading trucks or loaders) the occupation time should be minimized. The additional measure is to have a careful turn (if needed) for the heavy trucks or loaders due to the high-speed vehicles passing by the highway.</li> <li>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</li> </ul>
Air emissions	High likelihood to occur – short term - Highly sensitive receptors including workers.	Medium on the workers/ Minor on surrounded communities	<p>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, he should ask for additional spraying of water in the spot generating high emissions</p>



Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
Impacts due to handling of construction waste	Likely to occur - short term – Highly sensitive receptors include soil at protectorate areas and workers. Receptors with medium sensitivity include nearby settlements. Receptors with low sensitivity include groundwater.	Medium	<p>EETC should communicate with the local authorities including protectorates for officially assigning location for the disposal of construction waste within the three governorates. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.</p> <ul style="list-style-type: none"> <li>• A specified (one or multiple) locations 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
			<ul style="list-style-type: none"> <li>• 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.</li> <li>• Domestic waste generated on site shall be segregated and not mixed with any other type of waste.</li> <li>• 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.</li> <li>• Construction contractor shall contract competent authority at each governorate premises for safe disposing of generated sewage</li> </ul> <p>Mitigation measures for hazardous waste management: 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 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 and the HWM-SOP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors</p>
Human Health and Safety	Low likelihood of major or medium impacts for workers– high likelihood of minor impact for sensitive recipient	Minor to Medium	<p>Occupational Health and Safety</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• All safety procedures reported in the Law should be abided to by the workers and the top management.</li> <li>• The contractor should assign a health and safety supervisor who ensures the workers are abided to the H&amp;S procedures</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
			<ul style="list-style-type: none"> <li>• The contractor should make health and safety facilities available in the project site</li> <li>• Contracts should be signed with the health facilities close to the construction site</li> <li>• 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</li> <li>• 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.</li> <li>• When operating power tools at height, workers should use a second (backup) safety strap</li> <li>• Testing structures for integrity prior to undertaking work</li> </ul> <p>Community health and Safety</p> <ul style="list-style-type: none"> <li>• 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</li> </ul>
Land use	Minor and direct impact to livelihood	Minor	<ul style="list-style-type: none"> <li>• The main mitigation measure to be adopted is exerting the maximum effort to minimize the impact on land. Avoidance mechanism should be applied to the maximum possible.</li> <li>• Select ROW for locating routes of power lines, and seek alternatives whenever the routes are rejected by community people. The ROW is 25 meters from the center of the power line from both sides. That is in accordance with Electricity Law 87/2015.</li> <li>• Access roads for the vehicles and storage areas during construction have to be defined during the preparation of the construction phase.</li> <li>• 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</li> <li>• The contractor is responsible for clearing the tower site after completing his work. EETC shall help the contractor if any problem with the</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
			<p>landowner in the agriculture area or with any other authority / agency along the line routes would arise.</p> <ul style="list-style-type: none"> <li>An area of 25 meter from the center of the OHTL should be evacuated from tall trees and buildings. Such area will be kept as a Right of Way (ROW) for maintaining the public safety from electric hazards and high exposure to EMFs. Appropriate compensation should be paid to the owner of trees</li> <li>In case of resettlement, a proper Resettlement Action Plan or Abbreviated Resettlement Action Plan (ARAP) should be adequately prepared.</li> <li>Form a committee of local people and involve them in the compensation process.</li> <li>Develop an adequate Grievance mechanism that enable people to voice their concerns and worries, particularly, the ones related to involuntary</li> </ul>
Visual intrusion	Low likelihood of major or medium impacts and localized	Minor	Visual evidence of these projects cannot be completely avoided, reduced, or concealed.
Fauna and Flora	Medium likelihood to occur – short term	Minor	<ul style="list-style-type: none"> <li>Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations within protectorates shall be located to avoid impacts.</li> <li>Minimize noise and artificial lighting at night during construction</li> <li>Inform construction staff on the importance of natural habitats and notable plant species</li> <li>No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>Construction and vehicle movement should be made to minimum</li> <li>Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>Prepare habitat maps for project sites using aerial photography and high resolution satellite imagery</li> </ul>
Bird Migration	Low likelihood to occur	Minor impact	<ul style="list-style-type: none"> <li>Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
			<ul style="list-style-type: none"> <li>Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>
Water Resource (groundwater, geology and hydrogeology)	Medium likelihood to occur – long term impact – irreversible in case of hazardous waste contaminants (reversible after a very long period).	Medium	Standard prevention or precaution measures shall be prepared by the contractor prior to the construction. It is preferable to include the waste management plan in the ToR of the contractor.
Cultural resources	Low likelihood of minor impacts	Insignificant	No mitigation measures is needed
Culture and Privacy of Local Communities	Minor likelihood to occur – short term	Minor	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.
Socioeconomic	Low likelihood of major or medium impacts	Medium to Major Positive temporary	No mitigation measures is needed

The following table presents the mitigation measures which should be taken during operation phase of OHTLs

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 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	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.
Exposure to EMFs	Likely to occur - long term impact	Medium	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 500 and 220kV OHTLs) so that the EMFs would effectively attenuate at the edge of this EMF

Impact	Likelihood and severity	Significance	Mitigation Measures
Bird Migration	Low likelihood to occur	Minor	<ul style="list-style-type: none"> <li>Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>
Risk of soil contamination	Low likelihood of occurrence - short term impact	Minor	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	<ul style="list-style-type: none"> <li>Workers that operate at the OHTLs 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.</li> <li>Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> </ul>
Cultural resources	Low likelihood of minor impact	Minor	Standard mitigation measures of recording and reporting
Human 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
Land use	Low Likelihood of major or medium impact	Major to Minor	following RAP Instructions for 500kV while 220kV no mitigation measures are required

**Table 1-5. Environmental and Social Management Plan (ESMP) during construction phase of 6<sup>th</sup> of October substation**

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
Noise and vibration during site preparation, construction and	General measures for surrounding establishments and sensitive receptors			
	Notification letter of the introduction of project and duration to surrounding establishment and municipality	Contractor	-	Cover letter from EETC for approval of starting of the project

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
installation of equipment	Clear sign and warning sign (can be seen during day and night) of the project (including duration)	Contractor as a part of ToR for EHS general requirements	None as a part of tender process	
	Duration of the working on site (including uploading and loading) are during day only (between 7AM – 5 PM)	Contractor	-	
	Mitigation measures for construction workers during preparation and construction			
	Strictly standard procedures for health and safety of the workers according to IFC general EHS guidelines (including limitation of the duration and expose to high noise) and management of concentration works of heavy machineries	Contractor	None as a part of tender process	
	Strictly standard equipment especially for ear protection during the work	Contractor related to the EHS requirements during construction works	None as a part of tender process	
Traffic destruction or congestion during transportation of construction materials, construction waste, equipment and movement of project vehicles and machineries	Approval from traffic department prior to the construction	Contractor	-	Cover letter from EETC for approval of starting of the project
	Clear sign and warnings (including duration) of the project that can be seen during the day and night	Contractor as a part of the tender activities related to EHS requirements	None as a part of tender process	
	Destruction of road done section by section and during the end of the day the street should be restored from the excavation and other work activities	Contractor in assistance from traffic department and the EETC supervisor	None as a part of Contractor financial budget during the bidding activities	
	Movement of vehicles (for transporting materials, construction waste and SS equipment done during the night and	Contractor in coordination with traffic department, if needed	None as a part of contractor responsibility	

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
	loading and uploading done during the day within the site of the SS.			
	Agreement for temporary storage and the final disposal to the designated landfill	Based on the waste management plan submitted by the contractor and approval from EETC	-	
	The drivers and operators of the machineries should have training on safety utilization of their machines on the main and side road.	Drivers and operators employed by the Contractor. It is the responsibility of the contractor for implementing regulations to the drivers and operators	None as a part of tender process	
Ambient Air Quality by dust emission and the air emission due to the exhaust gasses from the construction vehicles and machineries	Localize and minimize the vehicle movements including limiting the speed	Contractor	As a part of their financial budget during the bidding activities	Low impact and temporary
	If needed, spray the soil before any excavation, filling loading and unloading. Pavement (graveled) of access roads prior to usage in construction of the project components	Contractor	-	
	Maintaining the efficiency of the vehicles and machineries	Contractor	As a part of their financial budget during the bidding activities	
	Waste management of temporary stock piles, construction materials, construction waste. The periodic waste transportation to the designated landfill should be included on the waste management as well.	Contractor	As a part of the ToR for waste management	Implementing the waste management submitted by the contractor and approved by EETC prior to the preparation and construction phase



Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
Waste generated (hazardous and non-hazardous, solid and liquid as well as construction waste and domestic waste)	Notification and contract, if needed for transporting hazardous and non-hazardous waste to their designated landfills.	Contractor	None, as a part of the contractor's offers and responsibilities during preparation and construction phase	Implementing the waste management submitted by the contractor and approved by EETC prior to the preparation and construction phase
	Separation of hazardous waste and non-hazardous waste for temporary storage			
	Designated area or location should be included at the waste management plan submitted by the contractor and approved by the EETC			
	Construction waste should be hauled at the end of each business day to the officially approved disposal sites			
	Adequate trucks with standard precaution (coverage of the waste, not overloaded, etc) for transporting the waste to the designated landfills. Regarding the hazardous waste transportation, the vehicles should be according to the standard mentioned on the EEAA regulations for hazardous waste transportation			
	Temporary onsite waste bins for solid waste before its collection and temporary onsite sanitation facilities should be provided within the construction site for the workers	Contractor	None, as a part of waste management	According to the waste management plan submitted to EETC
Safety impacts during excavation	Excavation and trenching in accordance to the design and drawings.	Contractor	-	

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
and trenching for the workers and surrounding communities and establishments	Protection and localized (by fences or barriers) the excavation and trenching sites to reduce the danger and prevent falling of materials and person and the other vehicles or machineries moving nearby the site	Contractor	None as a part of contractor offers related to EHS requirements	
	Standard helmet and safety boots for the workers	Contractor	None as a part of contractor offers related to EHS requirements	
Safety impacts during the mechanical and machineries use for the health and safety of the workers	Provision of authorized and licensed personnel for heavy machineries	Contractor	None as a part of contractor responsibilities	
	Maintaining the efficiency of the heavy machineries, including inspection before its use and following the design capacity and standard manuals of the heavy machineries, etc.			
Health and safety of the construction workers	Standard protection for the construction site workers	Contractor	None as a part of contractor offers related to EHS requirements	
	Provided on job training for the construction workers prior to the preparation and construction phase (including working at the high construction)			

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
	Identification of the existing underground networks Management of heavy equipment movement, especially nearby other underground networks (Before any excavation activities, the contractor shall coordinate with the different authorities to determine the existing infrastructure in the project's area (e.g. water lines, sewage lines, electrical cables and telecommunication lines)so as to avoid any undue damage.			
Water resources and soil pollution during construction	Precaution and prevention of waste management to prevent the soil and further water resource (groundwater or nearby surface water or drinking water network) pollution	Contractor	None, as a part of waste management	According to the waste management plan submitted to EETC

**Environmental and Social 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 OHTLs					
<b>Effects of construction waste</b>	<ul style="list-style-type: none"> <li>Identify disposal sites for construction waste approved by the local authority</li> <li>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</li> <li>Adequate transportation and disposal of construction waste</li> <li>Allocate and prepare areas for temporary storage of scrap</li> <li>Keeping tidiness and cleanliness of the WAA</li> <li>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.</li> </ul>	Pre-construction– construction	EETC- Waste officer nominated by EETC Construction contractor	EETC- Construction supervisor consultant	<ul style="list-style-type: none"> <li>Review local authority approvals</li> <li>Site supervision</li> <li>occasional inspection of disposal site</li> <li>Auditing of allocated WAA</li> <li>Auditing of stores</li> </ul>
<b>Excavation</b>	<ul style="list-style-type: none"> <li>Identify the excavation depth and width according to the drawing design</li> <li>Clear safety signs and boundary for the excavation sites</li> <li>Safety and clear area around the excavation site</li> <li>Safety helmets and boots compulsory for workers</li> </ul>	Pre- Construction	Construction Contractor	Construction supervisor	<ul style="list-style-type: none"> <li>Site supervision and occasional inspection</li> </ul>

Potential Impact	Proposed Mitigation Measures	Project Phase	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs					
<b>Construction air emissions</b>	<ul style="list-style-type: none"> <li>• Spraying soil before excavation in loose sandy soil</li> </ul>	Construction	Construction contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>• Site supervision</li> </ul>
<b>Construction noise</b>	<ul style="list-style-type: none"> <li>• Provide ear muffs to construction workers usually located near noisy machines</li> <li>• Organize working hours so that noise exposure to workers will be minimized</li> <li>• Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>• Avoid construction activities at night close to residential areas</li> </ul>	Construction	Construction contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>• Site supervision</li> </ul>

Potential Impact	Proposed Mitigation Measures	Project Phase	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs					
<b>Impacts of Flora and Fauna</b>	<ul style="list-style-type: none"> <li>• Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations in protectorates shall be located to avoid sensitive areas</li> <li>• Construction and vehicle movement should be made to minimum</li> <li>• Access road has to be defined prior to the construction phase to avoid the resettlement or compensation</li> <li>• Minimize noise and artificial lighting at night during construction</li> <li>• Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>• No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>• Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>• Inform construction staff on the importance of natural habitats and notable plant species</li> </ul>	Pre-Construction & Construction	Construction contractor Design consultant	EETC- Construction supervisor consultant- EHS officer	<ul style="list-style-type: none"> <li>• Site supervision</li> <li>• Access road map and access road management of the vehicles to the towers.</li> <li>• Evidence of provisions for minimizing light and noise practices during construction</li> <li>• Provision of information through staff induction, toolbox talks, leaflets, office posters, wildlife photo competition</li> <li>• Report on habitats and locations of protected/threatened plant species</li> </ul>
<b>Impacts of culture and privacy of local communities</b>	<ul style="list-style-type: none"> <li>• Maximize the use of local workers as much as possible</li> <li>• Provide information sessions to the outsider</li> <li>• Engaging community people in employment process</li> </ul>	Construction	Construction contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>• Review of contractor's reports related to workers</li> <li>• Stakeholder engagement activities</li> <li>• Capacity building reports and orientation sessions reports</li> </ul>

<p><b>Human health and safety</b></p>	<ul style="list-style-type: none"> <li>• Restrict application to the health and safety procedures</li> <li>• The contractor should make health and safety facilities available in the project site</li> <li>• Contracts should be signed with the health facilities close to the construction site</li> <li>• Drivers should have a certified and valid license</li> <li>• All mechanical equipment should be checked prior to use</li> <li>• Appropriately tag all mechanical equipment that are locked or out of service</li> <li>• 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</li> <li>• 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.</li> <li>• A guard should be assigned to keep community people out of the construction site</li> </ul>	<p>Construction</p>	<p>Construction contractor</p>	<p>Construction supervisor consultant</p>	<ul style="list-style-type: none"> <li>• Review of contractor's reports related to health and safety measures as well as the lists of injured workers</li> <li>• Capacity building reports and orientation sessions related to health and safety measures</li> </ul>
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Potential Impact	Proposed Mitigation Measures	Project Phase	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs					
<b>Land use restrictions and possible resettlement</b>	<ul style="list-style-type: none"> <li>• Avoidance mechanism should be fully adopted</li> <li>• If the resettlement occur, information and RPF should be implemented accordance with WB and EIB standard</li> <li>• An RAP study should be prepared to inform about best strategies to compensate the poor</li> <li>• Access roads and storage areas to be defined</li> <li>• Rehabilitating the construction site</li> <li>• Engaging the stakeholder during the process of compensation</li> </ul>	Design, planning and implementation	Design consultant Contractor	Construction supervisor consultant A RAP consultant EETC and local authorities	<ul style="list-style-type: none"> <li>• ARAP results</li> <li>• The design consultant report</li> <li>• Site visits reports</li> <li>• Compensation reports and receipts</li> </ul>
<b>Trees removal for power lines right-of-way</b>	<ul style="list-style-type: none"> <li>• Avoiding of trees is essential</li> <li>• Plantation of trees near removed trees</li> <li>• Agriculture association should orient the farmers about the best strategy to move their trees</li> </ul>	Construction	Contractor in cooperation with the farmers and the agriculture associations	EETC	<ul style="list-style-type: none"> <li>• Review reports and occasional audits</li> </ul>
<b>Socioeconomic impacts</b>	<ul style="list-style-type: none"> <li>• Job opportunities to be provided to the community workers</li> <li>• Integration of community leaders during the employment procedures</li> </ul>	Construction phase	Contractor and sub-contractors in cooperation with the community leaders	EETC (site engineer and the SDO)	<ul style="list-style-type: none"> <li>• Reports about the workers employed</li> <li>• Complaints raised about employment</li> </ul>
<b>Traffic</b>	<ul style="list-style-type: none"> <li>• Prevent storage of construction materials, equipment and machineries on traffic lanes</li> <li>• Capacity building of the drivers about safety utilization should be assured</li> </ul>	Preconstruction and Construction	Construction Contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>• Site supervision and grievance log related to traffic impacts</li> </ul>



**Environmental Monitoring Plan during Construction Phase of 6<sup>th</sup> of October Substation**

Potential Impact/Activity	Parameters to be monitored	Locations	Measurements (methods and equipment)	Frequency of measurements	Cost Estimates (\$)**	Monitoring Responsibility
During preparation and construction phase of 6 <sup>th</sup> of October SS						
Site clearance	Worker's injuries	Construction site location	Preparation of recording form of workers injure during the construction	During the duration of the construction activities	None	Contractor  On the preparation stage, the tendering has been done to purchase the standard procedure for site clearance. However, the contractor shall put into consideration on their budget proposal
Monitoring the traffic disturbance due to the vehicles and machineries movement and other related construction activities	Traffic complaint	Within 500 m from the construction site (especially at the main road)	Visual observation and recording complaint received	During the duration of the construction activities		
Monitoring ambient Air Quality during construction works	Ambient air (gas emissions) PM, dust complaint	Within the site and surrounding establishments	Visual investigation and recording of the dust and ambient air increased due to construction activities  Recording and reporting of the complaints (monthly report)	during the construction activities at different locations	As a part of contractor's financial offer	

Potential Impact/Activity	Parameters to be monitored	Locations	Measurements (methods and equipment)	Frequency of measurements	Cost Estimates (\$)**	Monitoring Responsibility
During preparation and construction phase of 6 <sup>th</sup> of October SS						
Monitoring Noise and vibration Impacts at the project sites	Noise complaints from the neighboring communities	Project locations	Visual investigation and recording and documentation of complaints	during the construction activities at different locations	As a part of contractor's financial offer	
Management of construction waste and handling of hazardous waste	Amount of hazardous and nonhazardous waste generated	Project site locations	Estimation of the hazardous waste and non-hazardous waste in relation to the handling and transporting to the landfill	Weekly or monthly depending on the volume of waste	As a part of contractor's financial offer for wastes handling	Contractor during construction and EETC SS staff during operation
Monitoring soil contamination and water resource contaminations	Area of spillage	Project sites	Visual observation  Recording and documentation of spillage	weekly	As a part of contractor's financial offer for environmental monitoring	Contractor
Monitoring health and safety of the workers during the construction of the project components	Health records about occupational injuries	Clinic / hospital referred by the contractor	Medical reporting on received cases	on received case	The cost is undefined, depending on the cases	Contractor

Potential Impact/Activity	Parameters to be monitored	Locations	Measurements (methods and equipment)	Frequency of measurements	Cost Estimates (\$)**	Monitoring Responsibility
During preparation and construction phase of 6 <sup>th</sup> of October SS						
Storage of the machines and construction materials of the project components	Complaints from neighboring communities and records and documentation of the temporary area for storage of materials or machineries	Project sites	Recording and documentation	monthly	--	Contractor
Impacts of culture and privacy of local communities	% of local labor to total labor	Construction site	Reporting labor origin governorates and calculating the natives ratio	After completion of construction phase		Construction contractor

#### Environmental Monitoring Plan During Construction Phase of OHTLs

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
Disposal of waste during construction	<ul style="list-style-type: none"> <li>Quantities of scrap item by type</li> <li>Segregated waste weight</li> </ul>	WAA	<ul style="list-style-type: none"> <li>Inspection and recording of admitted items</li> </ul>	<ul style="list-style-type: none"> <li>After completion of construction phase</li> <li>reporting</li> </ul>	EETC storekeeper/Waste officer
Excavation impacts	<ul style="list-style-type: none"> <li>Areas of excavations and trenching Safety areas around the excavation</li> </ul>	Construction site	<ul style="list-style-type: none"> <li>Inspection and marking of the safety areas for excavation</li> </ul>	<ul style="list-style-type: none"> <li>Upon excavation and trenching</li> </ul>	Site supervisor consultant Construction contractor
Impacts of culture and privacy of local communities	<ul style="list-style-type: none"> <li>Number of workers from within the project areas</li> </ul>	Desk work	<ul style="list-style-type: none"> <li>Reports about the workers</li> <li>Reports about stakeholder engagement activities</li> </ul>	<ul style="list-style-type: none"> <li>After completion of construction phase</li> </ul>	EETC SDO

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
	<ul style="list-style-type: none"> <li>• Number of stakeholder engagement activities</li> <li>• Training sessions and capacity building trainees</li> </ul>		<ul style="list-style-type: none"> <li>• Reports about capacity building activities</li> </ul>		
Human health and safety	<ul style="list-style-type: none"> <li>• Total number of injured workers</li> <li>• Total number of injured community people</li> <li>• Total received grievances related to health and safety</li> <li>• Total number of attendance to the orientation sessions about health and safety</li> </ul>	<p>Construction site</p> <p>Desk work</p>	<ul style="list-style-type: none"> <li>• Site visits to the construction site</li> <li>• H&amp;S monthly reports</li> <li>• Reports about stakeholder engagement activities</li> <li>• Reports about H&amp;S capacity building activities</li> </ul>	<ul style="list-style-type: none"> <li>• After completion of construction phase</li> </ul>	Site engineer and EETC SDO
Safety of mechanical equipment	<ul style="list-style-type: none"> <li>• Performance of the equipment and the visible damage</li> </ul>	Construction site	<ul style="list-style-type: none"> <li>• Inspection and recording of the performance</li> </ul>	<ul style="list-style-type: none"> <li>• Upon the use of the mechanical and heavy machineries</li> </ul>	Construction contractor
Land use restrictions and possible resettlement	<ul style="list-style-type: none"> <li>• Total areas of restricted use penetrated by ROWs and access road to the towers for the materials</li> <li>• Total affected persons</li> <li>• Total compensation paid to the Project Affected Persons (PAPs)</li> </ul>	Construction site	<ul style="list-style-type: none"> <li>• Area measurements on maps and on ground using surveying tools</li> </ul>	<ul style="list-style-type: none"> <li>• During the construction and operation phase</li> <li>• The resettlement consultant should conduct a mid-term and final monitoring</li> </ul>	<p>Design consultant</p> <p>Resettlement consultant</p> <p>EETC SDO</p>

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
Trees removal for power lines right-of-way	<ul style="list-style-type: none"> <li>• Number of removed trees</li> <li>• Total number of affected farmers</li> <li>• Total cost of compensation for trees</li> </ul>	Construction site Desk work	<ul style="list-style-type: none"> <li>• Visual counting of removed trees</li> <li>• Reports related to compensation</li> </ul>	<ul style="list-style-type: none"> <li>• Upon removal of trees, reporting will be once monthly</li> <li>• Approximately 6 months after the commencement of the construction,</li> </ul>	Site supervisor consultant Compensation committee EETC SDO
Socioeconomic impacts (job opportunities and reducing the value of residential units)	<ul style="list-style-type: none"> <li>• Number of jobs provided to the community people</li> <li>• Total number of complaints raised by workers</li> </ul>	Construction site Desk work	<ul style="list-style-type: none"> <li>• Reports about the workers and employment</li> </ul>	<ul style="list-style-type: none"> <li>• After completion of construction phase</li> </ul>	EETC SDO
	<ul style="list-style-type: none"> <li>• Number of affected units</li> <li>• Number of complaints raised</li> </ul>	Construction site Desk work	<ul style="list-style-type: none"> <li>• Reports about the cost of units</li> </ul>	<ul style="list-style-type: none"> <li>• After completion of construction phase</li> </ul>	EETC SDO
Traffic	<ul style="list-style-type: none"> <li>• Storage sites areas</li> <li>• Complaints related to traffic</li> <li>• Total number of drivers attended training about safety utilization</li> <li>• Total number of complaints raised due to traffic problems</li> </ul>	Construction site Desk work	<ul style="list-style-type: none"> <li>• Reports about the capacity building received by drivers</li> <li>• Complaints reports</li> <li>• Reports about capacity building to the drivers</li> </ul>	<ul style="list-style-type: none"> <li>• After completion of construction phase</li> </ul>	Site supervisor consultant EETC SDO

## **X. Environmental Safeguard Training**

The Project Company (EETC) will ensure that the substation is manned 24 hours 7 days per week. Typically, a substation of this type employs around 25 staff with around 10 engineers with 3 shifts per day. All staff employed will be trained in the following:

- Specific job roles and procedures;
- Occupational health and safety; and
- Contingency plans and emergency procedures.

Training will include:

- Induction training on appointment;
- Specialist training (as required for their prescribed job role); and
- Refresher training as required.

The training program will be designed to ensure that appropriate skilled staff is used to operate and maintain the substation at all times. Aspects of occupational health and safety and emergency procedures are to be emphasized.

Furthermore, environmental training will be given to all staff employed at the project and special environmental training will be given to the staff during the operation phase to implement the ESMP.

They will receive training in the following:

- Day-to-day monitoring activities;
- Collection and analysis of data;
- Use of monitoring equipment, operation and maintenance;
- Industrial hygiene;
- Occupational health and safety; and
- Emergency and contingency procedures.

During the consultation with one of the operators of an existing substation, a safety standard and regular training for staff is already established. However, regular refreshment training held besides the operation and maintenance training are:

- Administration skills
- Civil protection
- Firefighting and fire accident
- Smoke detection
- Fire equipment maintenance

In addition, at every substation EETC provides an emergency plan map including the responsibility of each staff during emergency and their contacts.

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**End of Executive Summary**

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## 2 Arabic Non-Technical Executive Summary

### 1 مقدمة

في إطار مشاريع التنمية في زيادة الطاقة الكهربائية والتي توليها الدولة اهتمام كبير في هذه المرحلة، تقوم الشركة المصرية لنقل الكهرباء بعدة مشاريع تنمية منها إنشاء عدة محطات محولات وربطها بالشبكة القومية لسد الفجوة الموجودة من الطاقة .

وطبقاً لشروط ولوائح جهاز شئون البيئة فعلى مالك المشروع إجراء دراسة تقييم للآثار البيئية لأى مشروع خدمي والحصول على موافقة بيئية قبل البدء في أي أعمال بالموقع.

وعليه تعاقدت الشركة المصرية لنقل الكهرباء التابعة للشركة القابضة لكهرباء مصر مع شركة إكوكنسرف للحلول البيئية لإعداد دراسة تقييم أثر بيئي للمشروع والذي يتكون من محطة محولات 6 أكتوبر 500 والخطوط الهوائية لربطها بالشبكة القومية

### 2 أهداف الدراسة

تهدف الدراسة إلى بحث جميع جوانب وأنشطة المشروع من حيث التأثير على العناصر البيئية وتقديم البدائل الأفضل للحفاظ على البيئة وتجنب التأثيرات السلبية المحتملة أثناء إنشاء وتشغيل المشروع. كما تهدف الدراسة إلى التوافق مع المتطلبات القانونية واللوائح والإرشادات العامة التي تحدد أساليب التنمية المستدامة.

### 3 المنهجية

تم الاعتماد على العديد من الأساليب من أجل تحديد الآثار البيئية وتقييمها. من تلك الأساليب إجراء مسوحات حقلية للبيئة البرية والجيولوجية كما تم إجراء مقابلات مع الجهات ذات الصلة. وقد تم مراجعة المراجع البيئية التي تغطي منطقة الدراسة. أضف إلى ذلك الاعتماد على فريق عمل مكون من خبراء في مجالات البيئة مثل الحياة البرية والجيولوجيا بالإضافة إلى خبير دراسة تقييم الآثار البيئية وخبير القانون البيئي وخبير في المرافق. وسوف يشمل هذا التقرير التنفيذي ملخص غير فني للدراسة الكاملة لوصف مكونات المشروع والأنشطة وتأثيراتها المتوقعة على البيئة وكيفية منع أو تقليل تلك التأثيرات.

#### 4 الاعتبارات التشريعية والقانونية

تضم التشريعات المصرية المتعلقة بالجوانب البيئية ما يلي:

- قانون التشريع البيئي الوطني 4 لسنة 1994، والمعدل بالقانون 9 لسنة 2009 بالمرسوم رقم 1095 لسنة 2011
- التوجيهات الإرشادية ومتطلبات جهاز شئون البيئة الخاصة بتقييم الأثر البيئي، المواد 19، 20، 21، 23، في القانون 4 لسنة 1994
- التوجيهات الإرشادية لمبادئ وإجراءات تقييم الأثر البيئي، الطبعة الثانية - يناير 2009
- قوانين السلامة والصحة لمهنية
- قوانين المرور والتخطيط العمراني

تضم التشريعات المصرية المتعلقة بالجوانب الاجتماعية ما يلي:

- التوجيهات الإرشادية لجهاز شئون البيئة الخاصة بعملية التشاور العام، التوجيهات الإرشادية لمبادئ وإجراءات تقييم الأثر البيئي، الطبعة الثانية - يناير 2009
  - التشريعات المصرية المرتبطة بنزع ملكية الأرض وإعادة التوطين القسري وتضم القانون 2003/94 في شأن تأسيس المجلس القومي لحقوق الإنسان والقانون 1990/10 الخاص بنزع الملكية للمنفعة العامة
  - التشريعات المصرية الخاصة بحماية حقوق الإنسان القانون رقم 94 لسنة 2003 في شأن تأسيس المجلس القومي لحقوق الإنسان
  - القوانين والتشريعات المرتبطة بالآثار (القانون رقم 119 لسنة 2008، القانون رقم 117 لسنة 1983
  - قانون المناقصات رقم 1998/89 المرتبط بالمناقصات وتنظيم أنشطة المشتريات
- كثير من مؤسسات التمويل الدولية تنتظر في تمويل المشروع المقترح ومنها البنك الأوروبي لإعادة الإعمار والتنمية، هيئة التمويل الدولية، وبنك الاستثمار الأوروبي، وأفرسيز للاستثمارات الخاصة، و FMO ، Proparco, OPEC. جميع هذه المؤسسات لها متطلبات بيئية واجتماعية يجب أن تنفذها الشركات التي تطلب التمويل. لهذه الأغراض يشير التقرير إلى سياسات البنك الأوروبي لإعادة الإعمار والتنمية ومتطلبات الأداء العشرة الخاصة به، وهيئة التمويل الدولية ومعاييرها الثمانية، وبنك الاستثمار الأوروبي ومعايير البيئية والاجتماعية.



## 5 وصف المشروع

### 1-5 بيانات المشروع

- انشاء محطة محولات 6 اكتوبر بسعة 220/500 kv و 3x750 MVA transformer GIS substation

: ربط المحطة من خلال الكابلات الهوائية لتوصيلها بالمحطات القائمة في (وادي النطرون - مغاغة - شمال الجيزة- سمالوط)

- الربط على شبكة 500 كيلو فولت:

o كابلات الربط الهوائية - دائرة رباعي الموصل اكتوبر/500 وادي النطرون 500 kv بطول حوالي 50 كم

o كابلات الربط الهوائية - دائرة رباعي الموصل اكتوبر/500 مغاغة 500 kv بطول حوالي 150 كم

o ترك مكان خالي لعدد (2) خلية احتياطية 500 kv للربط بالشبكة مستقبلا

- بناء شبكة خط نقل علوية 220kv مع النطاق التالي:

o 220 كيلو فولت ، دائرة مزدوجة 6 OHTL اكتوبر / شمال اكتوبر ، 40 كم

o 220 كيلو فولت ، بناء الدائرة المزدوجة ل 6 OHTL اكتوبر / اكتوبر الرئيسي ، 39 كم

o 220 كيلو فولت من المطورين بدائرة مزدوجة / 6 اكتوبر ، على بعد 38 كم

### 2-5 مكان وموقع المشروع

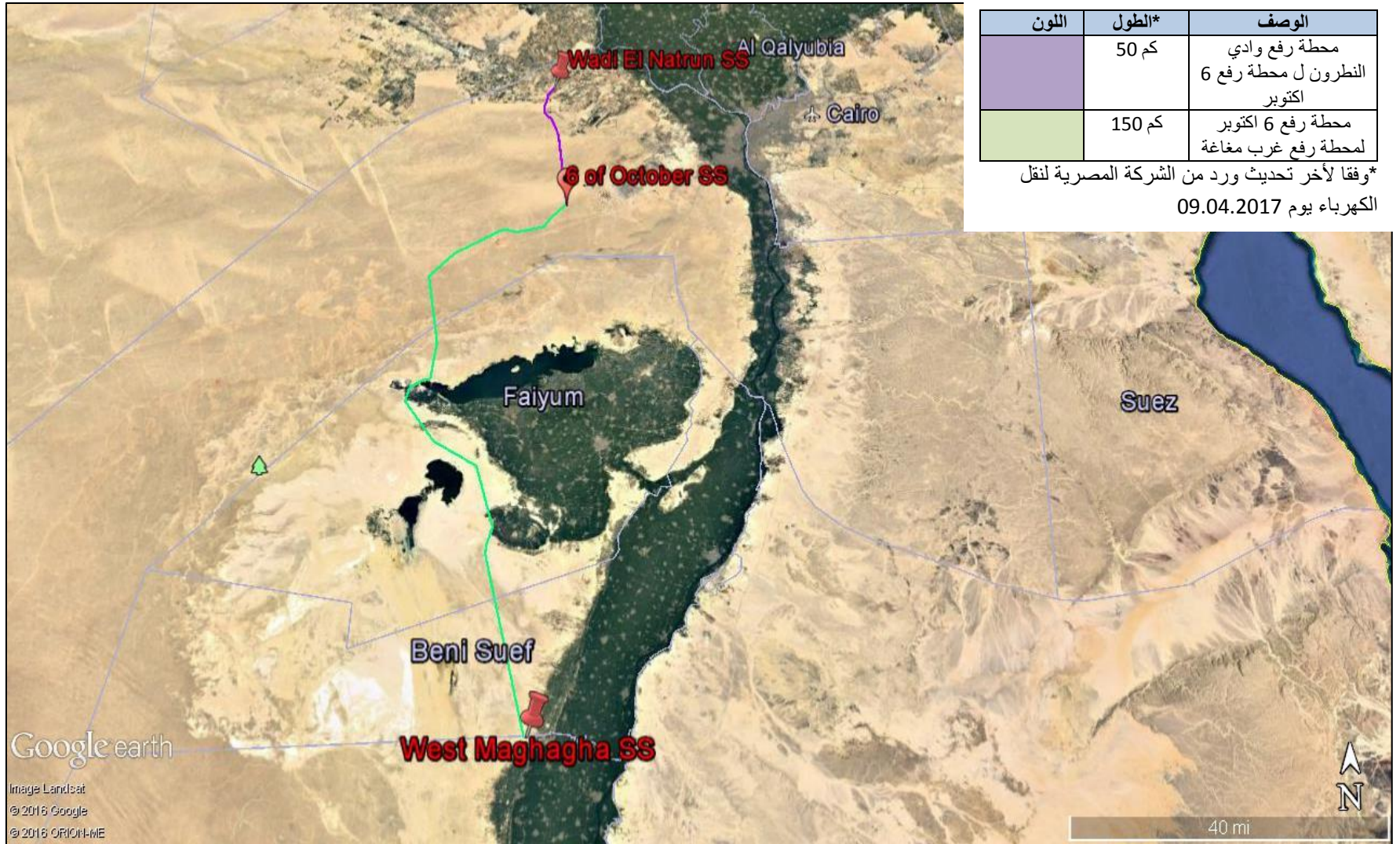
يقع المشروع في مدينة 6 اكتوبر في محافظة الجيزة علي ارض استصلاح زراعي في الظهير الصحراوي للمحافظة. الاراضي المحيطة بالمحطة هي اراضي مقسمة ومملوكة لأفراد ولكن لم يتم استصلاح أي منها حتى آخر زيارة ميدانية قام بها فريق عمل الاستشاري في يونيه 2016. المنطقة يحدها سور ولها مدخل من طريق الواحات

وقد تم تخصيص الأرض الخاصة بإنشاء محطة المحولات للشركة المصرية لنقل الكهرباء من جهاز مدينة 6 اكتوبر طبقا لخطاب السيد رئيس جهاز 6 اكتوبر (تاريخ 2015/4/19) وتم تسلمها في 2015/5/5 وتبلغ مساحتها 500 متر × 500,49 متر، حيث سيتم ربط خطوط المحطة جهد 500 ك.ف. بمحطات المحولات القائمة في (وادي النطرون- مغاغة) وجهد 220 ك.ف. بمحطات محولات (اكتوبر الرئيسية والمطورين، وشمال اكتوبر) كما هو موضح في الخريطة ادناه. كما سيتم ترك مكان خالي لخليتين احتياطيتين مع الأخذ

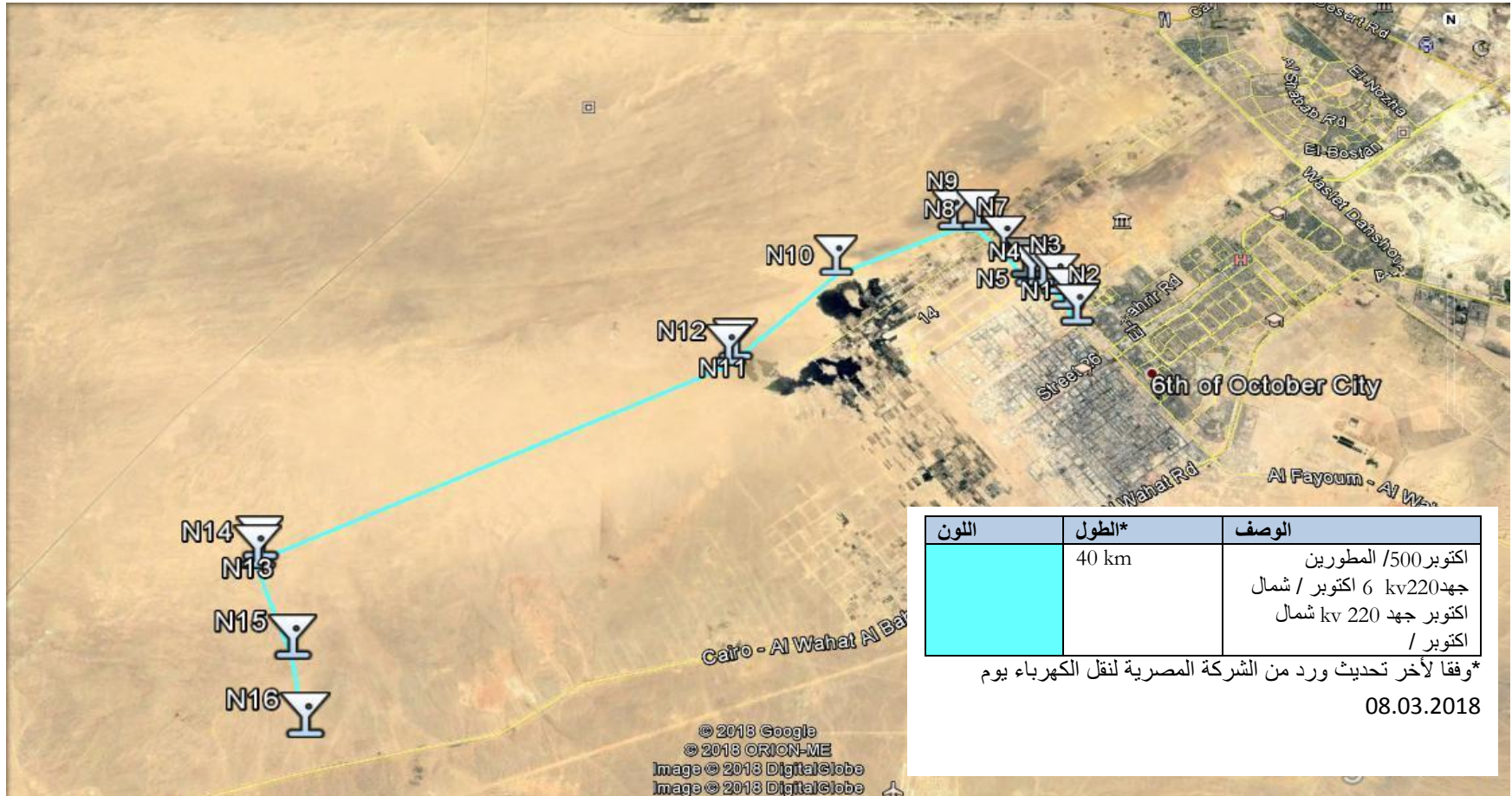
في الاعتبار توسيع المحطة مستقبلا بالجهد 66 ك.ف. عن طريق محولات جهد 66/220 ك.ف. ويوضح تقرير دراسة تقييم الأثر البيئي والاجتماعي المخطط التفصيلي لهذه التوصيلات (في الدراسة الكاملة).



شكل 1 . موقع محطة المحولات في 6 اكتوبر



شكل 2 . خطوط الربط الجهد العالي 500ك.ف



تبعد المحطة 3,28 كم عن الطريق الرئيسي (طريق الواحات) وتبعد حوالي 11,6 كم عن أقرب مستقبل وهي المنطقة الصناعية التابعة لمدينة 6 أكتوبر وحوالي 16,8 كم عن أقرب كتلة سكنية في حين تبعد حوالي 8,12 كم عن مطار 6 أكتوبر

### 3-5 وصف موجز لأنشطة الإنشاء

#### 1-3-5 إنشاء محطة المحولات

إعداد الموقع: يشمل أعمال تسوية الموقع (الحد من التأثيرات على شبكات البنية الأساسية القائمة في الموقع) نقل مواد البناء والمعدات اللازمة للإنشاءات - تشوين مواد البناء والمعدات في الموقع

يتم في هذه المرحلة الحصول على التصاريح والموافقات من الجهات الرسمية المختصة

أعمال الخرسانة: أعمال إنشاء الأساسات وصب الخرسانة والهياكل

أعمال إنشاء المباني الفرعية: تشمل المباني الإدارية وغيرها من المباني وغرف التحكم... الخ

تركيب المعدات: تشمل المحولات ووحدات التحكم واللوحات الكهربائية .. الخ

إدارة المخلفات: وتشمل المخلفات البلدية ومخلفات الإنشاءات (مخلفات خطرة وغير خطرة)، وتشمل التعرف على أنواع المخلفات وتخزينها بشكل مؤقت وإدارتها ونقلها إلى مدفن النفايات.

بالإضافة إلى الأنشطة السابقة سوف يتم تدريب العاملين على التشغيل والصيانة وسوف تشمل برامج التدريب خطة الطوارئ التي سوف يلتزم بها المقاول خلال أعمال توريد وتركيب وإعداد المحولات ومستلزماتها، سوف تتم أنشطة بناء القدرات في خلال فترة الضمان.

#### 2-3-5 مرحلة أعمال الإنشاءات للكابلات الهوائية

حفر القواعد: يتم الحفر بعمق حوالي 4.5 م لكل قاعده و يبلغ متوسط المساحة المطلوبة لتنفيذ قاعدة البرج من 22م X 22م الى 33م X 33م .

الخرسانة المسلحة: تستخدم خرسانه جاهزة لصب الخرسانة المسلحة في أماكن قواعد الأبراج.

تركيب الابراج الهوائية: يتم تجهيز البرج كأجزاء منفصلة ويتم تركيبه بالموقع عن طريق شركة مقاولات متخصصة .  
ويستخدم فريق الانشاء الروافع و المعدات لتركيب البرج بالموقع حيث يتم تركيب الزوايا الحديدية والعازلات.

عملية شد الأسلاك: بعد اتمام عملية انشاء الأبراج تقوم الروافع بثبيت الاسلاك الكهربائية و مدها ما بين الابراج حتي  
تصل بين المحطتين

و إنشاء المسار ينقسم الى جزئين:

عملية احلال البرج الهوائي القديم بالبرج الجديد: حيث يتم فك البرج الهوائي القديم باستخدام أوناش ثم تتم عملية تركيب  
البرج الهوائي الجديد على نفس المسار.

عملية إنشاء الأبراج على المسار الجديد: حيث يتم إتباع إجراءات الإنشاء التي سبق شرحها من عمليات حفر القواعد  
وصب الخرسانة و تثبيت الأبراج ومد الأسلاك.

### 3-3-5 مرحلة التشغيل

تحتاج محطة المحولات والابراج الهوائية إلى أعمال صيانة دورية وقائية وإصلاحية للحفاظ على عليها في أحسن حال  
في فترة التشغيل. تتبع الصيانة الوقائية جدول دوري يهدف إلى تجنب حدوث الأعطال والحفاظ على تشغيل المحولات  
على مستواها الأمثل. يعتمد تكرار الصيانة الوقائية على عدة عوامل مثل التكنولوجيا المستخدمة، والأوضاع البيئية في  
الموقع، شروط الضمان، والفروق الموسمية. تضم أنشطة الصيانة على سبيل المثال، فحص المحولات من حيث  
السلامة الهيكلية. تجرى أعمال الصيانة الإصلاحية في حالة حدوث الأعطال، على سبيل المثال لإصلاح أو تبديل  
المعدات المعطلة أو التالفة.

## 6 الوصف البيئي والاجتماعي

### المناخ

يكون معدل درجات الحرارة في منطقة مدينة 6 اكتوبر ما بين 18.5 د.م. في شهر يناير و 33.3 د.م. في شهر يونيو  
. وتتراوح الرطوبة النسبية في هذه المنطقة ما بين 58 % في شهر مايو و 73% في شهر يناير. أما بالنسبة لسرعة  
الرياح فأنها تتراوح بين 8.1 عقدة في شهر ديسمبر و 11.4 عقدة في شهر ابريل . ويبلغ أعلى قليل من سقوط الامطار  
في مدينة 6 اكتوبر

## الطبوغرافية

تقع مدينة 6 أكتوبر شمال طريق القاهرة - الإسكندرية الصحراوي وتتميز هذه المنطقة بعدم وجود تضاريس واضحة حيث أن سطح الأرض شبه منبسط تماما . وأن أهم دلائل انبساط الأرض في المنطقة هو عدم وجود مجارى على سطح الأرض لمسارات المياه السطحية في موسم المطر .

## الجيولوجية السطحية

تغطى رسوبات العصر الحديث منطقة الدراسات بالكامل والتي تتكون من رسوبات الكثبان الرملية والطفلة والتي تمتد في اتجاه الجنوب والشمال الغربي . وتظهر صخور عصر الميوسين غرب مدينة 6 أكتوبر بمنطقة وادي النطرون ويتجه الانحدار العام لسطح الأرض في هذه المنطقة نحو الشمال الغربي بانحدار بسيط للغاية

## الجيولوجيا تحت السطحية

تتكون الجيولوجيا تحت السطحية بالمنطقة المدروسة من التكوينات الصخرية الحبيبية والتي هي عبارة عن تسريبات الحجر الرملي والحجر الطفلي ويعتبر ظهور الحجر الجيري في الجزء الغربي القريب من سطح الأرض والمكون من صخور عصر البليستوسين وعصر الميوسين قليل للغاية . ومن الجدير بالذكر أن المنطقة تظهر بها صخور البازلت والتي يتراوح عمقها من سطح الأرض من مكان لآخر والتي تكون على شكل قواطع ومسطحات . وقد أظهرت الدراسات على صخور البازلت في طريق القاهرة الإسكندرية الصحراوي أن معظم هذه الصخور البازلتية تنتمي إلى عصر الاوليوسين حيث تقوم هذه الصخور الغير قابلة للنفاذ بحجز المياه الجوفية من الطبقات العليا من التتابع الصخري لهذه المنطقة

## المياه السطحية

يمكن وصف منطقة المشروع بالبيئية الصحراوية ولا توجد قناة او مياه سطحية كما لا يلغى النشاطات الزراعية في المنطقة



## فلورا

وجود النباتات قليل في منطقة مدينة 6 أكتوبر (منطقة حضرية) باستثناء بعض النباتات و شجر للزينة في الحدائق العامة، ومنطقة المشي، اما بقية المدينة هي مباني و منشآت. وتعتبر هذه المنطقة منطقة صحراوية لذلك من المتوقع ندرة النباتات. منطقة المشروع المقترح لا يوجد بها نباتات باستثناء عدد قليل من الأعشاب أو الحشائش.

## فونا

الحيوانات الموجودة في منطقة المشروع هي انواع متكيفة مع البيئة الحضرية، وأنه من النادر وجودها في منطقة المشروع المقترح في مدينة 6 أكتوبر. الحيوانات ممثلة أو يمكن أن ينظر إليه في منطقة المشروع الكلاب الضالة والقطط والقوارض والسحالي، والخفافيش، والغراب والحمام، وغيرها من الطيور. ويوجد في المنطقة عدد قليل من الموائل والنباتات.

## المحميات الطبيعية

محمية وادي الريان: تقع في الجزء الجنوبي الغربي بمحافظة الفيوم ويتكون وادي الريان من البحيرة العليا والبحيرة السفلى، ومنطقة الشلالات التي تصل بين البحيرتين، ومنطقة عيون الريان جنوب البحيرة السفلى، ومنطقة جبل الريان وهي المنطقة المحيطة بالعيون، ومنطقة جبل المدورة التي تقع بالقرب من البحيرة السفلى

ويتميز وادي الريان ببيئته الصحراوية المتكاملة بما فيها من كثبان رملية وعيون طبيعية وحيات نباتية مختلفة وحيوانات متنوعة وكذلك الحفريات البحرية، كما تعتبر منطقة الشلالات من مناطق الرياضات البحرية المختلفة.. ويوجد بالمحمية 15 نوعاً من الحيوانات البرية أهمها) الغزال الأبيض - الغزال المصري - ثعلب الفنك - ثعلب الرمل - الذئب (كما توجد بها عدة أنواع من الصقر

وادي الحيتان: هي منطقة للحفريات في الشمال الغربي لمحمية وادي الريان يرجع عمرها إلى حوالي 40 مليون عام وهذه الحفريات لهياكل متحجرة لحيتان بدائية وأسنان سمك القرش وأصداف وغيرها من الحيوانات البحرية التي تعتبر متحفاً مفتوحاً كما يوجد نبات الشورة متحجر داخل صخور لينة.

وفيما يتعلق بهجرة الطيور، فلا يقع موقع المحطة في مسار الطيور المهاجرة محلياً او دولياً

## الخصائص الاقتصادية - الاجتماعية

تقع الارض المخصصة للمحطة في مدينة 6 اكتوبر في محافظة الجيزة علي ارض استصلاح زراعي في الظهير الصحراوي للمحافظة. الاراضي المحيطة بالمحطة هي أراضي مقسمة ومملوكة لأفراد ولكن لم يتم استصلاح أي منها حتى آخر زيارة ميدانية قام بها فريق عمل الاستشاري في يونيه 2016. المنطقة يحدها سور ولها مدخل من طريق الواحات.

تم إنشاء مدينة 6 أكتوبر طبقا لقرار رئيس الجمهورية رقم 504 لسنة 1979 وتبعد عن منطقة الاهرامات بحوالي 17 كم و تبعد عن وسط مدينة القاهرة بحوالي 32 كم.

لا يمر المشروع باي من المناطق السكنية حيث تغلب الطبيعة الصحراوية على المنطقة المحيطة بالمشروع وهي لا يوجد بها أي مصادر طبيعية للمياه السطحية أو الوديان.

من خلال الدراسة الميدانية للمنطقة المحيطة بالمشروع تبين عدم وجود أي أنواع من النباتات البرية النادرة أو النباتات العشبية مع العلم أن المنطقة الواقع بها موقع المحطة تقع في منطقة مخصصة للاستصلاح الزراعي ولم يتم زراعتها بعد.

من خلال الدراسات الميدانية والتحليلية للموقع وتتبع آثار أي حيوانات برية موجودة بالمنطقة وكذلك سؤال العاملين بالمناطق المجاورة تبين عدم وجود أي حيوانات برية في منطقة المشروع.

## 7 بدائل المشروع

### 1-7 المشروع والتقنيات المستخدمة

- يهدف المشروع للتوسع في خدمات الكهرباء المقدمة للمنطقة المجاورة لمحطة محولات 6 اكتوبر وكابلات ربطها بالكابلات الهوائية
- التقنية المطبقة في محطة المحولات هي محطة GIS وتعتبر افضل نوع تكنولوجيا لمحطة المحولات من ناحية الامان و السلامة و الصحة المهنية في مرحلة التشغيل. سوف يتم ربط المحطة بالشبكة من خلال الكابلات القائمة بالفعل وهو ما يمثل استغلال امثل للموارد المتاحة.

## 2-7 بدائل الموقع ومسار خطوط الربط الهوائية

- تم تخصيص الأرض المخصصة لإنشاء محطة المحولات للشركة المصرية لنقل الكهرباء من جهاز مدينة 6 أكتوبر طبقاً لخطاب السيد رئيس جهاز 6 أكتوبر (تاريخ 2015/4/19) وتم تسلمها في 2015/5/5 تم اختيار موقع المحطة ومسار الكابلات لمراعاة الاستخدام الأمثل للموارد و تجنب اي مستقبلات حساسة.
- سوف يتم إنشاء الكابلات بمحاذاة شبكة الطرق (بما يسهل من توصيل المواد الخام والقيام بأعمال الصيانة)
- تم اختيار موقع المحطة ومسار الكابلات لمراعاة الاستخدام الأمثل (الحد من التكلفة بقدر الإمكان)
- محطة المحولات وخطوط الربط لها تأثيرات قليلة على مستقبلات الموجودة في المنطقة المحيطة بالموقع. باتباع إجراءات التخفيف الموصي بها تكون التأثيرات محدودة.

## 8 تأثيرات المحتملة على البيئة وإجراءات التخفيف

يتضمن التقرير تفاصيل التأثيرات المحتملة على البيئة وإجراءات التخفيف المقترحة خلال مرحلة أعمال الإنشاءات و خلال مرحلة التشغيل لمحطات المحولات و لخطوط نقل الكهرباء كلاً على حدة. مثال على ذلك التأثير الناتج عن الضوضاء الناتجة من المركبات/المعدات أثناء أعمال الإنشاءات والحفر، انبعاثات الهواء الناتجة من المركبات/المعدات ونقل التربة أثناء أعمال الإنشاءات، التأثير على الموارد الثقافية والموارد الأيكولوجية، التعامل مع المخلفات (الخطرة والغير خطرة) الناتجة عن أعمال الإنشاءات، الصحة والسلامة المهنية للعمال، التأثير على استخدام الأراضي، التأثير على المواقع الأثرية والثقافية، التأثيرات الاجتماعية، التأثير على حركة المرور، التأثير على الكساء النباتي والحيواني، التأثير على مصادر المياه الجوفية، التأثير على الطيران والاتصالات، فقدان بعض المميزات البيئية نتيجة قطع الأشجار لإقامة خطوط نقل الكهرباء، التأثيرات على مسار وأنماط هجرة الطيور وتأثير المشروع على المجتمع من خلال خلق فرص العمل وازدهار الاقتصاد.

يمثل الجدول التالي العناصر الرئيسية من التأثيرات المحتملة لمحطة المحولات وخطوط الربط خلال مرحلة الإنشاء

التأثير	مدى احتمالية و فداحة التأثير	الشدة	تأثيرات إجراءات التخفيف
التعامل مع مخلفات أعمال الإنشاءات	تأثيرات متوسطة	متوسط	اتباع خطة الإدارة البيئية لحد من شدة التأثير ليصبح تأثيراً محدوداً
انبعاثات الهواء الناتجة عن أعمال الإنشاءات	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	الحد من شدة التأثير في الأراضي التي تتكون من تربة رملية

## الملخص التنفيذي غير فني لدراسة تقييم الأثر البيئي والاجتماعي

التأثير	مدى احتمالية و فداحة التأثير	الشدة	تأثيرات إجراءات التخفيف
الضوضاء الناتجة عن أعمال الإنشاءات	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	اتباع خطة الإدارة البيئية لحد من شدة التأثير
التأثير على حركة المرور	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	اتباع خطة الإدارة البيئية لحد من شدة التأثير
التأثيرات على الكساء النباتي والحيواني	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	اتباع خطة الإدارة البيئية لحد من شدة التأثير
هجرة الطيور	احتمال منخفض	محدود	تركيب الأدوات المعززة للروية أو الخطوط المحددة مثل موانع مرور الطيور وصمامات الاهتزازات اللولبية أو الكرات المعلمة أو تحويل مسارها
التأثير على مصادر المياه الجوفية	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	اتباع خطة الإدارة البيئية لحد من شدة التأثير
مخاطر حدوث كوارث طبيعية	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	لا توجد حاجة لإجراءات التخفيف
التأثير على ثقافة وخصوصية المجتمعات المحلية واستخدام	تأثيرات متوسطة	متوسط	عمل خطة وافية لأعمال إعادة التوطين شاملة التعويضات

يمثل الجدول التالي العناصر الرئيسية من التأثيرات المحتملة لمحطة المحولات وخطوط الربط خلال مرحلة التشغيل

التأثير	مدى احتمالية و فداحة التأثير	الشدة	تأثيرات إجراءات التخفيف
المخاطر الناتجة عن الخردة والمخلفات الخطرة	احتمال منخفض لتأثيرات كبرى	محدود	الحد من شدة التأثير
المخاطر المرتبطة بالسلامة والصحة المهنية للعاملين	احتمال منخفض لتأثيرات كبرى	متوسط	الحد من شدة التأثير ليصبح تأثيرا محدودا
التعرض للمجال الكهرومغناطيسي	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	الحد من شدة التأثير

التأثير	مدى احتمالية وفداحة التأثير	الشدة	تأثيرات إجراءات التخفيف
المخاطر المرتبطة بتلوث التربة	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	الحد من شدة التأثير
التأثيرات على استخدام الأراضي والمناظر المفتوحة	احتمال منخفض لتأثيرات كبرى أو متوسطة	محدود	الحد من شدة التأثير
هجرة الطيور	احتمال منخفض	محدود	تركيب الأدوات المعززة للروية أو الخطوط المحددة مثل موانع مرور الطيور وصمامات الاهتزازات اللولبية أو الكرات المعلمة أو تحويل مسارها

## 9 خطة الإدارة والرصد البيئية

يتضمن هذا الفصل مصفوفات الإدارة البيئية خلال مرحلة أعمال الإنشاءات و خلال مرحلة التشغيل لكلاً من محطات المحولات وخطوط نقل الكهرباء، ويشمل التأثيرات المحتملة، إجراءات التخفيف المقترحة، مرحلة المشروع، المسؤولية الإدارية عن التنفيذ، المسؤولية المباشرة عن الإشراف، وأسلوب الإشراف. كما يتضمن هذا الفصل أيضاً مصفوفات خطة المتابعة البيئية خلال مرحلة الإنشاءات و خلال مرحلة التشغيل لكلاً من محطات المحولات وخطوط نقل الكهرباء، ويشمل التأثيرات المحتملة، مؤشرات المتابعة، موقع المتابعة، أسلوب المتابعة، دورية المتابعة، و مسؤولية المتابعة.

يمثل الجدول التالي العناصر الرئيسية من مصفوفة خطة الإدارة البيئية لمحطة المحولات وخطوط الربط خلال مرحلة الانشاء

التأثيرات المحتملة	إجراءات التخفيف المقترحة	مرحلة المشروع	المسئولية الإدارية عن التنفيذ	المسئولية المباشرة عن الإشراف	أسلوب الإشراف
التأثيرات الناتجة عن تراكم مخلفات البناء و الحفر	تحديد المواقع المقترحة للتخلص من مخلفات البناء التي توافق عليها السلطات المحلية	قبل البدء في أعمال الإنشاءات	الشركة المصرية لنقل الكهرباء	الشركة المصرية لنقل الكهرباء	مراجعة موافقات السلطات المحلية
	تحديد أماكن داخل الموقع لتخزين مخلفات البناء بشكل مؤقت	الإنشاء	مقاول الإنشاء	استشاري الإشراف على الإنشاء	الإشراف على الموقع

الملخص التنفيذي غير فني لدراسة تقييم الأثر البيئي والاجتماعي

التأثيرات المحتملة	إجراءات التخفيف المقترحة	مرحلة المشروع	المسئولية الإدارية عن التنفيذ	المسئولية المباشرة عن الإشراف	أسلوب الإشراف
	النقل السليم والتخلص من مخلفات الإنشاءات	الإنشاء	مقاول الإنشاء	استشاري الإشراف على الإنشاء	الإشراف على الموقع والتفتيش غير الدوري على موقع التخلص من المخلفات
	تخصيص وتجهيز منطقة للتخزين المؤقت للخرده	قبل بدء أعمال الإنشاءات	الشركة المصرية لنقل الكهرباء	الشركة المصرية لنقل الكهرباء	مراقبة كافة مواقع التخزين
	تحديد أماكن تركيب الأبراج بناء على الرسومات الفنية وضع علامات واضحة للسلامة وتحديد مناطق الحفر إتباع تعليمات السلامة وإخلاء المناطق المحيطة بموقع الحفر وتشمل ضرورة ارتداء العمال خوذات السلامة والأحذية الملانمة	قبل بدء أعمال الإنشاءات و أثناء الإنشاء	مقاول الإنشاء	مشرف الإنشاءات	الإشراف على الموقع والتفتيش غير الدوري
انبعاثات الهواء	رش التربة قبل الحفر لتفادي تطاير الرمال	الإنشاء	مقاول الإنشاء	مشرف الإنشاءات	رش التربة قبل الحفر لتفادي تطاير الرمال
الضوضاء الناتجة عن العمل	استخدام سدادات الأذن لعمال البناء بالقرب من الماكينات التي تصدر ضوضاء	لإنشاء	مقاول الإنشاء	مشرف الإنشاءات	الإشراف على الموقع
	تنظيم ساعات العمل للحد من تعرض العمال للضوضاء	الإنشاء	مقاول الإنشاءات	استشاري الإشراف على الإنشاءات	الإشراف على الموقع
التأثيرات على حركة المرور في الطرق	تفادي تخزين مواد ومعدات البناء في الحارات المرورية	قبل الإنشاء و أثناء الإنشاء	مقاول الإنشاءات	استشاري الإشراف على الإنشاءات	الإشراف على الموقع
	يجب أن يتلقى سائقو معدات البناء تدريبات على موضوعات السلامة	الإنشاء	مقاول الإنشاءات	استشاري الإشراف على الإنشاءات	الإشراف على الموقع
الصحة والسلامة المهنية للعمال	يجب أن يحصل السائقين على رخصة قيادة سارية	الإنشاء	مقاول الإنشاءات		الإشراف على الموقع

الملخص التنفيذي غير فني لدراسة تقييم الأثر البيئي والاجتماعي

التأثيرات المحتملة	إجراءات التخفيف المقترحة	مرحلة المشروع	المسئولية الإدارية عن التنفيذ	المسئولية المباشرة عن الإشراف	أسلوب الإشراف
	يجب فحص كافة المعدات قبل الاستخدام			استشاري الإشراف على الإنشاءات	مراجعة تقارير المشرف
	يجب وضع لافتات واضحة لكافة المعدات الميكانيكية أثناء الاستخدام أو في حالة عدم الاستخدام			المقاول	

يمثل الجدول التالي العناصر الرئيسية من مصفوفة خطة الإدارة البيئية لمحطة المحولات وخطوط الربط خلال مرحلة التشغيل

التأثيرات المحتملة	إجراءات التخفيف المقترحة	مرحلة التنفيذ	المسئولية الإدارية عن التنفيذ	المسئولية المباشرة عن الإشراف	أسلوب الإشراف
إنتاج المخلفات من الخردة والمخلفات الخطرة	تحديد وتجهيز مناطق في موقع المحطة للتخزين المؤقت للخردة	قبل الإنشاء			مراقبة المواقع التي تم تحديدها للتخزين
	الحفاظ على نظافة وتجميل مخزن الأدوات	التشغيل	مسئولي النظافة	القائم بالتشغيل الشركة المصرية لنقل الكهرباء/ قطاع البيئة	مراقبة أماكن التخزين
	التحكم في المخلفات الخطرة والخاصة (بالبيع أو إعادة التدوير)	التشغيل	القائم بالتشغيل الشركة المصرية لنقل الكهرباء	القائم بالتشغيل الشركة المصرية لنقل الكهرباء/ قطاع البيئة	توثيق إدارة المخلفات
	التحكم في المخلفات الخطرة غير الصلبة والمخلفات خاصة	التشغيل	القائم بالتشغيل الشركة المصرية لنقل الكهرباء	القائم بالتشغيل الشركة المصرية لنقل الكهرباء/ قطاع البيئة	مراجعة الوثائق والتفتيش المتقطع على موقع التخلص من المخلفات

الملخص التنفيذي غير فني لدراسة تقييم الأثر البيئي والاجتماعي

التأثيرات المحتملة	إجراءات التخفيف المقترحة	مرحلة التنفيذ	المسئولية الإدارية عن التنفيذ	المسئولية المباشرة عن الإشراف	أسلوب الإشراف
	تضمين مرحلة التصميم والإنشاءات إجراءات للحد من المخلفات خلال مرحلة التشغيل	التصميم والإنشاء	استشاري التصميم والمقاول خلال مرحلة الإنشاءات	استشاري الإشراف على الإنشاءات	الإشراف على الموقع
التعرض للمجال الكهرومغناطيسي	اختيار مسار خطوط نقل الكهرباء بعيداً عن المناطق التي تمت تميمتها	التصميم	استشاري التصميم	القائم بالتشغيل الشركة المصرية لنقل الكهرباء/ قطاع البيئة	مراجعة تقارير التصميم
	تحديد المسافة الخاصة بحق المرور في الطريق على جانبي خطوط نقل الكهرباء حتى لا يتم إنشاء مباني دائمة في هذه المناطق	قبل الإنشاء	الشركة المصرية لنقل الكهرباء والسلطات المحلية	القائم بالتشغيل الشركة المصرية لنقل الكهرباء	مراجعة المراسلات مع السلطات المحلية
	في حالة ارتفاع قياسات المجال الكهرومغناطيسي في المناطق السكنية يجب القيام بالإجراءات اللازمة للحد من المجال الكهرومغناطيسي بناء على مقترحات الاستشاري الهندسي	التشغيل	الاستشاري الهندسي المختص	الشركة المصرية لنقل الكهرباء/ قطاع البيئة	مراجعة تقارير الاستشاري وتنفيذ الإجراءات



## 10 الخلاصة

بعد تحليل أنشطة المشروع المختلفة خلال مرحلتى الإنشاء والتشغيل والتأثيرات البيئية المختلفة المترتبة عليها، إلى أن اختيار تلك المواقع المحددة للمشروع تمت بناء على المحددات التي تحقق الأهداف الفنية والاقتصادية والاجتماعية للمشروع. أما بالنسبة للتأثيرات البيئية السلبية في مرحلتى الإنشاء والتشغيل فهي محدودة ويمكن تخفيفها إلى الحد الأدنى الذي يمكن به جعل هذه التأثيرات مهملة بتطبيق خطة الإدارة والرصد البيئي المقترحة.

End of Arabic Non-Technical Executive Summary

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## 1 Introduction

### 1.1 Project Background

Over the past period, the electricity demand in Egypt has increased forming additional pressure on the already existing and aging electricity infrastructure. Recurrent and persistent power cuts and planned outages on the electrical grid peaked during 2011 and 2012. Such power cuts affected the daily life of citizens in addition to impacting production facilities. Since 2013 there have been constant efforts to meet the growing demand from the Egyptian government as well as by the private sector.

In order to meet the forecasted demand and secure the electricity stability in addition to the commitment to supply electricity to slum areas and informal buildings, the Egyptian Electricity Transmission Company (EETC) together with the distribution companies need to provide additional substations and their interconnections to evacuate newly produced energy and deliver to the final consumer.

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

In response to the growing demand for electricity and in support for EEHC's plan to expand the existing electricity infrastructure of power stations, substations and interconnecting lines/cables, the European Investment Bank (EIB) is funding the construction of several substations and interconnecting lines in cooperation with the EETC.

In line with EIB environmental and social standards, EETC is committed to carrying out an ESIA of the 6<sup>th</sup> of October Substation and its interconnecting OHTL to different existing substations and a Resettlement Action Plan (RAP) should the project activities trigger Egyptian legislations and/or EIB instruments relevant to resettlement.

EcoConServ environmental services (hereinafter referred to as 'the consultant') has been contracted to carry out the ESIA study and RAP in accordance with national legislations as well as EIB standards.

The consultant proceeded to identify and assess the environmental and social conditions in the project's area. In addition, the management and monitoring plan, including the mitigation measures during construction and operation and maintenance phases are described in the ESIA report for all project components involved.

### 1.2 Project Rationale of the 6<sup>th</sup> of October Substation and interconnection overhead transmission line.

In order to meet the steady increase in energy demand, the Egyptian expansion plan targeted to reinforce the national electricity network by adding more capacities and overhead transmission lines and underground cables by year 2018, this expansion is required for evacuation of power generated from the new power plants to the load centers.

The construction of 6<sup>th</sup> of October substation and its overhead transmission line cable will evacuate and transmit the produced power in north of Giza power plants (3x 750MW), provide stable electricity service at the surrounding area, as well as increase the electric capacity provided to the area and secure reliable power supply with minimum losses of transferred power.

The main objective of the proposed Project is to improve the voltage level and system stability in 6<sup>th</sup> of October area, reinforce the 500 kV national electricity network and evacuate the generated power from the new power plants. This is through construction of new substation in 6<sup>th</sup> of October and interconnection overhead transmission lines of 500kV and 220 kV.

### 1.3 The ESIA Objectives

According to the ToR, this consultancy task had two main outputs; An Environmental and Social Impact Assessment (ESIA) study, and a RAP study if necessary (in case resettlement or compensation is triggered by the project activities). During the preparation of the study, upon conducting a full site visit to the routes foreseen for the overhead transmission lines it will be decided whether a RAP will be necessary.

The objectives of the ESIA study thus 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.
- Hold consultations with the public including a final public consultation event which is publicly announced and well attended by relevant stakeholders.
- As a requirement, in parallel with the consultations activities, the disclosure will be conducted in accordance with the EIB 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.

### 1.4 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 particularly on the vulnerable groups (children, women, the poor),
- 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,
- Consult with project-affected groups and local non-governmental organizations about potential resettlement issues, and take their views into account.

## 2 Legislative and Regulatory Frameworks

### 2.1 Egyptian Laws, Regulations and Policies

The main legislations and guidelines that will be discussed under this section are as follows:

#### 2.1.1 Egyptian Constitution of 2014:

Article 13 states that the State shall protect workers' rights and strive to build balanced work relationships between both parties to the production process. It shall ensure means for collective negotiations, protect workers against work risks, guarantee the fulfillment of the requirements of security, safety and occupational health, and prohibit unfair dismissal, all as regulated by Law.

Article 35 states that the state is responsible for protecting private properties. With regards to expropriation, it shall be allowed only in the public interest and for its benefit, and against fair compensation to be paid in advance according to the Law.

Article 36 states that the State shall motivate the private sector to undertake its social responsibility in serving the economy and society.

Article 46 states that protecting the Environment is a national duty and that the State shall take necessary measures to protect and ensure not to harm the environment; ensure a rational use of natural resources so as to achieve sustainable development; and guarantee the right of future generations thereto.

#### 2.1.2 Environmental Law 4/1994 for the Protection of the Environment

Law 4/1994 and its executive regulations, subject to the Cabinet Decree 338/1995, as revised in some of its provisions in Cabinet decree 1741/2005, is the main environmental protection legislation in Egypt. The published Environmental Impact Assessment (EIA) guidelines (October 2001/January 2005/ January 2009) form the key regulation on environmental protection. Kindly refer to Annex 1 for detailed Executive Regulation related to Law 4/1994 concerning EIA.

#### 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 project, it is not compulsory to submit the full ESIA study including consultations and disclosure. However, based on the International requirements (EIB guidelines) the full ESIA study including public consultations and disclosure processes was followed during the study preparation.

- 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 Please refer to Annex 1 for the maximum permissible limit of noise.
- 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 Please refer to Annex 1 for maximum permissible gas emissions and period of exposure.

### **2.1.3 Law 38/1967 on Public Cleanliness**

The conditions mentioned in the previous paragraph are also mentioned in Law 38/1967 for General Cleanliness and its Executive Regulations. Article 15 of the Executive regulations stipulates that vehicles hauling construction waste should have tight cover to prevent dispersion or falling of its contents.

### **2.1.4 Law 93/1962: Discharge of Liquid Waste**

The law regulates the discharge of liquid waste to sewerage networks, thus protecting such networks and sewerage utilities from polluting discharges. Provisions of this law apply to all parts of sewerage networks including final inspection chambers and their joints to the main network and all pipelines whether constructed under public or private roads. Decree 649/1962 was revised (regulations of law 93/63) by Minister of Housing decree 44/200 including the revised specifications of liquid waste, prior to their discharge to the sewerage network. Late 2003, Minister of Housing decree 254/2003 (as 8<sup>th</sup> chapter of decree 44/2000) was issued for the bases and specifications of the treatment, handling and safe re-use of sludge.

Following, are some pertinent articles for the project activity.

Wastewater discharged to the sewerage network should comply with the standards stipulated in the regulations (decree 44/2000). Please refer to ana 1 for maximum pollutant to be discharged in public sewer network.

### 2.1.5 Electricity Law No. 87 of the Year 2015

In addition to Environmental Impact Assessment requirements, concerning the electricity sector installation, the People Assembly passed the bill of Electricity Law 87 which 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.

For the purposes of this report, Chapter 5 of law 87/2015 stipulates proceedings as follows:

Land Acquisition: Article 53, 55 and 62 addresses matters pertaining to land acquisition resulting from electricity projects and covers the compensation, the formation and responsibilities of the compensation committee, addressing grievances as well as specifications for the right of way.

Addressing Grievances: Article 53 further stipulates the owner/the tenants may submit written grievances/objections within 15 days from receiving the notice of forthcoming construction activities. Rejected objections will need a decision from the relevant minister to be implemented. Further grievances may be taken to the specialized courts.

Right of Way: Article 55 of the law specifies the distances to be measured and cleared from the axis of the OHTL routes as well as the underground cables, which should be kept away from the infrastructures and development areas tall trees, buildings and structures for the axis of the overhead/aerial lines routes as well as the cables. These paths are called the Right of Way (RoW). Following are the specifications:

- Twenty five meters in the case of overhead ultrahigh voltage lines (OUHVL). (132+kV)
- Thirteen meters in the case of overhead high voltage lines (HVL). (33kV – 66kV)
- Five meters from the medium voltage lines (MVL). (1kV – 33kV)
- Two meters in the case of low voltage lines (HVL). (up to 1kV)

### 2.1.6 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 regard of electricity tariff and collection fee, EETC is already provides the certain fees regulation and fees collection system, to provide all diverse consumers.

### **2.1.7 Natural Protectorates 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 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.

The Nature Protection Sector is the competent authority for this protected area and there is a documented approval from it with the Egyptian Environmental Affair agency on the proposed route for Maghagha which crosses on the border of the protectorates after it has been assessed from EEAA the Nature Protection Sector.

### **2.1.8 The work environment and operational health and safety**

Several laws and decrees tackle occupational health and safety provisions at the work place, in addition to Article 43 – 45 of Law 4/1994, which address air quality, noise, heat, humidity and the provision of protective measures to workers. These laws and decrees apply to the work crew that will be involved in construction activities.

Law 12/2003 on Labour and addresses workforce safety 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:

- Minister of Labour Decree 48/1967
- Minister of Labour Decree 55/1983
- Minister of Industry Decree 91/1985
- Minister of Labour Decree 116/1991

## **2.2 European Investment Bank (EIB) Environmental Guidelines**



The European Investment Bank (EIB) promotes European Union (EU) policies through its financial and other support to sustainable investment projects. Its approach is based on the environmental principles enshrined in the Treaty of preservation of the environment, protection of human health, rational utilization of natural resources and promotion of measures at the international level, establishing the European Community and the standards and practices incorporated in European Union (EU) secondary legislation on the environment.

The EIB Environmental and Social Standards provide an operational translation of the policies and principles contained in the 2009 EIB Statement of Environmental and Social Principles and Standards. They are grouped across 10 thematic areas covering the full scope of environmental, climate and social impacts and issues. They were originally adopted in September 2010 as part of the EIB Environmental and Social Handbook (the Handbook), which is subject to periodic review, revision and approval by the Bank's Governing Bodies

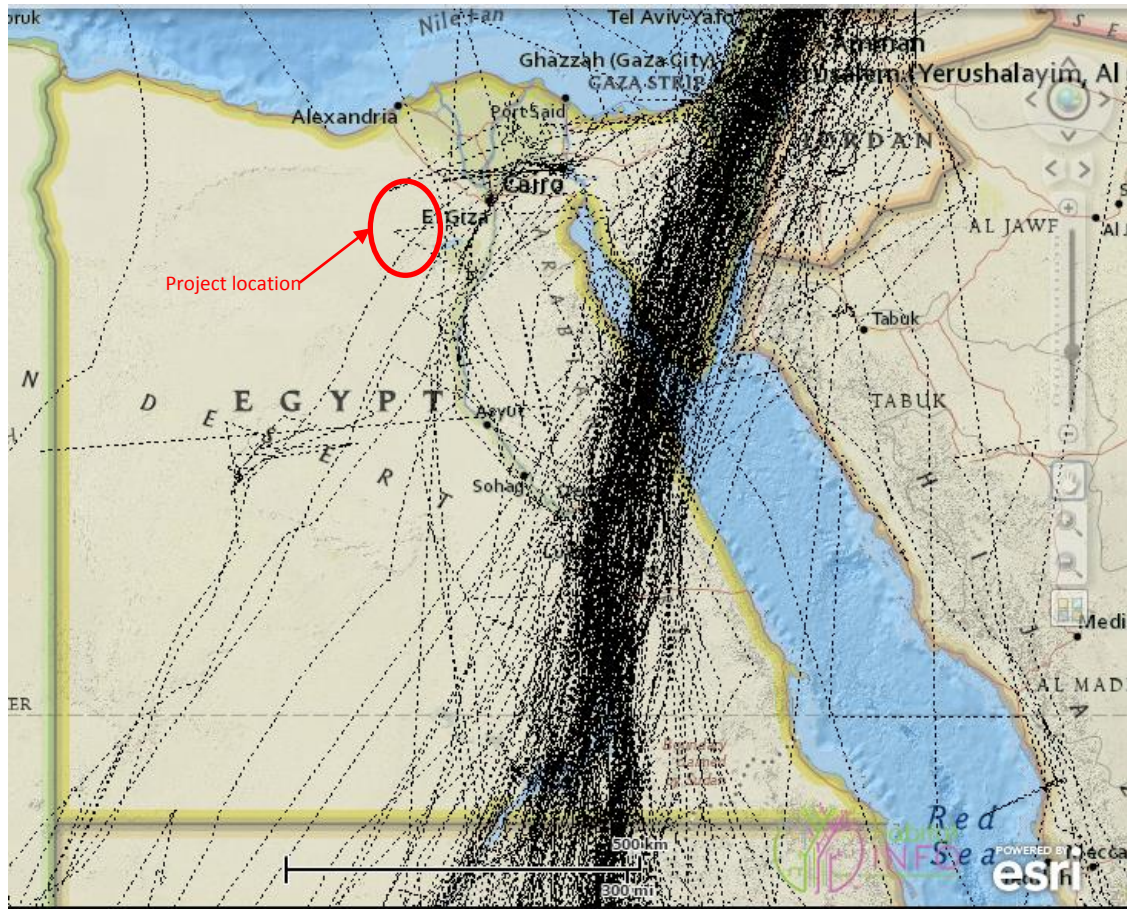
<http://www.eib.org/en/infocentre/publications/all/environmental-and-social-practices-handbook.htm>

The EIB environmental and social handbook also refers to the following directives as references to consider during the preparation of an ESIA:

- The Habitats Directive and 92/43/EEC
- The Birds Directive 2009/147/EC
- The EU Water Framework Directive (2000/60/EC)
- The SEA Directive 2001/42/EC
- The SEA Protocol under the UN ECE Espoo Convention

According to the EU EIA Directive, it is the responsibility of the host country and its competent Authorities to ensure that the "public concerned" are informed and consulted on the proposed project (Articles 6 and 9). Bank staff as part of their environmental assessment checks that these requirements have been fulfilled.

Concerning the bird migration and habitat, although Egypt does not lie within the European territory, but as the bird migration and the wildlife of the migration birds might trigger as some of the migration path pass the Egyptian territory from the European member states. However, as the project sites; both SS site and interconnections sites are not on the wild state and are not within the migration path that pass the Egyptian territory, the impacts on migration of birds are considered negligible.



**Figure 2-1. Main migration routes in Egypt**

*Source: BirdLife International (2015)*

In addition, as the nature of the existing sites are the empty land dedicated for a construction of a substation (within the suburb residential area) and interconnections lines to connect the new SS to the national grid, there is no natural habitats or wild life are present on site. Similarly, the flora and fauna of the project sites are considered low.

Consultation and participation is essential for investment sustainability through increased local ownership and support through informed involvement. Moreover, meaningful dialogue and participation is crucial to promoting and supporting the rights of people affected by a project. This includes the rights to due process via recourse to independent appeal and arbitration procedures in the case of disputes. As such, public consultation is a general requirement of the environmental and social safeguards of the Bank. For this ESIA, to ensure the public participation and public concerns is accounted, the public consultations were held during the preparation of ESIA, following Chapter 10 of the EIB Environmental and Social Standards and the WB procedures for public consultations plan. Summary of the EEAA, EIB policies and WB Procedures and guidelines concerning the environmental and social aspects of the project is presented at Table 2-1.

Table 2-1. Summary EEAA, EIB and WB safe guard and policies for environmental and social aspects

	Safe guard	Policy Triggered		Justification
		EEAA	EIB	
1	EIA	Yes	Yes	<ul style="list-style-type: none"> <li>• ESIA is a compulsory study (in accordance to Egyptian and International guidelines and regulations); that has to be provided prior to the implementation of any project.</li> <li>• This policy applies to all projects requiring a Category B of Egyptian Laws and Regulations 4/1994, and Table D of EIB project categorization will be applied. In addition, the EIA is in accordance to EIA Policy summarize in Environmental Statement 2004 governed by Directive 85/337/EEC, amended by Directives 97/11/EC and 2003/35/EC</li> <li>• All Environmental and Social aspects related to construction of the substation and interconnections project will be adequately examined in accordance to the Egyptian and EIB regulations and guideline</li> <li>• All Environmental and Social aspects related to operation of the substation and interconnections project shall be adequately examined in accordance with the Egyptian and EIB regulations and guidelines</li> </ul>
2	Natural habitat and Bird Migration	No	No	<ul style="list-style-type: none"> <li>• No natural habitat or physical cultural or natural protectorate property issues have been identified during site visits or desk studies, hence the risk of project affecting natural habitats or physical cultural or natural protectorate property is considered negligible.</li> <li>• The project does not belong to the international bird migration path. Therefore, the bird migration is not triggered in this study (by both national (Egyptian) and International (EIB)).</li> <li>• In addition, the project sites are mainly urban areas which are characterized by only local birds</li> </ul>
3	Involuntary Resettlement	No	Yes	<ul style="list-style-type: none"> <li>• For this particular component of the project, involuntary resettlement is triggered for the OHTLs only not for the SS.</li> <li>• There is no private land acquisition or resettlement that will take place at the new SS site, the proposed site for SS is already plotted and approved by the decree from Giza Governorate. In addition, most of the OHTLs paths through state government land; but others pass on agricultural lands owned by individuals (private property), which requires compensation for the destruction of crops, trees, and the plot of land on which the tower will be installed.</li> </ul>
4	Disclosure	No	Yes	<ul style="list-style-type: none"> <li>• According to Egyptian Law and Regulation, Disclosure is only applicable to category C project; hence it is not applicable to the current project.</li> </ul>

	Safe guard	Policy Triggered		Justification
		EEAA	EIB	
				<ul style="list-style-type: none"> <li>• However, as the Disclosure process is compulsory under the EIA Directive, it has been designed in accordance with EIB regulations and guidelines for the Public Consultation and Disclosure Plan. This will involve:               <ol style="list-style-type: none"> <li>a. For the scoping session Consultation Activities will be conducted with various stakeholders from government authorities and the PAPs will be affected by the construction of the OHTLs consultation activities will include a short description of the project components and predicted impact.</li> <li>b. For the Public Consultation will involve publishing an announcement in the agricultural associations and local units located in the path of OHTLs lines, which will be before the session prior to the event, invitations, distribution of the executive summary (in Arabic) for the invitees and attendees. In addition, the report will be available as well at the EETC and donor's (EIB) website after the approval.</li> </ol> </li> </ul>

### 3 Project Description

#### 3.1 Project Objectives

The construction of 6<sup>th</sup> of October substation (3x750 MVA, 500/220/11 kV GIS) and its overhead transmission lines interconnection (500 kV and 220 kV networks) will improve power capacity at the area with minimum losses of transferred power. The project aims to fulfill the following objectives:

- Improve the voltage level and system stability in 6<sup>th</sup> of October area.
- Reinforce the 220 kV and 500kV national electricity network.
- Evacuate the generated power from the new power plants in North of Giza and Ghayada power plants; and
- Connect with Wadi El Natroun substation and Maghagha substation through 500 kV overhead transmission line, in addition improving the 220 kV network through construction of 220 kV OHTLs New 6<sup>th</sup> of October / Main October , 6<sup>th</sup> of October /North October and 6<sup>th</sup> of October/ Motwreen.

Those objectives are in accordance to the EEHC and its affiliated companies' mission toward the society: to provides continuous and safe supply of electricity to all type of consumers. In addition, as the EEHC and its affiliated companies' long term goals, all the implementation of their project is in accordance with international performance standards and taking into consideration all the environmental, social and economic determinants.

#### 3.2 Project Location

During the preparation of the ESIA report, the ESIA experts conducted several site visits to the proposed SS location. The routes for the overhead transmission line was identified according to the data and maps collected from EETC, including the map showing the general layout of the Substation and the routes of the overhead transmission lines sorting from 6<sup>th</sup> of October SS. The data provided by the EETC and site reconnaissance visits conducted by the experts gave the team a better understanding of the project site, description of the project locations and its surroundings and the existing environmental and social conditions related to the different perspectives (environmental, social, human being, flora, fauna, cultural heritage sites, etc.).

The site of the proposed substation at 6<sup>th</sup> of October city will be constructed in arid area with no vegetation cover, the proposed substation has a rectangular shape with area of approximately 0.25km<sup>2</sup> and perimeter of 2km. as determined in the following coordinates:

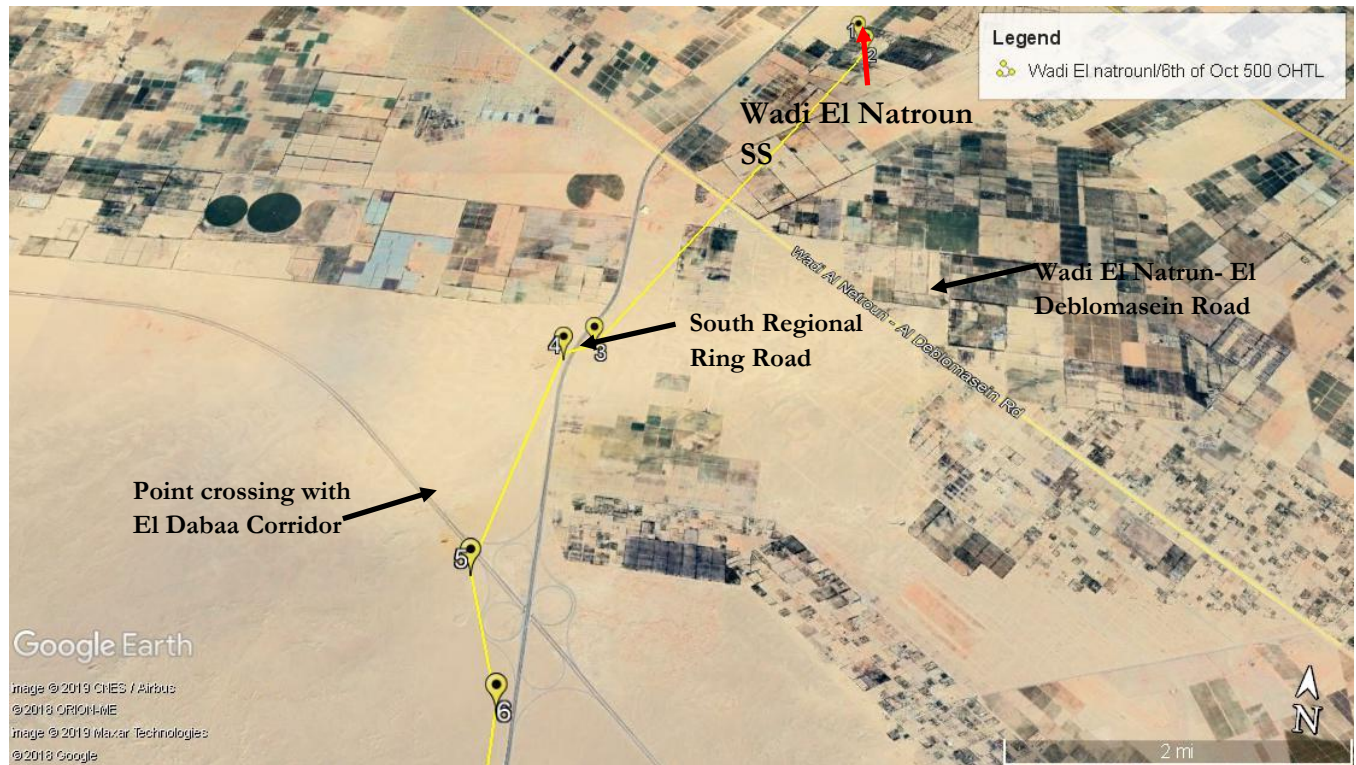
**Table 3-1. Proposed 6<sup>th</sup> of October SS coordinates**

	UTM Coordinates	
P1	29°53'6.44"N	30°44'45.10"E
P2	29°52'50.18"N	30°44'46.75"E
P3	29°52'49.37"N	30°44'28.18"E
P4	29°53'5.63"N	30°44'26.57"E

The map of the proposed 6<sup>th</sup> of October SS location and conceptual line diagram is presented at **Error! Reference source not found.** and Figure 3-4 The 500 kV overhead transmission line routes between Wadi El Natroun/6<sup>th</sup> of October SS and 6 October SS/Maghagha is presented at Figure 3-5.

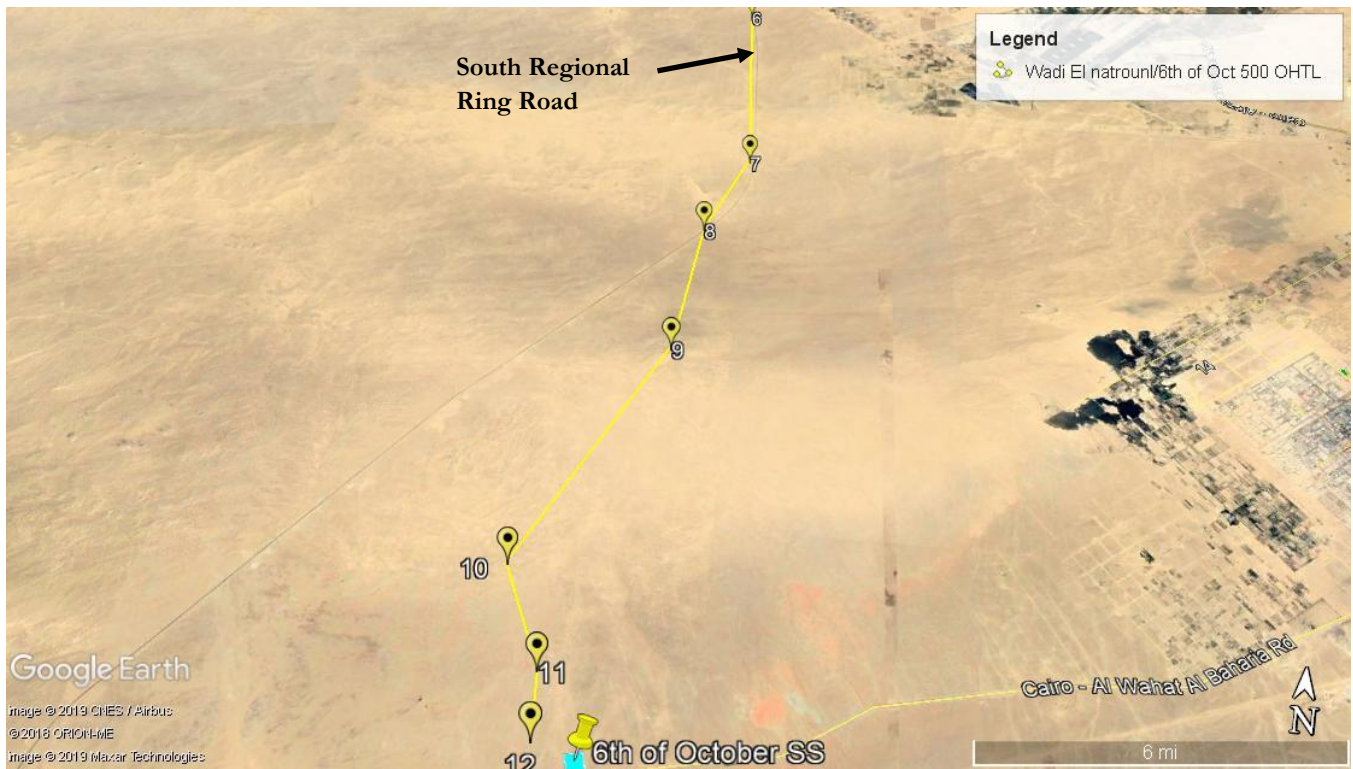
The below figure presents overview map of the 500 kV OHTL routes interconnection for 6<sup>th</sup> of October and Wadi El Natroun SS –at a scale 1:50,000. The 500 kV OHTL connecting Wadi El Natroun/6<sup>th</sup> of October SS

originate from Wadi El Natroun SS and ends at 6<sup>th</sup> of October SS extending over map length of 50km. The 500 kV OHTL will originate from Wadi El Natroun substation to cross Wadi El Natroun- El Deblomasein Road then run parallel to south regional ring road then cross it and will run parallel to it again, flying over El Dabaa Corridor.



**Figure 3-1. 500 kV OHTL routes interconnection between 6<sup>th</sup> of October and Wadi El Natroun SS(Part One)**

It will continue running parallel to the south regional ring road, next shift south-east to cross the south regional ring road and run parallel to it. Afterwards, it will break through unoccupied desert land towards 6<sup>th</sup> of October SS.



**Figure 3-2. 500 kV OHTL routes interconnection between 6<sup>th</sup> of October and Wadi El Natrun SS(Part Two)**

The 500kV OHTL connecting 6<sup>th</sup> of October SS/Maghgha will originate from 6<sup>th</sup> of October SS, in Giza Governorate, and will pass through Faiyum Governorate, Beni Suef Governorate and ends in Maghgha SS located in southern border of Menia Governorate.



Figure 3-3 Map of proposed SS



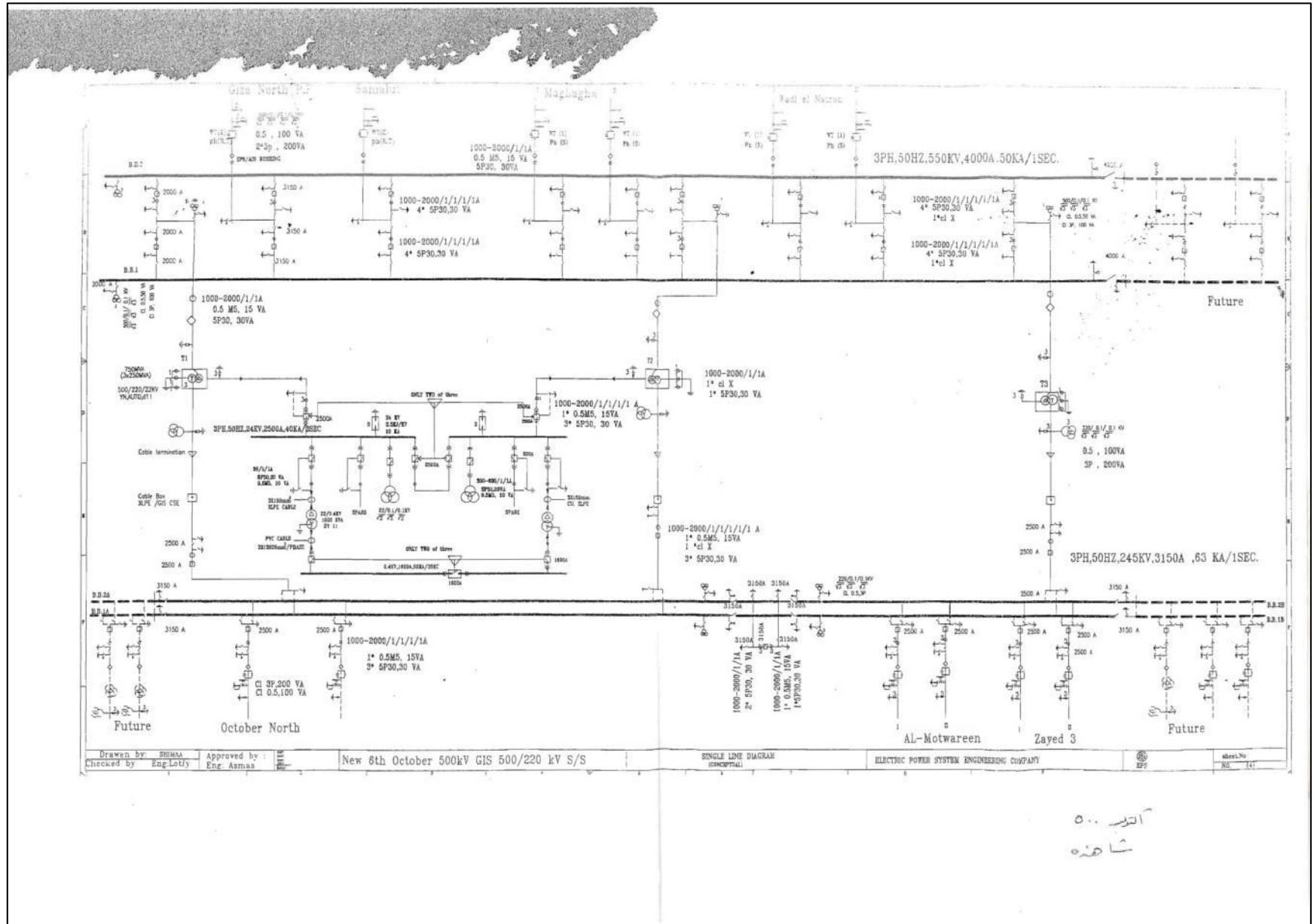


Figure 3-4. Conceptual line diagram of proposed SS

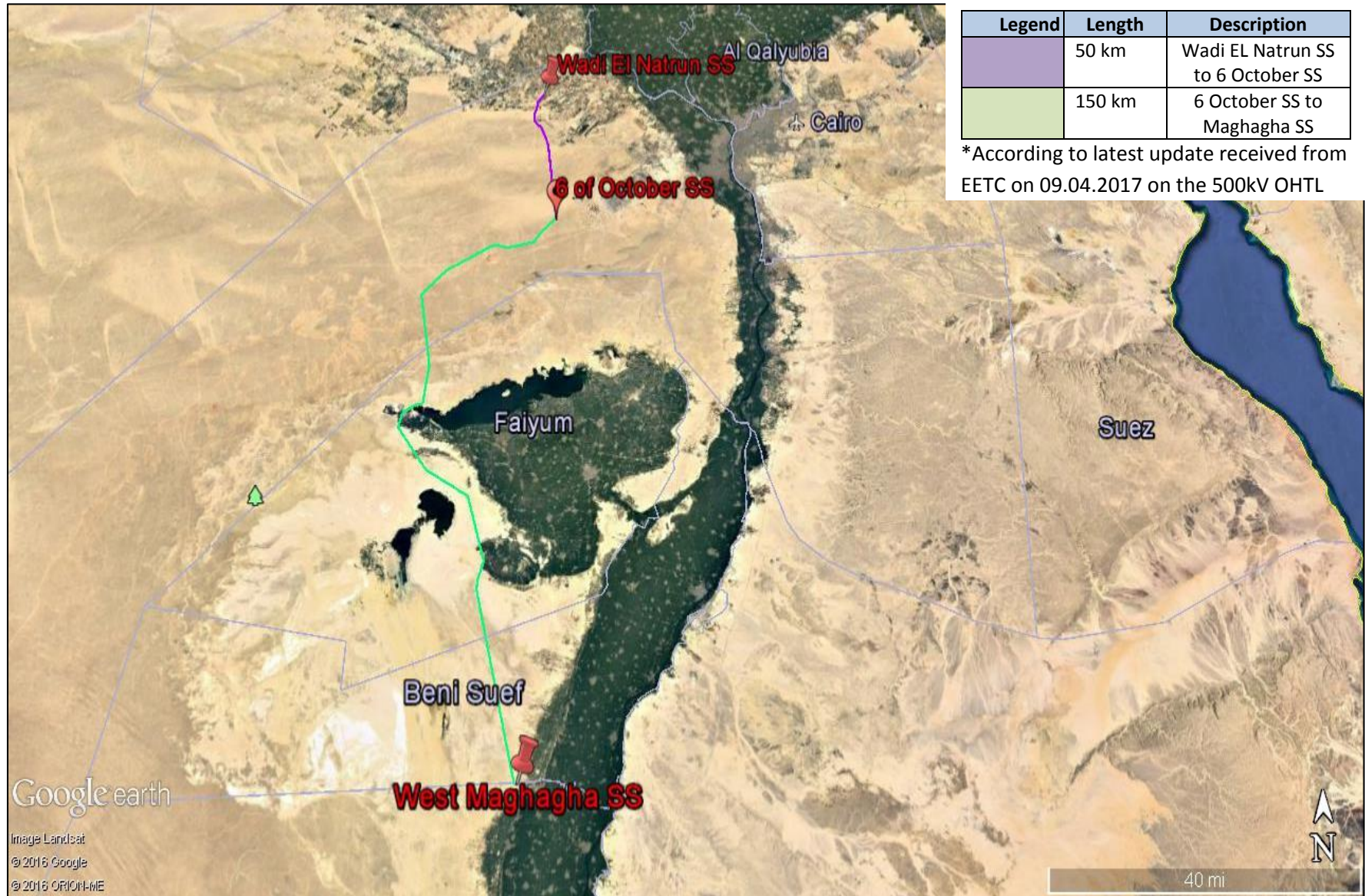


Figure 3-5. 500 kV OHTL routes interconnection between 6<sup>th</sup> of October, Wadi El Natrun SS and West Maghagha SS

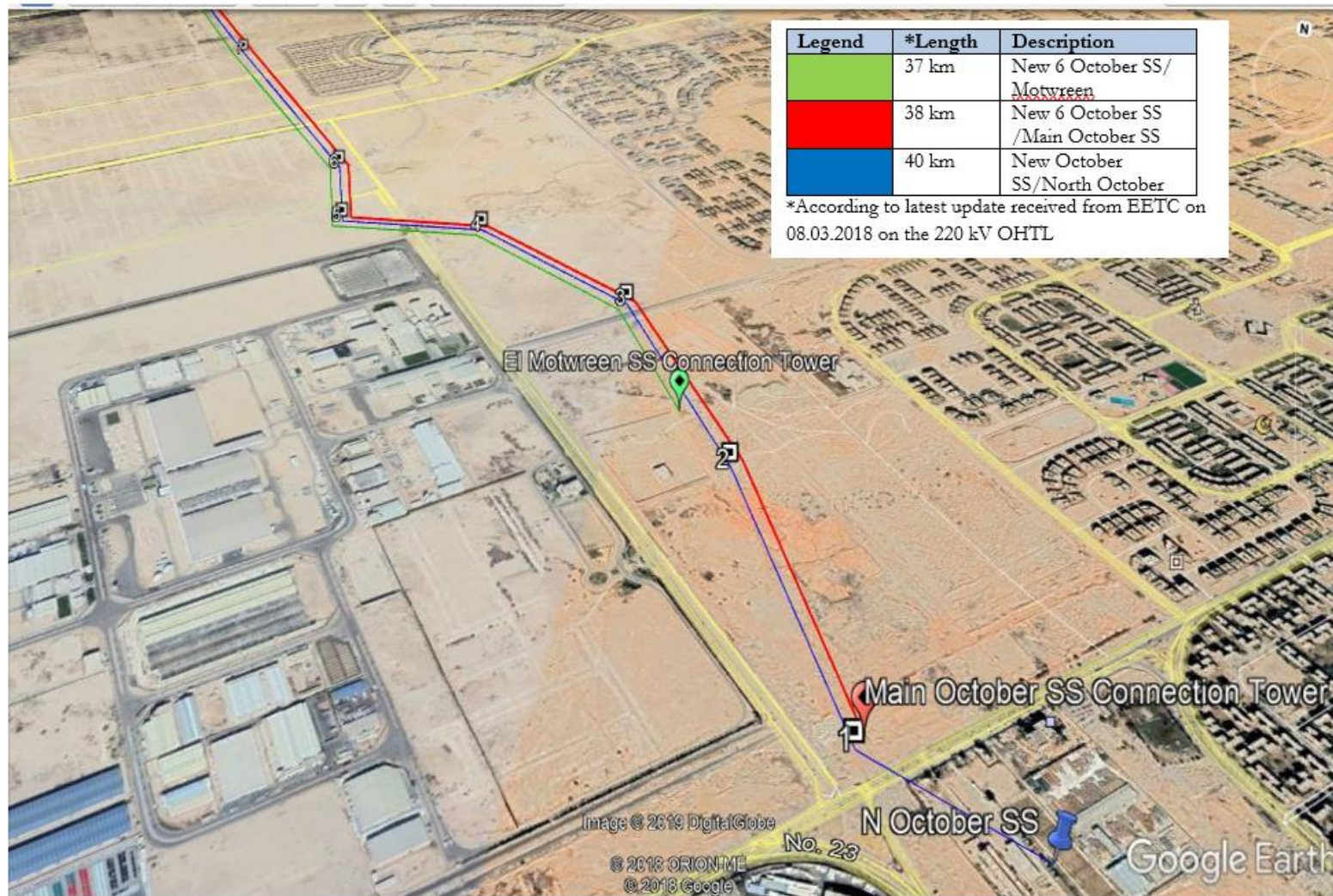


Figure 3-6. 220 kV OHTL routes interconnection for 6<sup>th</sup> of October SS

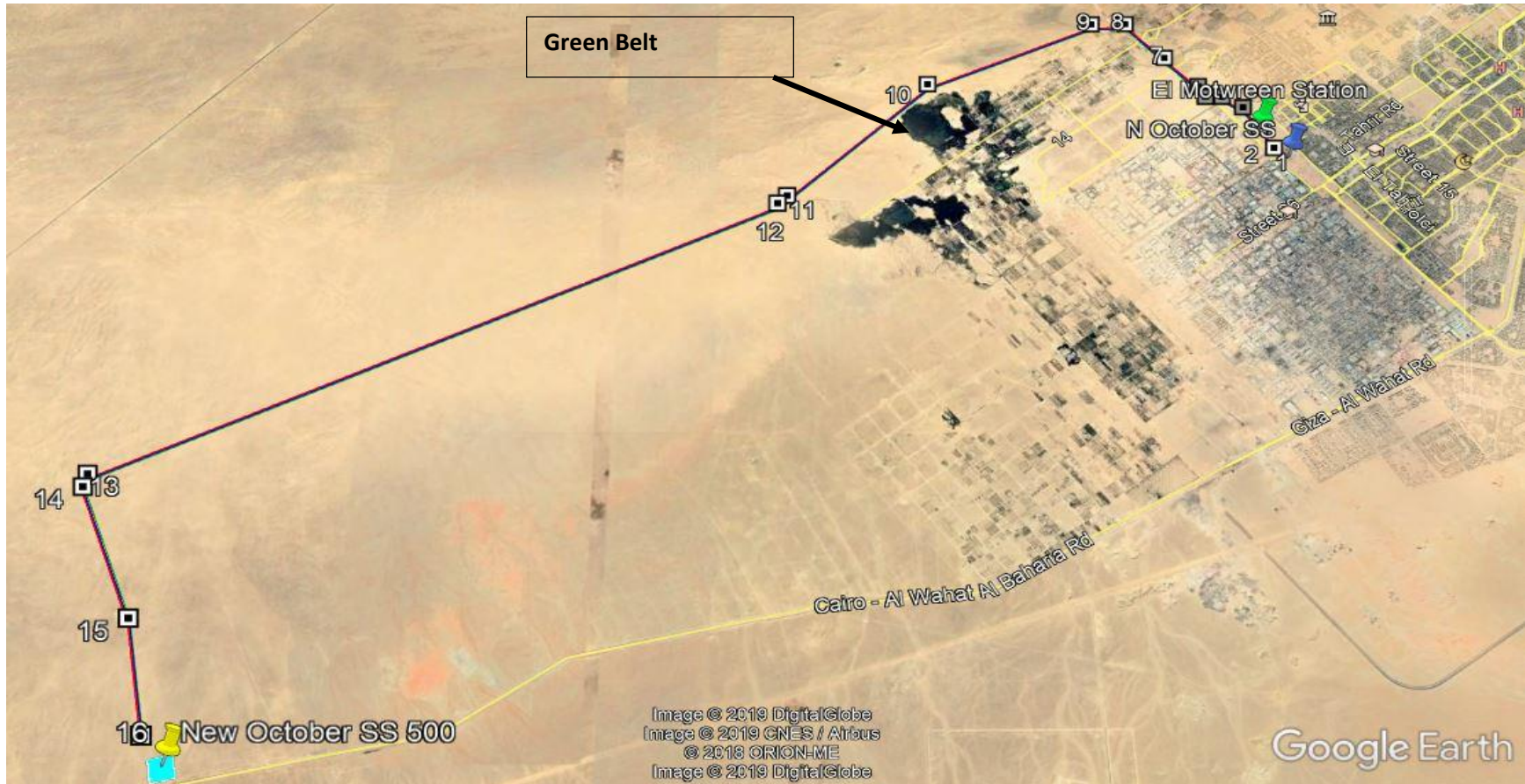


Figure 3-7. 220 kV OHTLs routes interconnection for 6<sup>th</sup> of October SS

### 3.3 Project Components

The main components of the project according to EETC technical specifications on 27/12/2015 are as following:

1. Construction of 6<sup>th</sup> of October SS 750 MVA, 500/220/11 kV GIS s/st with the following scope:
  - Voltage ratio 500/220/11 kv GIS
  - 500 kv, switch gear 9 GIS bays (6 feeder bays + 3 transformer bays) + 2 spare.
  - 220 kv, switch gear 13 GIS bays (8 feeder bays +transofmer bays) + 2 spare
  - 3 x 750 MVA, 500/220kv transformer ONAN/ONAF1/ONAF2
2. Construction of 500kV overhead transmission line network with the following scope:
  - 500 kv, construction of OHTL double circuit Wadi El Natroun/6<sup>th</sup> of October to be around 50 km.
  - 500 kv, construction of OHTL double circuit Maghagha/6<sup>th</sup> of October to be around 150 km.
3. Construction of 220kv overhead transmission line network with the following scope:
  - 220 kv, double circuit OHTL 6<sup>th</sup> of October/north October, 40 km
  - 220 kv, construction of OHTL double circuit 6<sup>th</sup> October / main October, 39 km
  - 220 kV construction of OHTL double circuit Motwreen/6<sup>th</sup> of October, 38 km

The three 220 kV OHTLs route originates from different points (main October electric connection tower, North October SS and El Motwreen connection electric tower). After 2 km from the starting point, the 3 OHTLs run parallel to each other with 25 meter apart. OHTLs ends at the same point at 6<sup>th</sup> of October SS with different lengths. Hereunder the route is described in details.

First, North October OHTL initiates from North October SS and runs for 1 km afterwards it crosses Al Mostakbal way to meet connection electric tower of Main October OHTL and starts to run parallel to each other for 1 kilometer. Then, the 2 OHTLs meet the connection electric tower of Motwreen OHTL and at this point the 3 OHTLs run parallel for 38 km other with 25 meter apart to reach 6<sup>th</sup> of October SS. There is only 0.37 km of the 3 OHTLs route will pass in the green belt (non-fruit trees are planted) of 6<sup>th</sup> of October city. This land is owned by the 6<sup>th</sup> of October City Authority which is responsible for the coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City to allocate lands for the route of the line within the green belt. The coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City resulted that the selected route is the best route for the 3 OHTLs to cross through the green belt with minimum distance of 0.37 km.

The 3 OHTLs runs in public desert areas and no sensitive receptors are crossing by the route and NO RAP study is anticipated for these OHTLs The table below summaries the description of the 3 parallel OHTLs.

**Table 3-2 Description of 220 kV OHTLs**

<b>OHTL</b>	<b>Starting point</b>	<b>Ending Point</b>	<b>Total length</b>
North October	North October SS	6 <sup>th</sup> of October 220 SS	40 km
Main October	Electric Tower links to Main October SS	6 <sup>th</sup> of October 220 SS	39 km
El Motwreen	El Motwreen SS	6 <sup>th</sup> of October 220 SS	37 km

The estimate duration of construction for the SS is 18 months, 220 kV is 4 months and 500 kV is 9 months.

### 3.4 Proposed Substation Technology

Gas Insulated Switchgear (GIS) with SF<sub>6</sub> gas will be used at the 6<sup>th</sup> of October SS. GIS is a compact multi component assembly enclosed a ground metallic housing in which the primary insulating medium is compressed Sulphur hexafluoride (SF<sub>6</sub>) gas. SF<sub>6</sub> acts as insulation between live parts and the earthed metal closure.

The use of SF<sub>6</sub> gas is one of the revolutionary technologies in addition to the technology of circuit breakers. The dielectric strength of SF<sub>6</sub> gas atmospheric pressure is approximately 3 times that of air, it is combustible, low order of toxicity, colorless and chemical inert. Also, it has ar-quenching properties three to four times better than air at equal pressure. GIS occupy 25% space than it is required for conventional substation (needed only small ground space requirements).

With regards to maintenance activities, the GIS substation requires minimal maintenance efforts (nearly zero maintenance), has less field erection time and erection cost.

Reasons for selection of the SS technology, is that the site is located at an urban area where land is limited. The optimal option for SS technology is the indoor GIS substation using SF<sub>6</sub> gas as described above.

Regarding the pollution and other accidents that may occur during operation and maintenance, the GIS SS with SF<sub>6</sub> gas is known to be non-flammable, non-explosive, oil free and less pollution.

In addition, with regards to the aesthetic aspects, the GIS SS is placed inside a closed building. Thus there will be no impact on the scenery at existing establishment surrounding. Figure 3.4 below describe the main advantages of the GIS SS compared with other technologies (Conventional SS, Hybrid GIS SS)








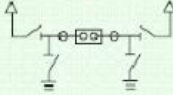

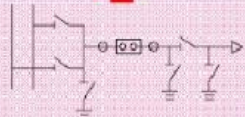
	Conventional AIS	Hybrid GIS	GIS
Main Bus	In air	In air	In SF <sub>6</sub> gas
Arrangement of Equipment	Distributed		Highly integrated
Exposure of Live Parts	Exposed		Fully enclosed
Overall Land Area	Large		Small
Equipment Cost	Less than GIS		-
Outline of main component	 	 	 

Figure 3-8. Type of GIS and their specifications

### 3.5 Proposed Overhead Transmission Line Technology

#### 3.5.1 Codes and Standards

##### Electrical

IEC60826-2003: Design criteria of overhead transmission lines.

IEC 61865: Overhead lines-Calculation of the electrical component of distance between live parts and obstacles-Method of calculation.

IEEE C2-2012: National Electrical Safety Code (NESC).

IEEE 516-2009: IEEE Guide for Maintenance Methods on Energized Power Lines.

GB 50545-2010: Code for design of 110-750kV overhead transmission line Electricity utilities specification

##### Civil Work

ASCE 7-05: Minimum Design Loads for Buildings and Other Structures

ASCE 10-97: Design of Latticed Steel Transmission Structures

IEEE Std 691™-2001: IEEE Guide for Transmission Structure Foundation Design and Testing

American concrete institutes (ACI)

##### Material

IEC61089: Round wire concentric lay overload electric standard conductor.

IEEE 812: Definition of terms relating to the fiber optics

IEC 60120: Dimensions of ball and socket coupling for string Insulators.

ISO 898: Mechanical properties of fasteners made of carbon steel and alloy steel.

ASTM: American Society for Testing and Materials.

GB/T: 700-2006: Carbon structural steels.

GB/T: 1591-2008: High strength low alloy structural steels.

#### 3.5.2 Basic Design Data

Table 3-3. Basic Information of the OHTL

Subject	Description
Nominal Voltage	500kV AC
Number of Circuits	Double circuit
Routes Length	About 1210km
Max. ambient temperature	50°C
Min. ambient temperature	-5°C
Ave. ambient temperature	25°C
Conductor	ACSR-490/65 AAAC-506



Subject		Description
Shield wire		AACSR-94.1 GSW-108 OPGW(48)-G.652
Suspension Insulator String		1×160kN single suspension Insulator set 2×160kN double suspension Insulator set
Tension Insulator String		2×240kN double tension Insulator set
Types of Towers	Suspension towers	W2
	Tension towers	WA, W30, W60
	Terminal towers	WT60
	Navigation towers	WCR

### 3.5.3 Electrical System Data

Table 3-4. Electric system data

Nominal voltage $U_n$	500kV
Maximum operating voltage $U_s$	525kV
Power frequency	50Hz
Basic Insulation Level Design BIL (lightning impulse)	1550kV
Switching impulse withstand voltage	2.0p.u.
Design creepage distance	40mm/kV 45mm/kV

### 3.5.4 Meteorological Conditions

Table 3-5. Meteorological conditions

Mean annual rainfall	65 mm
Max. annual rainfall	125 mm
Maximum ambient temperature	50°C
Minimum ambient temperature	-5°C
Everyday temperature	25°C
Max. humidity	100%
Reference wind speed at 10m above ground	35m/s

### 3.5.5 Conductor and Shield wire

The new 500kV transmission line will consist of two circuits of each quad-bundle phase conductors AACSR-490/65 or conductor AAAC-506. The line will be equipped with two shield wires, One shield wire shall be of AACSR-94.1 type, the other of similar type but designed as OPGW with 48 fibers.

**Table 3-6. Conductors for all transmission lines**

No.	Designation	Conductor	Nominal voltage	Number of circuits
1	Wadi El Natron – 6 <sup>th</sup> of October – Maghagha	4×ACSR-490/65	500kV	double circuit

Basic Standards as follows:

For the complete conductor: ASTM B 232 and EN 50182

For the component wires:

- a) aluminum wires EN 60889
- b) steel wires EN 50189
- c) grease EN 50326
- d) for conductor creep IEC 61395

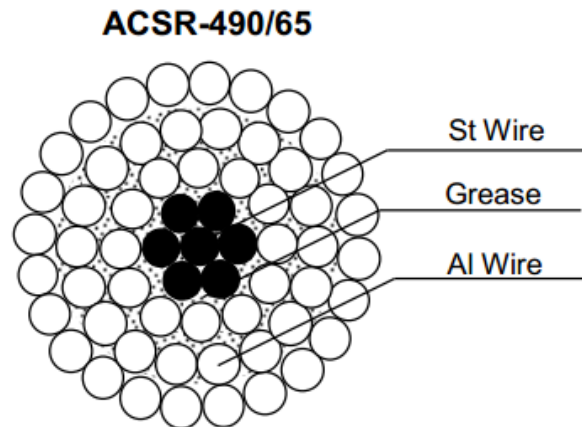
### 3.5.6 Conductor ACSR 490/65 and AAAC-506

The phase configuration shall be quad-bundle of aluminum conductor steel reinforced (ACSR) and all aluminum alloy conductor (AAAC) as per DIN\_EN 50182.

The main principal of conductor selection is as follows:

- 1) Meet the requirement of current-carrying capacity;
- 2) Meet the requirement of electromagnetic environment;
- 3) Good mechanical properties;
- 4) Economical;
- 5) Meet the requirement of production and construction.

The conductor of this project is mainly selected based on these principles and the employer's requirements.



**Figure 3-9 Conductor ACSR-490/65 Structure**

The main technical data of the ACSR 490/65 are as follows in accordance with EN 50182:

Table 3-7. Technical data for ASCR 490/65

Parameter		Unit	Value
Structure	Center: Steel wire	Nos./mm	1/3.40
	Layer 1: Steel wire		6/3.40
	Layer 2: Aluminum wire		12/3.40
	Layer 3: Aluminum wire		18/3.40
	Layer 4: Aluminum wire		24/3.40
Standard		/	IEC 60888/60889/61089
Stranding direction of outer layer		Direction	Right
Conductor diameter		mm	30.60
Cross section		mm <sup>2</sup>	553.8
Conductor weight(Without grease)		kg/km	1852
Conductor weight(All the conductor is greased except the outer layer)		kg/km	1922
Rated tensile strength		kN	152.85
Modulus of Elasticity		GPa	70
Coefficient of linear expansion		10 <sup>-6</sup> /°C	19.3
Max. DC Resistance at 20°C		Ω/km	0.05896
Dropping point temperature		°C	120
Lay ratio	Aluminum layer	times	Inner layer 10-16 Outer layer 10-14
	Steel layer		6 wires layer 16-26

The main technical data of the AAAC-506 are as follows in accordance with EN 50182:

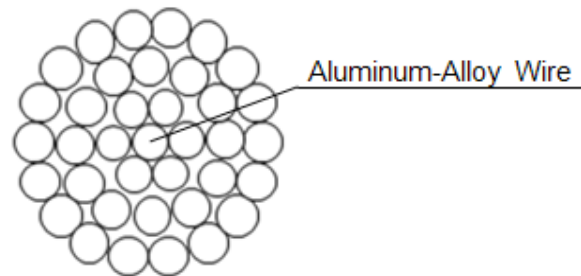


Figure 3-10 Conductor AAAC-506 Structure

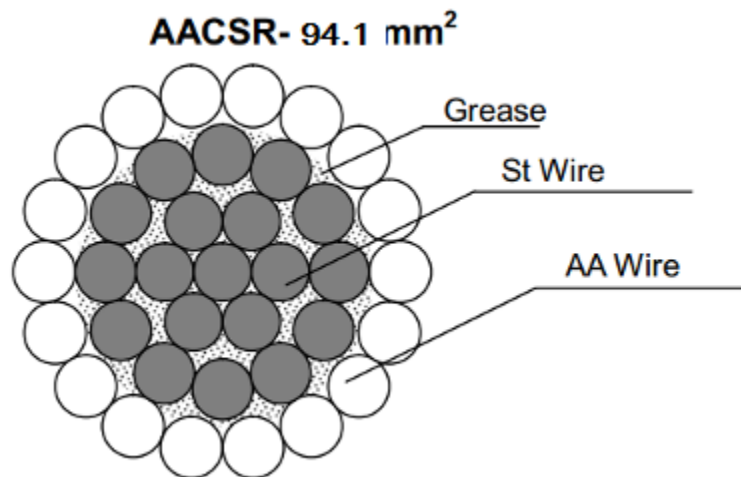
**Table 3-8. Technical data of conductor AAAC-506**

Code name	AAAC-506
Sectional area of Aluminum alloy	506.71 mm <sup>2</sup>
Total sectional area	506.71 mm <sup>2</sup>
Overall diameter	29.23mm
Approximate weight	1399 kg/km
Modulus of elasticity	55000 N/mm <sup>2</sup>
Coefficient of linear expansion	23×10 <sup>-6</sup> /°C
Minimum UTS	144.7kN
EDT at 25°C and no wind	18%UTS
0°C and max wind pressure	33%UTS
Resistance DC @20°C	0.06609Ω/km

Conductor creep will be compensated by over tensioning the conductor at a temperature of 25°C lower than the stringing temperature for ACSR-490/65 and AAAC-506 for the transmission lines.

### 3.5.7 Shield wire AACSR-94.1 and GSW-108

94.1 mm<sup>2</sup> Aluminum clad steel will be used as shield wire for 500 kV O.H.T's in coastal areas and in other areas 108 mm<sup>2</sup> zinc coated steel wires (hot dip galvanized) will be used.



**Figure 3-11 Shield wire AACSR-94.1 structure**

The main technical data of the AACSR-94.1 type according to ASTM are shown in the table below:

**Table 3-9. Technical data for AACSR-94.1**

Standard	FRENCH CONDUCTOR (Non-equal steel and aluminum wire diameter)
Conductor type	PHLOX 94.1
Aluminum Alloy Area	51.95
Steel Area	42.12
Total sectional area(mm <sup>2</sup> )	94.07
No. & Dia Of Al Alloy Wires(mm <sup>2</sup> )	15×2.10
No. & Dia Of Steel Wires	19×1.68
Overall diameter(mm)(mm <sup>2</sup> )	12.8
Linear weight(kg/m)	0.481
Modulus of elasticity(N/mm <sup>2</sup> )	112000
Coefficient of linear expansion	14.7×10 <sup>-6</sup>
Rated tensile strength/kN	80.35
Max. DC resistance at 20°C	0.642

The main technical data of the GSW-108 are shown in the table below:

**Table 3-10. Technical data of conductor GSW-108**

Conductor type	GSW-108
Total sectional area(mm <sup>2</sup> )	108
Overall diameter(mm)(mm <sup>2</sup> )	13.29
Linear weight(kg/m)	0.87
Modulus of elasticity(N/mm <sup>2</sup> )	186200
Coefficient of linear expansion	11.5×10 <sup>-6</sup>
Rated tensile strength/kN	134.26

The shield wire sag shall be equal the phase conductor's sag for everyday conditions (25°C, still air). Dampers are proposed for the shield wire for wire protection against aeolian vibration as a necessary measure for the adopted tension.

### 3.5.8 Optical fiber composite overhead ground wire (OPGW)

An Optical Phase Conductor with a design similar to a AACSR conductor shall be used.

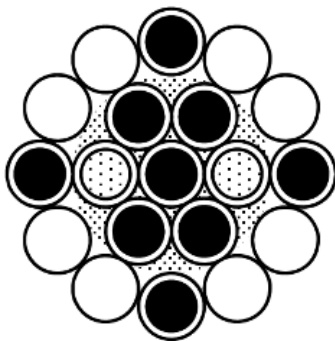


Figure 3-12. OPGW structure

Table 3-11. Technical data of OPGW

Structure Details		Named	No.	Diameter
		Layer 1	27%AS wire	1
Layer 2		27%AS wire	4	3.00 mm
		SUS-Tube	2	3.00 mm
Layer 2		27%AS wire	4	3.00 mm
		AA wire(LHA1)	8	

Technical Data	According to IEEE std 1138、IEC 60794-4 standards	
	Stranding direction of outer layer is "Right-hand"	
	Fiber No. & Type	48 G.652D
	Standard Diameter	15.00 mm
	Supporting Cross Section	120.17 mm <sup>2</sup>
	Section of AS wire	63.62 mm <sup>2</sup>
	Section of AA wire	56.55 mm <sup>2</sup>
	Approximate mass	574.9 kg/km
	Rated Tensile Strength	82.7 kN
	Maximum Allowable Tension(40%RTS)	275.4 N/mm <sup>2</sup>
	Everyday Stress(20%RTS)	137.7 N/mm <sup>2</sup>
	Strain Margin Stress(70%RTS)	481.9 N/mm <sup>2</sup>
	Modulus of Elasticity	105.0 GPa
	Thermal Elongation Coefficient	16.2 ×10 <sup>-6</sup> /°C
	Calculated D.C. Resistance at 20°C	0.374 Ω/km
	Short-Circuit Current (0.5 sec, 50~200°C)	14.3 kA
Short-Circuit Current Capacity (50~200°C)	101.7 kA <sup>2</sup> ·s	
Minimum Bending Radius	300 mm	
Ratio between Pull and Weight	14.67 km	
Temperature Range:	Installation	-10°C~+50 °C
	Transportation and Operation	-40°C~+80 °C

Remarks: All Sizes and Values are Nominal Values

OPGW sag shall be equal the phase conductor's sag for everyday conditions (25°C, still air).

Dampers are proposed for the OPGW for wire protection against aeolian vibration as a necessary measure for the adopted tension.

Regarding the optical fibers, the OPGW shall have 48 fibers.

### **Splice boxes**

Suitable splice boxes (enclosures) shall be provided to encase the optical cable ends and fusion splices in a protective, moisture and dust free environment.

- The splice boxes shall be designed for the storage and protections of a (48) fibers cables as specified and provide access through locked doors.
- Attenuation of single mode fusion splices shall not exceed 0.03 dB when measured at either 1310 or 1550 nm wavelengths.
- The splice boxes shall be appropriate for mounting on steel structures and accommodate pass-through splicing and fiber terminations.
- The splice box, including organizer/splicing trays , shall be designed to seal and protect the fiber cable splices from the environment and it shall protect easy access for any maintenance function.
- All splice boxes shall be of metal construction that are clean and smooth finished, treated to resist rust , accommodate the storage of a minimum of 3 meters of coiled fiber and allow easy access to the splice trays.
- The splice box shall be furnished with necessary grounding pads to connect the grounding conductor.
- The splice boxes shall be IP65.

Vibration damper shall be Stockbridge type.

Suspension clamp shall be flexible.

Tension clamp shall include adjustable extension link.

If an armor rod be inserted between the clamp of VD and the cable, thickness of the armor rod should be stated to ensure that the diameter of VD clamp is compatible with the diameter of the armor rod plus the OPGW diameter.

### **3.5.9 Tension limitation**

Conductor tension limitation shall be as follows:

- a) 33% of rated strength at 0°C with max wind. OPGW final sag shall be equal to the conductor sag of EDS temperature. Maximum tension of OPGW shall be at 0°C and maximum wind of referring to its tension mentioned above at EDS temperature.
- b) 18% of rated strength at 25°C with no wind.

### **3.5.10 Phase Order**

Total trip-out rate of double circuit transmission lines from high to low is same phase sequence (ABC-ABC) different phase sequence (ABC-BCA), reverse phase sequence (ABC-CBA). Lightning stroke simultaneity trip-out rate of parallel double circuit from high to low arrangement is same phase sequence (ABC-ABC), reverse phase sequence (ABC-CBA) and different phase sequence (ABC-BCA). Total trip-out rate of double circuit with same phase sequence (ABC-ABC) is significantly higher than that with different phase sequence

and reverse phase sequence. Thus considering the lightning protection, double circuit transmission line shall avoid the same phase sequence. At the same time, in order to reduce the capacitive current different phase sequence and reverse phase sequence are proposed.

### 3.5.11 Transposition

According to international rules, for directly grounded system, it is necessary to conduct a transposition if the length of transmission lines from the substation is more than 100km.

Sketch map of the transposition of the line is shown in attached drawings. Transposition tower will be modified and design based on the tension tower.

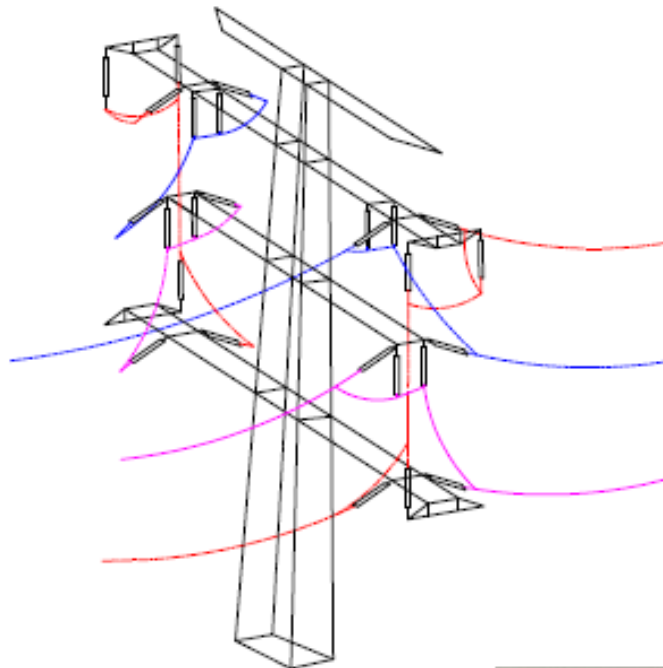


Figure 3-13 Sketch map of transposition tower



### 3.6 Project Surrounding

#### 3.6.1 6<sup>th</sup> of October Substation

The proposed location of substation can be described as desert land with scarce vegetation and unoccupied, far from any sensitive receptors. There is not existing buildings or structures over the land and the land is relatively flat thus does not require much of land preparation activities. There are no sensitive receptors to the project activities due to the large spatial range of the proposed project location. Some agriculture plots lies within a radius range of  $\approx 10$ km, industrial zone which lies at a distance of  $\approx 12$  km and the residential zone which lies at a distance of  $\approx 18$ km. The substation location is connected through Cairo-AL Wahat El Baharia road through a paved road.

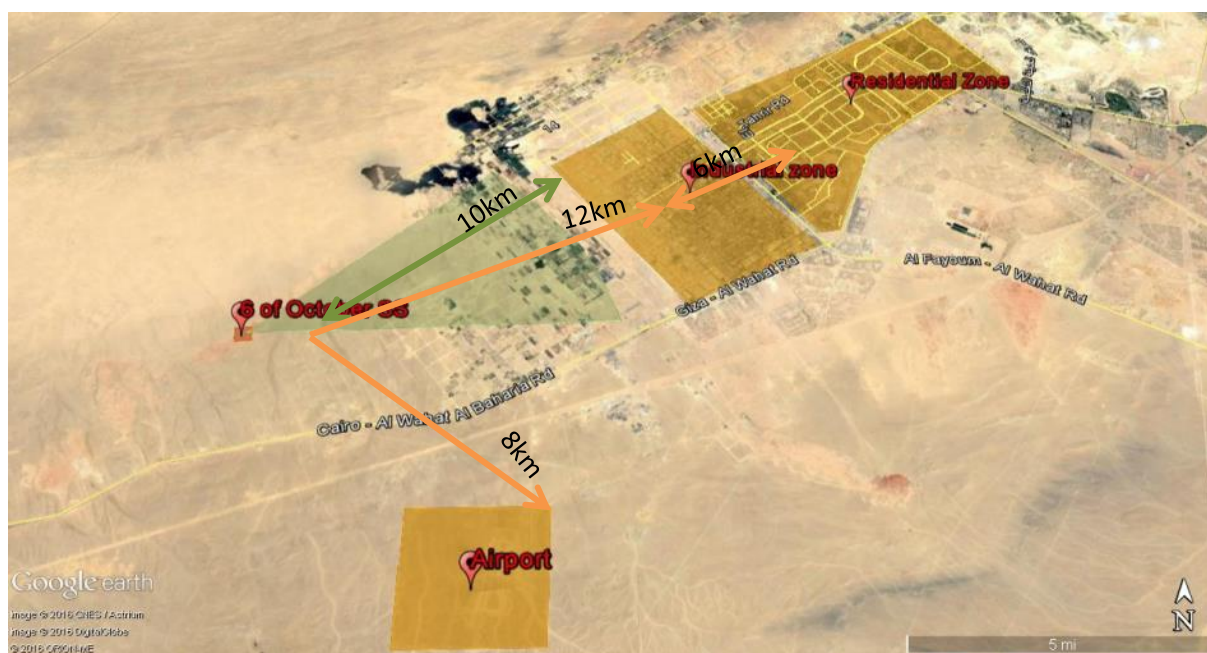


Figure 3-14 6<sup>th</sup> of October SS and its nearest sensitive receptors

#### 3.6.2 500kV OHTL Wadi El Natroun/ 6<sup>th</sup> of October SS

500 kV Wadi El Natroun/6<sup>th</sup> of October SS lies in Giza governorate originates lies in Giza governorate originates from Wadi El Natroun substation runs parallel to the south regional ring road, then shift south-east to run parallel to El Dabaa Corridor, afterwards break through unoccupied desert land towards 6<sup>th</sup> of October SS to reach with a total length of 50 km.

The desert segment of the transmission line route is approximately 90% of the total length of the line, while the remaining 10% lies on cultivated lands at Wadi El Natroun area. Accordingly, a RAP study was prepared and determined the types of crops and the way of compensation that had been followed. Meanwhile (First quarter of 2020), the towers located on desert lands (state-owned lands) are constructed but the towers located on agriculture lands haven't been constructed yet.

The following figures illustrate the line route.

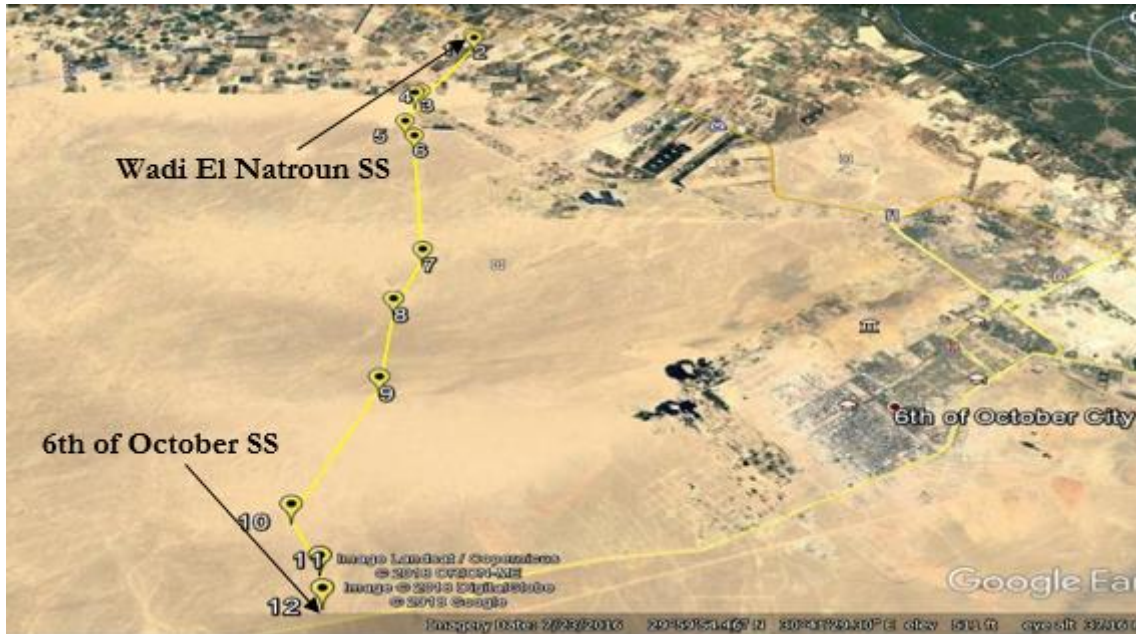


Figure 3-15: Wadi El Natroun/6<sup>th</sup> of October 500 OHTL interconnection



Figure 3-16: Type of crops and trees in the agricultural lands located around Wadi Al Natroun SS



Figure 3-17: Type of crops and trees in the agricultural lands located around Wadi Al Natroun SS



**Figure 3-18: orange trees in one of the agricultural lands around Wadi Al Natroun SS**



**Figure 3-19: Wadi El Natroun SS**

### 3.6.3 500 kV OHTL Maghagha /6<sup>th</sup> of October SS

This OHTL originates from 6<sup>th</sup> of October SS, in Giza Governorate, and passes through Fayoum Governorate, Beni Suef Governorate and ends in Maghagha SS located in southern border of Menia Governorate. The line from 6<sup>th</sup> of October SS runs on a desert land in parallel to Cairo-Al Wahat El Baharia road, then it crosses the road and passes parallel to Qaron Lake. After that it passes through agriculture plots (olive trees are planted) then crosses Wadi Al Natroun road and continues its path in agricultural plots (olive and palm trees are planted) to be parallel to Wadi El Rayan Protectorate.

Then it runs through uninhabited, uncultivated western desert in Beni Suef governorate and crosses Wadi El Rayan – Wadi El Hetan road to continue its path in desert lands. After that the line crosses Giza – Luxor road and eventually ending at West Maghagha SS with total length of 150 km. Meanwhile (First quarter of 2020), this line is completely constructed but hasn't been energized yet. The following figures illustrate the line routes of 500kV OHTL.

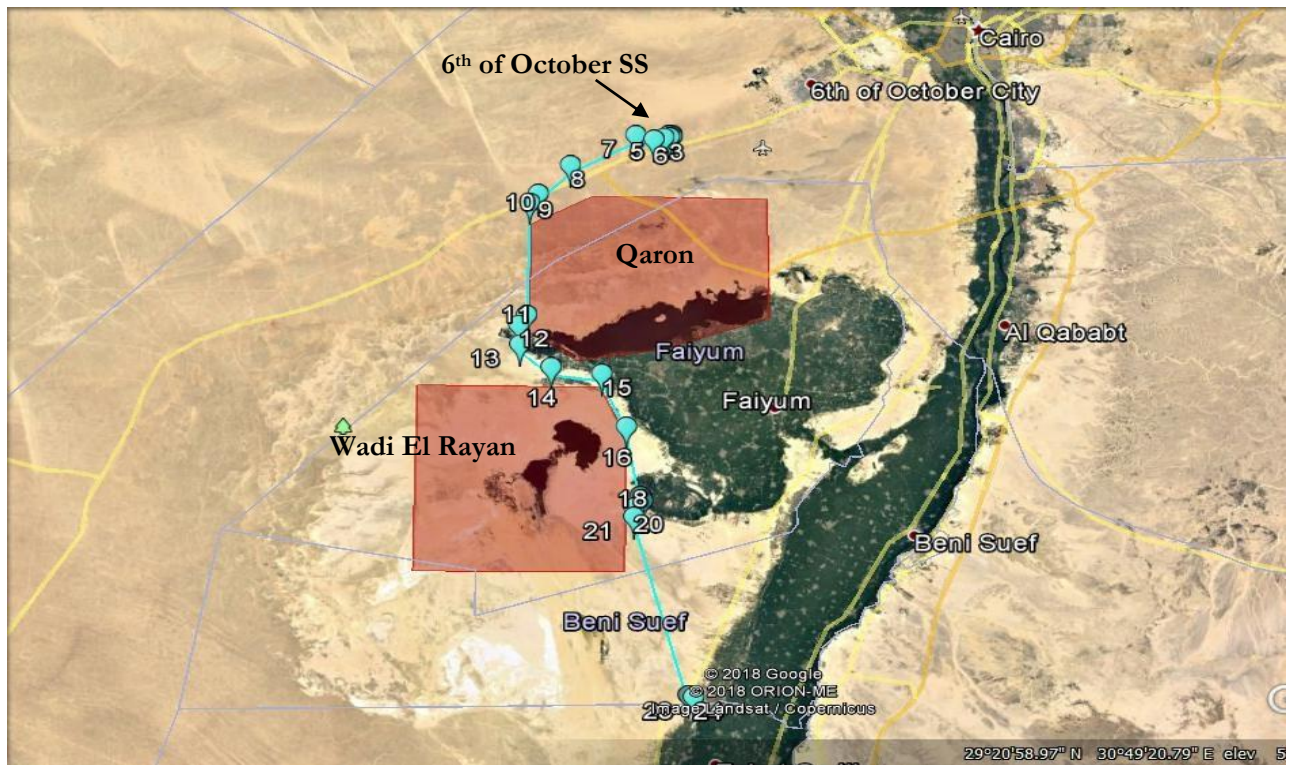


Figure 3-20: Maghagha 500/6<sup>th</sup> of October 500 OHTL interconnection



Figure 3-21: the line route is parallel to Qaron Lake



Figure 3-22: Wadi Al Natroun road



Figure 3-23: one of the agricultural plots that the line route will pass through



Figure 3-24: uninhabited, uncultivated western desert in Beni Suef governorate



Figure 3-25: the entrance of Wadi El Rayan Protectorate



Figure 3-26: West Maghagha SS

#### 3.6.4 220 kV OHTLs Main October / 6<sup>th</sup> of October - North October/ 6<sup>th</sup> of October - Motwreen/6<sup>th</sup> of October

The three 220 kV OHTLs route originates from different points ( main October electric connection tower, North October SS and El Motwreen SS ). After 2 km from the starting point, the 3 OHTLs run parallel to each other with 25 meter apart. However, OHTLs ends at the same point at 6<sup>th</sup> of October SS with different lengths.

North October OHTL initiates at North October SS and runs for 1 km afterwards it crosses Al Mostakbal way then it meets Main October OHTL and starts to run parallel to each other for 1 kilometer. After that, the 2 OHTLs meet el Motwreen OHTL and that point the 3 OHTLs run parallel for 38 km to reach 6<sup>th</sup> of October SS. There is only 0.5 km of the OHTLs route will pass in the green belt (non-fruit trees are planted) of 6<sup>th</sup> of October city, the land is owned by the 6<sup>th</sup> of October City Authority which is responsible for the coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City, in order to allocate lands for the route of the line within the green belt. The coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City is currently taken place.

Consequently, The 3 OHTLs runs in desert areas and no sensitive receptors are crossing by the route, The table below summaries the description of the 3 parallel OHTLs. No construction activities have started yet for these 3 OHTLs.

**Table 3-12 Description of 220 kV OHTLs**

OHTL	Starting point	Ending Point	Total length
North October	North October SS	6 <sup>th</sup> of October 220 SS	40 km
Main October	Electric Tower links to Main October SS	6 <sup>th</sup> of October 220 SS	39 km
El Motwreen	El Motwreen SS	6 <sup>th</sup> of October 220 SS	38 km

Figure 2 ,3 and 4 presents the routes of 500kV and 220 kV respectively.

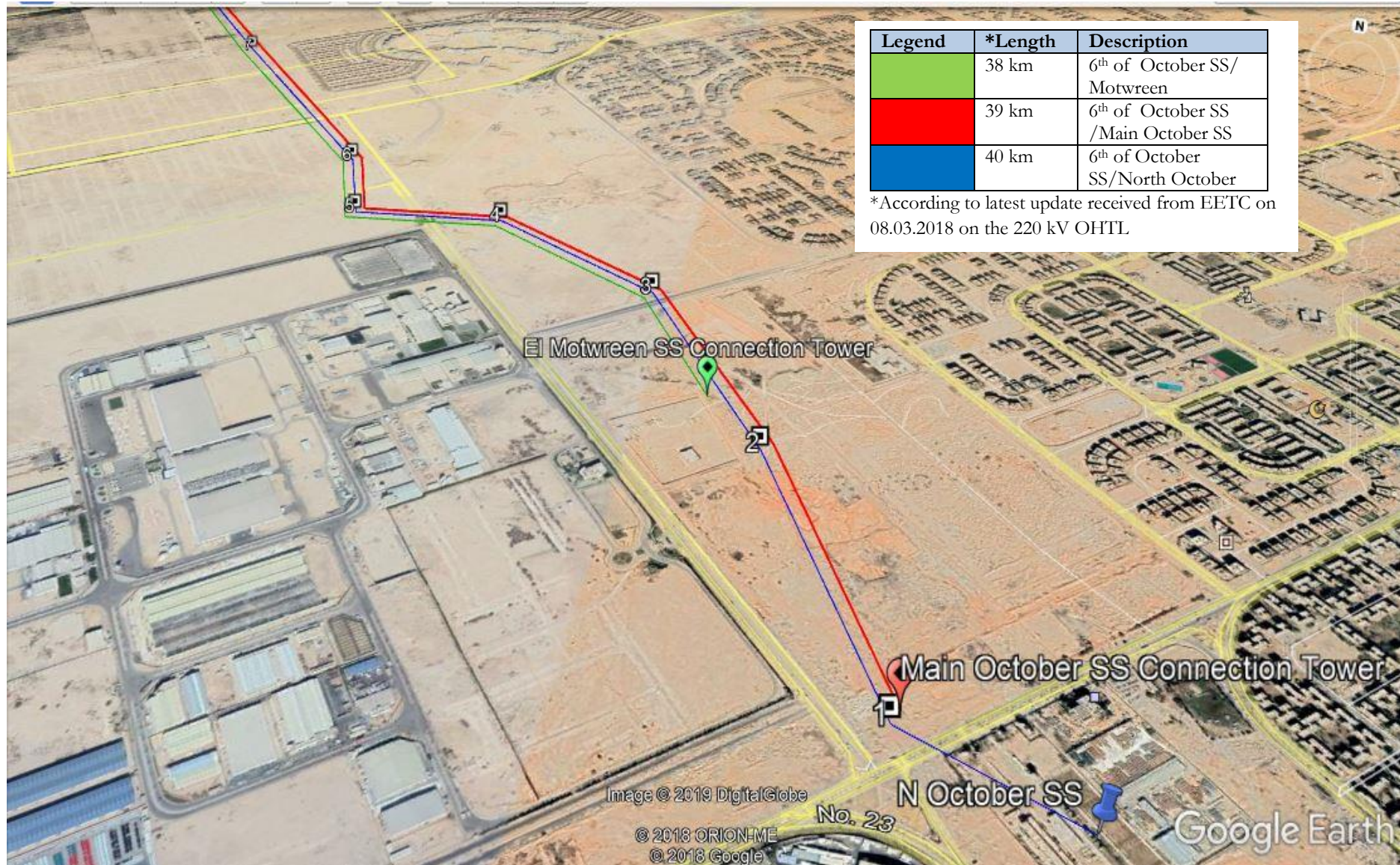


Figure 3-27. 220 kV OHTLs different starting points



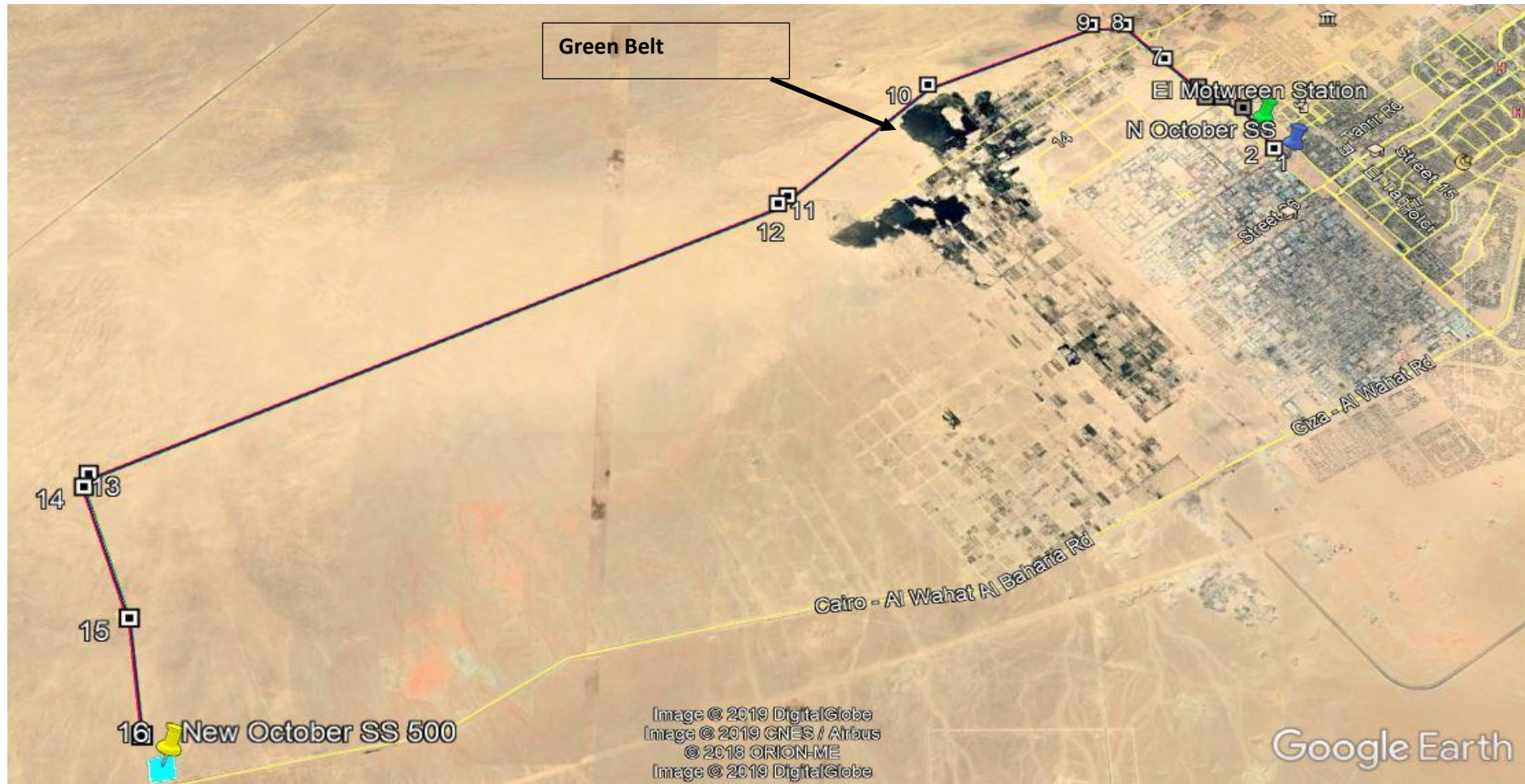


Figure 3-28. 220 kV OHTL routes parallel reaching 6<sup>th</sup> October SS



**Figure 3-29: The existing electric tower at Motwreen station**



**Figure 3-30: The Industrial Area road**



**Figure 3-31 The green belt**



**Figure 3-32: Uninhabited uncultivated state-owned desert**

### 3.7 Description of Activities during Project Implementation

#### 3.7.1 Description of Activities during Construction Phase of SS

- **Site preparation:** including but not limited to: site clearance (limiting ground disturbance to existing networks during site preparation), fences construction, preparing

site camp, preparing access road (if needed) for moving construction material and machineries and temporary storage of construction materials, machineries, etc.

Besides the site preparation, the approvals or the permissions from the competent authorities and surrounding establishments shall be obtained.

- **Construction of concrete works:** (footing, foundations, SS framework, support structures and equipment) and other concrete construction for OHTL path, etc.
- **Construction of Supporting buildings:** including administration building and facilities, control room, etc.
- **Erection of the equipment:** including transformers, switches yards, electrical panel, etc.
- **Waste management:** including generated domestic and construction waste (hazardous and non-hazardous). This activity will include waste identification, temporary storage, handling and transportation to the designated landfill.

Besides all activities described above, the training for operation and maintenance, including the emergency plans is required to be conducted by the contractors who supply, erect and start up the transformers and their accessories. The capacity building activities shall be held during the warranty period.

### 3.7.2 Description of Activities during Construction Phase of OHTL

- **Tower erection:** It is erected member by member using chain pulleys manually
- **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

During construction phase, the following activities are expected to take place:

- Identifying the ROW
- Clearance works for the ROW prior to the installation of the towers.
- Construct the site access tracks
- Storage and transportation of equipment and materials
- Tower spotting
- Construction of access and tower corridor tracks
- Erection of towers
- Stringing of transmission line

Some of the abovementioned activities are expected to generate waste such as

- Cut-off trees and vegetation

- Metals, wood, cement sacks, sand and gravel, concrete spills, cut off cables, garbage from daily activities of workers,
- Hazardous wastes such as spent oil from the operation and maintenance of machinery

### Contractor responsibility before EETC

Under the project scope agreement of EETC with substation and OHTL contractor, the work shall cover on turn-key basis engineering, design, services, fabrication, factory testing, site delivery, loading, unloading of the specified equipment, civil works, installing, site testing, commissioning and insurance till handing over, training, warranty and technical assistance during warranty period. The contractor shall abide to the ESIA findings and adhere to the recommendations entailed in the environmental permit that would be issued by the Egyptian Environmental Affairs Agency upon approval of the environmental studies.

### 3.7.3 Description of Activities during Operation Phase of SS

- **General check:** for the fitting, oil quality, performance of the transformers, gas insulation quality and quantity etc.
- **Oil filtration:** during operation of the GIS substation. Please note that during the operation and maintenance, it is expected to generate limited amounts of the rejected oil, since oil is generally filtered using the oil filter machine available at the SS site.
- **Transformer replacement:** Due to the increased power demand at some areas, EETC may change the transformer. Please note that the current practice of the EETC is to replace the transformer. The old transformer is reused at other SS with less demand on electricity.
- **Replacement of cables and insulators:** the old and rejected insulators, OHTL cables, etc.
- **Waste management:** including the generated domestic waste and rejected waste (rejected cables and spare parts). The waste management will include waste identification, temporary storage, handling and transporting to the designated landfill.

### **3.7.4 Description of Activities during Operation Phase of OHTL**

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

## 4 Project Alternatives

### 4.1 No Go Option

The main objective of the project is to meet the steady increase in energy demand and evacuate the power generated from the new power plants.. Environmental and social impacts from the project are assessed and no significant impacts are anticipated. other objectives of the proposed project includes increasing the national energy capacity in the two countries, improving power supply to customers, decrease the financial loss for low quality power supply and increase the economic activities in Egypt. Recently Egypt has suffered from an energy crisis across the country because of the energy capacity.

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

- Energy capacity will not increase
- Secure the demand of the new establishment as well as to meet with the demand increased from the residential / housings will not be achieved
- The quality of the power supply to the consumers will not be improved
- The consumers' financial losses from low quality power supply will increase, and
- As a result, an increase in the economic activities in the region would not be possible.

The site of the proposed SS at 6<sup>th</sup> of October city is far from residential area and connected with a main road. Therefore, the no go option for the project is not recommended.

### 4.2 Technology Limitation

The substation is based on GIS technology with SF<sub>6</sub> gas insulated is the most appropriate technology to be used based on environmentally and economically acceptable standards for similar SSs. It requires limited space (occupies only 1/10 compared to the conventional SS), especially since the site is located at an urban area (due to the aesthetic landscape as the SS will be indoor) and more reliable than conventional SS are the priorities to select the GIS system in this project. In addition, to reducing the risk of flammable materials, having long lifetime and less operation and maintenance compared to the conventional SS, the SF<sub>6</sub> gas insulated system is selected for this substation at 6<sup>th</sup> of October.

However, if SF<sub>6</sub> is released to the environment will increase the impact on ozone depletion and global warming. Therefore, the periodically check of the insulated gas has to be done properly and periodically in accordance to the specification and operation manuals.

### 4.3 Location/Routes Alternatives

#### 6<sup>th</sup> of October Substation

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

The SS site at 6<sup>th</sup> of October city is proposed to be built to serve the increase of the electricity demand from the new power plants, establishment and demand on new connections to residential area around the substation. The SS location is plotted far from any sensitive receptors and in best location for interconnection with Wadi El Natroun SS and Maghagha SS. The selection of the SS location and the

proposed routes have been considered length optimization thus reducing the cost as much as possible whilst at the same time the proposed routes are aligned to the existing road network as much as possible for easy access during construction and maintenance and to reduce to a minimum the number as possible the number of sensitive receptors.

### **Transmission Lines Route Selection**

The preferred route was selected on parameters like:

- Study Area Identification: Identifying major features in the study area like main roadways, residential and commercial areas to help identify constraints during the selection of the routes.
- Consider the route to be far from residential areas as much as possible;
- Cross roads in appropriate areas;
- Avoid pipe passage from congested areas;
- Accessibility of the construction area and facilitating the implementing of the construction work; and
- Avoid route crossing by any of cultural heritage areas, graveyards and prayers houses.

In addition, 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 benefit, as the excavation of OHTL is much less in comparison with underground cable which would require drilling and more land work.

### **500kV OHTL Wadi El Natroun/6<sup>th</sup> of October**

The route of this OHTL will run parallel to the south regional ring road, then shift south-east to run parallel to El Dabaa Corridor, afterwards break through unoccupied desert land towards 6<sup>th</sup> of October SS.

Based on the above mentioned criteria for route selection, the route for the proposed OHTL was chosen. Also, there are no environmental sensitive areas along the route. Consequently, no alternative has to be consider for this OHTL.

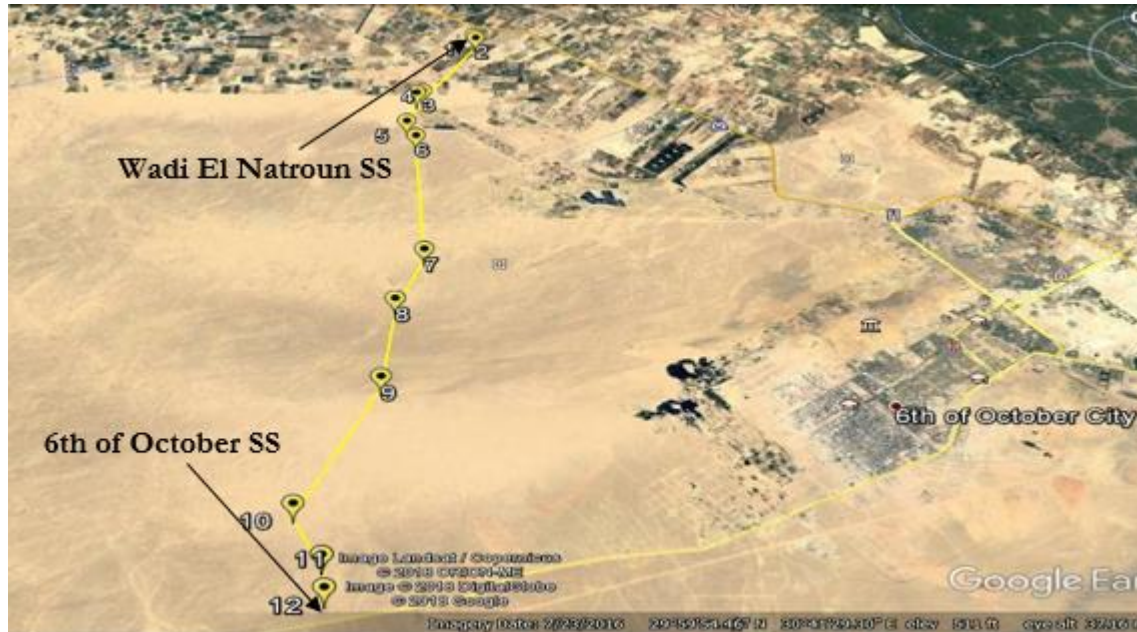


Figure 4-1: Wadi El Natroun/6<sup>th</sup> of October 500 OHTL interconnection

#### 500kV OHTL Maghagha/6<sup>th</sup> of October

The route of this OHTL runs on a desert land in parallel to Cairo-Al Wahat El Baharia road, then passes parallel to Qaron Lake. After that it passes through agriculture plots (olive trees are planted) then crosses Wadi Al Natroun road and continues its path in agricultural plots (olive and palm trees are planted) to be parallel to Wadi El Rayan Protectorate.

Then it runs through uninhabited, uncultivated western desert in Beni Suef governorate and crosses Wadi El Rayan – Wadi El Hetan road to continue its path in desert lands. After that the line crosses Giza – Luxor road and eventually ending at West Maghagha SS with total length of 150 km .

The selected route of this OHTL is meeting the above mention criteria of transmission lines route selection through avoiding Wadi El Rayan Protectorate and Qarun Protectorate which is the ideal route.



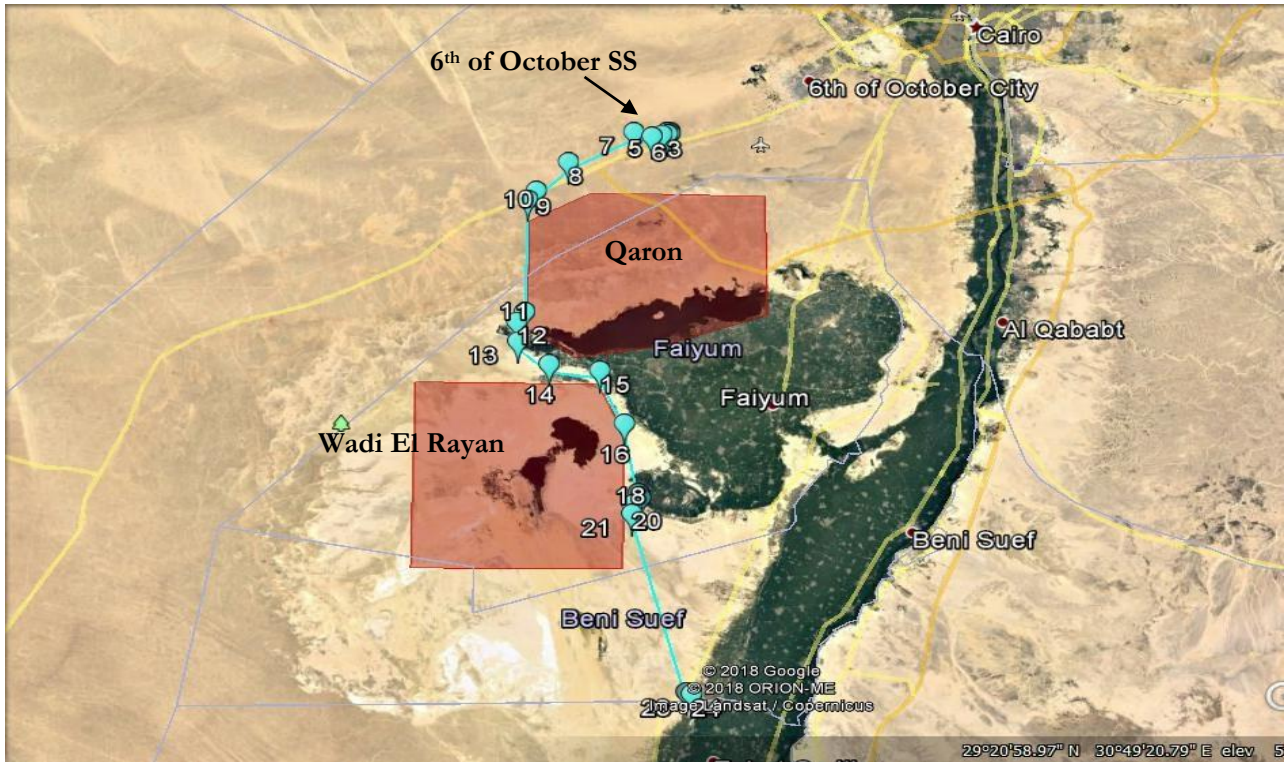


Figure 4-2: Maghagha 500/6<sup>th</sup> of October 500 OHTL interconnection

#### 220 kV OHTLs Main October / 6<sup>th</sup> of October - North October/ 6<sup>th</sup> of October - Motwreen/6<sup>th</sup> of October

The route of the parallel 3 OHTLs runs through uninhabited uncultivated state-owned desert land not crossing any of the protectorates. until it reaches 6<sup>th</sup> of October SS. There is only 0.37 km of the 3 OHTLs route will pass in the green belt (non-fruit trees are planted) of 6<sup>th</sup> of October city. This land is owned by the 6<sup>th</sup> of October City Authority which is responsible for the coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City to allocate lands for the route of the line within the Green Belt. The coordination between the Cairo Electricity District and the 6<sup>th</sup> of October City resulted that the selected route is the best route for the 3 OHTLs to cross through the green belt with minimum distance of 0.37 km.

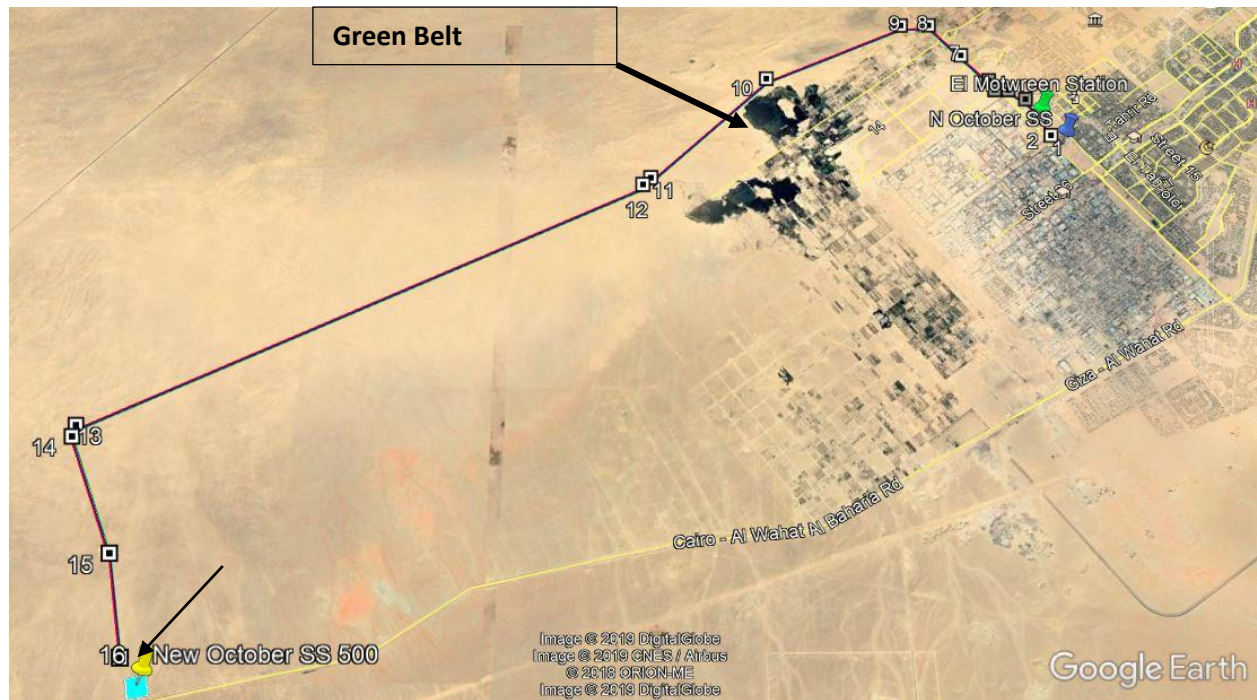


Figure 4-3: 220 kV OHTLs connected to 6<sup>th</sup> of October SS

### Conclusion

Generally, there are few environmental constraints for construction of the Substation which requiring a set of mitigations described in ESMP (Chapter 8 of this ESIA). If necessary measures will be followed during the implementation (construction and operation phase) of the project, there will be no environmental/social objection with regard to site selection for SS.

## 5 Baseline Environmental and Social Conditions

This section of the ESIA contains a description of the baseline physical, biological and socio-cultural characteristics of the environment at the proposed project areas.

The baseline shall provide separate description to each of SS and OHTL whenever the baseline condition varies considerably (e.g. geology) as for baseline conditions that exhibits common characteristics the description shall encompass the zone (e.g. weather). The substation is in uncultivated unoccupied desert land in Giza governorate and the OHTL crosses the western desert of Giza Governorate, Faiyum Governorate and the western desert of Beni Suef Governorate as illustrated in figure below. The description of socio-economic baseline is on the concerned community that are anticipated to be impacted from the project activities, which are 6<sup>th</sup> of October City and Faiyum Governorate. The mitigation and monitoring plans are developed with respect to the baseline condition covering the construction and operation of the SS and OHTL project. Environmental and social baseline conditions are assessed through a combination of a desk-based study, site visits, previous projects conducted in the area, and consultation with relevant authorities and stakeholders.

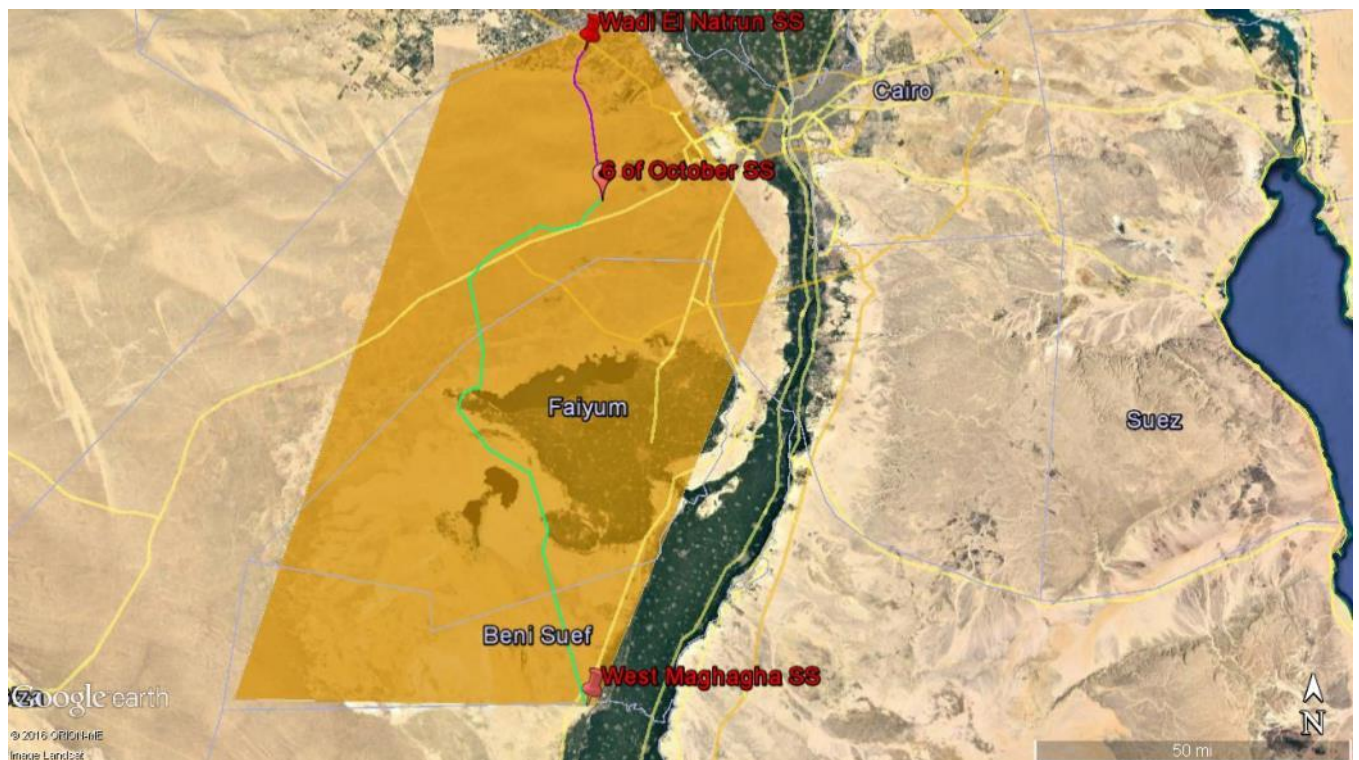


Figure 5-1 Environmental Baseline zone [orange polygone layer]

## 5.1 Baseline Environmental Conditions

### 5.1.1 Climate Conditions

The climatic zone stretches from north of Egypt where climate is more pleasant and of Mediterranean nature up to south of Egypt where climate is hotter and of deserted nature. The climate is generally extremely dry all over the country and the country is classified as hot desert climate under Köppen climate classification BWh. The climatic conditions of area covering the transmission line by warm winter and hot summer, which gets milder in winter and hotter in summer with less humidity percentage as line in the zone stretch south. Rain fall is in general scarce in the country, which gets as low as 0.2mm in south of the zone and higher in North of zone up to maximum 35mm. Wind speed varies in range of 3.2 – 6 knots during the year, with highest during winder period from September to February in south of the Zone around Red sea Governorate which can reach up to 6 knots and low wind speed in north of the zone.

The table below indicates the average of zone of climatic characteristic. The average maximum temperature varies from 20.2 C° in winter to 35.1 C° in summer, and the average minimum temperature varies from 8.2 C° in winter to 22.8 C° in summer. The maximum relative humidity is 59 % in winter and low as 37% in summer. Prevailing winds are in South of Zone A, with an average maximum speed of 6 knots and an average minimum speed of

Table 5-1. Climatic conditions

Month	Air Temperature		Relative Humidity Average %	Wind Speed Range (knots)	Rainfall Range (mm)
	Mean (max)	Mean (min)			
Jan	20.2	8.2	59.5	4.2-6	35-0.3
Feb	21.7	8.8	56	4.4-6	14.9-0.2
Mar	27.8	11.1	53.5	5-5.7	8.1-0.3
Apr	28.4	14.0	49.5	5-5.4	2.2-0.9
May	28.9	18.2	41	4.7-5	2.5-0.3
Jun	33.8	21.1	47	4.2-5	0
Jul	35.1	22.7	52.5	3.9-4.8	0
Aug	34.9	22.8	55	3.8-5	0.6-0
Sep	33.1	21.0	56.5	3.3-5.6	0.2-0
Oct	30.7	18.3	58.5	3.5-5.7	5.1-0.7
Nov	26.1	14.5	60.5	3.2-6	8.6-1.7
Dec	20.3	11.5	60.5	4.4-6	22.3-1.8

### 5.1.2 Geology

Substation and OHTL Giza Governorate section (500 kV Wadi El Natroun/6<sup>th</sup> of October and 3 220 kV OHTLs)

Geology of Giza near 6<sup>th</sup> of October: The SS and OHTL stretch south crosses over deserted side of Giza governorate with geological characteristic of surface sediments from Modern Era and it composed from limestone, quartz and clay. While calcareous solid sediments appear in the north and southwest region, such sediments are deposits followed by the Miocene era. Then sediments of marble and chalk follow up to the late Cretaceous period

#### OHTL - Faiyum Governorate section (500 kV Maghagha /6<sup>th</sup> of October)

Faiyum Depression is one of the depressions in Grand Egypt. It is considered as a depressed cavity of Miocene formations disappearing under recent geologic formations. This Depression connects to the Nile River through El-Lahun Hole. The Bahr Youssef Canal, which is one of Ibrahimiya Canal branches in the Nile River near Dirout, is considered the only source providing Faiyum with water by (1.9 billion cubic meters). This canal generally slopes from +26 meter in El-Lahun to – 45 meter above sea level near at Qaron Lake.

Faiyum Depression is different from other depressions as it is inhabited, it is irrigated by the Nile River and its soil consists of fertile silt which is transferred to the Depression with the Nile River water. That depression has all characteristics, so the geographers call it “Minor Egypt”. Faiyum Depression is the only depression combining Agricultural and desert natural environments, an old natural salt lake, and artificial fresh modern lakes.

The geological formation of the Faiyum Depression dates back to the Eocene and Alolajusyn Eras. The scientists see that its information is likely to be during Jurassic Era (136 billion year) as a result of declines in the lower layers of the Earth continuing until the Eocene Era. The Old Nile River water has flooded the province of Faiyum during the Quaternary Era. During the middle of Eocene and Miocene Eras (40 million years ago), Faiyum located between the Mediterranean coast when it was early the early formed and the Nile Delta that stretched in the south. The sandstone, limestone rocks in the palace chapel area, the accumulations of fossilized seashells “Alnimolat” in Wadi Rayan and Whale Valley fossils to the formations of the Eocene Era.

#### OHTL – Beni Suef Governorate section(500 kV Maghagha /6<sup>th</sup> of October)

Geological units in Beni Suef governorate are of sedimentary origin between loam configurations brought by the Nile River, and some limestone formations in the East (east of the Nile), then there are sand and sand dunes on the western side of the flood plain. The geological formations in the governorate are Quaternary Deposits; these are disjointed and incoherent configurations that are represented by:

##### A) Nile flood Deposits:

These are represented by the sediments constituting the flood plain, and brought by the River Nile from Ethiopia hill. These sediments consist of silt and clay, the silt layer has a thickness of about 9 meters and the thickness increases as we move to the south, as well as at the west, where the proportion of sand rises in the soil due to north west and western wind blowing from the Western desert.

##### B) Sandy sediments:

These are represented in the longitudinal bar parallel to the flood plain lands. These sediments consist of very small sand particles brought by the wind from the desert, and also from the movement of the sand dunes in the region.

#### C) Eocene formations:

These are limestone formations at the east of the governorate, ranging back to the Middle Eocene era. In some regions, sand and silt are noticed above the ground surface of the hill. In some other areas, limestone appears above the ground surface, and accordingly these areas are mostly used as quarries.

It is a requirement by EETC that OHTL contractor to carry specific soil investigation study for the route to incorporate safety design elements before the commencement of the construction activities after the contractual agreement with the construction contractor.

### **5.1.3 Surface Water**

The main source of water in Egypt is the Nile River. It represents about 96 % of renewal water sources in Egypt according to Full Utilization of the Nile water Agreement by and between Egypt and The Sudan for year 1959. Subject to this Agreement, Egypt gets annually 55.5 billion cubic meters while The Sudan gets 18.5 billion cubic meters in addition to some of the monsoon rains on coasts and Sinai estimated at 1.3 billion cubic meters per year. Additionally, there are amounts of renewable and non-renewable ground water in deserts. Current use is a mix between direct use of main resources and indirect use including re-use of agricultural drainage water and treated wastewater. The renewal water is about 55.5 billion cubic meters of the Nile River and 1.3 billion cubic meters of non-renewable ground water in the Western and Eastern Desert and Sinai. On the other hand, the indirect use is about 6.1 billion cubic meters of renewable ground water in the Nile Valley and Delta, 7.5 billion cubic meters of re-use of agricultural drainage water, 7.8 billion cubic meters of re-use of industrial wastewater and 1.4 billion cubic meters of treated wastewater. In Egypt, the use of water resources includes several segments such as agriculture estimated at 58.65 billion cubic meters, industry estimated at 7.5 billion cubic meters, drinking and household use estimated at 4.75 billion cubic meters, Nile navigation and power generation.

#### Substation and OHTL Giza Governorate section(500 kV Wadi El Natroun/6<sup>th</sup> of October and 3 220 kV OHTLs)

The OHTL route considered in Giza governorate section is at desert zone with no canal or drainage path (surface water) existent in the area

#### OHTL – Faiyum Governorate section(500 kV Maghagha /6<sup>th</sup> of October)

Qaron Lake is situated in the north western part of Faiyum depression, and considered one of the oldest natural lakes in the world. It is the remainder of Morris old lake, with area amounting to 55 thousand acres and depth of 12.5 meter. Its water surface level is 43 meters below the sea surface and salinity ranging between 32 to 35 grams/ liter. The lake is fed by El Bats watercourse, El Wadi watercourse and 12 other secondary watercourses. These watercourses transport around 70% of the drainage water in Faiyum governorate to the lake

Bahr Youssef is Canal from which the irrigation water enters to the Governorate. Bahr Youssef gets out from Ibrahimiya Canal at Dirout and goes through Assiut, Minia and Beni Suef Governorates before entering Faiyum Governorate.

#### OHTL – Beni Suef Governorate section (500 kV Maghagha /6<sup>th</sup> of October)

The OHTL route considered in Beni Suef governorate section is at desert zone with no canal or drainage path (surface water) existent in the area.

### **5.1.4 Ground Water**

#### Substation and OHTL Giza Governorate section (500 kV Wadi El Natroun/6<sup>th</sup> of October and 3 220 kV OHTLs)

Giza Governorate is considered a part of northern part of the Nile Valley, which includes eleven districts. Generally, the main aquifer in the Valley is a Quaternary Era aquifer (composing of graduated size sand, gravel and sludge lenses).

The thickness of the aquifer in Giza is approximately between 100 and 150 meters. The thickness decreases as long as we move to en parties of the Valley in east and west, so it may be about 30 meters in certain areas. It also may be disappear with the appearance of the limestone plateau at east and west. The ground water of this aquifer is easily accessible and its quality varies according to salinity due to closing to sources of nutrition and medium aquifer levels.

#### OHTL – Faiyum Governorate section(500 kV Maghagha /6<sup>th</sup> of October)

Generally, there are three aquifers under the El-Faiyum area. In the agricultural areas, a perched water table is maintained by infiltration from canals, drains and irrigated fields. Many of the springs in El-Faiyum depression have their sources from the Quaternary aquifer. Beneath this aquifer, the Eocene aquifer of limestones and marls was found. This aquifer is salty and therefore unsuitable for potable or irrigation use. The Nubian sandstone aquifer is a very deep aquifer that underlies parts of the depression. However, the depth to this aquifer is too great to allow exploitation<sup>1</sup>.

The Quaternary water-bearing formations cover most of El-Faiyum depression and extend in the subsurface with variable thicknesses depending on the shape of the underlying Upper Eocene marl and limestone which are faulted against the Middle Eocene along the peripheries of the depression in the eastwest sections. The maximum thickness of the shallow aquifer is about 47 m at the center of the depression while the minimum thickness approaches less than 1m along the depression peripheries due to local faulting. This aquifer suffers from water logging problem as detected from the observation wells<sup>2</sup>. At some localities, groundwater from Quaternary deposits flows as natural springs such as Ain El-Siliyin. The sources recharging the Quaternary aquifer include the irrigation water, surface channels, water flowing

<sup>1</sup> A.M.A. Abdel Baky (1972): Hydrogeological situations and Paleohydrogeological development of El Faiyum and Wadi El Rayan. M.Sc. Thesis, Cairo University

<sup>2</sup> A.E. El-Sheikh (2004): Water Budget analysis of the Quaternary deposits for the assessment of the water logging problem in El Faiyum depression Ph.D. Thesis, Fac. of Science, Al-Azhar University.

from the River Nile through Hawara depression and the nourishing from the underlying fractured limestone aquifer through hydraulic connection.

#### OHTL – Beni Suef Governorate section (500 kV Maghagha /6<sup>th</sup> of October)

In Beni Suef Governorate, ground water suffers from some pollution where there are many harmful elements such as phosphate, ammonia and nitrate, as well as heavy metals such as zinc, copper, iron and manganese in addition to high salinity. The source of water pollution is because of the fertilizers and pesticides used in agriculture, where dissolve in irrigation water of agricultural during the immersion of agricultural land with water and then it seeps from the pores of the soil to reach ground water.

There are two types of groundwater aquifers in Beni Suef governorate; namely, Quadruple tank, and the Eocene tank. The summary for each of these reservoirs is described below:

##### A) Quadruple tank

The Quadruple sediments that appear around the Nile Valley in Beni Suef governorate are divided into two Hydrogeological units: the Holocene semi-permeable layer, and the Pleistocenetank. The semi permeable layer noticed around the Nile Valley has a thickness ranging from one meter to more than 15 meters, and it is composed of some deposits of silt and clay. The Pleistocene sediments layer follows the Holocene layer, and it consists of loose deposits of sand and gravel with some clay lenses. Below this reservoir, the Pliocene clay sediments are located with thickness ranging between 20 meters at the edges of the valley to more than 200 meters in the middle of the valley, which means that the productivity of the reservoir level is high. The groundwater levels for the Quadruple -tank decreases generally from the south to the north of the governorate where the groundwater level is between +31 meters in the south to +21 meters in the north.

The direction of movement of water in this reservoir is generally in the direction of the River Nile, and it is fed directly from the major canals, or from the agricultural land irrigation.

##### B) Eocene reservoir

Eocene reservoir is characterized by a wide geographical distribution in Beni Suef governorate, where it is located at the western and eastern sides of the governorate. The depth of this reservoir ranges between 200 meters to 500 meters, and it is fed from the Cretaceous and pre-Cretaceousreservoirs, or from water infiltration from the Quadruple tank.

#### **5.1.5 Flora**

##### Substation and OHTL Giza Governorate section (500 kV Wadi El Natroun/6<sup>th</sup> of October and 3 220 kV OHTLs)

The SS and OHTL route located at 6<sup>th</sup> of October city where there are no critical habitats identified at the SS location nor along the routes of the OHTLs . The area has already seen human developments where residence and economic areas existed neighboring to the proposed project site. There is no critical flora or fauna exist in the area.



Flora existing in the city area (civilization development area) are plants for decoration at public garden, cultivated tree, side walk area, rest of the city are buildings. This region is considered desert area so the scarcity of flora is expected.

Fauna identified at the SS location and OHTLs route are stray dogs and cats, rodents, lizard, bats, crow, pigeons, and other birds. However, the presence of such fauna is rare at proposed project area.

#### OHTL – Faiyum Governorate section (500 kV Maghagha /6<sup>th</sup> of October)

Faiyum is located in an extremely arid region and is characterized by plant life adapted to extreme conditions. At least 36 native plant species and 108 agriculture plants have been recorded in the Faiyum governorate. Faiyum contains three main types of vegetative communities

##### A) Desert shrub community:

Occur on minor variations due to soil and moisture conditions, throughout the area. Its plants share a number of adaptations that enable them to survive in this hostile environment. This community distributed as sparse desert flora in small patches in the low lands of the interdune and desert plain areas. The desert shrub and sub-shrub plants includes: halfa, nitraria retusa, Tamarix nilotica, Zygophyllum album, Phoenix dactylifera, alhagi maurorum, and Desmostachya bipinnata.

##### B) Salt march community

Along the adjacent lands to the shoreline of the lakes of Qaron and Wadi El-Rayan and around the salt marshes of Oyoun El Rayan springs, the wet Sabkha communities of salt tolerant plants (halophytes) prevail. A characteristic element of this community is the Tamarix species. The Salt marsh plants includes: Phragmites Australis, Typha domingensis, Juncus sp. and Imperata cylindrica.

##### C) Agriculture community

The agriculture land of the Faiyum Governorate covers an area of about 330000 acres. The agricultural production based on fruit trees represents 8.6% of the cultivated fruit land of Egypt. The fruit trees in the study area include figs, olive, palm trees as well as the other traditional crops such as vegetables, cotton, and wheat which are produced mostly for local consumption

Desert shrub community and agriculture community are anticipated to be encountered in some sections (in 58 km, 70 km and 106 km of the route) crossing in Faiyum Governorate.

#### OHTL – Beni Suef Governorate section (500 kV Maghagha /6<sup>th</sup> of October)

In the western desert of Beni Suef governorate where the OHTL route is crossing, there are wild plants such as camel thorns (Alhagi), wormwood, chamomile, cactus, berries, bitter melon, and henna. Most of the overhead transmission line routes is crossing over a zone of un-vegetative arid desert lands.

### 5.1.6 Fauna

#### Substation and OHTL Giza Governorate section (500 kV Wadi El Natroun/6<sup>th</sup> of October and 3 220 kV OHTLs)

Fauna existing in the SS and OHTL are adapted species with civilization, and it is rare to exist at proposed area which is located at 6<sup>th</sup> of October city. Fauna represented or can be seen at the project area stray dogs, cats, rodents, lizard, bats, crow, pigeons, and other birds. Wild mammals have are not existent in the project area

#### OHTL – Faiyum Governorate section(500 kV Maghagha /6<sup>th</sup> of October)

A list of 38 land mammals was identified. (Basyouni 1992) Several are now very rare or extinct, including the slender horned gazelle, *Gazelles leptoceros leptoceros*. The Faiyum population of this sub-species may represent the only survivors in the world and is now probably locally extinct (IUCN, 2000). Other key wildlife species include *Gazelles dorcas* (listed as an endangered species), ubiquitous Sand fox, *Vulpes rueppelli*, and Fennec fox, *Vulpes zerda*. The main factors of declining mammal's populations are loss of habitat, hunting and the widespread use of rodent poison. In desert areas near by Wadi Natroun, there are low numbers of hyenas and trough and very rare numbers of bighorn ram and Egyptian and white deer.

**Table 5-2. Threatened fauna species in the Faiyum Governorate**

Common Name	Scientific Name	IUCN Status		Habitat
		National	Global	
Giant Musk Shrew	<i>Crocidura flavescens</i>		VU	Cultivated lands
Flower's shrew	<i>Crocidura flower</i>		EN	Cultivated lands
Fennec Fox( Sand Fox)	<i>Vulpes zerda</i>	EN		Sand areas
Hyena	<i>Hyaena hyaena</i>	EN		Desert margins
Wild Cat	<i>Felis silvestris</i>	VU		Wadi and rocky areas
Dorcas Gazelle	<i>Gazelles dorcas</i>	EN		Wadi and rocky areas
Slender-Horned Gazelle	<i>Gazelles leptoceros</i>	CR	EN	Wadi and rocky areas

During the spring and autumn, a remarkable diversity of birds migrates along Faiyum's lakes. This migratory corridor represents a critically important primary route for birds traveling between the northern and southern hemispheres. Large numbers of birds travel between Europe and Africa. International recognition of the importance of this flyway has been established by Bird Life International, which has defined 34 "Important Bird Areas" in Egypt. Faiyum wetlands, specially Lake Qaron has been described as a wintering area of international importance for breeding, passing and over wintering migrating water birds. Nearly 214 bird species have been recorded in the Faiyum area, three quarter of these are migratory. Bird populations have been declining since the beginning of this century. The main reasons are illegal falconry and hunting. In 1989, a prime ministerial decree made the areas of Lake Qaron and Wadi El-Rayan as nature protectorates. The OHTL in Faiyum governorate is crossing by desert margins and sand areas habitat.

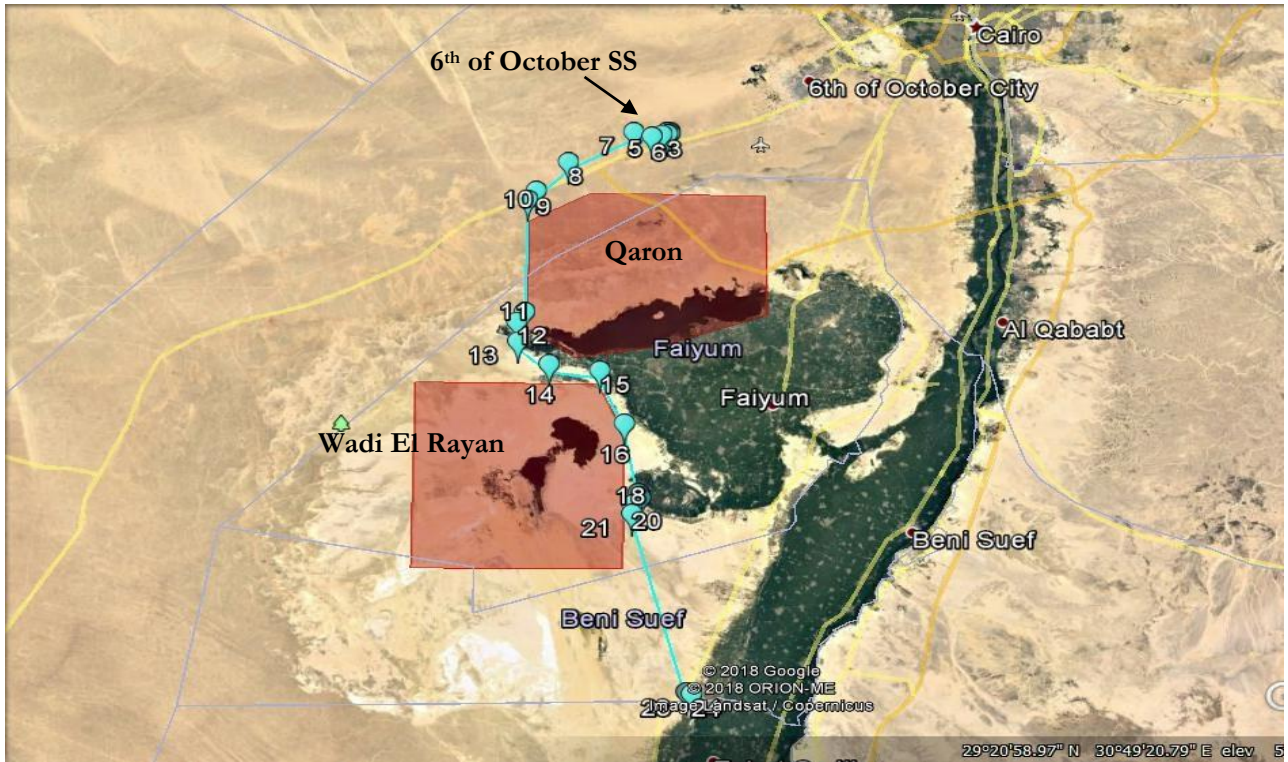


Figure 5-2: Maghagha 500/6<sup>th</sup> of October 500 OHTL interconnection

OHTL – Beni Suef Governorate section (500 kV Maghagha /6<sup>th</sup> of October)

The proposed OHTL route is located in a barren desert area with no evidence of previous and/or current use. The desert areas of Beni Suef are home to several species of fauna and flora which have adapted to the harsh conditions of the desert. Most of the desert areas are devoid of any vegetation except for some places which have a presence of water resources. Fauna in the area has also adapted to survive under the harsh desert environments and are usually more active during the night since temperatures fall greatly. There are more rodents animals which evolve any (omnivorous) to co-exist with the harsh conditions, and many of these rodents animals which can eat plants and meat at the same time. There are troughs in all parts of Egypt, but mostly in desert areas, where evolved and adapted to become fit well with life in the desert. In most cases, only footprints or burrows residues of them can be seen.

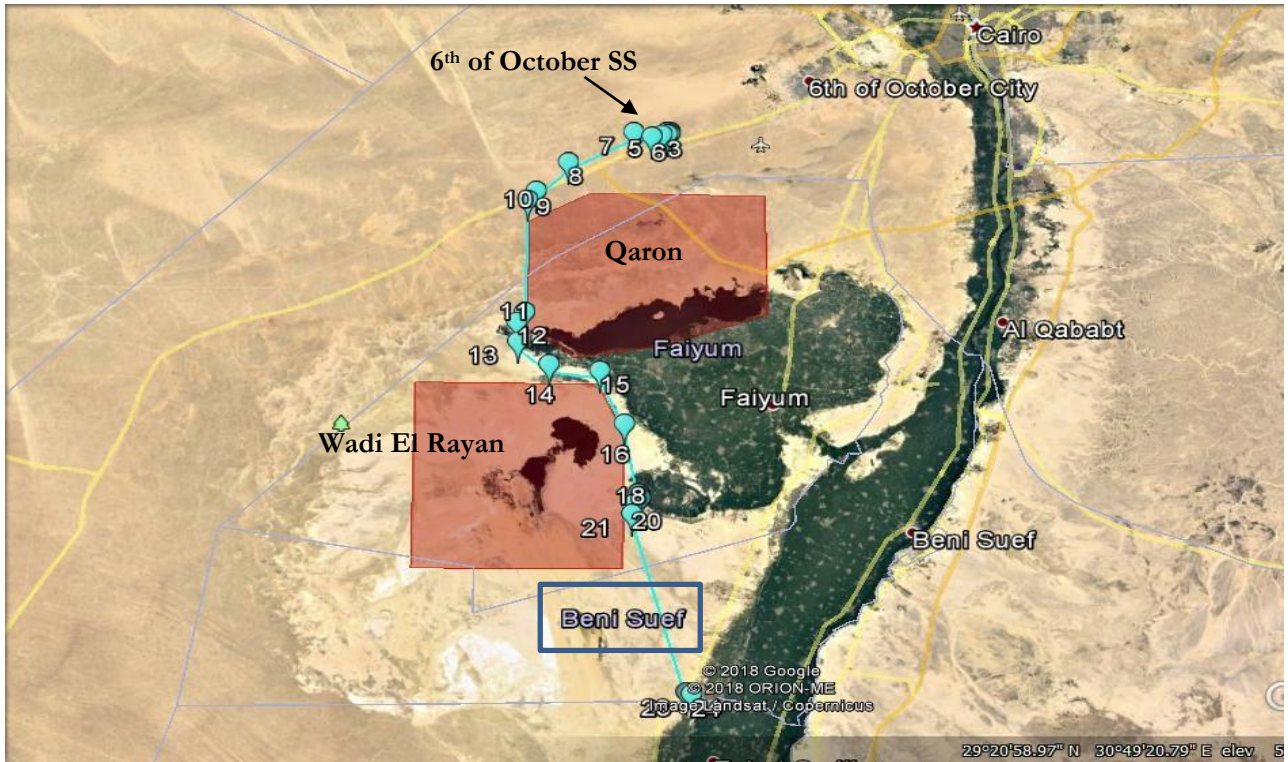


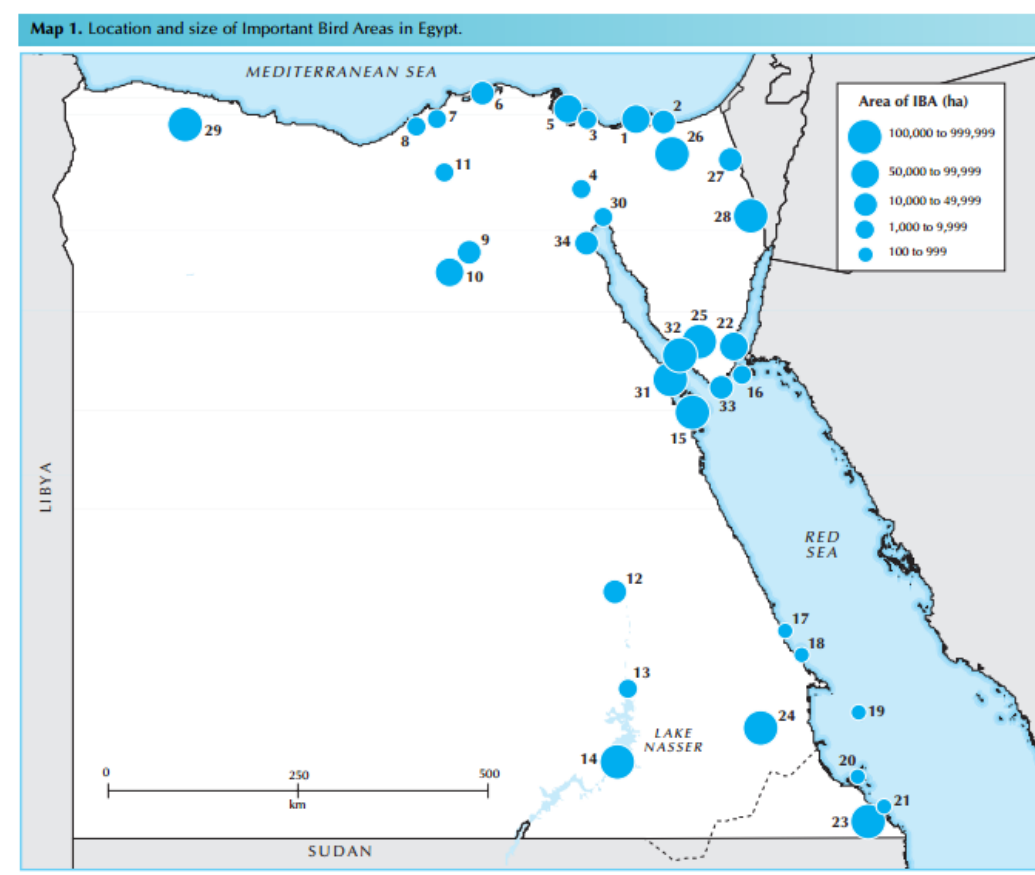
Figure 5-3: Maghagha 500/6<sup>th</sup> of October 500 OHTL interconnection

### 5.1.7 Important Birds Area

The Directory of IBAs in Egypt identifies 34 sites as IBAs in the country. Egypt's IBAs comprise wide range of habitats critical for birds, including: wetlands, high altitude mountains, desert wadis, coastal plains and marine islands.

Fifteen of Egypt's IBAs are in existing Protected Areas. Five further IBAs have been proposed for protection. However, not all IBAs can become Protected Areas. Bird conservation needed at sites such as Suez and Ain Sukhna can only be addressed through conscientious planning and management.

The Directory of IBAs in Egypt Provides decision makers and planners with a practical tool that can aid in setting conservation priorities and environmental management.



Distribution of IBAs on the Map			
1- Lake Bardawil	10- Wadi El Rayan	19- Zabargad Island	27- Quseima
2- Zaranik	11- Wadi El Naturn	20- Siyal Islands	28- Wadi Gerafi
3- El Malaha	12- Upper Nile	21- Rawabel Islands	29- El Qasr Desert
4- Bitter Lakes	13- Aswan Reservoir	22- Nabaq	30- Suez
5- Lake Manzalla	14- Lake Nasser	23- Gabel Elba	31- Gabel El Zeit
6- Lake Burullus	15- Hurghada Archipelago	24- The Abraaq Area	32- El Qa Plain
7- Lake Idku	16- Tiran Island	25- St. Katherine	33- Ras Mohammed
8- Lake Maryut	17- Wadi Gimal Island	26- Gabel Maghara	34- Ain Sukhna
9- Lake Qarun	18- Qulan Island		

Figure 5-4 Distribution of IBAs in Egypt

As the only land bridge between Eurasia and Africa, Egypt represents one of the most important migration routes in the world, with hundreds of millions of birds passing through the country every spring and autumn. Many birds over winter in Egyptian wetlands, making them internationally important wintering grounds for water birds. A total of 16 globally threatened species occur in the country, seven of which Egypt has particular importance.

Egypt has benefited from its bird life since ancient times. The country is vital for many species of birds

and shares a global responsibility to conserve them.

Regarding the project location and OHTLs and bird migration path, the SS and the OHTLs are not located along the path of the birds' migration. Based on Bird Life international tool's report (Annex 2), the overall sensitivity of this project area is considered low as there are no soaring or soaring bird species observed in the area, according to the IUCN Red List observed in the area; only 28 soaring bird species classified as LC; NT( near threatened); VU (vulnerable); EN (endangered) are expected to occur but not observed (classification of 'observed' or 'expected' based on presence status). However, EEAA draws a high attention regarding to the bird migration path, accordingly, minor mitigation measures are required to be implemented for the OHTLs to minimize the risk of birds' electrocution and collision on the birds. The following figures represent the birds' migration path versus the project's location and routes of OHTLs.

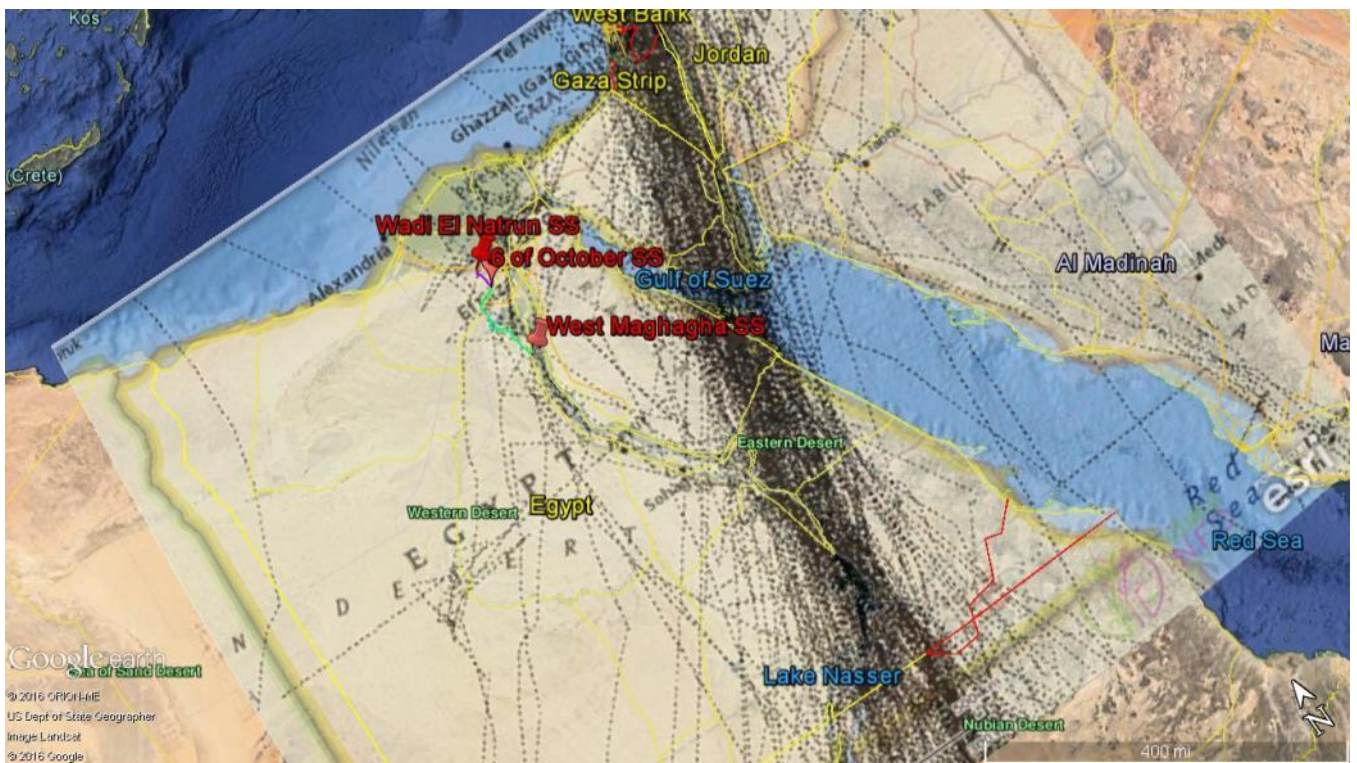


Figure 5-5 Migratory routes for birds in Egypt (Source ESRI,2016)

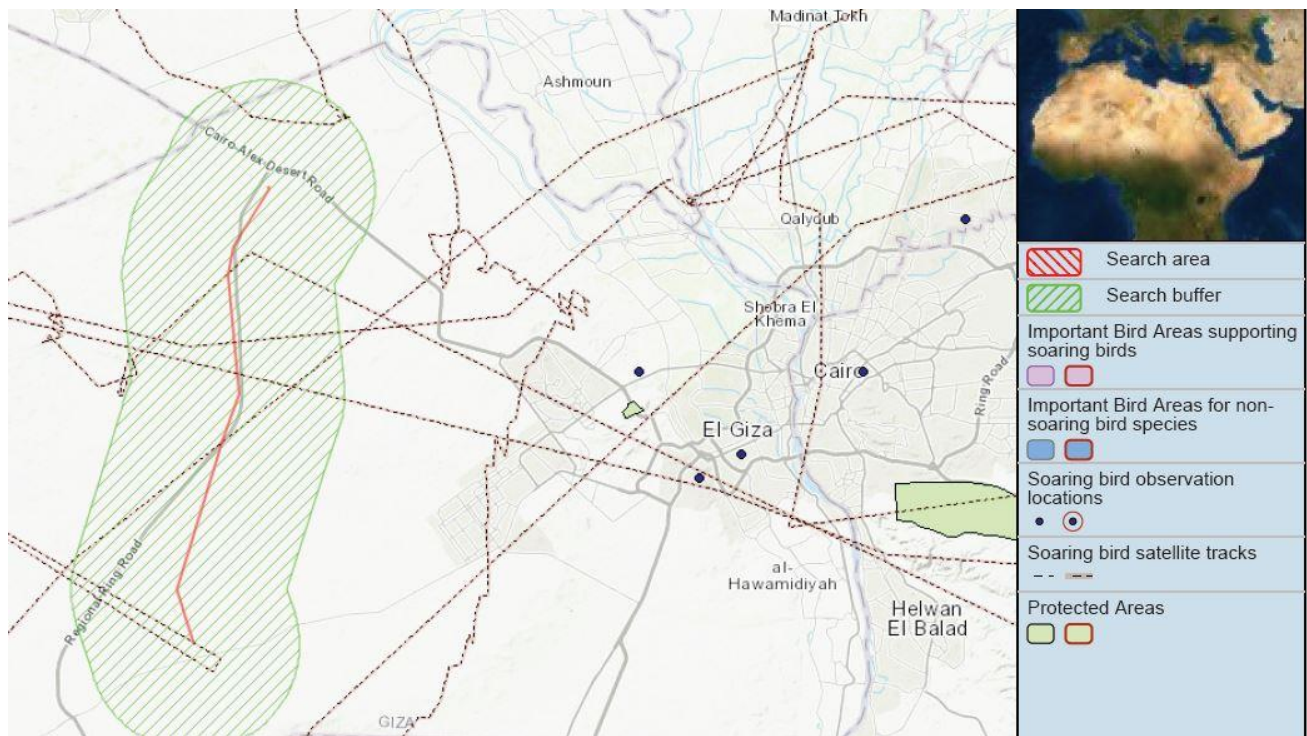


Figure 5-6 Bird migration route versus Wadi El Natroun OHTL route

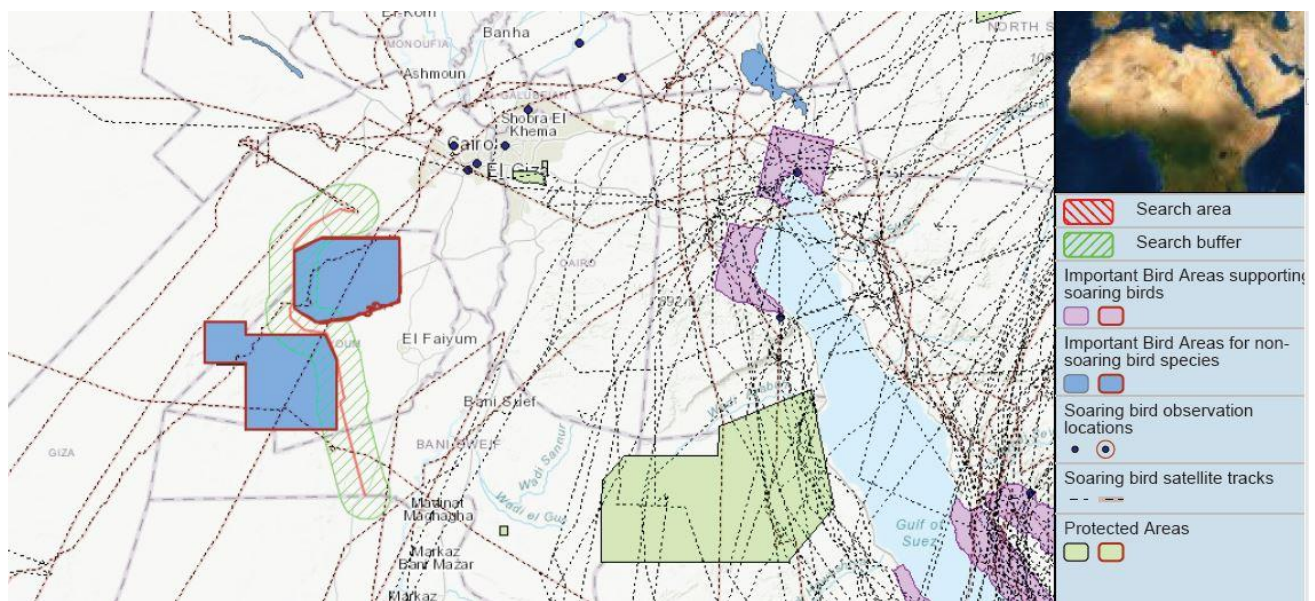


Figure 5-7 Bird Migration route versus Maghagha OHTL route

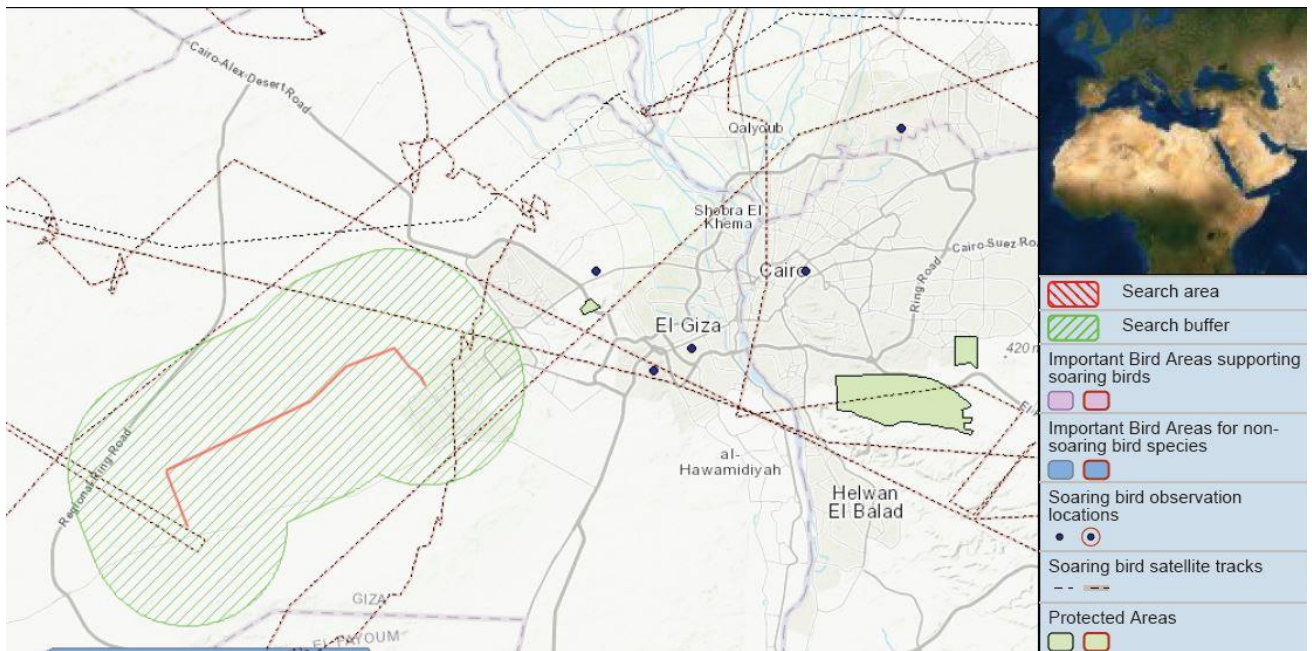


Figure 5-8 Bird Migration route versus 3OHTLs 220kV

### 5.1.8 Protectorate

The OHTL interconnection between 6<sup>th</sup> of October and Maghagha will not pass either Qaron Protectorate nor Wadi El Rayan Protectorate as it appears in the following figure.

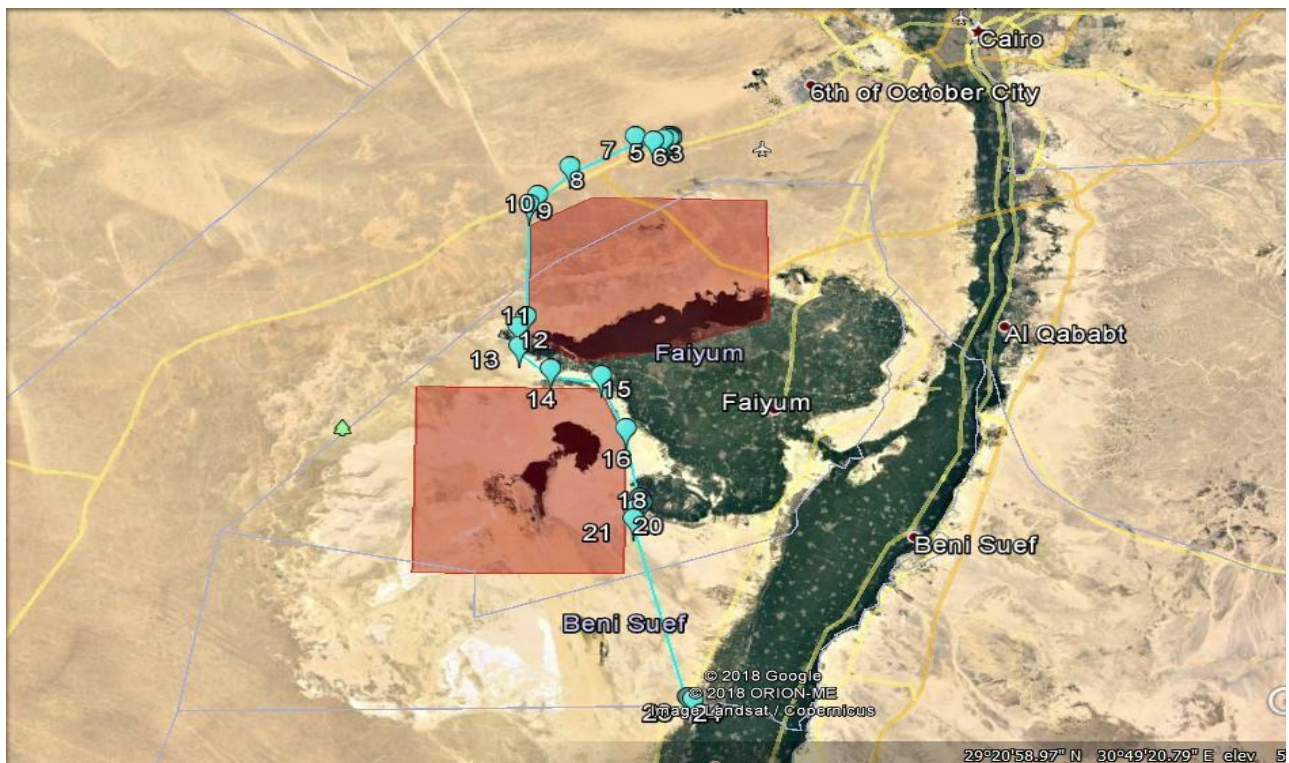


Figure 5-9 Protectorates with respect to OHTL component



### 5.1.8.1 *Wadi El-Rayan Protected Area in Faiyum Governorate*

Wadi El-Rayan area is characterized by its integrated desert environment, consisting of sand dunes, natural springs, large water bodies and a different botanical life, different wild animals and important and various sea fossils. The area of El-Rayan Lake is a calm natural environment and free of pollution. Wadi El-Rayan consists of the following important areas:

**Waterfall Area:** this area was formed due to the gathering of farming drainage waterfalls. It is a place for various sea sports.

**The area of Wadi El-Rayan:** consists of long dense movable sand dunes. It has four natural sulfuric springs. It is characterized by the existence of plant groups that contain 15 species of desert plants and about 15 types of wild mammals like the white deer, the Egyptian deer, sand fox, red fox and others, and 16 species of reptiles, and over 100 species of resident and migrating birds.

**The Area of El-Rayan Mountain El-Mashgaeega Mountain:** It includes deep canyons known as split rock. It is one of the favorite places to see a panorama of Wadi El-Rayan and picnics.

**Wadi Al-Hitan:** It is an Area of fossils in the western north of Wadi El-Rayan protected Area, it dates back to 40 million years. These fossils of petrified primitive whales skeletons, shark teeth, shells and other sea animals that are considered as an open museum. The roots of Mangroves preserved in soft rocks.

The importance of Wadi El-Rayan is attributed to the fact that it is a natural environment for animals threatened with extinction like white deer, Egyptian deer, sand fox, wolf and rare migrating birds like shahin falcon, deer falcon, free falcon, and other types of migrating birds like some kinds of ducks, quail, some kinds of herons, goats and others. Wild plants like: Aqool, zygothylum, Athl Tomarex, Halfa, Ghatdaa, Ghaab, Sammaar, reed and others.

#### **Wadi El-Rayan Depression**

Wadi El-Rayan is a small enclosed and curiously shaped (clover-leaf like) uninhabited depression 25 km southwest of El-Fayium Province

Depression, discovered by Linant de Bellefonds (1873), is cut out of white limestone of Eocene age, rich in nummulites. The lowest point of the floor of the depression is at 60 m below sea level. The area at the -60 m contour is 22 km<sup>2</sup>, at the sea level contour is 301 km<sup>2</sup>, and at the 130 m contour about 703 km<sup>2</sup>. Its maximum breadth is 25 km" (Zahran, 1970–1971).

The origin of the word "Rayan" is discussed by Fakhry (1947) – Rayan is Arabic for the "watered one" or the "luxuriant", a suitable name for this wadi which is covered with vegetation at many places and whose subsoil has water at less than 2 m. A bedouin legend gives another explanation. The ruins of ancient buildings are the ruins of the houses of a powerful king called "El-Rayan" and his soldiers who lived here. Coptic literature gives yet a further interpretation of the name of the wadi. It is stated in the biography of Anba Samuel of Kalamous that he used to go from time to time to worship alone in this wadi and found the word "El-Rayan" in the Arabic text on Abu Salih, the American Worship. The name "Rabana" is a possible one; this is affirmed by its mention in the *Horris Papyrus* in connection with the Libyan war of Rameses (Zahran, 1970–1971).

Ground water is the main source of supply for the Wadi El-Rayan Depression in the south portion of which, and according to Ball (1927), there are three springs deriving their water from the continuous sheet of subterranean water under the Western Desert. Fox (1951) believes that these springs are in the fissured Nubian Sandstone about 600 m beneath the depression. Ball (1927) indicates that "the water of these springs is derived from remote collecting areas and is therefore warm". According to Fakhry (1947), there

is evidence that all these springs have long been in use, as their water is drinkable. In the first and second centuries AD the depression was inhabited and a part of it was cultivated.

The vegetation in the Wadi El-Rayan Depression is confined to areas around springs. Besides the trees of *Phoenix dactylifera* and *Acacia raddiana* there are bushes undershrubs and grasses, e.g. *Tamarix* spp., *Nitraria retusa*, *Zygophyllum album*, *Desmostachya bipinnata*, *Alhagi maurorum* and *Fagonia arabica*. Common xerophytes can also be seen in the desert surrounding the depression, e.g. *Calligonum comosum*, *Cornulaca monacantha*, *Farsetia aegyptia*, *Heliotropium luteum*, *Panicum turgidum* and *Pituranthos tortuosus*.

#### **5.1.8.2 Qaron Protectorate**

Qaron Protectorate is a natural protectorate located in Faiyum, Egypt, in the northwestern part of the Wadi Rayyan Depression, with an area of 1385 km<sup>2</sup>. Rayyan Valley Protectorate contains Qaron Lake, one of the oldest natural lakes in the world and the remaining part of the old Morris Lake. It was declared a natural protectorate in 1989. Wadi Rayyan Protectorate is located in the southwestern part of Faiyum Governorate. Wadi El Rayyan composes of the upper lake, the lower lake, the waterfalls that connect the two lakes, the Rayyan wells at south part of the lower lake, Al Rayyan Mountain, which is an area surrounding the wells, and Modawara mountain area, which is near by the bottom of the lower lake.

## 5.2 Baseline Socioeconomic Conditions

This section begins by shortly describing the methodology used by the consultant to measure the baseline conditions of the concerned community in terms of socio-economic living conditions of the project area.

The methodology is followed by an overview of the findings from both primary and secondary sources, detailing the conditions of residents of the impacted areas as well as their perception of, and expectations from the project.

- i. Methodology overview
- ii. Area profile
- iii. Demographic characteristics and human development profile
- iv. Social services

### 5.2.1 Methodology Overview

#### *Data Collection and Desktop Review*

In addition to secondary and primary data collection tools, the consultants conducted field visits to the SS project area to familiarize themselves with the nature of the site, confirm potential stakeholders and potential resettlement candidates in addition to creating a photo archive of the site.

#### *Secondary data collection method*

The Consultant reviewed national legislations and EIB standards, readily available reports, official statistics and web-based sources in addition to relying on project specific information received from EETC. The Consultant's aim was to harmonize the ESIA, to the extent possible, with existing references, studies and efforts and building on their findings rather than duplicating efforts.

#### *Primary data collection methods & Sample Description*

Primary data was collected by conducting several meetings with relevant governmental bodies, including EETC and its Cairo Zone as well as 6<sup>th</sup> of October City Authority. Additionally, 10 individual interviews and were conducted with residents closest to the SS project area. An additional tool to confirm collected data was on-site observations and informal meetings and discussions which were held with people residing and working in the SS project area. A total of 15 individuals have been interviewed during the scoping phase of this study; 7 males and 3 females. Considering the distance of the project area from 6<sup>th</sup> of October residential area, and hence the limited foreseen impact, scoping activities were limited in number.

A community engagement plan has been developed for the different Stakeholders through 2 phases :

- Phase I: Consultation activities conducted on the SS and the surrounding areas (June 2016),
- Phase II: During the preparation of the RAP study, the areas located along the routes of the OHTLs; were included Scoping Meetings during March and April 2018, and Public Consultation Session on 26 November 2019. The public consultation session was held to share the results of the study with members of the community, representatives of academia as well as governmental representatives. The session was publicly announced and feedback received from attendees were responded directly as well as taken into consideration and reflected in the report.

#### *Limitations*

The research team found difficulty in reaching female respondents around the project area especially within the younger age groups. Due to limited presence of community based organizations in the area, the research team had to rely largely on snowball sampling in reaching out to respondents.

## 5.2.2 6<sup>th</sup> of October SS Main Findings

### 5.2.2.1 Area Map<sup>3</sup>

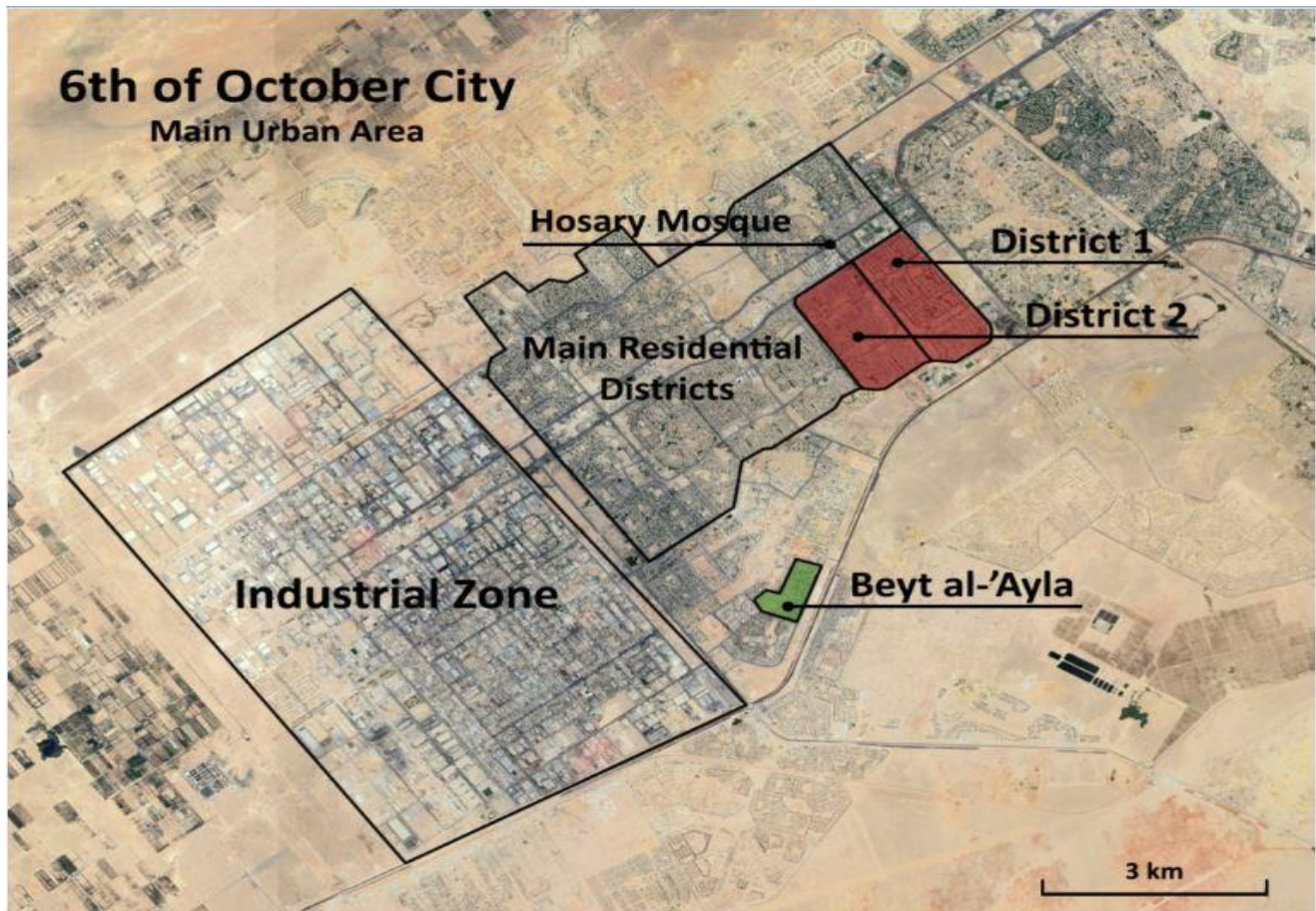


Figure 5-10 Main Urban area in 6<sup>th</sup> of October City

### 5.2.2.2 Area profile

6<sup>th</sup> of October city is one of greater Cairo's newer cities which was developed in light of the presidential decree number 504 of 1979. It is part of Giza governorate and is located around 17 km from the pyramids area and around 32km from downtown Cairo.

The SS project area is located in 6<sup>th</sup> of October desert backland which was allocated for agricultural reclamation. The land plots surrounding the SS project area are divided and owned by individuals; this shows by the signs put up in each plot. No real reclamation activities had taken place at the time of site

<sup>3</sup> IDSC, Description of Egypt by Information, 2012

visits conducted by the team in June of 2016. There were no people present at the project site except for one guard at the entrance of the reclamation area.

The SS project area is accessible through the main road. The roads network does not extend inside the project area. EETC Cairo zone have already addressed 6<sup>th</sup> of October city authority regarding providing the project area with a roads network as well as water services. Water is delivered to the area through water tanks which are delivered to the area periodically.

The land allocated for the project did not yet have a fence at the time of the site visits.



Figure 5-11: Nature of project area



Figure 5-12: Caravan of water containers brining water to the SS project area that is not covered by the water network

### 5.2.2.3 Demographic Profile

6<sup>th</sup> of October City is around 14191.56 km<sup>2</sup> in size and houses a population of around 2.9million people.

### 5.2.2.4 Poverty Status

Table 5.7 Poverty Distribution on the level of the 6<sup>th</sup> of October in relation to Giza

Level	Number of Poor in 2013	% of Population Classified as Poor	Poverty Gap	Gini Coefficient <sup>4</sup>
Giza	2,329,603	32.33%	7.01	0.26
6 <sup>th</sup> of October	1102	22.46%	5.74	0.27

Source: CAPMAS – Income and Expenditure Survey, 2013

<sup>4</sup> The Gini Coefficient is a statistical dispersion tool used most commonly as a measure of inequality whereby 1 (100%) expresses maximum inequality in income distribution and 0 (0%) represents absolute equality. Both extremes are unlikely to be reached.

With only 22.46% of the 6<sup>th</sup> of October population classified as poor in 2013, the shiakha falls below the national average of 25.2%. This may be attributed to the nature of the district which houses younger families as well as many middle income state built residential areas. These fall in stark contrast with some of the better fairing residential luxurious compounds. The poverty rates fail to fully reflect this conflicting nature of the city.

### 5.2.2.5 Employment Conditions

The following table from the National Census data for 2006 describes employment conditions at the 10<sup>th</sup> district Shiakha:

Table 5.8 Employment rates in the 10<sup>th</sup> District

Workers	Unemployed		
Total Workers	Unemployment Rate	Female Unemployment Rate	Total Unemployed
708,000	7.48%	7.93%	34,700

Source: Description of Egypt by Numbers

### 5.2.2.6 Education Conditions

Illiteracy rates in 6<sup>th</sup> of October (21.25% overall and 21.90% for females) are somewhat lower than the national average (25%). 6<sup>th</sup> of October has a total of 1202 public schools available in addition to 48 technical schools and 375 private schools.

### 5.2.2.7 Infrastructure Accessibility & Health Facilities<sup>5</sup>

Table 5.10 Accessibility to infrastructure in the 10<sup>th</sup> District

Area level	Access to Sanitation network	Electricity	Access to Clean Water
Giza	61.96%	99.2%	89%-100%
6 <sup>th</sup> of October	93.07%	99.26%	92.67%-98.49%

Overall, most residents of 6<sup>th</sup> of October have access to basic services including access to sanitation network (93.07%), electricity (99.26%) and drinking water where 92.67% have taps at home and 98.49% have access to potable water in the area.

Overall, 6<sup>th</sup> of October is considered to be well planned and has access to basic services including access to electricity, potable water, sanitation networks, road networks as well as educational and health facilities (1 public hospital in addition to a number of private hospitals and medical facilities).

### 5.2.2.8 Respondents' Perception of the Project

Seeing as the proposed project land is far removed from all residential areas, feedback received from surveyed groups was entirely positive. Residents as well as 6<sup>th</sup> of October city authority environmental officers stated that the project would not have any negative impacts due to its removed location and that

<sup>5</sup> IDSC, Description of Egypt by Information, 2012

conversely, it is expected to have a positive impact on improving the national electricity network and thereby providing opportunities for industrial activities.

### **5.2.3 Faiyum Governorate Main Findings**

#### ***5.2.3.1 Population***

Faiyum governorate's population amounts to 2.48 million persons according to the census of January 2005, distributed to 6 markazs, under which 6 cities, 61 local village units and 163 villages are included.

#### ***5.2.3.2 Historical and Tourism significance***

Faiyum is considered one of the most important tourist areas as it comprises tourism attraction elements, the most significant of which is the meeting between the three agricultural, coastal and desert environments. Pre-historic civilizations, the Pharonic, Greek, Roman, Coptic and Islamic civilizations emerged there. It contains many tourist areas such as Ein El Seleen, natural protectorates such as Qaron Lake, El Rayan Valley and many monuments, Om El Borigat City, Qaron Palace, Madi monumental city, Coptic monuments such as Virgin Mary Church, El Naqloon Abbey, and Islamic monuments such as the suspended mosque and Qaitabai mosque. Faiyum region enjoys several and diversified resources. Such resources are not confined to natural protectorates. Rather, they include also the most significant fossils area in the world, El Hitan valley (which is now on the list of international natural heritage.). It also comprises the fossilized forest and the monumental basalt quarries in Qotrani Mountain. Currently, the UNESCO is considering the location of Qortani Mountain to include it within natural heritage areas. Faiyum region includes in addition to the above environmental heritage and its diversified elements al over the governorate, which may be the topic of scientific researches and academic studies in order to achieve the targeted growth through activation of environmental tourism, a promising tourism to assist the socio-economic growth of the local population.



Figure 5-13. Closest archeological/cultural sites with respect to OHTL route

As it appears in Figure 5-13 the Hawara pyramid lies within approximately 33 kilometers from the closest point of OHTL route; the Deir El Azab Monastery lies 28 kilometers from the closest point of OHTL route; Wadi Hitan national park is over 35km from the closest point of OHTL route, where archeological sites are most likely to be located. However, no visual impact is expected due to the long distance between the closest points and the OHTLs.

### 5.2.3.3 Area and Agricultural Activity

The total area of the governorate amounts to 6068 km<sup>2</sup>, inhabited by 2.48 million persons. The farmed area in the governorate amounts to 423737 acres, and is famous for cultivating fruits such as grapes, figs and mango. Further, traditional crops are cultivated there, the most famous of which are wheat, cotton, rice, sweet corn, sugar beats and sunflower.

### 5.2.3.4 Industry

Faiyum governorate comprises two industrial areas, El Fath industrial city in Kom Osheem over a 11.2 acres area, and the second is in Qota area over 2000 acres. Many projects were set up in Kom Osheem, comprising food industries- building materials-chemicals- minerals- glass- cardboard- plastic, in addition to the existence of other industries outside the industrial area, such as cotton weaving, fodder, pottery, sugar beat and carpets industries. In Qota area, no factories were built there, while the area is ready to accommodate industrial installations



### **5.2.3.5 Education**

Faiyum is witnessing an extensive educational progress whether in pre-university or university education. The number of schools amounts to 1176 school and the number of Azhar institutions is 139 institutes. The number of pre-university education classes in Faiyum governorate amounts to 9122 classes for general education, comprising 408226 students, in addition to 213 classes for special education comprising 8862 students.

## 6 Potential Environmental and Socioeconomic Impacts

### 6.1 Impact evaluation Methodology

A focus on the materiality of risk to affected persons, to be henceforth acknowledged as rights-holders, constitutes a cornerstone principle that calls for sound and meaningful stakeholder engagement and guaranteed access to remedy. It is guided by considerations of likelihood, severity and frequency of human rights impacts anticipated, thereby ordering the prioritization of mitigation measures accordingly. In-depth assessment of the likelihood and severity of identified impacts is necessitated, so as to “prioritize actions to address actual and potential adverse human rights impacts (by) first seek(ing) to prevent and mitigate those that are most severe” (UNGP 24). The likelihood that potential human rights impacts may occur is often based on (i) the country context related to specific rights and (i) specific business relationships that pose particular risks to human rights. Severity, on the other hand, is to be appraised on the basis of the gravity of the impact that might occur (scale), the scope of the impact and the remediability of said impact (namely, the possibility that those impacted may be restored to a situation at least the same as/equivalent to their situation prior to the impact). In further considerations of influence over potential impact borne and leverage over those able of effecting change should inform respectively attribution of responsibility and obligation for action

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.

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<sup>6</sup>. 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.

In addition, 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 including 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.

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<sup>6</sup> According to EEAA EIA Guideline, January 2009

### 6.1.1 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(15 months for construction of the SS and average of 9 months for construction of OHTLs)
- 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

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

### 6.1.2 Sensitivity of the receptor

Sensitivity of the receptor is based on the relationship between the respective project and present baseline environment (the receptor). It is assessed based on vulnerability of the receptor. These receptors include the surrounding population and environment. As the effect of an impact is more readily absorbed and easily mitigated it becomes 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 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

### 6.1.3 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:

		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

Where:

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

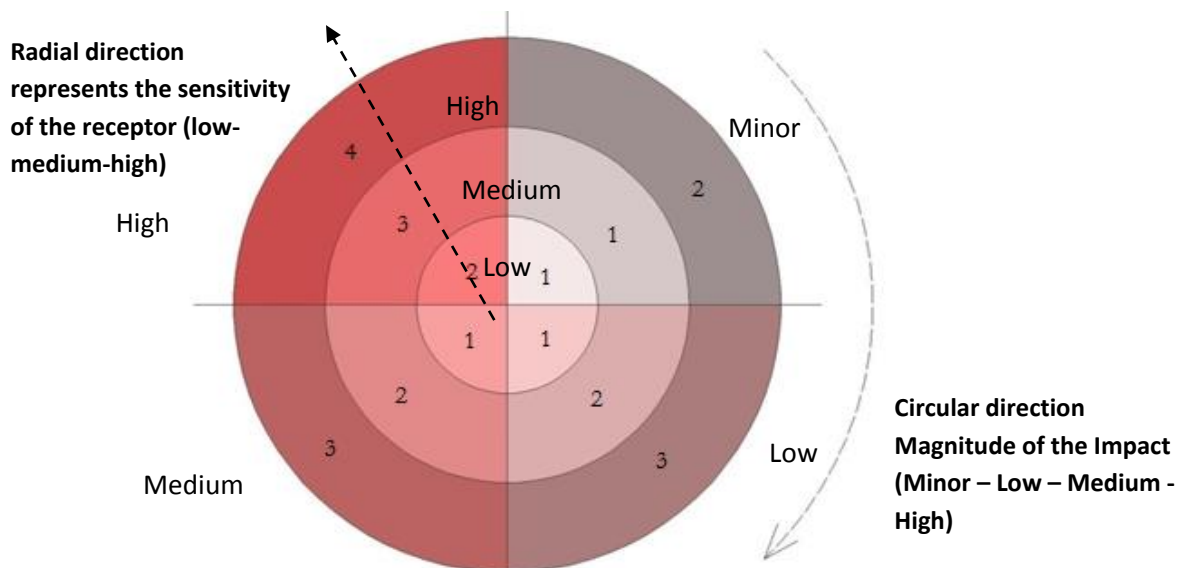


Figure 6-1 Impact evaluation methodology

This section will discuss the environmental impacts (both negative and positive impacts) associated with the construction and operation and maintenance phase of new substation at 6<sup>th</sup> of October and its interconnection overhead transmission lines. [Please refer to Chapter 3, Project Description].

## 6.2 Impact Assessment for Proposed Development

As the nature and characteristics of the impacts associated to the project components (SS and interconnection overhead transmission lines (500 kV and 220 kV)) are different, the impacts assessment in this chapter is divided into each of the project components. In addition, impact assessment is also differentiated between two phase of the proposed development; during construction phase and during operation and maintenance phase.

Impacts for 500kV OHTLs are presented separately because the routes are crossing by different areas while the impacts of 220 kV are presented together as the routes of 3 OHTLs are parallel to each other with 25 meter apart and crossing by same areas for distance of 38 km. However, the total length of the OHTLs is 40 km. The remainder 2 km are at the beginning of the route where North October OHTL route starts for 1 km till it meets Main October connection electric tower and then the 2 OHTLs run for more 1 km to meet Motwreen connection electric tower. These 2 km are in desert area and no specific significant impacts could be presented for these 2 km. Accordingly, the impacts for 220 kV OHTLs are presented all together.

## 6.3 Impact Assessment During Construction of 6<sup>th</sup> of October SS

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

The potential impacts which may result from the construction activities of the SS are:

### 6.3.1 Noise

Construction of the SS at 6<sup>th</sup> of October city will require using various construction equipment, vehicle, etc. in addition to the other activities that generate noise. These tools signify potential major sources of different types of noise that will have an impact on the receptors who are susceptible to the generated noise.

On construction site these major sources exhibit many different types of noise such as background noise, idling noise, blast noise, impact noise, rotating noise, intermittent noise. In addition to the British standard for general construction noise, the table below lists the major expected noise generated from different construction equipment according to *Society of Automotive Engineers SAE*. This comparison indicated that the general International standard is similar to the standard used at the Egyptian standard provided by the local automotive society.

Table 6-1. Expected construction equipment and sound levels

Equipment	Sound Level at operator dB ( 20 feet from the equipment)	
	Average	Range
<i>Earth Moving</i>		
Front End Loader	88	85-91

Equipment	Sound Level at operator dB ( 20 feet from the equipment)	
	Average	Range
Back Hoe	86.5	79-89
Bull Dozer	96	89-103
Roller	90	79-93
Grader	<85	
Truck	96	89-103
<b><i>Material Handling:</i></b>		
Concrete Mixer	<85	
Concrete Pump	< 85	
Crane	100	97-102
Derrick	<85	
<b><i>Power Units:</i></b>		
Generators	<85	
Compressors	<85	
<b><i>Other Equipment:</i></b>		
Poker Vibrator	94.5	87-98
Power Saw	88.5	78-95

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

- Onsite Workers and
- Neighboring establishments

### Impact Significance

Based on the typical construction machineries used during construction (Table 6.1 above), the large spatial distance to nearest establishments (>10 km – industrial zone ), the wind direction and the duration of the noise, the average construction noise will have low impact and sensitivity. Most vulnerable group are the onsite workers, and the impact can be minimized significantly by adopting a set of health and safety measures.

Activities conducted at the worksite; during the use of the equipment for construction, will generate levels of noise which will have a considerable impact on workers. Therefore construction noise shall be mitigated to ensure a safe work environment and to fulfill the occupational health and safety requirements concerning national and international requirements (as presented at Chapter 2, Legislative and Regulatory Frameworks).

The impact on the construction workers will be low impact.

### 6.3.2 Traffic Impacts

The greatest potential for traffic impacts to occur arises during the short period where construction works peaks. The traffic flow that will be created during construction period will to some extent depend on which type and number of trips to and from the proposed site.

The contractor require to have a time management plan to manage and schedule the traffic movement for the construction materials, equipment in addition to transporting the debris to the landfill. In addition, the notification to the traffic department should be obtained and the time management plan should be approved prior to the construction activities.

#### Impact Significance

It is estimated that the overall additional traffic would have insignificant impacts on the level of service on the road.

During transportation of the equipment, raw materials as well as equipment, it is anticipated that one lane will be used by the trolleys and the movement of one trip will not last more than 8 hours (during the midnight – morning). Therefore, the impact significant on traffic is considered short term, during the specific time duration and low to medium impact.

The SS site is located not directly to the main road. Additional activities, such as entering and exit to the site will not have significant impacts on the main road. In addition, there is sufficient storage area adjacent to the site, next to the service road that the raw material can be placed, as well as the standby equipment, it is expected that the main road will not be impacted.

The impact is considered low to medium and the mitigation measures as well as the management plan will effectively control the traffic impact and reduce the impact to minor.

### 6.3.3 Air Quality

Construction of the SS and installation of the equipment will include several activities such as excavation, land clearing, earthworks, stock piling transportation of construction material and equipment, burial of cables and pipes, etc. Those activities in consequence are expected to emit air pollutants to the ambient air, however it will be conducted for a short periods. The following air pollutants are foreseeable for most of the construction activities:

- Fugitive dust emissions ( PM<sub>10</sub>, PM<sub>2.5</sub>)
- Exhaust of vehicles or equipment such as temporary generators, trucks, trolley, etc

#### Impact Significance

In the vicinity of project site, dust emissions will slightly negatively impact ambient air quality, particularly during the initial phases of construction. However the impact is not significant as soil characteristic at SS site is mainly hard soil and residential areas are at a distance of above 10km.

Fugitive dust impacts from the construction activities are expected to be minimum and will be minimize with the measures done by the Contractor for the following reasons:

- Dust emissions from construction activities impacts will be limited to a small area in the vicinity of the project site of SS and OHTL (within less than 100 m) and the dust is expected to settle in close proximity to the construction site(s).
- The wind speed is considered low in the area.
- The project will hire a qualified contractor with health and safety standards awareness. In addition, the ToR for the contractor and the ESIA provides the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction.

Therefore the impact is assessed as low for the receptors and medium for the workers in the vicinity of the project area. Therefore, the dust control should be mitigated to reduce or minimize the impact to the residents as well as the workers.

Emissions of CO<sub>2</sub>, CO and PM will result from the operation of the construction machinery and road vehicles during construction of the Substation. However, impacts of gas emissions due to the construction activities are expected to be temporarily negatively significant for the following reasons:

- Quantities of air pollutants emitted from construction machinery are generally temporary (during the working activities) and non-permanent.
- It is expected that most of the vehicles and machineries for work activities are diesel-powered, and produce lower nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM) compared to the benzene or gasoline. Diesel engines emit lower levels of carbon monoxide (CO) than gasoline engines. The emission of the NO<sub>x</sub> and PM as well as CO at the existing baseline conditions are considered high. The cumulative impact due to the construction activities will have only slightly higher than the existing emission. Therefore the impact of the project is considered low compared to the existing impact on gas emission.
- The intensity of work activities and the number of vehicles traveling onsite would be relatively low for all tasks.
- The emissions will be mostly limited to the construction phase and therefore are temporary.

Therefore the impact is assessed as low impact. However, the air quality control or monitoring should be mitigated to further reduce the impact.

#### **6.3.4 Vibration**

Construction activities would result in varying degrees of ground-borne vibration depending on the stage of construction, the equipment and construction methods employed, the distance from the construction locations to vibration-sensitive receptors and soil conditions.

According to the proposed activities during the construction phase of SS project, the concern of vibration comes from the truck movements and construction of the infrastructures and installation of the equipment.

Based on the investigation of the sensitive receptors surrounding the project site, no sensitive establishment will be impacted due to the vibration generated during the construction phase. Consequently, minor vibration impacts could be anticipated to occur.



### 6.3.5 Hazardous Materials and Waste Management

The waste that would be generated during construction could be categorized as follows:

- Human or domestic wastes generated by construction labor, including sewage and garbage collected from the labor camp location. Disposal of sewage and garbage generated from construction labor, if not transported to adequate sites, will be a continuation of the existing sanitation situation and contribute, although to a relatively low extent, to environmental deterioration. This kind of wastes has to be transported outside the site or managed on site. In this project, the ESMP and Monitoring Plan has recommended measures for sound management of such waste.
- Normal construction wastes including scrap concrete, steel, bricks, wood, etc., which are chemically inert, therefore the associated environmental risks with improper disposal of such waste is limited to aesthetic effects at the disposal site. Therefore, all kind of wastes generated should be properly managed and disposed off at the designated facilities for their final disposal. By following the construction waste management plan and monitoring plan, these limited aesthetic effects will be minimized.
- Miscellaneous non-hazardous solid wastes, including packaging waste, used drums, wood, scrap metal, and building rubble will be generated during the construction phase of the project
- Solid hazardous wastes generated include empty containers, spent welding materials, solvents, paints or adhesives, and other hazardous wastes resulting from operation and maintenance of the equipment and vehicles, i.e. spent oil, spent lube, waste oil filters, batteries, etc. Among the hazardous wastes also are the wasted or faulted materials including conductors and insulators.

Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects at the disposal site. The legal standards of Law 4/1994 for the Environment and Law 38/1967, discussed in Chapter 3, stipulate that these wastes should be disposed of at licensed sites by the local authority, which minimizes any aesthetic effects of such waste.

For the non-hazardous solid wastes, those that cannot be recycled will be disposed in a sanitary landfill periodically (weekly or monthly depending on the volume of waste generated). Regarding the domestic waste, as the existing collection is already established and the amount to be expected is considered small, the domestic waste will be temporary stored at the outside of the site to be periodically collected.

The management and monitoring of the non-hazardous waste, temporary internal storage, and collection and transportation arrangement including the monitoring of waste management will be discussed in the ESMP.

The domestic wastes (wastewater and solid waste) generated are relatively small as only small number of workers will be employed during the construction. The contractor during the site preparation and construction shall prepare the onsite sanitation for the workers. In general, the facilities should be provided by the contractor during the construction of the project component is included in the ToR for the Contractor.

Hazardous solid and liquid wastes generated during construction should be transported off-site for disposal. Negative 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 with EEAA guidelines for hazardous waste handling, storage, transportation and final disposal to the designated landfill facilities.

The lubrication oil, and paint container waste could contain some hazardous components. Disposal of paint containers waste at construction waste disposal sites is the common practice in Egypt. However, it would be a more acceptable environmental practice to transport paint containers to the supplier for container reuse. In general the disposal method for the empty containers, as well, is included in the ToR for the Contractor for waste management during construction.

#### Impact Significance

The impact of temporary construction waste storage area onsite before transporting it to the landfill facility on the groundwater quality is considered negligible as the receptor is situated at a large distance from the source of emissions. The impact on the soil quality is considered Medium due to the potential presence of hazardous wastes such as spent oil which could leach into the soil.

Uncontrolled waste accumulation would be visually unacceptable and would therefore be of Medium significance. From the above, it can be concluded that the impact of solid wastes in general, if not properly managed, could be considered medium due to the potential presence of hazardous wastes and the possibility of wastes being accumulated which has a negative environmental, health and visual impact.

By implementing the mitigation measures recommended in the ESMP, the significance of the impact could be reduced to Minor.

#### **6.3.6 Health and Safety**

As the site of the substation is already localized with in enclosed area and entrance gate, the potential impacts may mainly occur due to the workers at the construction site. There will be no potential impacts on safety at the surrounding residential area although public health may be a concern.

Potential safety impacts to workers and health for the public community and the workers during construction of a substation, in general, 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 either working at heights or in trenches.

In addition, accidents might occur on site to workers in various construction project activities, therefore mitigation measures are developed to mitigate the risk of health and injuries to the workers.

#### Impact significance

Health and safety concerns for the sensitive receptors (community surrounding the SS site) have minor significant impacts, as it is described previously that the project site is localized in enclosed area. Standard prevention, i.e. clear sign at the entrance and the surrounding the project site and management of the machineries and vehicles avoiding the peak hours are sufficient to prevent the accident occur for the residential area surrounding the construction site.

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 working at height has to be put into mitigation measures and in the management and monitoring plan to minimize and reduce the significant impact.

### 6.3.7 Visual Intrusion

Project component installation would produce visible activity and dust in dry soils. Project construction may be progressive, persisting over a significant 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.

The site of the SS is nearby the access road; therefore, it is visible that the construction activities are held on site. However, with the clear sign and the existing fences and possible to the temporary fences provided by the contractor will minimize the visual impact to the surrounding areas.

#### Impact significance:

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

### 6.3.8 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 not relatively high (less than 25mm/year). These will reduce the significance of the impact.

Added to the above, the ground water is at high depth, which is a large distance for the contaminants of potential concern to migrate and have a considerable impact on the water quality.

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

#### Impact Significance:

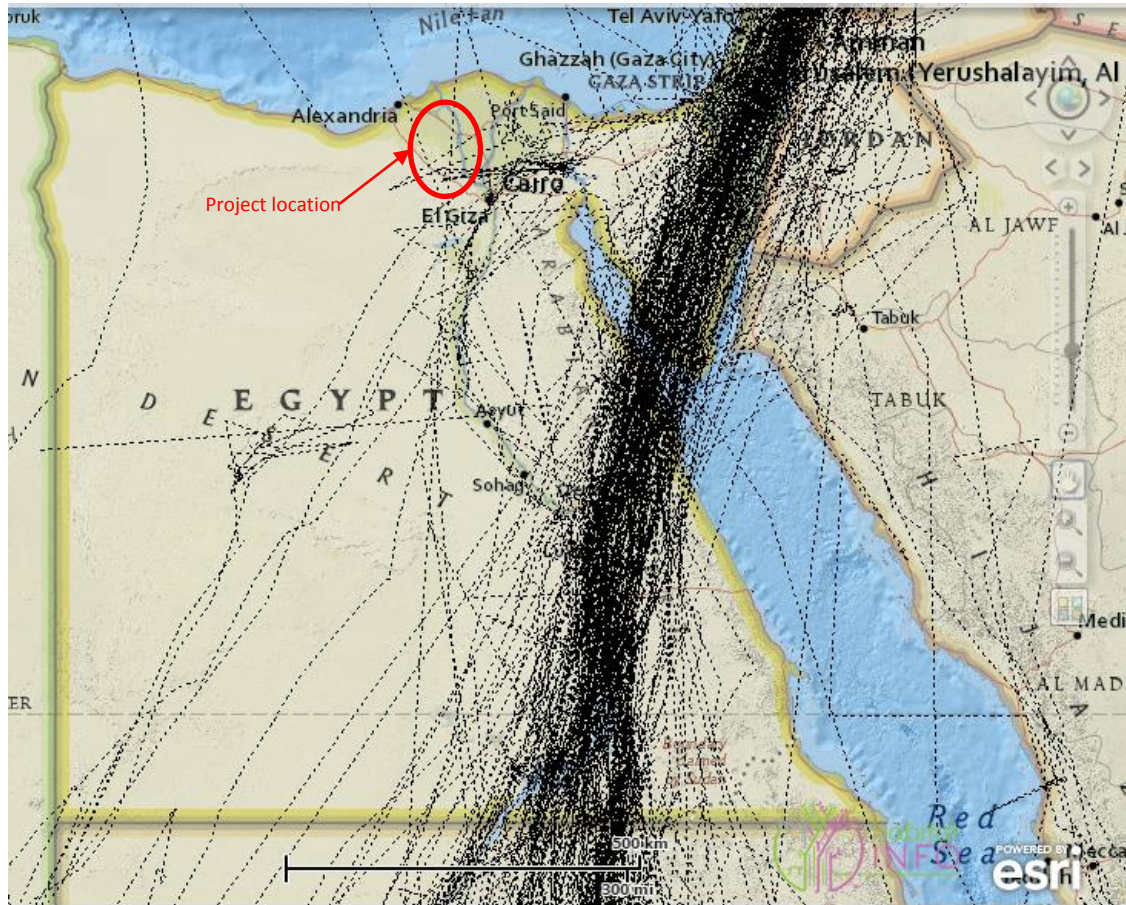
Considering the above and the potential presence of hazardous substances among the wastes generated at the site, this impact could be classified as Minor which is believed to be fully controlled with the implementation of proposed mitigation measures such as standard construction precaution and prevention 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.

### 6.3.9 Impacts on Fauna and Flora

No protected areas have been identified in the vicinity of the substation. The proposed site itself is an empty land within the urban area. No endemic or threatened species were documented during this study.

Regarding the existing flora and fauna, there are no recorded flora and fauna found within the vicinity, and surrounding the area. The local pets and pot plantations might exist at the surrounding residential area. However, those habitats will not be impacted from the project activities.

Regarding the bird migration, there is no such recorded avian bird surrounding the site and the site is not belonging to the migration path, locally or internationally.



**Figure 6-2. Main migration routes in Egypt**

Source: BirdLife International (2015)

### Impact Significance

According to the recorded species; no endemic or threatened species were documented during this study. In addition, the investigated habitats are not unique and are very common and widespread in neighboring areas (only several local pets and pot plantations at the residential area) which easily continue their life cycle. The bird migration pattern as well is not affected by the construction. The impact is considered Negligible.

### **6.3.10 Land use and Involuntary Resettlement**

The EETC has already received the governor's decree to allocate the land for the construction of the proposed SS (Annex 4 comprises the official letter allocation). From the field observation, the land is an empty flat land that has no other structures. Accordingly, there is no conflict for the future use of the land.

In addition, regarding the involuntary resettlement, there will be no involuntary physical resettlement resulting from construction activities.

Impacts to land use 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 construction of the SS.

This impact is not significant for the construction phase of the SS, as it will be built on a land already available and approved by the Giza Governorate. Therefore, no impact associated to the land use; therefore, no mitigation measures will be developed.

There is no potential impact of having any involuntary resettlement as well for this project. Similarly, there is no impact associated to the involuntary resettlement; therefore, no RAP, ARAP or RPF is necessary.

### **6.3.11 Impact on Archeological and Cultural sites**

The construction site is located far 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: no impact.

### **6.3.12 Socioeconomic Impacts**

Direct impacts would include the creation of new jobs for construction workers and the associated income and taxes generated by the proposed 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.

Given the limited number of workers (100 worker) will not result in any significant impact on the community resource.

#### Impact significance:

Finding job opportunities whether temporary or permanent is the main concern of the local people. Once this is achieved, it will boost the people's sense of ownership towards the project. In the meantime, if the employment process focused on people from outside the OHTL areas, it might surge the angry of the community people. Therefore, employment activities should be wisely and transparently handled

Moreover, finding temporarily job opportunities is on a long term potential problematic issue with the community, as the temporary workers always seek for permanent work opportunity. Thus, most of the electricity projects were faced by demonstrations and encroachments to the sub-stations.

### 6.3.13 Creation of Job Opportunities and Flourishing Economies of Construction Sites

During the construction phase, the project is foreseen to bring about job opportunities for semiskilled and unskilled workers as well as guards. This will increase potential support for the project with the surrounding communities. The job opportunities offered during the construction phase represent a temporary high positive impact.

Summary of the significance impacts during construction of SS and overhead transmission lines cables are presented at Table 6.1 and Table 6.2 respectively.

## 6.4 Impact Assessment During Construction of 500kV OHTL Wadi El Natroun/6<sup>th</sup> of October

### 6.4.1 Noise

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. The baseline assessment of noise quality at 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 environmental law.

During the construction phase, noise would be generated during day and night at levels exceeding the currently recorded levels during the baseline study. At the vicinity of all identified receptors, the noise intensity should not exceed 55 Decibel during the day (7am-10pm), and 45 Decibel during the night (10pm-7am). Monitoring the noise emissions during the construction phase and handling the complaints received from neighboring areas will help to effectively control this impact.

#### Impact Significance:

Construction noise is not likely to affect neighboring areas because of the relatively large distance between the source of noise and the receptors along the line. ( See section 5 Baseline )

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 which could be further minimized and fully controlled if construction workers used safety gear as recommended in the ESMP.

### 6.4.2 Traffic Impacts

Power lines routes will be established away from road sides and on the desert land, as well as on urban and agriculture lands. In addition, there will be plenty of space for storage of construction materials and construction waste on road sides, therefore there will be very little possibilities that construction contractors will actually need to store materials on road lanes.

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 Minor Impact. Mitigation measures included in the ESMP will effectively control this impact.

### **6.4.3 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:

Most of 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 short duration of the impact given. As a result this impact could be also considered Minor along the OHTL line and Medium on the workers environment along the line. Exhaust from vehicles is considered minor.

### **6.4.4 Hazardous Materials and Waste Management**

Wastes generated during construction activities at OHTL comprise of excavated soil for foundations. The excavated soil will normally be accumulated besides OHTL route, and collected after installations are completed. Other types of solid construction wastes would include the following:

- Foundations
- Trimmings of steel.
- ⊖ Cut-off trees and vegetation
- Metals, wood, cement sacks, sand and gravel, concrete spills, cut off cables, garbage from daily activities of workers.
- Hazardous wastes such as spent oil from the operation and maintenance of machinery.
- Wasted or faulted materials of the towers including conductors and insulators

#### Impact Significance

The impact of uncontrolled waste dumping to groundwater is considered minor along the proposed project as the receptor (groundwater) is situated at a large depth from the source of emissions along the routes. Moreover the impacts during construction are characterized by being short term impacts.

Along the proposed project, the impact to soil is considered Medium due to the potential presence of hazardous wastes such as spent oil which could leach into the soil when subjected to rainwater.

From the above, it can be concluded that the impact of solid wastes in general, if not properly managed, could be considered medium due to the potential presence of hazardous wastes and the possibility of wastes being accumulated which has a negative visual impact

By implementing the mitigation measures recommended in the ESMP, the significance of the impact could be reduced to minor.

#### 6.4.5 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 either 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 to affect the community people due to moving the vehicles, dust emissions and contamination of water As well; there was a fear that neglectful workers may cause accidents harmful to themselves or to the community members, particularly children, especially close to the construction areas. The significance of this impact is limited and of temporary nature.
- **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 approximately 99% of the project site are not in the urban area or in the populated area. Therefore, the impact can be classified as minor. Standard prevention, i.e. clear sign and fences around the project area are sufficient to prevent the accident occur for the animals or inhabitants might pass the project site. 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 working at 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.



#### 6.4.6 Right of Way (ROW)

Tall tree removal is necessary within the ROW zone which is 25 meters from both sides for the ultra-high voltage electricity power (500 kV and 220 kV) in accordance to the Electricity Law 87/2015. The removal of trees, where it exists along the ROW of the proposed transmission lines and cannot be avoided, will require compensations. The compensations have to be matched with the loss to the source of income that is created by removing these trees. The EETC will have to substitute the removed trees. The ROW will also limit tall trees plantations along the transmission lines during operation in order to maintain the safety of the lines.

The compensations for trees will vary according to the type of tree, its age, productivity, type of irrigation used. The EETC will only be responsible for the compensation; however, as the EETC is not responsible for replanting trees, it will be the responsibility of Agricultural Associations as well as individuals.

Identifying the value of the removed trees should be through the valuation and compensation committee that has to consider that the price lists developed by the Agriculture Directorate are applied.

It was noted that the project will result in a temporary impact on the crops and lands. Therefore, a standalone Resettlement Action Plan need to be conducted. The pricing lists are evaluated annually in cooperation with the agriculture associations within the project areas. The lists were based on:

- 1- Quality of crop/tree
- 2- Productivity of lands
- 3- Type of irrigation system
- 4- Age of trees
- 5- Access to main roads

#### Impact significance:

Removing the trees will have a negative impact, medium to major on the environment as well as on the owners of these trees. In order to compensate the negative impact on the environment, any removed tree should be substituted by planting other trees in other areas away from the ROW by the local stakeholders (Ministry of Agriculture). The compensation for the owners of these trees should also take place in order to minimize the significance of the impact.

#### 6.4.7 Land Use

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. There will be possible effects of electromagnetic fields from the OHTL, which will create certain restrictions on some land uses under the power lines. A ROW of 25 meters from both sides for OHTL (of 500 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.

The ROW zone as identified by the Electricity Law 87/2015 will restrict the construction of new buildings and plantation of high trees on the routes in order to maintain the safety of the line; therefore in case of OHTL, there will be a limitation on agriculture crops such as wheat- maize- citrus fruits-potatoes and clover as well as trees plantation.

The total affected lands particular in one area highlighted in figure below. Which are passing through cultivated agriculture plots and residential areas. There will be no need for additional storage areas or access roads as the estimated plots of lands will satisfy the needs of storage areas and access roads.

There are no direct effects related to power lines to animals passing under them; therefore, the construction of power lines is unlikely to cause any limitations on grazing activities. A standalone RAP will be conducted for 500kV OHTLs.



**Figure 6-3 Areas affected by ROW**

Location of power lines will be most suitable to be found on sides of existing rural roads to facilitate access to these lines for construction and maintenance. The land use limitations for power lines along roads are not expected to be an issue of concern.

#### Impact significance:

For the construction of the towers of the OHTL along the routes and the transmission lines, there will be an affected land due to these constructions. The construction will only affect the plant growth in the agricultural lands along the right of way, as well as, put limitation to the buildings constructions. Therefore, the significance of this impact is high some areas and minor in most of the desert project areas. Limitation of land use has a direct influence on the livelihood of people.

There is potential impact of having involuntary resettlement the OHTL project component. Therefore, a RAP will be necessary.

#### **6.4.8 Visual Intrusion**

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.

#### **6.4.9 Impacts on Fauna and Flora**

The proposed route of the OHTL is mainly located on desert margins, sand areas habitat for around 38km, and around 12 km in agricultural lands and therefore poses no threat to endangered species. The investigated habitats at agricultural lands 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.

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. The impact is considered Minor .

Regarding the project location and OHTLs and bird migration path, the OHTLs are not located along the path of the birds' migration. Based on Bird Life international tool's report (Annex 2) ,the overall sensitivity of this project area is considered low as there are no soaring or soaring bird species observed in the area, according to the IUCN Red List observed in the area; only 28 soaring bird species classified as LC; NT( near threatened); VU (vulnerable); EN (endangered) are expected to occur but not observed (classification of 'observed' or 'expected' based on presence status). However, EEAA draws a high attention regarding to the bird migration path, accordingly, minor mitigation measures are required to be implemented for the OHTLs to minimize the risk of birds' electrocution and collision on the birds. The following figures represent the birds' migration path versus the project's location and routes of OHTLs.

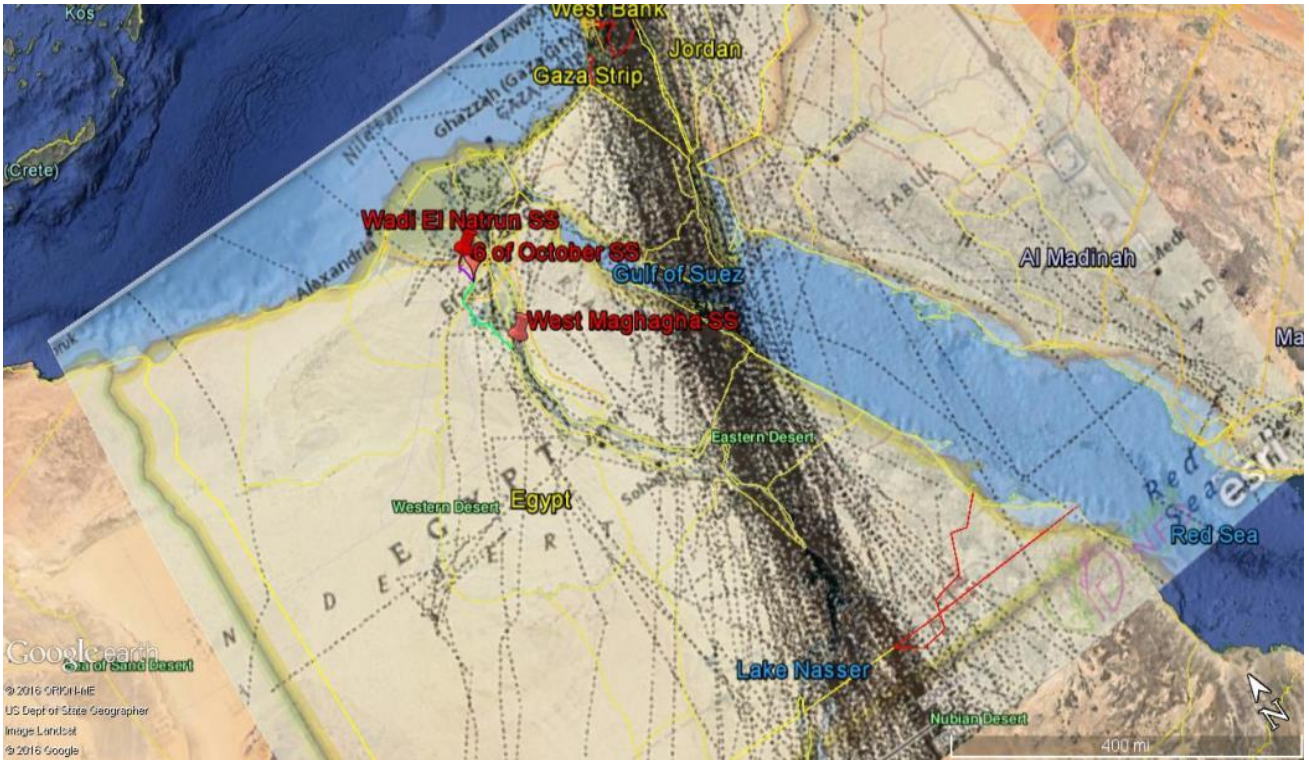


Figure 6-4 Migratory routes for birds in Egypt (Source ESRI,2016)

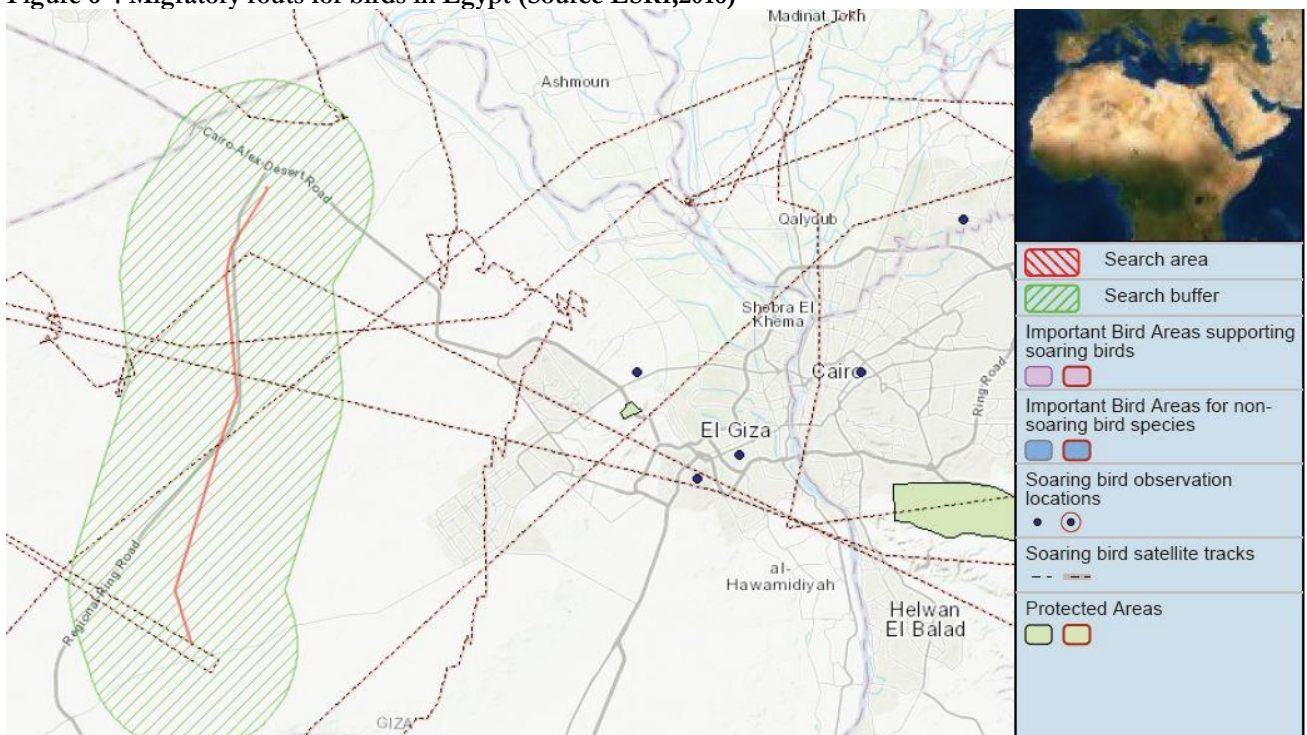


Figure 6-5 Bird migration route versus Wadi El Natroun OHTL route

6.4.10 Water Resource (groundwater, geology and hydrogeology)

Similar to the impact associated to the groundwater, surface water and drinking water associated to the construction of the SS; the construction of OHTL will have Minor Impact. However, 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.

#### **6.4.11 Impact on Archeological and Cultural Sites**

Given the far OHTL route 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: no impact.

#### **6.4.12 Impact on the Culture and Privacy of Local Communities**

EETC normally conducts construction activities through an external contractor. Therefore, in areas where the OHTL will pass through populated areas, 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.

#### **6.4.13 Creation of Job Opportunities and Flourishing Economies of Construction Sites**

During the construction phase, the project is foreseen to bring about job opportunities for semiskilled and unskilled workers as well as guards. This will increase potential support for the project with the surrounding communities. The job opportunities offered during the construction phase represent a temporary high positive impact.

### **6.5 Impact Assessment During Construction of 500 kV OHTL Maghagha / 6<sup>th</sup> of October**

#### **6.5.1 Noise**

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. The baseline assessment of noise quality at 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 environmental law.

During the construction phase, noise would be generated during day and night at levels exceeding the currently recorded levels during the baseline study. At the vicinity of all identified receptors, the noise intensity should not exceed 55 Decibel during the day (7am-10pm), and 45 Decibel during the night (10pm-7am). Monitoring the noise emissions during the construction phase and handling the complaints received from neighboring areas will help to effectively control this impact.

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, which could be further minimized and fully controlled if construction workers used safety gear as recommended in the ESMP.

### 6.5.2 Traffic Impacts

Power lines routes will be established away from road sides and on the desert land, as well as on urban and agriculture lands. In addition, there will be plenty of space for storage of construction materials and construction waste on road sides, therefore there will be very little possibilities that construction contractors will actually need to store materials on road lanes.

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 Minor Impact. Mitigation measures included in the ESMP will effectively control this impact.

### 6.5.3 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:

Most of 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 short duration of the impact given. As a result this impact could be also considered Minor along the OHTL line and Medium on the workers environment along the line. Exhaust from vehicles is considered minor.

#### 6.5.4 Hazardous Materials and Waste Management

Wastes generated during construction activities at OHTL comprise of excavated soil for foundations. The excavated soil will normally be accumulated besides OHTL route, and collected after installations are completed. Other types of solid construction wastes would include the following:

- Foundations
- Trimmings of steel.
- ⊖ Cut-off trees and vegetation
- Metals, wood, cement sacks, sand and gravel, concrete spills, cut off cables, garbage from daily activities of workers.
- Hazardous wastes such as spent oil from the operation and maintenance of machinery.
- Wasted or faulted materials of the towers including conductors and insulators

#### Impact Significance

The impact of uncontrolled waste dumping to groundwater is considered minor along the proposed project as the receptor (groundwater) is situated at a large depth from the source of emissions along the routes. Moreover the impacts during construction are characterized by being short term impacts.

Along the proposed project, the impact to soil is considered Medium due to the potential presence of hazardous wastes such as spent oil which could leach into the soil when subjected to rainwater. In addition, due to the sensitivity of the protectorate area in Faiyum Governorates (Qaron Protectorate) the impact is considered High.

Uncontrolled waste accumulation would be visually unacceptable and would therefore be of high significance especially at sensitive areas (protectorates).

From the above, it can be concluded that the impact of solid wastes in general, if not properly managed, could be considered medium due to the potential presence of hazardous wastes and the possibility of wastes being accumulated which has a negative visual impact, in addition to the high sensitivity and significance of the protectorate.

By implementing the mitigation measures recommended in the ESMP, the significance of the impact could be reduced to minor.

#### 6.5.5 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 either 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 to affect the community people due to moving the vehicles, dust emissions and contamination of water As well; there was a fear that neglectful

workers may cause accidents harmful to themselves or to the community members, particularly children, especially close to the construction areas. The significance of this impact is limited and of temporary nature.

- **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 approximately 99% of the project site are not in the urban area or in the populated area. Therefore, the impact can be classified as minor. Standard prevention, i.e. clear sign and fences around the project area are sufficient to prevent the accident occur for the animals or inhabitants might pass the project site. 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 working at 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.

### **6.5.6 Right of Way (ROW)**

Tall tree removal is necessary within the ROW zone which is 25 meters from both sides for the ultra-high voltage electricity power (500 kV and 200 kV) in accordance to the Electricity Law 87/2015. The removal of trees, where it exists along the ROW of the proposed transmission lines and cannot be avoided, will require compensations. The compensations have to be matched with the loss to the source of income that is created by removing these trees. The EETC will have to substitute the removed trees. The ROW will also limit tall trees plantations along the transmission lines during operation in order to maintain the safety of the lines.

The compensations for trees will vary according to the type of tree, its age, productivity, type of irrigation used. The EETC will only be responsible for the compensation; however, as the EETC is not responsible for replanting trees, it will be the responsibility of Agricultural Associations as well as individuals.

Identifying the value of the removed trees should be through the valuation and compensation committee that has to consider that the price lists developed by the Agriculture Directorate are applied.

It was noted that the project will result in a temporary impact on the crops and lands. Therefore, a standalone Resettlement Action Plan will be conducted. The pricing lists are evaluated annually in cooperation with the agriculture associations within the project areas. The lists were based on:

- 6- Quality of crop/tree
- 7- Productivity of lands
- 8- Type of irrigation system



- 9- Age of trees
- 10- Access to main roads

Impact significance:

Removing the trees will have a negative impact, medium to major on the environment as well as on the owners of these trees. In order to compensate the negative impact on the environment, any removed tree should be substituted by planting other trees in other areas away from the ROW by the local stakeholders (Ministry of Agriculture). The compensation for the owners of these trees should also take place in order to minimize the significance of the impact.

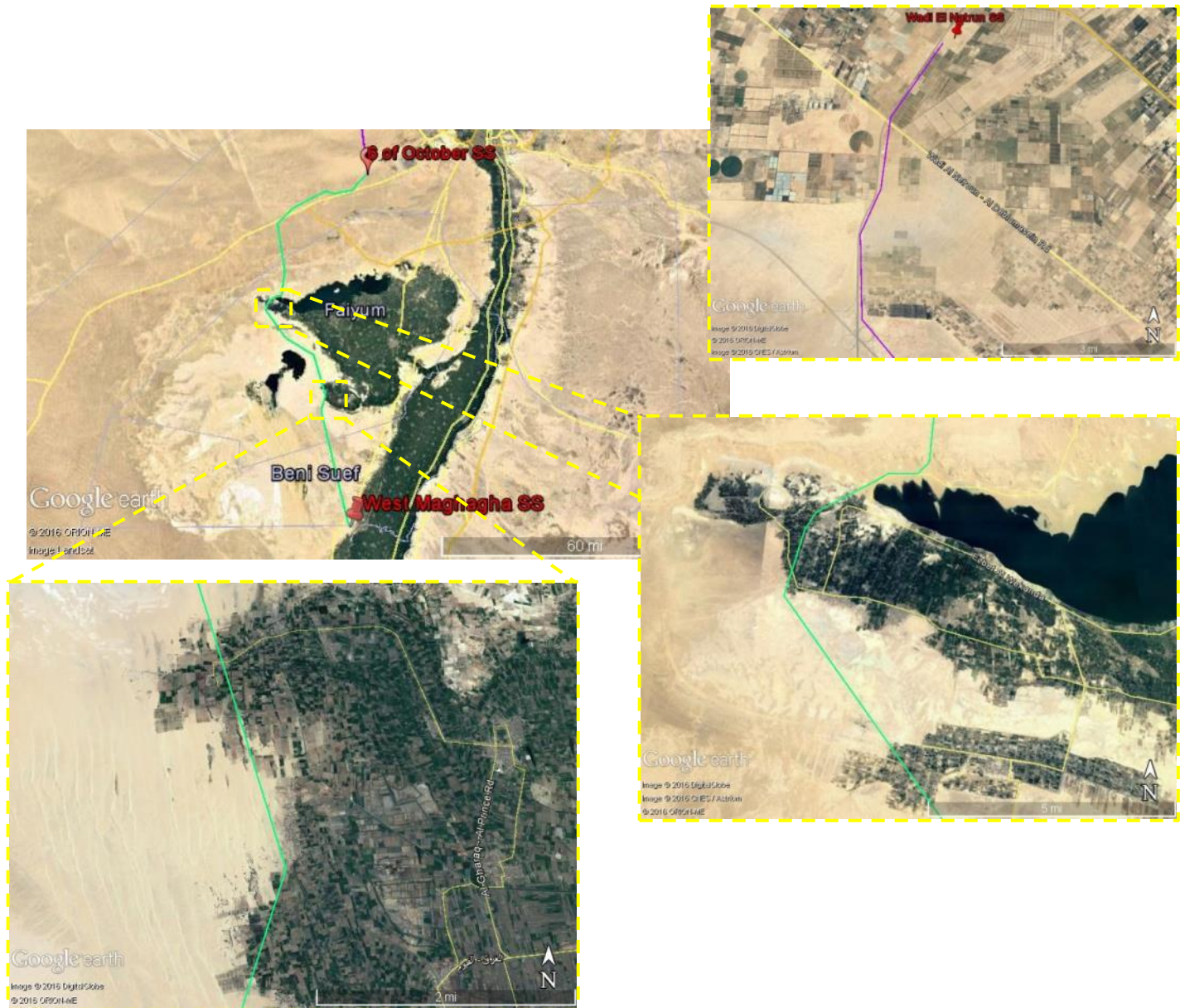
### 6.5.7 Land Use

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. There will be possible effects of electromagnetic fields from the OHTL, which will create certain restrictions on some land uses under the power lines. A ROW of 25 meters from both sides for OHTL (of 500 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.

The ROW zone as identified by the Electricity Law 87/2015 will restrict the construction of new buildings and plantation of high trees on the routes in order to maintain the safety of the line; therefore in case of OHTL, there will be a limitation on agriculture crops such as wheat- maize- citrus fruits-potatoes and clover as well as trees plantation.

The total affected lands particular in 2 areas highlighted in figure below which are passing through cultivated agriculture plots and residential areas. There will be no need for additional storage areas or access roads as the estimated plots of lands will satisfy the needs of storage areas and access roads.

There are no direct effects related to power lines to animals passing under them; therefore, the construction of power lines is unlikely to cause any limitations on grazing activities. A standalone RAP will be conducted for the 500 kV OHTLs.



**Figure 6-6 Areas affected by ROW**

Location of power lines will be most suitable to be found on sides of existing rural roads to facilitate access to these lines for construction and maintenance. The land use limitations for power lines along roads are not expected to be an issue of concern.

Impact significance:

For the construction of the towers of the OHTL along the routes and the transmission lines, there will be an affected land due to these constructions. The construction will only affect the plant growth in the agricultural lands along the right of way, as well as, put limitation to the buildings constructions. Therefore, the significance of this impact is high some areas( at 58 and 70 km ) and minor in the rest of the route which runs in desert areas. Limitation of land use has a direct influence on the livelihood of people.

There is potential impact of having involuntary resettlement the OHTL project component. Therefore, a RAP will be necessary.

#### **6.5.8 Visual Intrusion**

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.

#### **6.5.9 Impacts on Fauna and Flora**

The proposed site of the OHTL line up is mainly located on desert margins, sand areas habitat, and agricultural lands and therefore poses no threat to endangered species. The investigated habitats at agricultural lands 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.

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.

Regarding the project location and OHTLs and bird migration path, the OHTLs are not located along the path of the birds' migration. Based on Bird Life international tool's report (Annex 2) ,the overall sensitivity of this project area is considered low as there are no soaring or soaring bird species observed in the area, according to the IUCN Red List observed in the area; only 28 soaring bird species classified as LC; NT( near threatened); VU (vulnerable); EN (endangered) are expected to occur but not observed (classification of 'observed' or 'expected' based on presence status). However, EEAA draws a high attention regarding to the bird migration path, accordingly, minor mitigation measures are required to be implemented for the

OHTLs to minimize the risk of birds' electrocution and collision on the birds. The impact is considered Minor

The following figures represent the birds' migration path versus the project's location and routes of OHTLs.

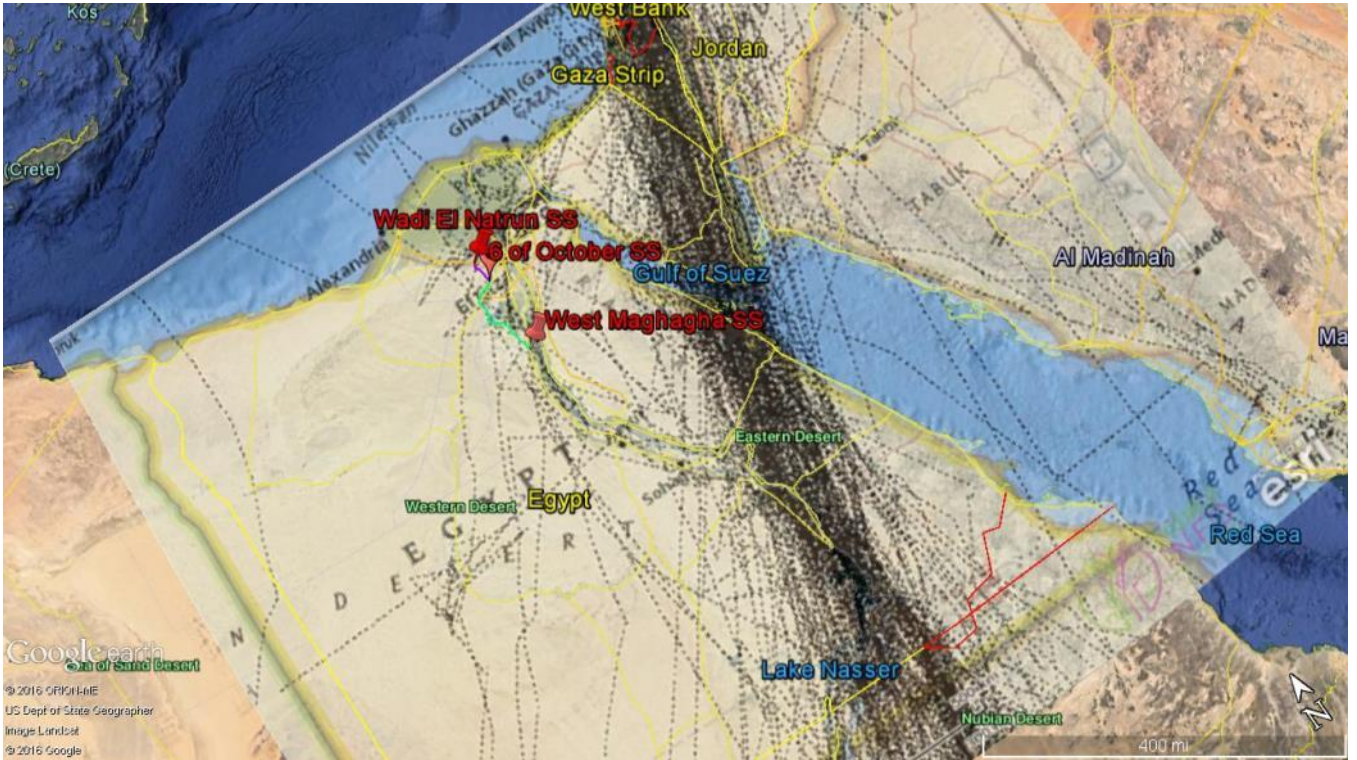


Figure 6-7 Migratory routes for birds in Egypt (Source ESRI,2016)

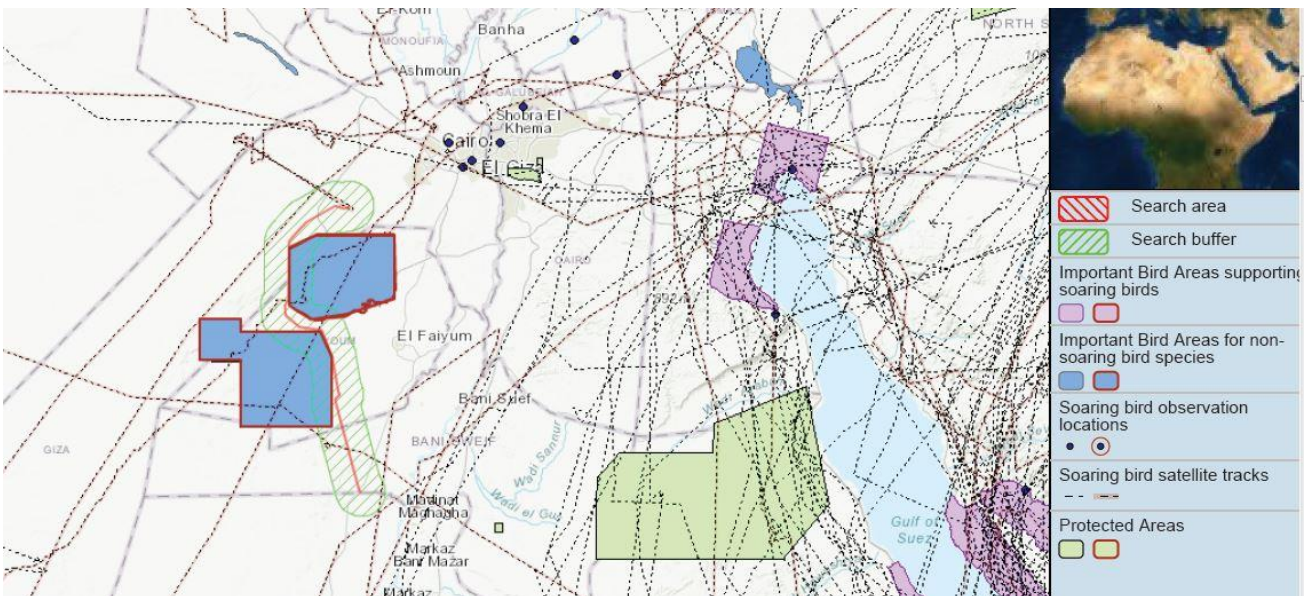


Figure 6-8 Bird Migration route versus Maghagha OHTL route

### 6.5.10 Water Resource (groundwater, geology and hydrogeology)

Similar to the impact associated to the groundwater, surface water and drinking water associated to the construction of the SS; the construction of OHTL will have Minor Impact. However, 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.

### 6.5.11 Impact on Archeological and Cultural Sites

The Governorate of Faiyum is rich in archaeological resources. The Environmental Profile of Faiyum (Van Zon and Jeanes 1992a) lists 24 significant sites. Most sites lie at higher elevations and around the periphery of the depression, where buildings and monuments were safe from rising lake waters. The distribution of lacustrine deposits indicates that ancient Lake Moeris had an elevation around sea level. Thus in antiquity the population centers was distributed at sites around the edges of the depression. According to Egyptian regulations, construction activities involving digging within three kilometers of a known antiquities site require permission from the Supreme Council on Antiquities.

As it appears in Figure 5-13 the Hawara pyramid lies within approximately 33 kilometers from the closest point of OHTL route; the Deir El Azab Monastery lies 28 kilometers from the closest point of OHTL route; Wadi Hitan national park is over 35km from the closest point of OHTL route, where archeological sites are most likely to be located

Given the far OHTL route 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: no impact.

### 6.5.12 Impact on the Culture and Privacy of Local Communities

EETC normally conducts construction activities through an external contractor. Therefore, in areas where the OHTL will pass through populated areas, 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.

### 6.5.13 Creation of Job Opportunities and Flourishing Economies of Construction Sites

During the construction phase, the project is foreseen to bring about job opportunities for semiskilled and unskilled workers as well as guards. This will increase potential support for the project with the surrounding communities. The job opportunities offered during the construction phase represent a temporary high positive impact.

## 6.6 Impact Assessment During Construction of 220 kV OHTLs North October/Main October /Motwreen / 6<sup>th</sup> of October SS

The impacts of 220 kV are presented together as the routes of 3 OHTLs are parallel to each other with 25 meter apart and crossing by same areas for distance of 38 km. However, the total length of the

OHTLs is 40 km. The remainder 2 km are at the beginning of the route where North October OHTL's route starts for 1 km till it meets Main October connection electric tower and then the 2 OHTLs run for more 1 km to meet Motwreen connection electric tower. These 2 km are in desert area and no specific significant impacts could be presented for these 2 km. Accordingly, the impacts for 220 kV OHTLs are presented all together.

### 6.6.1 Noise

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 and night at levels exceeding the currently recorded levels during the baseline study. At the vicinity of all identified receptors, the noise intensity should not exceed 55 Decibel during the day (7am-10pm), and 45 Decibel during the night (10pm-7am). Monitoring the noise emissions during the construction phase and handling the complaints received from neighboring areas will help to effectively control this impact.

#### Impact Significance:

Construction noise is not likely to affect neighboring areas because the route of the OHTLs is in the area separating the industrial area from the residential area. The nearest residential area is far from the route by distance of around 500 meters .

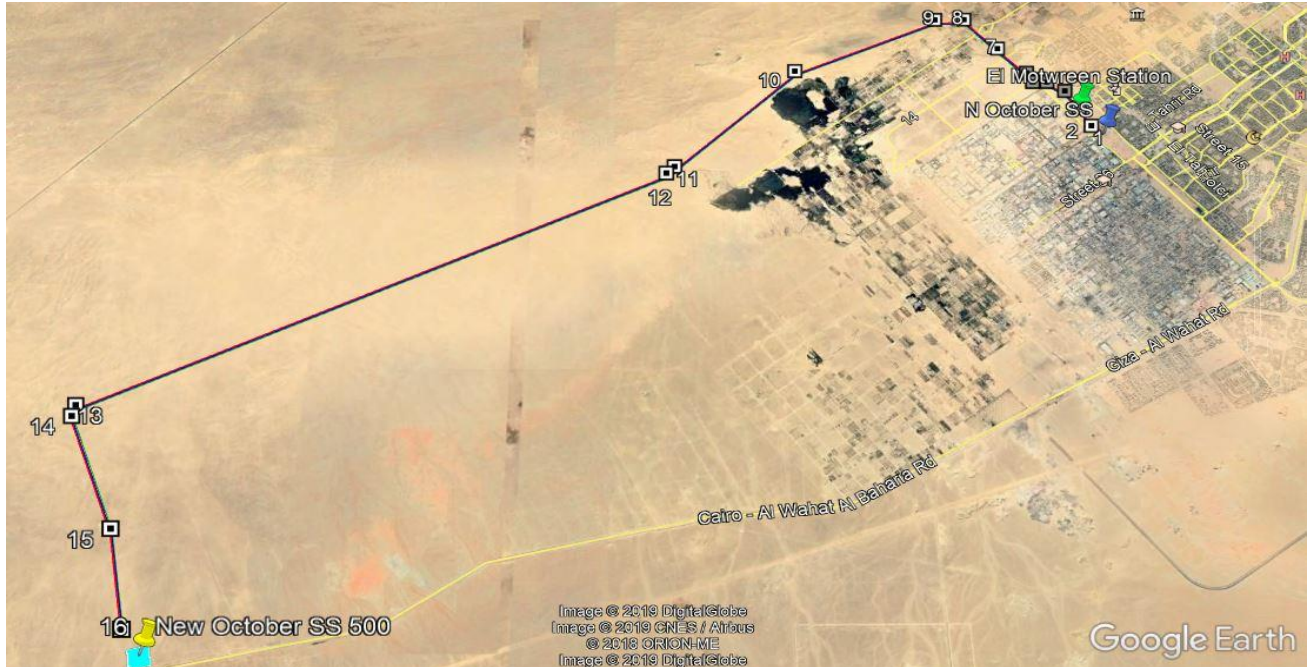


Figure 6-9 Route of 220 kV OHTLs North October/Main October /Motwreen / 6<sup>th</sup> of October SS

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, which could be further minimized and fully controlled if construction workers used safety gear as recommended in the ESMP.

### 6.6.2 Traffic Impacts

Power lines routes will be established away from road sides and on the desert land, as well as on urban and agriculture lands. In addition, there will be plenty of space for storage of construction materials and construction waste on road sides, therefore there will be very little possibilities that construction contractors will actually need to store materials on road lanes.

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 Minor Impact. Mitigation measures included in the ESMP will effectively control this impact.

### 6.6.3 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:

Most of 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 short duration of the impact given. As a result this impact could be also considered Minor along the OHTL line and Medium on the workers environment along the line. Exhaust from vehicles is considered minor

### 6.6.4 Hazardous Materials and Waste Management

Wastes generated during construction activities at OHTL comprise of excavated soil for foundations. The excavated soil will normally be accumulated besides OHTL route, and collected after installations are completed. Other types of solid construction wastes would include the following:

- Foundations
- Trimmings of steel.
- ⊖ Cut-off trees and vegetation

- Metals, wood, cement sacks, sand and gravel, concrete spills, cut off cables, garbage from daily activities of workers.
- Hazardous wastes such as spent oil from the operation and maintenance of machinery.
- Wasted or faulted materials of the towers including conductors and insulators

### Impact Significance

The impact of uncontrolled waste dumping to groundwater is considered minor along the proposed project as the receptor (groundwater) is situated at a large depth from the source of emissions along the routes. Moreover the impacts during construction are characterized by being short term impacts.

From the above, it can be concluded that the impact of solid wastes in general, if not properly managed, could be considered medium due to the potential presence of hazardous wastes and the possibility of wastes being accumulated which has a negative visual impact.

By implementing the mitigation measures recommended in the ESMP, the significance of the impact could be reduced to minor.

### **6.6.5 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 either 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 to affect the community people due to moving the vehicles, dust emissions and contamination of water. As well; there was a fear that neglectful workers may cause accidents harmful to themselves or to the community members, particularly children, especially close to the construction areas. The significance of this impact is limited and of temporary nature.
- **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 approximately 99% of the project site are not in the urban area or in the populated area. Therefore, the impact can be classified as minor. Standard prevention, i.e. clear sign and fences around the project area are sufficient to prevent the accident occur for the animals or inhabitants might pass the project site. 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 working at 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.

#### **6.6.6 Land Use**

The Electricity Law 87/2015 has identified the limits of distances to be measured from the axis of the OHTL route in order to identify the Right of Way (ROW) zone. There will be possible effects of electromagnetic fields from the OHTL, which will create certain restrictions on some land uses under the power lines. A ROW 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 EMFs.

The ROW zone as identified by the Electricity Law 87/2015 will restrict the construction of new buildings and plantation of high trees on the routes in order to maintain the safety of the line; therefore in case of OHTL, there will be a limitation on agriculture crops such as wheat- maize- citrus fruits-potatoes and clover as well as trees plantation.

The total affected land is 0.37 km within the green belt where (non-fruit trees are planted) highlighted in figure below. No RAP is anticipated for this part as the land is owned by the 6<sup>th</sup> of October City Authority There will be no need for additional storage areas or access roads as the estimated plots of lands will satisfy the needs of storage areas and access roads.

There are no direct effects related to power lines to animals passing under them; therefore, the construction of power lines is unlikely to cause any limitations on grazing activities.

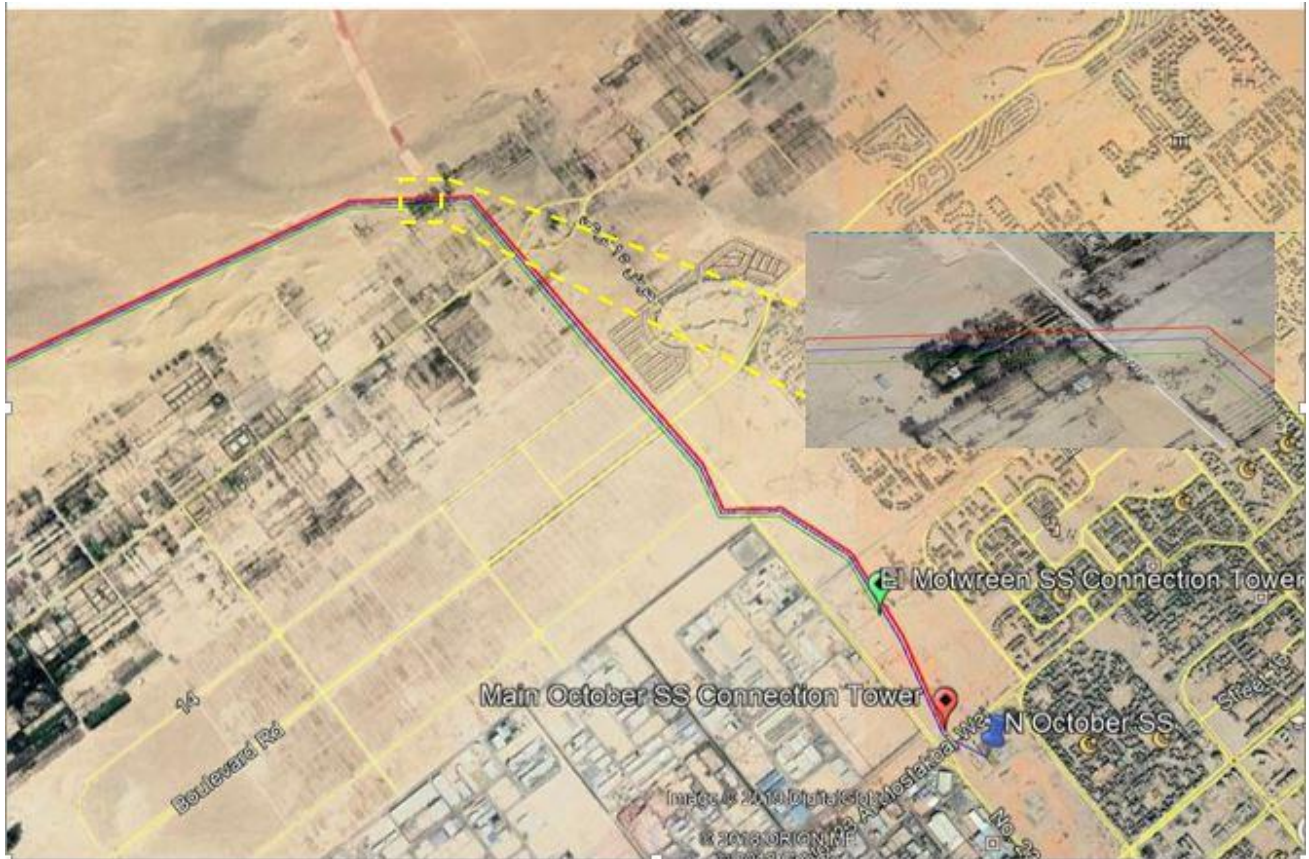


Figure 6-10 Areas affected by ROW

Impact significance:

For the construction of the towers of the OHTL along the routes and the transmission lines, there will be an affected land due to these constructions. The construction will only affect the plant growth in the green belt land along the right of way. Therefore, the significance of this impact is minor in most of the project areas as most of the route runs in desert land.

### 6.6.7 Visual Intrusion

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.

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.

### 6.6.8 Impacts on Fauna and Flora

The proposed site of the OHTL line up is mainly located on desert margins, sand areas habitat, and a limited planted land within the green belt in 6<sup>th</sup> of October and therefore poses no threat to endangered species.



**Figure 6-11 Plants along the route**

Mitigation actions have been developed 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. The impact is considered Minor. Regarding the project location and OHTLs and bird migration path, the SS and the OHTLs are not located along the path of the birds' migration. Based on Bird Life international tool's report (Annex 2), the overall sensitivity of this project area is considered low as there are no soaring or soaring bird species observed in the area, according to the IUCN Red List observed in the area; only 28 soaring bird species classified as LC; NT( near threatened); VU (vulnerable); EN (endangered) are expected to occur but not observed (classification of 'observed' or 'expected' based on presence status). However, EEAA draws a high attention regarding to the bird migration path, accordingly, minor mitigation measures are required to be implemented for the OHTLs to minimize the risk of birds' electrocution and collision on the birds. The following figures represent the birds' migration path versus the project's location and routes of OHTLs.

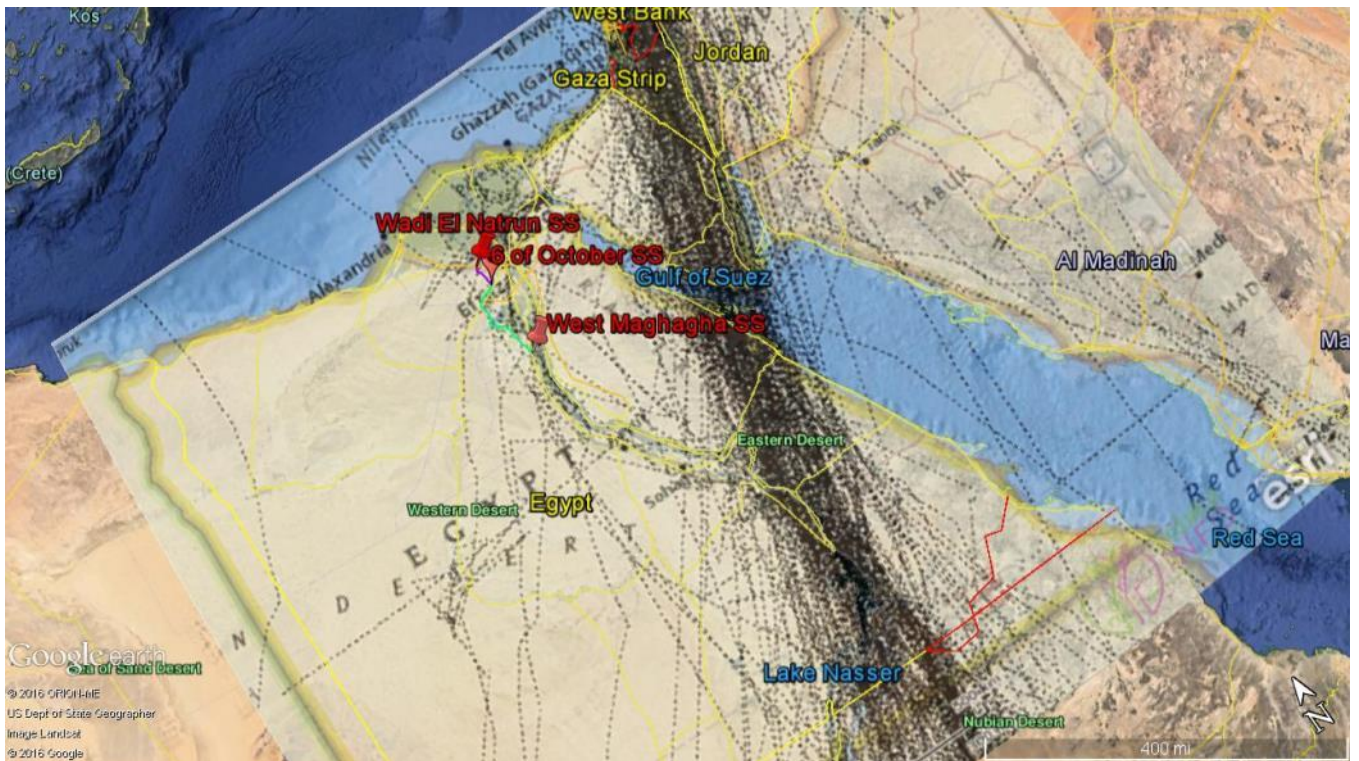


Figure 6-12 Migratory routes for birds in Egypt (Source ESRI,2016)

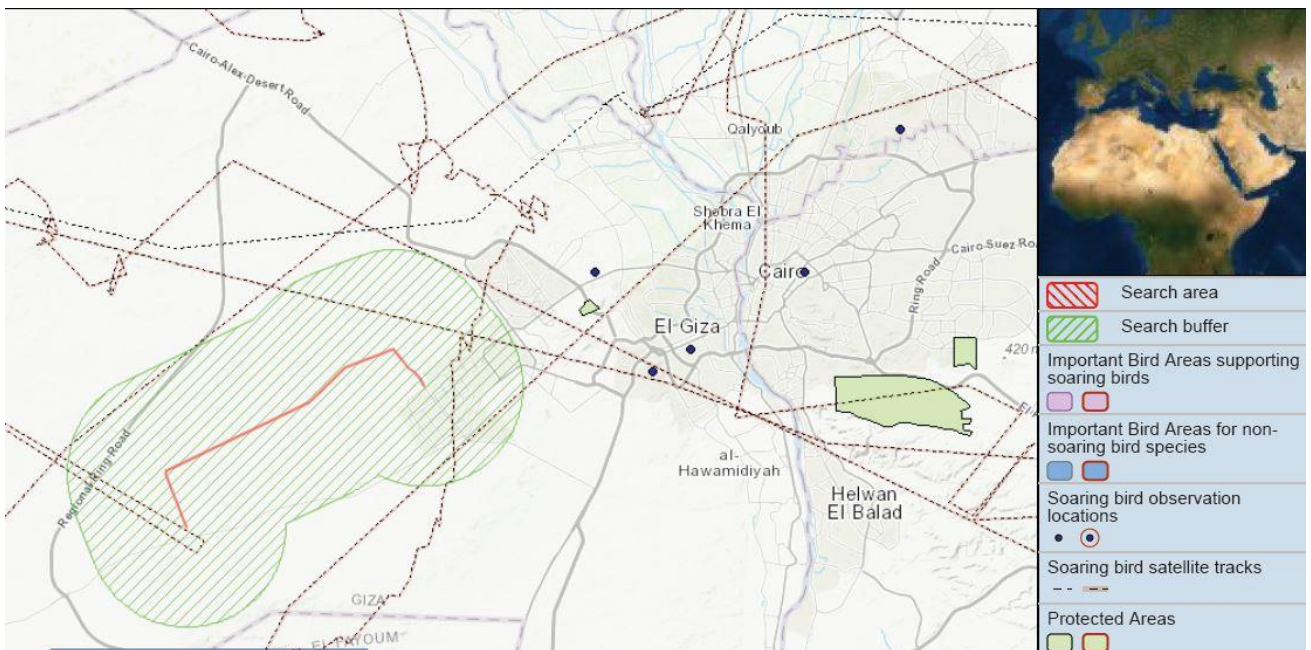


Figure 6-13 Bird Migration route versus 3 OHTLs 220kV

### 6.6.9 Water Resource (groundwater, geology and hydrogeology)

Similar to the impact associated to the groundwater, surface water and drinking water associated to the construction of the SS; the construction of OHTLs will have Minor Impact. However, 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.

#### **6.6.10 Impact on Archeological and Cultural Sites**

Given the far OHTL route 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: no impact.

#### **6.6.11 Impact on the Culture and Privacy of Local Communities**

EETC normally conducts construction activities through an external contractor. Therefore, in areas where the OHTL will pass through populated areas, 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.

#### **6.6.12 Creation of Job Opportunities and Flourishing Economies of Construction Sites**

During the construction phase, the project is foreseen to bring about job opportunities for semiskilled and unskilled workers as well as guards. This will increase potential support for the project with the surrounding communities. The job opportunities offered during the construction phase represent a temporary high positive impact.

Summary of the impacts during construction of SS and 500 kV and 220kV OHTLs presented in Table 6.1 and Table 6.2 Respectively below.

**Table 6-2. Assessed significance of expected impacts during construction phase of 6<sup>th</sup> October Substation**

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Impact on Noise	High likelihood to occur – short term and temporary - Highly sensitive receptors includes construction workers	Medium Impact on the construction workers	Application of the normal precautions normally taken by construction workers. Notification to the surrounding establishment prior to the construction of the SS Time management and construction schedule according to the IFC regulation provided by the contractor prior to the construction phase. (Residential, Institutional, educational: 55 dB (A) daytime from 07:00 to 22:00; and 45 dB (A) nighttime from 22:00 to 07:00, Industrial, commercial: 70 55 dB (A) daytimes and 70 55 dB (A) nighttime) will be provided by the contractor prior to the construction phase
Impact on traffic	High likelihood to occur – short term, temporary and localized only on the main road	Low to medium impact	Time management for transporting the materials, equipment, debris, etc Clear sign surrounding construction site and the enter / exit gate Coordination with traffic department (ministry of interior) for vehicles routes and movement.
Impact on Air Quality	High likelihood to occur – short term, temporary and localized - Highly sensitive receptors include construction workers. Receptors with low sensitivity include nearby projects/settlements.	Medium impact on construction workers Low impact on the residents, surrounding establishment and pedestrians passing by the construction site	Spraying the sandy soil with water (if needed, especially during the dry period). Maneuver area and the parking area should be well paved Management of the number of vehicles at the same time for specific location and the scheduling the intensity of vehicles
Impact on Vibration	Low likelihood to occur	Minor impact	Schedule and time plan for vehicles movements

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Impact on Hazardous materials and waste generation	Uncertain likelihood – Uncertain impact duration - Highly sensitive receptors include soil pollution and workers. Receptors with low sensitivity include nearby projects/settlements. Physical environment receptors with low sensitivity include groundwater, surface water and drinking water	The impact of uncontrolled waste dumping to groundwater is considered minor along the proposed project as the receptor (groundwater) is situated at a large depth from the source of emissions along the routes. Uncontrolled waste accumulation would be visually unacceptable and would therefore be of high significance especially at sensitive areas (protectorates).	Agreement should be reached prior to commencing construction work between the contractor and landfill for officially assigning a location for the disposal of construction waste.  Waste management submitted by the contractor for waste management (solid waste; hazardous and non-hazardous)  Protection of spillage including paved site for workshop or maintenance of vehicles  Temporary storage of wastes including on site sanitation before the proper connection to the existing sewage network is installed. It is preferable to include the onsite waste management for the construction workers in the ToR of the contractor to ensure their awareness and following it .

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Health and Safety	<p>High likelihood to occur for the construction workers</p> <p>Low likelihood to occur for the surrounding establishment and sensitive receptors.</p> <p>Highly sensitive receptors include workers. Receptors with low sensitivity include nearby residents and existing establishments</p>	<p>Minor impact for sensitive receptors and medium to high / major impact for the workers</p>	<p><b><u>Community Health and Safety</u></b>            Standard protection by placing clear project signs.            Time management for vehicles movement; especially avoiding the peak hours</p> <p><b><u>Occupational Health and Safety</u></b>            Standard protection for the workers especially working at elevated heights as following:</p> <p>a) The Contractor shall be responsible to ensure that its personnel are protected from the risk of falling from any height by applying the following general guidelines.</p> <p>b) The Contractor shall provide training and maintain training records for safe working at height procedures and for the use of any equipment that enables working at height to its personnel assigned to work at height based on risk assessment and Applicable Laws.</p> <p>c) The Contractor shall ensure that all personnel assigned to work at height are physically and medically fit to do so.</p> <p>d) Collective fall protection – guard rails, scaffolds, mobile platform ladders, mobile elevating work platforms (MEWP) or cherry-pickers, safety nets, etc., has priority over individual fall protection.</p> <p>e) When collective fall protection measures are not possible to implement then individual protection, such as a safety harness and life-lines, etc., is compulsory.</p> <p>f) Safe access to all work stations at height must be assured.</p> <p>g) No person is obliged to place themselves at risk of falling; they retain the right to withdraw from any situation, without prejudice, where the risk of falling exists.</p>
Impact on natural disaster risks	Low likelihood to occur	Negligible impact	<p>No mitigation measures is prepared</p> <p>Technical specifications of the equipment is include the standard measures for natural disaster risks</p>
Impact on visual Resources	Low likelihood to occur	Minor impact, localized and temporary	<p>Following the standard protection for the ground and soil disturbance, air quality (and dust) measures and proper waste management described on the section of waste management measures</p> <p>Clear sign of the construction activities</p>



Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 6 <sup>th</sup> of October substation			
Impact on water resource (ground water, surface water and drinking water)	Low likelihood to occur	Minor impact on groundwater, surface water and drinking water	Following standard protection for the ground and soil and proper waste management described on the section of waste management measures
Ecological Resources	Low likelihood to occur	No significant impact	No mitigation measures is prepared
Impacts on Fauna and Flora and bird migration	Low likelihood to occur	Negligible impact (no impact)	No mitigation measures are needed.
Impact on landscape	Low likelihood to occur	Negligible or no impacts	No mitigation measures are needed
Impact on land use and Involuntary resettlement	Low likelihood to occur	Very low or no impacts	No mitigation measures are needed
Impact on archeological and cultural sites	Low likelihood to occur	Very low or no impacts	No mitigation measures are needed
Creation of Job opportunities and flourishing Economics of construction site	Creating job opportunities for members of the local community	High positive temporary impact	Coordination with the contractor to employ members of the local community as construction workers and guards
Culture and Privacy of Local Communities	Construction workers must respect the culture and privacy of members of the surrounding residential area	Minor and temporary	Respect from construction workers to the privacy of the surrounding houses

**Table 6-3. Assessed significance of expected impacts during construction phase of 500kV OHTL Wadi El Natroun/6<sup>th</sup> of October**

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
Impacts due to handling of construction waste	Likely to occur - short term – Highly sensitive receptors include soil at protectorate areas and workers. Receptors with low sensitivity include groundwater.	Medium	<ul style="list-style-type: none"> <li>• EETC should communicate with the local authorities including protectorates for officially assigning location for the disposal of construction waste within the three governorates. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.</li> <li>• A specified (one or multiple) locations 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
			<ul style="list-style-type: none"> <li>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.</li> <li>Domestic waste generated on site shall be segregated and not mixed with any other type of waste.</li> <li>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.</li> <li>Construction contractor shall contract competent authority at each governorate premises for safe disposing of generated sewage</li> </ul> <p>Mitigation measures for hazardous waste management: 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 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 and the HWM-SOP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors.</p>
Air emissions	High likelihood to occur – short term - Highly sensitive receptors including workers.	Medium	<ul style="list-style-type: none"> <li>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, he should ask for additional spraying of water in the spot generating high emissions.</li> </ul>
Noise	High likelihood to occur – short term - Highly sensitive receptors including workers only along the line.	Medium	<ul style="list-style-type: none"> <li>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</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
			<p>to abide to this role, and the site supervisor should make sure the Contractor is compliant with this role</p> <ul style="list-style-type: none"> <li>Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> <li>Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>Avoid construction activities at night</li> </ul>
Ecological (Fauna and Flora)	Medium likelihood to occur – short term	Medium	<ul style="list-style-type: none"> <li>Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations within protectorates shall be located to avoid impacts.</li> <li>Minimize noise and artificial lighting at night during construction</li> <li>Inform construction staff on the importance of natural habitats and notable plant species</li> <li>No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>Construction and vehicle movement should be made to minimum</li> <li>Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>Prepare habitat maps for project sites using aerial photography and high resolution satellite imagery</li> </ul>
Bird Migration	Low likelihood to occur	Minor	<ul style="list-style-type: none"> <li>Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>
Cultural resources	Low likelihood of major or medium impacts	Minor	<ul style="list-style-type: none"> <li>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.</li> <li>The community leaders could take part in the process of employment in terms of informing their local community about job opportunities</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
			<ul style="list-style-type: none"> <li>The newly employed persons and non-Egyptian experts should be oriented about the norms and traditions of the surrounding communities, particularly, the Bedouin ones.</li> <li>In case of any violation of norms, the site engineer should handle meetings with the community leaders in order to settle any disputes</li> <li>Enable grievance and redress mechanism in order to receive people concerns about such impact</li> </ul>
Human Health and Safety	Low likelihood of major or medium impacts for workers– high likelihood of minor impact for sensitive recipient	Minor to Medium	<p><b><u>Occupational Health and Safety</u></b></p> <ul style="list-style-type: none"> <li>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.</li> <li>All safety procedures reported in the Law should be abided to by the workers and the top management.</li> <li>The contractor should assign a health and safety supervisor who ensures the workers are abided to the H&amp;S procedures</li> <li>The contractor should make health and safety facilities available in the project site</li> <li>Contracts should be signed with the health facilities close to the construction site</li> <li>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</li> <li>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.</li> <li>When operating power tools at height, workers should use a second (backup) safety strap</li> <li>Testing structures for integrity prior to undertaking work</li> </ul> <p><b><u>Community health and Safety</u></b></p> <ul style="list-style-type: none"> <li>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.</li> </ul>
Limitations on land use and	Medium and direct impact to livelihood	Medium	Reduce impact significance to minor following recommendations of RAP/ARAP preparation

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
risks of involuntary resettlement			
Losing environmental benefits of trees along power lines	Low likelihood of major or medium impacts	Minor	In order to compensate the negative impact on the environment, any removed tree should be substituted by planting other trees in other areas away from the ROW by the local stakeholders (Ministry of Agriculture). The compensation for the owners of these trees should also take place in order to minimize the significance of the impact.
Removing trees on ROW	Low likelihood of major or medium impacts	Medium to Major	Reduce impact significance to minor following RAP
Socioeconomic	Low likelihood of major or medium impacts	Medium to Major Positive temporary	No mitigation measures is needed
Traffic	Low likelihood of major or medium impacts	Medium	<ul style="list-style-type: none"> <li>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.</li> <li>Find suitable locations for temporary storage of conventional construction wastes.</li> <li>In case a narrow access road needs to be occupied for limited period (for example by loading/unloading trucks or loaders) the occupation time should be minimized. The additional measure is to have a careful turn (if needed) for the heavy trucks or loaders due to the high-speed vehicles passing by the highway.</li> <li>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.</li> </ul>
Visual intrusion	Low likelihood of major or medium impacts and localized	Minor	Visual evidence of these projects cannot be completely avoided, reduced, or concealed.

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500kV OHTL Wadi El Natroun/6 <sup>th</sup> of October			
Water Resource (groundwater, geology and hydrogeology)	Medium likelihood to occur – long term impact – irreversible in case of hazardous waste contaminants (reversible after a very long period).	Medium	Standard prevention or precaution measures shall be prepared by the contractor prior to the construction. It is preferable to include the waste management plan in the ToR of the contractor.

**Table 6-4. Assessed significance of expected impacts during construction phase of 500 kV OHTL Maghagha / 6<sup>th</sup> of October**

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
Impacts due to handling of construction waste	Likely to occur - short term – Highly sensitive receptors include soil at protectorate areas and workers. Receptors with medium sensitivity include nearby settlements. Receptors with low sensitivity include groundwater.	Medium	<p>EETC should communicate with the local authorities including protectorates for officially assigning location for the disposal of construction waste within the three governorates. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.</p> <ul style="list-style-type: none"> <li>• A specified (one or multiple) locations 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
			<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Domestic waste generated on site shall be segregated and not mixed with any other type of waste.</li> <li>• 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.</li> <li>• Construction contractor shall contract competent authority at each governorate premises for safe disposing of generated sewage</li> </ul> <p>Mitigation measures for hazardous waste management:                      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 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 and the HWM-SOP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors.</p>



Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
Air emissions	High likelihood to occur – short term - Highly sensitive receptors including workers.	Medium	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, he should ask for additional spraying of water in the spot generating high emissions.
Noise	High likelihood to occur – short term - Highly sensitive receptors including workers only along the line.	Medium	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 <ul style="list-style-type: none"> <li>Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> <li>Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>Avoid construction activities at night</li> </ul>
Impacts on Fauna and Flora	Medium likelihood to occur – short term	Medium	Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations within protectorates shall be located to avoid impacts. <ul style="list-style-type: none"> <li>Minimize noise and artificial lighting at night during construction</li> <li>Inform construction staff on the importance of natural habitats and notable plant species</li> <li>No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>Construction and vehicle movement should be made to minimum</li> <li>Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>Prepare habitat maps for project sites using aerial photography and high resolution satellite imagery</li> </ul>
Bird Migration	Low likelihood to occur	Minor	<ul style="list-style-type: none"> <li>Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
Cultural resources	Low likelihood of major or medium impacts	Minor	<p>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.</p> <ul style="list-style-type: none"> <li>• The community leaders could take part in the process of employment in terms of informing their local community about job opportunities</li> <li>• The newly employed persons and non-Egyptian experts should be oriented about the norms and traditions of the surrounding communities, particularly, the Bedouin ones.</li> <li>• In case of any violation of norms, the site engineer should handle meetings with the community leaders in order to settle any disputes</li> <li>• Enable grievance and redress mechanism in order to receive people concerns about such impact</li> </ul>
Human Health and Safety	Low likelihood of major or medium impacts for workers– high likelihood of minor impact for sensitive recipient	Minor to Medium	<p>Occupational Health and Safety</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• All safety procedures reported in the Law should be abided to by the workers and the top management.</li> <li>• The contractor should assign a health and safety supervisor who ensures the workers are abided to the H&amp;S procedures</li> <li>• The contractor should make health and safety facilities available in the project site</li> <li>• Contracts should be signed with the health facilities close to the construction site</li> <li>• 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</li> <li>• 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.</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
			<ul style="list-style-type: none"> <li>When operating power tools at height, workers should use a second (backup) safety strap</li> <li>Testing structures for integrity prior to undertaking work</li> </ul> Community health and Safety <ul style="list-style-type: none"> <li>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.</li> </ul>
Limitations on land use and risks of involuntary resettlement	Medium and direct impact to livelihood	Medium	Reduce impact significance to minor following recommendations of RAP/ARAP preparation
Losing environmental benefits of trees along power lines	Low likelihood of major or medium impacts	Minor	In order to compensate the negative impact on the environment, any removed tree should be substituted by planting other trees in other areas away from the ROW by the local stakeholders( Ministry of Agriculture ). The compensation for the owners of these trees should also take place in order to minimize the significance of the impact
Removing trees on ROW	Low likelihood of major or medium impacts	Medium to Major	Reduce impact significance to minor following RAP
Socioeconomic	Low likelihood of major or medium impacts	Medium to Major Positive temporary	No mitigation measures is needed
Traffic	Low likelihood of major or medium impacts	Medium	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. <ul style="list-style-type: none"> <li>Find suitable locations for temporary storage of conventional construction wastes.</li> <li>In case a narrow access road needs to be occupied for limited period (for example by loading/unloading trucks or loaders) the occupation time should be minimized. The additional measure is to have a careful turn (if needed) for the heavy trucks or loaders due to the high-speed vehicles passing by the highway.</li> <li>The contractors should make sure that the employed drivers of construction machinery (such as trucks and loaders) have received</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 500 kV OHTL Maghagha / 6 <sup>th</sup> of October			
			sensitization/training on safety utilization of their machines in order to minimize accidents risks
Visual intrusion	Low likelihood of major or medium impacts and localized	Minor	Visual evidence of these projects cannot be completely avoided, reduced, or concealed.

**Table 6-5 Assessed significance of expected impacts during construction phase of 220 kV OHTLs North October/Main October /Motwreen / 6<sup>th</sup> October SS**

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
Noise	High likelihood to occur – short term - Highly sensitive receptors including workers only along the line.	Minor	<p>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</p> <ul style="list-style-type: none"> <li>Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> <li>Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>Avoid construction activities at night</li> </ul>
Impacts on Traffic	Low likelihood of major or medium impacts	Minor	<p>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.</p> <ul style="list-style-type: none"> <li>Find suitable locations for temporary storage of conventional construction wastes.</li> <li>In case a narrow access road needs to be occupied for limited period (for example by loading/unloading trucks or loaders) the occupation time should be minimized. The additional measure is to have a careful turn (if needed) for the heavy trucks or loaders due to the high-speed vehicles passing by the highway.</li> <li>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</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
Air emissions	High likelihood to occur – short term - Highly sensitive receptors including workers.	Medium on the workers/ Minor on surrounded communities	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, he should ask for additional spraying of water in the spot generating high emissions
Impacts due to handling of construction waste	Likely to occur - short term – Highly sensitive receptors include soil at protectorate areas and workers. Receptors with medium sensitivity include nearby settlements. Receptors with low sensitivity include groundwater.	Medium	<p>EETC should communicate with the local authorities including protectorates for officially assigning location for the disposal of construction waste within the three governorates. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.</p> <ul style="list-style-type: none"> <li>• A specified (one or multiple) locations 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
			<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Domestic waste generated on site shall be segregated and not mixed with any other type of waste.</li> <li>• 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.</li> <li>• Construction contractor shall contract competent authority at each governorate premises for safe disposing of generated sewage</li> </ul> <p>Mitigation measures for hazardous waste management: 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 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 and the HWM-SOP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors</p>
Human Health and Safety	Low likelihood of major or medium impacts for workers– high likelihood of minor impact for sensitive recipient	Minor to Medium	<p>Occupational Health and Safety</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
			<ul style="list-style-type: none"> <li>• All safety procedures reported in the Law should be abided to by the workers and the top management.</li> <li>• The contractor should assign a health and safety supervisor who ensures the workers are abided to the H&amp;S procedures</li> <li>• The contractor should make health and safety facilities available in the project site</li> <li>• Contracts should be signed with the health facilities close to the construction site</li> <li>• 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</li> <li>• 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.</li> <li>• When operating power tools at height, workers should use a second (backup) safety strap</li> <li>• Testing structures for integrity prior to undertaking work</li> </ul> <p>Community health and Safety</p> <ul style="list-style-type: none"> <li>• 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</li> </ul>
Land use	Minor and direct impact to livelihood	Minor	<ul style="list-style-type: none"> <li>• The main mitigation measure to be adopted is exerting the maximum effort to minimize the impact on land. Avoidance mechanism should be applied to the maximum possible.</li> <li>• Select ROW for locating routes of power lines, and seek alternatives whenever the routes are rejected by community people. The ROW is 25 meters from the center of the power line from both sides. That is in accordance with Electricity Law 87/2015.</li> <li>• Access roads for the vehicles and storage areas during construction have to be defined during the preparation of the construction phase.</li> <li>• Inform the local people and raise their awareness about the importance of the project. Mobilizing the community people is essential in</li> </ul>

Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
			<p>terms of raising their awareness about the importance of the project and the compensation mechanism to be adopted</p> <ul style="list-style-type: none"> <li>• The contractor is responsible for clearing the tower site after completing his work. EETC shall help the contractor if any problem with the landowner in the agriculture area or with any other authority / agency along the line routes would arise.</li> <li>• An area of 25 meter from the center of the OHTL should be evacuated from tall trees and buildings. Such area will be kept as a Right of Way (ROW) for maintaining the public safety from electric hazards and high exposure to EMFs. Appropriate compensation should be paid to the owner of trees</li> <li>• In case of resettlement, a proper Resettlement Action Plan or Abbreviated Resettlement Action Plan (ARAP) should be adequately prepared.</li> <li>• Form a committee of local people and involve them in the compensation process.</li> <li>• Develop an adequate Grievance mechanism that enable people to voice their concerns and worries, particularly, the ones related to involuntary</li> </ul>
Visual intrusion	Low likelihood of major or medium impacts and localized	Minor	Visual evidence of these projects cannot be completely avoided, reduced, or concealed.
Ecological (Fauna and Flora)	Medium likelihood to occur – short term	Minor	<ul style="list-style-type: none"> <li>• Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations within protectorates shall be located to avoid impacts.</li> <li>• Minimize noise and artificial lighting at night during construction</li> <li>• Inform construction staff on the importance of natural habitats and notable plant species</li> <li>• No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>• Construction and vehicle movement should be made to minimum</li> <li>• Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>• Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>• Prepare habitat maps for project sites using aerial photography and high resolution satellite imagery</li> </ul>



Impact	Likelihood and Severity	Significance	Mitigation Measures
During construction of 220 kV OHTLs North October/Main October /Motwreen / 6 <sup>th</sup> of October SS			
Bird Migration	Low likelihood to occur	Minor	<ul style="list-style-type: none"> <li>Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>
Water Resource (groundwater, geology and hydrogeology)	Medium likelihood to occur – long term impact – irreversible in case of hazardous waste contaminants (reversible after a very long period).	Medium	Standard prevention or precaution measures shall be prepared by the contractor prior to the construction. It is preferable to include the waste management plan in the ToR of the contractor.
Cultural resources	Low likelihood of minor impacts	Insignificant	No mitigation measures is needed
Culture and Privacy of Local Communities	Minor likelihood to occur – short term	Minor	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.
Socioeconomic	Low likelihood of major or medium impacts	Medium to Major Positive temporary	No mitigation measures is needed

## 6.7 Impact during Operation of 6<sup>th</sup> of October Substation

During the operation of the substation, typically, beside the managerial and administration activities, the most important activities are operation and maintenance of the substation components according to their specifications, monitoring of the substation components and regular trainings (administrative, managerial, emergency plan, etc.)

It is expected that prior to the commissioning, the training of the operator staff will be done by the contractor / supplier, as a part of their contract for operation and maintenance of the substation. Normally, according to the practice done by EETC, at least 5 staff will be needed for operation and maintenance of such substation at 6<sup>th</sup> of October. Thus, the impact during the operation and maintenance of the substation is expected to be minimized.

However, the following potential impacts may result from the operation and maintenance of a substation:

### 6.7.1 Noise

Sources of noise during the operation and maintenance phase would include staff vehicles and GIS transformers and other supporting equipment of the substation. The primary impacts from noise would be localized disturbance. It is worth mentioning that the GIS substation is placed indoor and the transformers will be selected to have the least noise disturbance accordingly.

#### Impact significance:

The maintenance, investigation and staff and vehicles movement is not expected to be significant or considered low impact. The number of vehicles will be limited and during operation and maintenance, the staff will be using the ear protection. The standard protection, earmuff and helmet for the workers are sufficient to reduce the noise impacts. No specific mitigation measures are developed. However, regarding the noise generated from the operation of substation, the impact of the surrounding environment (establishment and residential area) will not be highly noticeable. Due to the significant distance of over 10km from source (SS) and receptor (residential zone). The impact to the sensitive receptors surrounding is classified as low impact. Mitigation measures will be presented to reduce such impact. This will include typically noise mitigation techniques such as planting trees to further reduce the noise exposure as well as to increase the positive visual impact and landscape.

### 6.7.2 Traffic

During the operation and maintenance of the substation, there will be only small number of staff vehicles moving in and out from the substation. The additional number of vehicles will not impact the existing traffic at the local road or main road. Consequently, this impact is considered to be insignificant

### 6.7.3 Air Quality

Similarly for noise and traffic impact, vehicular traffic and machinery would continue to produce small amounts of fugitive dust and exhaust emissions during the operation and maintenance phase. These emissions would not likely exceed air quality standards nor have any impact or considered as very low impact.

Concerning the air emission from the GIS substation, as the substation is insulated; gas emission is not expected and there is no impact generated from the substation during operation and maintenance phase.

#### **6.7.4 Vibration**

The substation will generate low vibration. Additional vibration will be associated with the staff vehicles only and it is considering low as the number of vehicles will be very small. Therefore, it is not expected there is any impact related to the vibration, thus the impact is considered very minor and no mitigation measure is prepared.

#### **6.7.5 Hazardous Materials and Wastes Management**

During operation and maintenance of the substation, besides industrial hazardous and non-hazardous waste, small quantity of domestic wastes (solid and liquid waste) will be generated. Industrial hazardous wastes are generated during routine operations (e.g., lubricating oil, hydraulic fluids, coolants, solvents, and cleaning agents). These wastes are typically; according to EEA regulations for hazardous waste management should be placed in containers, characterized and labeled, possibly stored briefly, and transported by a licensed contractor to an appropriate permitted off-site disposal facility as a standard practice.

Regarding the replaced transformer, the reuse, if possible, is conducted as a common practice at EETC. When the transformer is still functioning well but due to the increase capacity on the substation, the functioned transformer will be reused at the other SS. Otherwise, the unused transformer will be disposed to the hazardous landfill.

Regarding the oil used in the transformer, as the closed cycle is applied and the oil filtration will be implemented if the quality of oil is deteriorating, no rejected oil will be generated. Otherwise, in case of incidents (oil spill or leakage) the oil will might contaminate the soil. However, with the design specification for solid, paved and isolated foundation, the oil spill will not be expected to cause environmental negative impact.

The hazardous waste impacts during operation phase have been assessed in detail in a following chapter to address the mitigations and management and monitoring of the hazardous waste during the operation and maintenance of the substation. The waste management is developed in accordance to the standard requirements of EEA regarding the storage, disposal and transportation of hazardous waste to the designated landfill.

Non-hazardous waste has relatively low environmental risks; however, the quantitative aspects could be an issue. In this typical GIS substation for urban area, there is no expected large amount of wastes will be produced. However, ESMP includes measures for establishing temporary stores for scrap at project sites and keeping the tidiness and cleanliness of these stores until scrap is sold for recycling or disposed as shall be detailed in the ESMP. The ESMP includes measures for waste minimization and waste management that could reduce the impact to be of a minor significance.

Regarding the domestic waste, the liquid waste generated from the sanitation facility will be connected to the existing public sewage network. In addition, the domestic solid waste will be collected as well by the existing public collection.

Impact significance:

Concerning the industrial wastes, this impact is considered to be Medium impact ( hazardous and non hazardous wastes). ECAA regulations should be followed to minimize the impact. The detailed mitigation measures are developed at the following chapter.

Concerning the domestic wastes, standard monitoring for leakage or damage for the pipeline sewage networks and internal sanitation network in addition to standard temporary waste bins provision will be sufficient to maintain the low impact of the wastes generated.

### **6.7.6 Risks of Soil Contamination**

Risk of soil contamination is only associated with the possible spillage or leakage of the transformer oil. The possibilities of contaminating the soil during incident of oil spillage or leakage are not high although the amount of the transformers oil could be accidentally released to the environment is very high (over thousands of liters in every transformer, and, eventually, leakage of transformers oil is considered as being a great and serious environmental accident.

Impact Significance:

To reduce the amount of the accidentally oil spill during the incident of spillage of the transformer during operation, the area surrounding the transformer site should be securely paved with concrete and bordered with the higher pavement and the surrounded with the stones for first indication of oil leak to the soil. In addition, the further measures in the ESMP are presented to further minimize the impact at the substation.

The design of the foundation of the transformer will follow the standard design applied at the existing EETC SS. The paved, isolated and covered with the gravel will be constructed at the transformer site. Therefore, the soil contamination impact is considered low impact. In addition, the paved area at the SS site will also reduce any possible soil contamination.

### **6.7.7 Health and Safety**

Possible impacts to health and safety during operations include exposures to electromagnetic fields (EMF), accidental injury to workers during operation and maintenance activities In addition; health and safety issues include working around energized equipment, and possible contact with natural hazards. However, during the operation and maintenance phase, if there is any incident or emergency situation, the impact will be negatively endanger the surrounding community and establishment.

Impact significance

Health and safety for the sensitive recipient (community surrounding the project site of substation) does not have a significant impact, as it is described previously that the nearest sensitive recipient is far from the SS by

more than 10km, the impact can be classified as minor. In addition, the SF6 gas insulated in the SS and the use of XLPE type of cables will eliminate the EMF exposure to the environment. Therefore, the impact is considered low and the standard monitoring, including tightening and regular monitoring of the equipment will be sufficient to reduce the impact.

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

Concerning the high risk impact associated to the incident or emergency situation, i.e. during the fire, leakage, or other equipment faults, the emergency plans have to be developed, trained and regularly practices for the staff of the SS to manage the incident. The capacity buildings and trainings section will describe in detailed the current procedures and practices shall be implemented.

#### **6.7.8 Natural Disaster Risks**

An assessment of the risks to the operation and maintenance of the substation due to earthquake or seismic activity concluded that given the engineering measures incorporated into the design of the SS, the potential environmental impacts of a seismic event is not anticipated to be significant so this impact would be considered a very low or negligible impact. Possible mitigation measures have been already considered in the technical design.

#### **6.7.9 Visual Intrusion**

As the substation is in an indoor facility, and the transformers side will be placed in the area on the middle of the infrastructure, as well as the substation is within enclosed area with entrance gate, there will be no indication that this site is a substation. Therefore, the impact associated to the visual resource is considered very low or negligible and no measure is developed.

#### **6.7.10 Water Resource (groundwater, geology and hydrogeology)**

Similarly, the impact associated to the groundwater, surface water and drinking water associated to the operation and maintenance of the SS will have Minor Impact. The SS will connect their liquid and solid wastes to the existing public network. In addition, the hazardous waste generated will be managed and dispose according to the EEAA waste management for hazardous waste. With the proper management and monitoring, the impact associated to the water resources will be maintained and reduce.

#### **6.7.11 Ecological Resources**

As the operation and maintenance of SS will not be associated with any ecological resource, and the fact that there is non-existence of wild life, habitats, even local flora and fauna in the substation vicinity, there is no significant impact is predicted. There will be no ecological disturbance due to construction activities. There is no recorded species; no endemic or threatened species were documented during this study.

### 6.7.12 Impacts on Fauna and Flora

Similarly, the impact on flora and fauna as well as the disturbance on bird migration during the operation of SS; accordingly, the impact is considered Negligible.

### 6.7.13 Impacts on Landscape and Land Use

Effects on landscape will be limited to the visual intrusion, there is no expected impact on landscape and the impact is classified as Negligible.

Regarding land use, there will be no other plan for the future land use is plotted for urban planning. As it is mentioned previously, the land is already dedicated for the SS site thus the impact on the future land is also negligible.

### 6.7.14 Impact on Archeological and Cultural Sites

No impact on archeological or cultural sites is expected during operation of the SS. This impact is considered: no impact.

### 6.7.15 Socioeconomic Impacts

Overall improvement of the national electricity grid and the services offered by EETC as part of the overall plan is expected. 6<sup>th</sup> of October 500 SS is also expected to reduce the load off the already existing substations which it connects to. Impact Significance: Medium positive Impact.

### 6.7.16 Creation of Job Opportunities and Flourishing Economies of during Operation

A limited number of skilled, semi-skilled and unskilled employees will be needed throughout the operation of the substation. Additionally, the availability of stable electricity service may encourage members of the local community to open new business activities, such as small workshops. 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. Significance of Impact: Positive Moderate Impact

The summary of the impact during operation of the SS will be presented at Table 6-7 below.

## 6.8 Impacts During Operation and Maintenance of OHTLs(500 kV and 220 kV)

Operation and maintenance phase and activities of OHTLs for 500kV and 220 kV are the same and no specific activities are carried out for one differs than the other. Accordingly, the impacts of OHTLs(500kV and 220 kV) are presented together.

### 6.8.1 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 during maintenance of equipment along the transmission line. Therefore it is expected that the amount of generated hazardous waste will not be significant.

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, domestic waste and hazardous waste shall be segregated as recommended according to the ESMP. Implementing the measures could reduce the impact to be of a minor significance.

### 6.8.2 Effect of Electromagnetic Fields

**Table 6-6. 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.

#### 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

The impact is considered of Medium significance which will be minimized to Minor Impact if mitigations as presented in section 8.4 are applied

### 6.8.3 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 dumped at random sites across the line. 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.

### 6.8.4 Noise

OHTL are not sources of noise; however noise may be emanated due to corona effects. Corona associates with operating OHTL under certain weather conditions, rainy and foggy weather, which is not normally, occur along the proposed routes.

The baseline assessment of noise quality along the OHTL line 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 emanate 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.

### 6.8.5 Impact on 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.

### 6.8.6 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. Electrocutation 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.



The workers are not fully committed to use safety belts; consequently, some of them might fall down the towers. There is a certain probability of death or injuries.

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 connection of transmission lines to vegetation, an issue which have been previously discussed in the impacts of construction phase and it was mentioned that power line routing will avoid, as much as possible. Fields having high trees will be removed from the ROW zone of transmission lines. Another factor which could cause fires is overloading of transmission lines, a risk that is also minimized by adequate safety precautions in the design and operation of the system.

#### Impact significance

Health and safety for the sensitive recipient (community surrounding the project site of transmission lines) does not have a significant impact, as it is described previously that the project site is already localized. Therefore, the impact can be classified as minor.

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. 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 is responsible for the work of operation and maintenance of the transmission line. The training obtains include the civil protection, firefighting and smoke detection, besides the operation and maintenance of the transmission lines and its equipment. The map of the emergency plan in case of fire accident is also provided.

However, 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. It is also worth noting that at Cairo 500 substation that has been established since 1964 has no recorded accidents at the substation and its interconnection lines.

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.

### 6.8.7 Land Use

Land use impacts would be major for OHTL, as many activities could continue within the ROW (e.g., agriculture and grazing). However, the limitation of construction activities might impose the residents and the owners of lands under the ROW. The restrictions of land use might shed light on the economic situation of the households due to the high probability of not being able to trade in land. As well as, in case of urbanization, the lands under the ROW will not be used for the construction activities( it cannot be used for buildings).

#### Impact significance:

Major impact will be associated to the land use. The impact is classified as major and developing RAP/RFP is recommended for 500 kV OHTLs while 220 kV OHTLs no RAP is anticipated for these lines.

### 6.8.8 Visual Intrusion

The overhead transmission lines would be highly visible in rural or 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.

Summary of significant Impacts during Operation of SS and OHTLs 500 kV and 220 kV OHTL are presented on Table 6.4 and Table 6.5 respectively.

**Table 6-7. Assessed significance of expected impacts during operation phase of 6<sup>th</sup> of October substation**

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 6 <sup>th</sup> of October substation			
Impact on Noise	Low likelihood to occur – receptors include nearby settlements (residential) are far at a distance above 10km.	Low impact on settlement and nearby establishment :Low impact on permanent workers	Application of the normal precautions normally taken such as planting trees reduces the visual impact , increase the air quality and improve the landscapes.. Standard protection for the workers provided at the substation. Several laws and decrees tackle occupational health and safety provisions at the work place, in addition to Article 43 – 45 of Law 4/1994, which address air quality, noise, heat, humidity and the provision of protective measures to workers. These laws and decrees apply to the work crew that will be involved in construction activities.
Impact on traffic	Low likelihood to occur	Low impact	No mitigation identified
Impact on Vibration	Minor or very low likelihood to occur	Very minor	No mitigation identified
Impact on wastes generated (hazardous and non-hazardous, solid and liquid wastes)	Uncertain likelihood – Uncertain impact duration - Highly sensitive receptors include soil pollution and workers. Receptors with low sensitivity include nearby projects/settlements. Physical environment receptors with low sensitivity include groundwater, surface water and drinking water	Medium impact on industrial wastes generated (hazardous and non-hazardous) Low impact on domestic wastes (solid and liquid wastes)	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.

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 6 <sup>th</sup> of October substation			
Impact on soil contamination	High likelihood to occur, only during the incident of oil spillage from the transformers and possible vehicles.	Low to medium impact	Standard design of precaution for the site of transformers Paved within surrounding site of substation especially at the area for parking and movement of vehicles
Health and Safety	High likelihood to occur for the permanent workers Low likelihood to occur for the surrounding establishment and sensitive receptors. High risk likelihood impact during the emergency and accident	Minor impact for sensitive receptors (public and residents as well as existing establishment) and medium impact for the workers High risk likelihood impact during the emergency and accident	Standard protection by placing clear project signs. Time management for vehicles movement; especially avoiding the peak hours Standard protection for the workers especially working at elevated heights
Impact on natural disaster risks	Low likelihood to occur	Negligible impact	No mitigation identified Technical specifications of the equipment is include the standard measures for natural disaster risks
Impact on visual Resources	Low likelihood to occur as the substation is in an indoor facility, and the transformers with GIS technology side will be placed in the area on the middle of the infrastructure, as well as the substation is within enclosed area with entrance gate, there will be no indication that this site is a substation	Very low impact or negligible impact	No mitigation measure is needed

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of 6 <sup>th</sup> of October substation			
Impact on water resource (ground water, surface water and drinking water)	Low likelihood to occur	Minor impact on groundwater, surface water and drinking water	Proper waste management according to EEAA regulations Monitoring for pipeline of sewage network Provision of waste bins for temporary storage
Ecological Resources	Low likelihood to occur	No significant impact	No mitigation is needed
Impacts on Fauna and Flora and bird migration	Low likelihood to occur	Negligible impact (no impact)	No mitigation is needed
Impact on landscape and land use	Low likelihood to occur	Negligible or no impacts	No mitigation is needed
Impact on archeological and cultural sites	Low likelihood to occur	No impacts	No mitigation measures are needed
Socio Economy	Improving living conditions Providing a stable electricity service	High Positive impacts	The distribution company at EETC should have an awareness plan to connect beneficiaries legally. Increase awareness about the importance of having official connections
Creation of Job opportunities and flourishing Economics of construction site	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

Table 6-8. Assessed significance of expected impacts during operation phase of OHTLs(500 kV and 220 kV)

Impact	Likelihood and severity	Significance	Mitigation Measures
During operation and maintenance of OHTLs			
Risk of Waste generated	Likely to occur - short term – Highly sensitive receptors include soil and workers.	Medium	Waste management implemented according to EEAA regulations, especially for industrial hazardous wastes (solid and liquid wastes)

Impact	Likelihood and severity	Significance	Mitigation Measures
	Receptors with medium sensitivity include nearby projects/settlements. Receptors with low sensitivity include groundwater.		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.
Exposure to EMFs	Likely to occur - long term impact	Medium	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 500 and 220kV OHTLs) so that the EMFs would effectively attenuate at the edge of this EMF
Bird Migration	Low likelihood to occur	Minor	<ul style="list-style-type: none"> <li>Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>
Risk of soil contamination	Low likelihood of occurrence - short term impact	Minor	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	<ul style="list-style-type: none"> <li>Workers that operate at the OHTLs 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.</li> <li>Working hours for workers exposed to noise equipment should be designed so that noise exposure periods do not exceed the safe limits</li> </ul>
Cultural resources	Low likelihood of minor impact	Minor	Standard mitigation measures of recording and reporting
Human 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
Land use	Low Likelihood of major or medium impact	Major to Minor	following RAP Instructions for 500kV while 220kV no mitigation measures are required

## 7 Resettlement Action Plan (RAP)

Based upon the impacts identified during the environmental and social impact assessment phase, the project is foreseen to incur negative impacts on the use of land in the project area where limited lands will be acquired for the erection of the towers, trees and buildings along the right of way. EETC approaches land acquisition in the form of consensual sale rather than resettlement as per the electricity law.

In order to identify potential Project Affected Persons and mitigate the impacts of resettlement activities, standalone Resettlement Action Plan Report shall form integral part of the ESIA with the following objectives.

- Mitigate the negative impacts and identify potential development benefits;
- Establish the entitlements of all categories of affected people, including the host communities;
- Document all compensation measures and relocation activities (if any);
- Establish procedures to guarantee fair process to the affected people; and;
- Establish procedures to monitor and evaluate the implementation of resettlement plans and take corrective action as necessary.

The RAP shall employ a participatory bottom-up approach. Various qualitative and quantitative data collection tools shall be used in order to engage various categories of PAPs.

RAP study will include 500kV OHTLs and no anticipated RAP for Substation and 220 kV.

## 8 Environmental and Social Management Plan (ESMP) and Monitoring Plan

This chapter presents Environmental and Social Management Plan (ESMP) developed for EETC 6<sup>th</sup> of October substation and its interconnection overhead transmission lines. This chapter consists of the following sections:

- ESMP during construction and operation phase (including detailed mitigation measures) of Substation and its interconnection overhead transmission lines cables
- Guidance on Emergency Response Plans
- Roles and responsibilities in the implementation of the ESMP (during construction and operation phase) of Substation and its interconnection overhead transmission lines cables
- Trainings
- Cost Estimation

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, or compensate or offset any adverse social and environmental impacts analyzed at the previous chapter. The ESMP has distinguished between mitigation measures that should be implemented during the construction and operation of the project.

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 Environmental and Social Management Plan (ESMP) presented in this chapter reflects the

implementation procedures and mechanisms for the mitigation measures and monitoring activities of the expected 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 who will be appointed under the health and safety department in the Substation. 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 a management plan that incorporates and successfully integrates with interface documents, the following elements must be considered and acted upon:

- The environmental and Social Management unit should be adequately staffed to ensure the proper implementation and monitoring of the ESMP. The organizational structure of the environmental and social at PMU should also reflect the range of complete competencies to perform the tasks.
- The development and management of registers for the proper documentation and tracking of environmental and social training, environmental and social incidents and environmental and social related complaints.

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 substation and its interconnection, which will include the environmental measures that should be undertaken by the construction contractor
- During tenders 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 substation shall have permanently at least one staff member for health, environmental and safety (HSE)during operation and maintenance of the substation and its interconnection (under supervision of the substation management). HSE staff of the substation and interconnection appointed by EETC (under environmental safety and health department) will be responsible for monitoring the ESMP. He will be responsible for implementing the mitigation measures through periodic reports presented to EETC including auditing and inspections that will be undertaken on random basis.



## 8.1 Environmental Management Plan (ESMP) during Construction of the Substation

### 8.1.1 Management of Noise and Vibration

#### Mitigation measures

For general measures to reduce the impact on construction to surrounding establishments and the residents nearby the construction, the measures are:

- Clear sign for construction sites label and warning signs should be placed. The signs should be clear during the night as well.
- The construction should be done during the day (between 7 AM to 5 PM).
- Although the transportation of the materials and the other equipment (that need the big trolley) will be done during the night (after midnight) to avoid the traffic congestion, loading and unloading of materials and equipment should be done during the day.

For mitigation measures of construction workers, within the construction site, it could be mitigated through application of the normal precautions normally taken by construction labor. The safety measures have to be taken for standard protection of the construction workers in addition the schedule of the machineries used for the construction activities and for transporting the equipment or materials should be managed properly.

According IFC General EHS Guidelines, the mitigation measures that should be implemented are the following:

- No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A).
- No unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
- Limiting the duration of noise exposure.
- Construction of the structure and the installation of the equipments should be conducted at daytime.
- The management of the use of heavy machineries and the equipment (at the same time and concentrated at the same place) to avoid the vibration accumulation.

#### Monitoring activities:

- Ensure the warning signs and the construction site labels are placed and clearly seen.
- Reviewing contractor's policy for EHS and ensure that all the National and international requirements are fulfilled.

- Random inspection on contractors during SS construction and installation of the equipment.
- Review the contractor's project progress, accident and the complaint from the surrounding establishment, if any, due to the noise and vibration disturbance.

Reporting:

- Monthly report for the implementation of the ESMP submitted by the contractor to EETC
- Monthly report on incident and complaint from the surrounding establishments and residents nearby the construction site.

### 8.1.2 Management of Traffic

Mitigation measures:

- Approval from the traffic department prior to the construction of the substation should be obtained by the contractor prior to the construction preparation
- Clear signs and warning at the construction site and surrounding, especially at the site entrance.
- The trucks and trolleys movement for equipment, construction materials and disposal of the construction debris should be done during the night, but loading and unloading should be done during the day time. The loading and unloading should be done within the site of the SS or at the empty land adjacent to the SS site (if needed and upon the agreement for temporary storage).
- 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
- Careful turns (if needed) for the heavy trucks or loaders at the main road.
- 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:

- Ensure the mitigation measures are done by the contractor

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.

### 8.1.3 Management of Ambient Air Emission

Mitigation measures:

- Localize and minimize the vehicles movements
- 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, he should ask for additional spraying of water in the spot generating high emissions. Roads on site shall be graveled when necessary

- All vehicles and heavy equipment working in the site should be effectively maintained. Any vehicle that has high smoke emissions visibly detected should be promptly repaired.
- Limiting trucks and other vehicles speed on site
- Construction materials and stock piles of material should be carefully managed to minimize the risk of windblown material and dust.
- Removing excavated material promptly
- Storage pile activity should be conducted downwind and covering storage piles and properly shape storage piles

#### Monitoring Activities:

- Ensure that the contractor is applying mitigation measures on site
- Daily visual monitoring of the increase dust and exhaust emission
- Immediate action if there is complaint from the surrounding establishment and residents.

#### Reporting:

- The Site Supervisor prepares a monthly progress report, which would be submitted to EETC, on implementation of mitigation measures. This report should include any incidents of high dust emissions or smoke during construction works including the natural dust that might be encountered.

### **8.1.4 Management of Wastes (hazardous and non-hazardous; liquid and solid wastes)**

#### Mitigation measures:

- The nearby landfill that is used to receive the non-hazardous waste has to be notified if there are bigger or different amounts of waste generated resulting from the construction activities. Agreement on these disposal sites should be reached prior to commencing construction works
- The non-hazardous waste has to be separated from hazardous waste at storage area. The separation will be done to identify the parts that can be recycle or sell.
- A certain location in the construction site should be assigned for temporary storage of construction waste; this location will be within the construction area of the substation. This location should be agreed between the contractor and supervisor prior to starting the project.
- Separate area should be dedicated for temporary storage before sending it to the hazardous waste landfill has to be defined prior to the construction activities. The hazardous waste management has to be developed by contractor before the construction. In addition, the management plan can be added as a part of ToR.
- Construction waste should be hauled at the end of each business day to the officially approved disposal sites. Adequately equipped trucks should undertake waste transportation. The supervisor 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 supervisor should also occasionally inspect that the truck drivers are disposing the waste in the approved location and

not through practicing open dumping in the midway, through irregular visits and inquiries in the disposal site.

- Regarding the hazardous waste, the contract with the hazardous waste landfill shall be applied before starting the construction
- For the hazardous waste, the management and monitoring plan is in accordance with EEAA's requirements for hazardous waste handling, disposing and transporting.
- As the domestic solid waste is already established, the contractor only provides temporary storage onsite before collection done by the municipality.
- For the sanitation or wastewater generated, before the site is connected to the existing sewage network, onsite sanitation facility has to be provided by the contractor for their workers

#### Monitoring Activities:

- Ensure the collection; transportation and disposal of wastes are according to the measures.
- Regarding the hazardous waste generated, the management, temporary storage, transportation and disposal to the designated landfill should be in accordance to EEAA regulations for hazardous waste.

#### Reporting:

- There should be a form prepared by EETC for the contractor to keep records of quantities, types of wastes received and the location where it has been received from.
- The monthly report of supervisor from EETC 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.

### **8.1.5 Safety during Excavation and Trenching**

#### Mitigation measures:

- All excavations shall be conducted 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 falling 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 works 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.

### **8.1.6 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 taken 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 appointed 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.

### 8.1.7 Health and Safety of the Construction Workers

As the site of the substation is localized, the significant impact on health and safety concerns are for the construction works mainly.

#### Mitigation measures:

- Workers should wear standard protection for the construction site.
- Workers should be trained to cover the completed parts and keep their work areas safe. In case of causing an accidents, the workers should be penalized either by deduction of salaries or dismissal.
- Existing utilities would be located and staked before construction begins, including and at intersections of other pipes and crossings. This would confirm the location and depth to ensure new construction does not impact the existing utilities.
- Following the measures above, the identification of the existing infrastructure (other pipelines, cables, etc.) have to be identified prior to the construction phase.
- Heavy equipment should not normally be operating above the existing utilities during construction. If heavy equipment or trucks must cross the existing utilities, additional soil cover will be needed to protect the existing pipe.
- Workers should take the following steps to protect themselves from falls during high construction:
  - a) Use 100% fall protection when working on higher construction sites
  - b) Participate in all training programs offered by the employer (contractor).
  - c) Follow safe work practices identified by worker training programs.

#### Monitoring Activities:

- Inspect equipment daily and report any damage or deficiencies
- Onsite inspectors should be present during construction to verify that the construction contractor is following engineering specifications and meeting regulatory requirements.

#### Reporting:

- Monthly report on health and safety performance. This report will include any incident and complaint regarding health and safety measures perform by the contractor.

### 8.1.8 Management of Water Resources and Soil

#### Mitigation measures:

- Include the precaution and prevention of waste management to avoid water resources and soil pollution
- Emergency plan during accident due to oil spillage or other possible pollution on soil and water resource

- If needed, the site is paved or graveled to reduce to direct contact of the possible soil contamination during the workshop of the equipment and vehicles and their movements

Monitoring Activities:

- Proper implementation of waste management done by contractor

Reporting:

- Monthly report of any accident due to oil spillage, etc.

### **8.1.9 Management of Possible Impacts on Culture and Privacy of Local Communities**

Mitigation measures:

- The contractor should be advised to use 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 contractor could be advised to seek the help of local NGOs or community leaders for recruiting labor from the local communities

Monitoring Activities:

- The contractor should provide list of construction workers and their addresses from the surrounding area on After completion of construction phase basis.

Reporting

- Reporting on percentage of labor recruited from local governorates should be presented by the contractor to the supervisor consultant and to EETC on a quarterly basis.

### **8.1.10 Other Socio-economic Impacts**

Mitigation measures:

- The Distribution Company may be advised to start some awareness campaigns about the importance to rationalize consumption of electricity. The company may network with the local NGO's to participate in conducting the awareness activities.

Monitoring Activities:

- The number of posters and awareness events held by the company and by the local NGO's. A staff member (social development officer) from the distribution company may attend the events held by the NGO's.

### Reporting

- Reporting on percentage of attendance and response to awareness events.

## **8.2 Environmental Management Plan (ESMP) During Construction of the Overhead Transmission Lines**

### **8.2.1 Management of Wastes [Hazardous and Non-Hazardous]**

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

#### Mitigation measures:

- EETC should communicate with the local authorities including protectorates for officially assigning location for the disposal of construction waste within the three governorates. Agreement on the disposal sites and the collection means should be reached prior to commencing construction works.
- A specified (one or multiple) locations 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

#### Mitigation measures for hazardous waste management:

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 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 and the HWM-SOP shall apply to all hazardous wastes generated at the sites managed by EETC and apply to the EETC staff and contractors.

### **8.2.2 Management of Excavation**

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 falling 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.

### **8.2.3 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, he 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.

### 8.2.4 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
- Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.
- 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.

### 8.2.5 Management of Traffic

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

Mitigation measures:

- 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.
- In case a narrow access road needs to be occupied for limited period (for example by loading/unloading trucks or loaders) the occupation time should be minimized. The additional measure is to have a careful turn (if needed) for the heavy trucks or loaders due to the high-speed vehicles passing by the highway.
- 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

### **8.2.6 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 either 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 health and safety facilities available in the project site
- Contracts should be signed with the health facilities close to the construction 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.

#### Monitoring Activities:

- The resident health and safety supervisor should follow the commitment of workers to use the protective equipment.
- Health and Safety officer should record on a daily bases the activities and accidents occur among the community people.
- 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 PMU
- 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 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.

### **8.2.7 Safety of Mechanical Equipment**

Similar measures as described for 6<sup>th</sup> of October substation construction

### **8.2.8 Management of Flora and Fauna 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 at Faiyum governorate.

#### Mitigation measures

- Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations within protectorates shall be located to avoid impacts.
- Minimize noise and artificial lighting at night during construction
- Inform construction staff on the importance of natural habitats and notable plant species
- 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

- Prepare and implement a habitat/soil removal and re-instatement plan
- Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants
- Prepare habitat maps for project sites using aerial photography and high resolution satellite imagery

### Monitoring Activities

- EETC health and Safety Officer shall ensure that tracks routes that will be made by the construction contractor are avoiding locations where endangered species may be present
- Evidence of provisions for minimizing light and noise practices during construction
- Reported incidents of staff violating the hunting ban to Wildlife Officer
- Provision of information through staff induction, toolbox talks, leaflets, office posters, wildlife photo competition
- Report on habitats and locations of protected/threatened plant species
- Habitat maps prepared and issued one month before construction

### Reporting

- No reporting is required

### **Bird Migration**

The location of the SS and the routes of OHTLs don't expose to bird migration path. The impact of the operational phase of the OHTL on the migratory birds is considered of minor significance. The transmission towers' design and distribution can pose fatal risk to birds through collisions and electrocutions. Birds collision can occur with power lines in case of presence of transmission lines along migratory routes, at night or during low light conditions (e.g. dense fog).

### Mitigation measures:

- Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision
- Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)

### Monitoring activities and reporting:

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

## **8.2.9 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, 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 EETC is normally constructing such projects 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 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 be oriented about the norms and traditions of the surrounding communities, particularly, the Bedouin ones.
- 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

### **8.2.10 Management of Land Use Restrictions**

The ROW zone as identified by the Electricity Law 87/2015 will restrict the construction of new buildings and plantation 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 agriculture crops such as wheat- maize- citrus fruits-potatoes and clover as well as trees plantation. The habitats of nesting birds should be identified first before any construction to take place in order to avoid the demolition of these habitats.

#### Mitigation measures:

- The main mitigation measure to be adopted is exerting the maximum effort to minimize the impact on land. Avoidance mechanism should be applied to the maximum possible.
- Select ROW for locating routes of power lines, and seek alternatives whenever the routes are rejected by community people. The ROW is 25 meters from the center of the power line from both sides. That is in accordance with Electricity Law 87/2015.
- 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
- The contractor is responsible for clearing the tower site after completing his work. EETC shall help the contractor if any problem with the landowner in the agriculture area or with any other authority / agency along the line routes would arise.
- An area of 25 meter from the center of the OHTL should be evacuated from tall trees and buildings. Such area will be kept as a Right of Way (ROW) for maintaining the public safety from electric hazards and high exposure to EMFs. Appropriate compensation should be paid to the owner of trees
- In case of resettlement, a proper Resettlement Action Plan or Abbreviated Resettlement Action Plan (ARAP) should be adequately prepared.
- Form a committee of local people and involve them in the compensation process.
- Develop an adequate Grievance mechanism that enable people to voice their concerns and worries, particularly, the ones related to involuntary

#### Monitoring activities:

- Conduct regular monitoring visits to verify that no encroachment took place under the ROW.
- A field visit should take place by the designer of the project in order to identify the areas of restricted uses and to identify different habitat locations, to be reported by the designer in his design report.
- Monitoring of ROW maintenance activities to apply proper control methods.
- Areas of restricted uses should be monitored along with the type and reason for the restriction and identification of the different habitat locations. The designer in his design report should report these areas.

#### Reporting

- The designer should identify the locations of intersection between OHTL ROW with areas of restricted uses. In case where this intersection could not be avoided, the designer should justify reasons for selecting this routes in his design report.
- Reporting associated with the land acquisition problems could arise along the routes line.
- Reporting possible resettlement procedures are detailed in the RAP

### **8.2.11 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 grievance 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 SS and OHTL is presented in Table 8-1 and Table 8-2 respectively. The Monitoring Plan for SS and OHTL is presented in Table 8-3 and Table 8-4 respectively.



**Table 8-1. Environmental and social management plan (ESMP) during construction phase of 6<sup>th</sup> of October substation**

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
Noise and vibration during site preparation, construction and installation of equipment	General measures for surrounding establishments and sensitive receptors			
	Notification letter of the introduction of project and duration to surrounding establishment and municipality	Contractor	-	Cover letter from EETC for approval of starting of the project
	Clear sign and warning sign (can be seen during day and night) of the project (including duration)	Contractor as a part of ToR for EHS general requirements	None as a part of tender process	
	Duration of the working on site (including unloading and loading) are during day only (between 7AM – 5 PM)	Contractor	-	
	Mitigation measures for construction workers during preparation and construction			
	Strictly standard procedures for health and safety of the workers according to IFC general EHS guidelines (including limitation of the duration and expose to high noise) and management of concentration works of heavy machineries	Contractor	None as a part of tender process	
	Strictly standard equipment especially for ear protection during the work	Contractor related to the EHS requirements during construction works	None as a part of tender process	
Traffic destruction or congestion during transportation of construction	Approval from traffic department prior to the construction	Contractor	-	Cover letter from EETC for approval of starting of the project
	Clear sign and warnings (including duration) of the project that can be seen during the day and night	Contractor as a part of the tender activities related to EHS requirements	None as a part of tender process	

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
materials, construction waste, equipment and movement of project vehicles and machineries	Destruction of road done section by section and during the end of the day the street should be restored from the excavation and other work activities	Contractor in assistance from traffic department and the EETC supervisor	None as a part of Contractor financial budget during the bidding activities	
	Movement of vehicles (for transporting materials, construction waste and SS equipment done during the night and loading and unloading done during the day within the site of the SS.	Contractor in coordination with traffic department, if needed	None as a part of contractor responsibility	
	Agreement for temporary storage and the final disposal to the designated landfill	Based on the waste management plan submitted by the contractor and approval from EETC	-	
	The drivers and operators of the machineries should have training on safety utilization of their machines on the main and side road.	Drivers and operators employed by the Contractor. It is the responsibility of the contractor for implementing regulations to the drivers and operators	None as a part of tender process	
Ambient Air Quality by dust emission and the air emission due to the exhaust gasses from the construction vehicles and machineries	Localize and minimize the vehicle movements including limiting the speed	Contractor	As a part of their financial budget during the bidding activities	Low impact and temporary
	If needed, spray the soil before any excavation, filling loading and unloading. Pavement (graveled) of access roads prior to usage in construction of the project components	Contractor	-	
	Maintaining the efficiency of the vehicles and machineries	Contractor	As a part of their financial budget during the bidding activities	

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
	Waste management of temporary stock piles, construction materials, construction waste. The periodic waste transportation to the designated landfill should be included on the waste management as well.	Contractor	As a part of the ToR for waste management	Implementing the waste management submitted by the contractor and approved by EETC prior to the preparation and construction phase
Waste generated (hazardous and non-hazardous, solid and liquid as well as construction waste and domestic waste)	Notification and contract, if needed for transporting hazardous and non-hazardous waste to their designated landfills.	Contractor	None, as a part of the contractor's offers and responsibilities during preparation and construction phase	Implementing the waste management submitted by the contractor and approved by EETC prior to the preparation and construction phase
	Separation of hazardous waste and non-hazardous waste for temporary storage			
	Designated area or location should be included at the waste management plan submitted by the contractor and approved by the EETC			
	Construction waste should be hauled at the end of each business day to the officially approved disposal sites			
	Adequate trucks with standard precaution (coverage of the waste, not overloaded, etc) for transporting the waste to the designated landfills. Regarding the hazardous waste transportation, the vehicles should be according to the standard mentioned on the EEAA regulations for hazardous waste transportation			
	Temporary onsite waste bins for solid waste before its collection and temporary onsite sanitation facilities should be	Contractor	None, as a part of waste management	According to the waste management plan submitted to EETC

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
	provided within the construction site for the workers			
Safety impacts during excavation and trenching for the workers and surrounding communities and establishments	Excavation and trenching in accordance to the design and drawings.	Contractor	-	
	Protection and localized (by fences or barriers) the excavation and trenching sites to reduce the danger and prevent falling of materials and person and the other vehicles or machineries moving nearby the site	Contractor	None as a part of contractor offers related to EHS requirements	
	Standard helmet and safety boots for the workers	Contractor	None as a part of contractor offers related to EHS requirements	
Safety impacts during the mechanical and machineries use for the health and safety of the workers	Provision of authorized and licensed personnel for heavy machineries	Contractor	None as a part of contractor responsibilities	
	Maintaining the efficiency of the heavy machineries, including inspection before its use and following the design capacity and standard manuals of the heavy machineries, etc.			
Health and safety of the construction workers	Standard protection for the construction site workers	Contractor	None as a part of contractor offers related to EHS requirements	
	Provided on job training for the construction workers prior to the preparation and construction phase			

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
During preparation and construction of the SS				
	(including working at the high construction)			
	Identification of the existing underground networks			
	Management of heavy equipment movement, especially nearby other underground networks (Before any excavation activities, the contractor shall coordinate with the different authorities to determine the existing infrastructure in the project's area (e.g. water lines, sewage lines, electrical cables and telecommunication lines)so as to avoid any undue damage.			
Water resources and soil pollution during construction	Precaution and prevention of waste management to prevent the soil and further water resource (groundwater or nearby surface water or drinking water network) pollution	Contractor	None, as a part of waste management	According to the waste management plan submitted to EETC

Table 8-2. Environmental and social management plan (ESMP) during construction phase of OHTLs

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs				
Effects of construction waste	<ul style="list-style-type: none"> <li>Identify disposal sites for construction waste approved by the local authority</li> <li>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</li> <li>Adequate transportation and disposal of construction waste</li> <li>Allocate and prepare areas for temporary storage of scrap</li> <li>Keeping tidiness and cleanliness of the WAA</li> <li>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.</li> </ul>	EETC- Waste officer nominated by EETC Construction contractor	EETC- Construction supervisor consultant	<ul style="list-style-type: none"> <li>Review local authority approvals</li> <li>Site supervision</li> <li>occasional inspection of disposal site</li> <li>Auditing of allocated WAA</li> <li>Auditing of stores</li> </ul>
Excavation	<ul style="list-style-type: none"> <li>Identify the excavation depth and width according to the drawing design</li> <li>Clear safety signs and boundary for the excavation sites</li> <li>Safety and clear area around the excavation site</li> <li>safety helmets and boots compulsory for workers</li> </ul>	Construction Contractor	Construction supervisor	<ul style="list-style-type: none"> <li>Site supervision and occasional inspection</li> </ul>
Air emissions	<ul style="list-style-type: none"> <li>Spraying soil before excavation in loose sandy soil</li> </ul>	Construction contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>Site supervision</li> </ul>

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs				
Noise	<ul style="list-style-type: none"> <li>• Provide ear muffs to construction workers usually located near noisy machines</li> <li>• Organize working hours so that noise exposure to workers will be minimized</li> <li>• Coordinate and Inform inhabitants/employees at the nearby sensitive receptors about the peak time and hours for construction activities.</li> <li>• Avoid construction activities at night close to residential areas</li> </ul>	Construction contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>• Site supervision</li> </ul>
Ecological (Flora and Fauna)	<ul style="list-style-type: none"> <li>• Tracks routes required for transporting equipment, raw material, etc, from main roads to the construction locations in protectorates shall be located to avoid sensitive areas</li> <li>• Construction and vehicle movement should be made to minimum</li> <li>• Access road has to be defined prior to the construction phase to avoid the resettlement or compensation</li> <li>• Minimize noise and artificial lighting at night during construction</li> <li>• Prepare and implement a habitat/soil removal and re-instatement plan</li> <li>• No hunting or poaching by Contractor staff in the Project area and surroundings during construction and operation</li> <li>• Undertake pre-construction surveys to minimize impacts on natural habitats and protected and threatened plants</li> <li>• Inform construction staff on the importance of natural habitats and notable plant species</li> </ul>	Construction contractor Design consultant	EETC- Construction supervisor consultant- EHS officer	<ul style="list-style-type: none"> <li>• Site supervision</li> <li>• Access road map and access road management of the vehicles to the towers.</li> <li>• Evidence of provisions for minimizing light and noise practices during construction</li> <li>• Provision of information through staff induction, toolbox talks, leaflets, office posters, wildlife photo competition</li> <li>• Report on habitats and locations of protected/threatened plant species</li> </ul>

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs				
Impacts of culture and privacy of local communities	<ul style="list-style-type: none"> <li>• Maximize the use of local workers as much as possible</li> <li>• Provide information sessions to the outsider</li> <li>• Engaging community people in employment process</li> </ul>	Construction contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>• Review of contractor's reports related to workers</li> <li>• Stakeholder engagement activities</li> <li>• Capacity building reports and orientation sessions reports</li> </ul>



Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs				
<p><b>Human health and safety</b></p>	<ul style="list-style-type: none"> <li>• Restrict application to the health and safety procedures</li> <li>• The contractor should make health and safety facilities available in the project site</li> <li>• Contracts should be signed with the health facilities close to the construction site</li> <li>• Drivers should have a certified and valid license</li> <li>• All mechanical equipment should be checked prior to use</li> <li>• Appropriately tag all mechanical equipment that are locked or out of service</li> <li>• 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</li> <li>• 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.</li> <li>• A guard should be assigned to keep community people out of the construction site</li> </ul>	<p>Construction contractor</p>	<p>Construction supervisor consultant</p>	<ul style="list-style-type: none"> <li>• Review of contractor's reports related to health and safety measures as well as the lists of injured workers</li> <li>• Capacity building reports and orientation sessions related to health and safety measures</li> </ul>

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Responsibility of direct supervision	Means of supervision
During preparation and construction of OHTLs				
<b>Land use restrictions and possible resettlement</b>	<ul style="list-style-type: none"> <li>• Avoidance mechanism should be fully adopted</li> <li>• If the resettlement occur, information and RPF should be implemented accordance with WB and EIB standard</li> <li>• An ARAP study should be prepared to inform about best strategies to compensate the poor</li> <li>• Access roads and storage areas to be defined</li> <li>• Rehabilitating the construction site</li> <li>• Engaging the stakeholder during the process of compensation</li> </ul>	Design consultant Contractor	Construction supervisor consultant A RAP consultant EETC and local authorities	<ul style="list-style-type: none"> <li>• ARAP results</li> <li>• The design consultant report</li> <li>• Site visits reports</li> <li>• Compensation reports and receipts</li> </ul>
<b>Trees removal for power lines right-of-way</b>	<ul style="list-style-type: none"> <li>• Avoiding of trees is essential</li> <li>• Plantation of trees near removed trees</li> <li>• Agriculture association should orient the farmers about the best strategy to move their trees</li> </ul>	Contractor in cooperation with the farmers and the agriculture associations	EETC	<ul style="list-style-type: none"> <li>• Review reports and occasional audits</li> </ul>
<b>Socioeconomic impacts</b>	<ul style="list-style-type: none"> <li>• Job opportunities to be provided to the community workers</li> <li>• Integration of community leaders during the employment procedures</li> <li>•</li> </ul>	Contactore and sub-contractors in cooperation with the community leaders	EETC (site engineer and the SDO)	<ul style="list-style-type: none"> <li>• Reports about the workers employed</li> <li>•</li> <li>• Complaints raised about employment</li> </ul>
<b>Traffic</b>	<ul style="list-style-type: none"> <li>• Prevent storage of construction materials, equipment and machineries on traffic lanes</li> <li>• Capacity building of the drivers about safety utilization should be assured</li> </ul>	Construction Contractor	Construction supervisor consultant	<ul style="list-style-type: none"> <li>• Site supervision and grievance log related to traffic impacts</li> </ul>

Table 8-3. Environmental monitoring plan during construction phase of 6<sup>th</sup> of October substation

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
During preparation and construction phase					
Site clearance	Worker's injuries	Construction site location	Preparation of recording form of workers injure during the construction	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	Contractor  On the preparation stage, the tendering has been done to purchase the standard procedure for site clearance. However, the contractor shall put into consideration on their budget proposal
Base camp preparation for the workers	Neighbors' complaints	Project construction sites	Recording of complaint and type of complaint	Once during the preparation and the construction phase	
Monitoring the traffic disturbance due to the vehicles and machineries movement and other related construction activities	Traffic complaint	Within 500 m from the construction site (especially at the main road, El Nasr rd)	Visual observation and recording complaint received	During the duration of the construction activities	
Monitoring ambient Air Quality during construction works	Ambient air (gas emissions) PM, dust complaint	Within the site and surrounding establishments	Visual investigation and recording of the dust and ambient air increased due to construction activities  Recording and reporting of the complaints (monthly report)	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	
Monitoring Noise and vibration	Noise complaints from the neighboring communities	Project locations	Visual investigation and recording and	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> </ul>	

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
During preparation and construction phase					
Impacts at the project sites			documentation of complaints	<ul style="list-style-type: none"> <li>• DueDiligence report after completion of construction phase</li> </ul>	
Management of construction waste and handling of hazardous waste	Amount of hazardous and nonhazardous waste generated	Project site locations	Estimation of the hazardous waste and non-hazardous waste in relation to the handling and transporting to the landfill	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	Contractor during construction and EETC SS staff during operation
Monitoring soil contamination and water resource contaminations	Area of spillage	Project sites	Visual observation  Recording and documentation of spillage	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	Contractor
Monitoring health and safety of the workers during the construction of the project components	Health records about occupational injuries	Clinic / hospital referred by the contractor	Medical reporting on received cases	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	Contractor
Storage of the machines and construction materials of the project components	Complaints from neighboring communities and records and documentation of the temporary area for storage of materials or machineries	Project sites	Recording and documentation	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	Contractor

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
During preparation and construction phase					
Impacts of culture and privacy of local communities	% of local labor to total labor	Construction site	Reporting labor origin governorates and calculating the natives ratio	<ul style="list-style-type: none"> <li>Review monitoring reports prepared during construction</li> <li>DueDiligence report after completion of construction phase</li> </ul>	Construction contractor

Table 8-4. Environmental monitoring plan during construction phase for OHTL

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
During preparation and construction of OHTL					
Disposal of waste during construction	<ul style="list-style-type: none"> <li>Quantities of scrap item by type</li> <li>Segregated waste weight</li> </ul>	WAA	<ul style="list-style-type: none"> <li>Inspection and recording of admitted items</li> </ul>	<ul style="list-style-type: none"> <li>Review monitoring reports prepared during construction</li> <li>DueDiligence report after completion of construction phase</li> </ul>	EETC storekeeper/Waste officer
Excavation impacts	<ul style="list-style-type: none"> <li>Areas of excavations and trenching Safety areas around the excavation</li> </ul>	Construction site	<ul style="list-style-type: none"> <li>Inspection and marking of the safety areas for excavation</li> </ul>	Upon excavation and trenching	Site supervisor consultant Construction contractor
Impacts of culture and privacy of local communities	<ul style="list-style-type: none"> <li>Number of workers from within the project areas</li> <li>Number of stakeholder engagement activities</li> <li>Training sessions and capacity building trainees</li> </ul>	Desk work	<ul style="list-style-type: none"> <li>Reports about the workers</li> <li>Reports about stakeholder engagement activities</li> <li>Reports about capacity building activities</li> </ul>	<ul style="list-style-type: none"> <li>Review monitoring reports prepared during construction</li> <li>DueDiligence report after completion of construction phase</li> </ul>	EETC SDO

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
Human health and safety	<ul style="list-style-type: none"> <li>• Total number of injured workers</li> <li>• Total number of injured community people</li> <li>• Total received grievances related to health and safety</li> <li>• Total number of attendance to the orientation sessions about health and safety</li> </ul>	<p>Construction site</p> <p>Desk work</p>	<ul style="list-style-type: none"> <li>• Site visits to the construction site</li> <li>• H&amp;S monthly reports</li> <li>• Reports about stakeholder engagement activities</li> <li>• Reports about H&amp;S capacity building activities</li> </ul>	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	Site engineer and EETC SDO
Safety of mechanical equipment	<ul style="list-style-type: none"> <li>• Performance of the equipment and the visible damage</li> </ul>	Construction site	<ul style="list-style-type: none"> <li>• Inspection and recording of the performance</li> </ul>	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	Construction contractor
Land use restrictions and possible resettlement	<ul style="list-style-type: none"> <li>• Total areas of restricted use penetrated by ROWs and access road to the towers for the materials</li> <li>• Total affected persons</li> <li>• Total compensation paid to the PAPs</li> </ul>	Construction site	Area measurements on maps and on ground using surveying tools	Approximately 6 months after the commencement of the construction	<p>Design consultant</p> <p>Resettlement consultant</p> <p>EETC SDO</p>
Trees removal for power lines right-of-way	<ul style="list-style-type: none"> <li>• Number of removed trees</li> <li>• Total number of affected farmers</li> <li>• Total cost of compensation for trees</li> </ul>	<p>Construction site</p> <p>Desk work</p>	<ul style="list-style-type: none"> <li>• Visual counting of removed trees</li> <li>• Reports related to compensation</li> </ul>	Approximately 6 months after the commencement of the construction	<p>Site supervisor consultant</p> <p>Compensation committee</p> <p>EETC SDO</p>

Potential Impact/Activity	Monitoring Indicator	Monitoring Location	Monitoring Methods	Monitoring Frequency	Monitoring Responsibility
Socioeconomic impacts (job opportunities and reducing the value of residential units)	<ul style="list-style-type: none"> <li>• Number of jobs provided to the community people</li> <li>• Total number of complaints raised by workers</li> <li>• Number of affected units</li> <li>• Number of complaints raised</li> </ul>	<p>Construction site</p> <p>Desk work</p>	<ul style="list-style-type: none"> <li>• Reports about the workers and employment</li> <li>• Reports about the cost of units</li> </ul>	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	EETC SDO
Traffic	<ul style="list-style-type: none"> <li>• Storage sites areas</li> <li>• Complaints related to traffic</li> <li>• Total number of drivers attended training about safety utilization</li> <li>• Total number of complaints raised due to traffic problems</li> </ul>	<p>Construction site</p> <p>Desk work</p>	<ul style="list-style-type: none"> <li>• Reports about the capacity building received by drivers</li> <li>• Complaints reports</li> <li>• Reports about capacity building to the drivers</li> </ul>	<ul style="list-style-type: none"> <li>• Review monitoring reports prepared during construction</li> <li>• DueDiligence report after completion of construction phase</li> </ul>	<p>Site supervisor consultant</p> <p>EETC SDO</p>

### 8.3 Environmental Management Plan (ESMP) and Monitoring Plan during Operation and Maintenance (O&M) Phase for the SS

Generally, during Operation and Maintenance (O&M) of the substation is related to the noise generated from the transformers, possible EMF exposure, and other related accident that has to be managed by the proper emergency plans. The emergency plans should be prepared and periodically trained to the SS staff include fire accident, emergency of possible leakage of the transformers, the smoke detection. The mitigation measures, monitoring activities as well as reporting expected during O&M of the SS are the following:

#### Management of Noise

Transformers typically produce harder to mitigate low frequency noise, especially during the night as the SS location is rural developed area so it is hard to disturbed any neighbors; however birds and fauna in the area can be disturb. Accordingly, regarding the noise level during the operation phase, the standard specifications for the transformers are already included at the tender documents.

#### Mitigation measures:

- Standard specification written of expected noise from the transformers has to be strictly followed by the supplier. Accordingly, the expected noise level of the transformers measured at the residential area will not exceed the permissible noise level (55 dB(A) during the day and 45 dB(A) during the night).

#### Monitoring Activities and Reporting:

- Monitor and report if there is any complaint related to the noise generated from the SS and disturb the surrounding establishments.

#### Management of Wastes (hazardous and non-hazardous waste)

#### Mitigation measures:

- The non-hazardous waste generated is very limited and can be disposing with the domestic waste to be transported to the landfill.
- Regarding the hazardous waste, it is also considered limited. When the transformers need to be replaced due to the increased of the capacity, the transformer will be reuse and installed at the SS that has the needed capacity.
- 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.
- Domestic waste is connected to the existing network. Regular check for pipeline connection will be done to avoid the leakage and the dis-function of the network.
- In general, a proper waste collection and storage plus regular (preferably twice a week) 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.

#### **Management of EMF**

##### Mitigation measures:

- Periodic maintenance of the GIS SS and its interconnections. This includes the regular tightening, SS efficiency, oil quality, gas pressure, etc.

##### Monitoring Activities and Reporting:

- Regular EMF monitoring, quarterly at several place inside the SS area and surround the establishment. This measurement can be done together with the EMF monitoring of the OHTLs.

#### **Management of risks during the emergency situations (fire, soil contamination, water resource contamination and smoke)**

##### Mitigation measures:

- Providing the safety equipment and regular check of the equipment
- Design of the foundation of the transformers to include the side for possible oil leak collection (including concrete and gravel surrounding the transformers area.

##### Monitoring Activities and Reporting:

- Regular visual monitoring for possible leak at surrounding the transformers area
- Regular visual monitoring for possible damage on the foundation and isolated area surrounding the transformers

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 SS. The training obtains include the civil protection, firefighting and smoke detection, besides the operation and maintenance of the SS and its equipment. The map of the emergency plan, responsible persons and their contacts in case of fire accident is also provided.

Table 8-5 Environmental and Social Management Plan (ESMP) during Operation and Maintenance of SS

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
<b>During Operation and Maintenance of the SS</b>				
Noise	<i>Mitigation measures for operators and staff of SS</i>			
	Standard procedures for health and safety of the workers according to IFC general EHS guidelines (including limitation of the duration and expose to high noise) and management of concentration works of heavy machineries	EETC	Around 10,000 LE annually for standard protection of staff	
	Standard equipment especially for ear protection during the work	EETC		
Waste generated (hazardous and non-hazardous, solid and liquid industrial wastes as well as domestic waste)	Proper waste management (industrial wastes) including separation of waste, separate area for temporary waste, transporting and disposing the industrial waste to their designated landfills	EETC	Undefined as the amount of wastes generated, especially for the industrial non-hazardous and hazardous waste are uncertain.	
	Especially for hazardous waste, the storage, collection, transportation and disposal of hazardous waste should follow the EEAA regulations for hazardous waste.			
	Concerning domestic waste, the standard procedures for maintenance of the			

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
	networks (including provision of waste bins) should be maintained			
Public and operators and staff safety of the EMF exposure	Periodic maintenance of the GIS SS and its interconnections. This includes the regular tightening, SS efficiency, oil quality, gas pressure, etc.	EETC operators of the SS	-	
	EMF reading at the SS and surrounding site	EETC	100-150 USD per EMF meter	The cost estimation is based on one time purchased for one meter. It is advisable to purchase two machines for standby purposes.
Trainings provided for potential risks during accidents (firefighting training, oil spillage, smoke detector, etc)	Provision of trainings provided by EETC as a general requirements	EETC	Undefined as the type of trainings and the duration of trainings are vary.	The cost estimation is included at annual trainings provided by EETC for their SS staffs.
Health and safety of the staff	Standard protection for the SS operators and staffs	EETC	None as a part of precaution of noise protection	
	Provided on job training for the staff for general health and safety			

**Table 8-6 Environmental and Socioeconomic Monitoring Plan**

Potential Impacts	Proposed Mitigation Measures	Institutional Responsibilities (enforcement and coordination)	Cost Estimates (\$)*	Comments
<b>During Operation and Maintenance of the SS</b>				
<p>In general, the administration works, recording of accidents, injuries and other complaints from the surrounding establishment will be done during the monitoring of the operation and maintenance of the SS.</p> <p>The record includes the recording and monitoring of the waste management on the SS (especially industrial waste management).</p> <p>Regarding the EMF exposure, the monitoring of the surrounding the SS will be done similar and at the same time with the measurements of EMF exposure of the SS.</p>				

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

During the operation of the OHTLs (500 kV and 220 kV), the operator of OHTLs will be responsible for management and monitoring activities for operation and maintenance phases

##### 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 (preferably twice a week) 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.

##### 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 where 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 be distributed the safety standard procedures during the operational phase that put in detailed of the safety measurements include:

- Maintain minimum clearance between ENF 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
- Carry out an awareness raising campaign that should target the different communities where the project will be implemented in order to educate them about the precautions that they should be considering in order to ensure their safety on both community and household or family level. There should be special attention for accessing women, who are so close to issues of energy rationalization on the households' level. In addition, also to some associated risks outside house (e.g. herding activities near substation and the risk of electric shocks), and children because they are one of the most vulnerable groups to the risks of electric shocks both outside homes i.e. by playing near substations or inside homes. The awareness raising will be undertaken through local NGOs who can be trained by a specialized training consultant.

#### Monitoring Activities and reporting:

- EMF should be measured frequently in different locations especially at the areas where sensitive receptors are located (along the transmission line). 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.
- Grievances raised by the community people regarding the EMF
- Design consultant should present the safety precautions, which have been considered, as a separate section of his design report
- The training consultant appointed by EETC should report to the head of the substation (after he is appointed) of training courses that have been conducted, while the NGOs should report on the implemented awareness activities both on quarterly bases

### **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.

## 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 (PPE)

### Mitigation measures:

- Workers that operate at the OHTLs 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)

## 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

- Careful attention should be taken to select the exact locations of the transmission towers at the area of protectorates
- Avoid locating any of transmission line towers at flood runoffs routes or exits within protectorate.
- Design of Foundations of the towers located at protectorate 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

## Management of the Land Use limitations

Land use impacts would be minimal, as many activities could continue within the ROW (e.g., agriculture and grazing). However, the limitation of construction activities might impose the residents and the owners of lands under the ROW. The restrictions of land use might shed light on the economical situation of the households due to the high

probability of not being able to trade in land. As well as, in case of urbanization, the lands under the ROW will not be used for the construction activities.

Mitigation measures:

- Developing a Resettlement Action Plan (RAP) that identifies both short and long term impacts
- Provide detailed information to the populated agriculture lands' community in order to inform about the results of the RAP
- In case of any urbanization, the project affected persons who might face limitation of his land should be properly compensated as reported in the RAP
- The EETC should pay compensation according to the full replacement value

Monitoring activities and reporting:

- The number of project affected persons
- Type of compensation to be provided to those group
- Due diligence is required to validate the willingness of the project affected persons who approve to apply restrictions of use to their lands with no intimidation and coherence
- Quarterly report of the grievances received by the Social Development Officers

**Management of Socioeconomics impact**

The potential loss of economic wellbeing might result in 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.
- The second major economic impact will result in due to the restriction of land use. It is well- known that the construction lands are of much higher value than the agriculture lands. In case of restricting the use of lands, the project affected persons will lose the value of their lands.

Mitigation measures:

- Workers should be fully informed about the duration of work.
- Developing a Resettlement Action Plan (RAP) that identifies both short and long term impacts
- Provide detailed information to the populated agriculture lands' community in order to inform about the results of the RAP
- In case of any urbanization, the project affected persons who might face limitation of his land should be properly compensated as reported in the RAP
- The EETC should pay compensation according to the full replacement value
- The key issue for mitigating this impact is the community participation in all phases of the project. The consultation activities conducted during the ESIA was a 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.

- Adopting the proposed service provider (NGOs or women leaders) will maximize their involvement in the project; therefore, to understand it properly.
- Form a committee representing by the natural leaders inside each community to be responsible for reconciliation in case of having any conflict arise.
- Informing the consumer and communicating with him/her is essential as it keeps them informed and gives them the sense that their interests are respected.

#### Monitoring activities and reporting:

- Total number of workers who complain due to losing their temporary work.
- The number of project affected persons who will lose the benefit of their lands.
- Type of compensation to be provided to those group.
- Due diligence is required to validate the willingness of the project affected persons who approve to apply restrictions of use to their lands with no intimidation and coherence
- Quarterly report to be developed by the compensation committee during the construction phase
- 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.
- Involve some selected members from the local community to be part of the assessment and scoping phase.
- 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.

#### **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.
- The operator should assign a health and safety supervisor who ensures the workers are abided to the H&S procedures
- 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.

#### Monitoring Activities and reporting :

- The resident health and safety supervisor should follow the commitment of workers to use the protective clothes.
- He should follow on day to day bases the accidents occur among the community people.
- The lists of injured workers 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 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.

#### **Bird Migration**

The impact of the operational phase of the OHTL on the migratory birds is considered to be minor significance. The transmission towers' design and distribution can pose fatal risk to birds through collisions and electrocutions. Birds 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:

- Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision
- Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)

Monitoring activities and reporting:

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

**Table 8-7 Environmental Management Plan during Operation and maintenance Phase of OHTLs**

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
<b>Exposure to EMF</b>	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 500 and 220kV OHTLs) so that the EMFs would effectively attenuate at the edge of this EMF	Design consultant/ Specialized Engineering Consultant	Undefined	<ul style="list-style-type: none"> <li>• Review design reports</li> <li>• Review consultant reports and implementation of measures</li> </ul>
<b>Management of Natural Risks</b>	<ul style="list-style-type: none"> <li>• Avoid locating any of transmission line towers at flood runoffs routes or exits.</li> <li>• Design of Foundations of the towers shall consider the flood runoffs risks</li> <li>• It should be noted that in protectorates, placing the transmission towers shall not alter at any condition the flood runoffs route</li> <li>• Consider other mitigation measures factors</li> </ul>	Designer contractor	Undefined	<ul style="list-style-type: none"> <li>• Review the design of the towers</li> <li>• Ensure implantation of proposed measures</li> </ul>
<b>Land use restrictions and possible resettlement</b>	<ul style="list-style-type: none"> <li>• Developing a Resettlement Action Plan (RAP)</li> <li>• RAP/RPF should be implemented accordance with IFC and EIB standard</li> <li>• A RAP study should be prepared to inform about best strategies to compensate for the loss of lands due to the restrictions of use</li> <li>• Access roads and storage areas to be defined</li> <li>• Rehabilitating the construction site</li> <li>• Engaging the stakeholder during the process of compensation</li> </ul>	EETC operator staff  Compensation committee	Undefined	<ul style="list-style-type: none"> <li>• RAP results</li> <li>• The design consultant report</li> <li>• Site visits reports</li> <li>• Compensation reports and receipts</li> </ul>

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
<b>Socioeconomic impacts</b>	<ul style="list-style-type: none"> <li>• losing of temporary jobs</li> <li>• Workers should be fully informed about the duration of work</li> <li>• Losing of land value</li> <li>• Developing a RAP that identifies both short and long term impacts</li> <li>• Provide detailed information about the results of the RAP</li> <li>• Compensation to be paid to the PAPs as reported in the RAP</li> <li>• The EETC should pay compensation according to the full replacement value</li> <li>• Inform the community about the different stages of the project, safety measures and transportation route</li> </ul>	EETC operator staff with the community leaders	Undefined	<ul style="list-style-type: none"> <li>• Reports about the workers employed</li> <li>• Complaints raised about employment</li> <li>• Reports about information dissemination</li> </ul>
<b>Health and safety</b>	<ul style="list-style-type: none"> <li>• Restrict application to the health and safety procedures</li> <li>• The contractor should make health and safety facilities available in the project site</li> <li>• Contracts should be signed with the health facilities close to the construction site</li> <li>• Drivers should have a certified and valid license</li> <li>• All mechanical equipment should be checked prior to use</li> <li>• Appropriately tag all mechanical equipment that are locked or out of service</li> <li>• 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</li> <li>• 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</li> </ul>	EETC operator	Undefined	<ul style="list-style-type: none"> <li>• Review of EHS officer reports related to health and safety measures as well as the lists of injured workers</li> <li>• Capacity building reports and orientation sessions related to health and safety measures</li> </ul>

Potential Impact	Proposed Mitigation Measures	Institutional Responsibility for Implementation	Estimate Cost	Comments
	<p>nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident.</p> <ul style="list-style-type: none"> <li>• A guard should be assigned to keep community people out of the construction site</li> </ul>			
<b>Bird Migration</b>	<ul style="list-style-type: none"> <li>• Installing bird diverters devices or line markers such as spheres, spiral vibrational dampers or bird deflectors in order to attract attention of birds and avoid collision</li> <li>• Avoid working in seasons of bird migration, Spring (March-May) and Autumn (August to November)</li> </ul>	EETC operator	Undefined	Carrying out Bird monitoring surveys including carcass observations and mortality surveys, as part of the seasonal monitoring, during spring and autumn seasons.

## 8.5 Environmental Safeguard Training

The Project Company (EETC) will ensure that the substation is manned 24 hours 7 days per week. Typically, a substation of this type employs around 25 staff with around 10 engineers with 3 shifts per day. All staff employed will be trained in the following:

- Specific job roles and procedures;
- Occupational health and safety; and
- Contingency plans and emergency procedures.

Training will include:

- Induction training on appointment;
- Specialist training (as required for their prescribed job role); and
- Refresher training as required.

The training program will be designed to ensure that appropriate skilled staff is used to operate and maintain the substation at all times. Aspects of occupational health and safety and emergency procedures are to be emphasized.

Furthermore, environmental training will be given to all staff employed at the project and special environmental training will be given to the staff during the operation phase to implement the ESMP. They will receive training in the following:

- Day-to-day monitoring activities;
- Collection and analysis of data;
- Use of monitoring equipment, operation and maintenance;
- Industrial hygiene;
- Occupational health and safety; and
- Emergency and contingency procedures.

During the consultation with one of the operators of an existing substation, a safety standard and regular training for staff is already established. However, regular refreshment training held besides the operation and maintenance training are:

- Administration skills
- Civil protection
- Firefighting and fire accident
- Smoke detection
- Fire equipment maintenance

In addition, at every substation EETC provides an emergency plan map including the responsibility of each staff during emergency and their contacts

## 9 Consultations with Stakeholders

The Stakeholder Engagement chapter aims at highlighting the key consultation and community engagement activities and their outcomes, in addition to outlining the validity and reliability of the collected data. The Stakeholder engagement activities were conducted with reference to the standard 10 of the environmental and social standards of EIB<sup>7</sup>

In summary, the following system of stakeholder engagement is applicable to the project:

- Identification of project stakeholder groups including members of the public who could be affected (directly or indirectly) by project construction and operation.
- Stakeholder engagement process. Timely and ongoing provision of information to stakeholders on the environmental and social issues that could potentially affect them
- Meaningful consultation and disclosure which will be based on the disclosure of information relevant project activities, and will be undertaken in a manner that is inclusive and culturally appropriate for all stakeholders.
- Grievance mechanism by which the general public and other stakeholders can raise concerns, which the Company will handle in a prompt and consistent manner.

### In order to achieve that:

- Community engagement plan has been developed for the different Stakeholders through Two phases :
  - Phase I: Consultation activities conducted on the SS and the surrounding areas (June 2016),
  - Phase II: During the preparation of the RAP study, the areas located along the routes of the OHTLs; were included Scoping Meetings during March and April 2018, and Public Consultation Session on 26 November 2019.
- Based on the identification of stakeholders, various questionnaires and guidelines were prepared in order to engage:
  - The residents in the project area
    - The community people
    - Women
    - Young people and Elderly
  - Owners of farms and workers
  - Governmental Organizations and Authorities
    - El Beheira, Giza, and Fayoum Governorates Authority
    - 6th October, Wadi El Natroun, and Magaga Cities Authority
  - Agricultural associations
  - Agricultural directorates
  - NGOs
  - Environmental administrations
  - Contractors

<sup>7</sup> [http://www.eib.org/attachments/strategies/environmental\\_and\\_social\\_overview\\_en.pdf](http://www.eib.org/attachments/strategies/environmental_and_social_overview_en.pdf)



- Project owners (Egyptian Electricity Transmission company)

### The consultation outcomes will be used in:

- 1- Define/refine potential project stakeholders and suggest their possible project roles
- 2- Identify the most effective outreach channels that support continuous dialogue with the community

Thereafter the results will provide proper documentation of stakeholder feedback and enhance future stakeholder engagement activities accordingly.

## 9.1 Stakeholder Identification

The project is recognized as an important electricity distribution project, accordingly, it is essential to realize, within the context of this project the importance of engaging the wide base of ‘stakeholders’ in the process which aims to bring these stakeholders together from the local and national levels to inform and support project implementation.

A stakeholder is defined, in the IFC Guidance Note 1, 2012 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”. The following table summarizes all potential project stakeholders.

**Table 9-1: potential project stakeholders**

Categories	Stakeholder groups	Role
<i>Primary stakeholders</i>		
<b>Potential affected communities in Sixth of October, Maghagha, and Wadi El Natroun</b>	Major Investors and Head of cities Authorities	<ul style="list-style-type: none"> <li>• They are the community leaders of the project affected communities</li> <li>• They will be responsible of communicating with the Project and sharing information with their community people</li> </ul>
	The community people living in Sixth of October, Maghagha, and Wadi El Natroun cities	<ul style="list-style-type: none"> <li>• Households and communities that will receive impacts (positive/negative) as a result of the project.</li> </ul>
	Women	<ul style="list-style-type: none"> <li>• They will receive the impacts of the project. Additionally given their vulnerable status they might be severely affected by positive or negative impacts</li> </ul>
	Young people (from age of 18 to 35 year)	<ul style="list-style-type: none"> <li>• They have interests in the project as they might get a job opportunities</li> </ul>
	Elderly	<ul style="list-style-type: none"> <li>• They will receive the impacts of the project. Additionally given their vulnerable status they might be severely affected by positive or negative impacts</li> </ul>

Categories	Stakeholder groups	Role
	Owners of farms, and workers	<ul style="list-style-type: none"> <li>They will receive the impacts of the project. they might be severely affected by positive or negative impacts</li> </ul>
	Sixth of October, Maghagha, and Wadi El Natroun cities Authorities	<ul style="list-style-type: none"> <li>Permissions for the road cut during the implementation</li> <li>Rehabilitation of roads, which is one of the major issues raised by the community.</li> </ul>
	Information Centers in Sixth of October and Maghagha Cities	<ul style="list-style-type: none"> <li>Provide the project with the underground utilities and infrastructure maps. As well as, providing information about the surrounding communities</li> </ul>
<b>Project owner</b>	Egyptian Electricity Transmission company	<ul style="list-style-type: none"> <li>Project owner</li> </ul>
<b>Financial institutes</b>	European investment bank (EIB)	<ul style="list-style-type: none"> <li>Financiers and regulators</li> </ul>
<b>Secondary stakeholders</b>		
<b>Civil society</b>	Local NGOs	<ul style="list-style-type: none"> <li>They are responsible of sharing information with the community.</li> <li>NGO's are a good method for spreading awareness messages to the local community. Regular meetings are held regularly every two months with the NGO's and community leaders. Publications will be distributed (project fact sheets and grievance forms).</li> </ul>

## 9.2 Consultation Activities during Preparation of the ESIA and RAP studies

The research team has adopted multi-dimensional consultation activities that enabled the marginalized, voiceless, youth and women to gain information about the project. In addition to, gaining information about their concerns and worries regarding the project during various implementation phases, through the following methods: Focus Group Discussions (FGDs) with community members and surrounding farming-related stakeholders, Semi-Structured Interviews with government and community stakeholders, and Public Consultation session with PAPs.

The consultation activities were carried out in two phases, one of which was for the sub-station SS 2016, and the second phase was carried out during the preparation of the RAP study. The consultation activities were attended by representatives from (EEAA), the Electricity Zones (West of Delta Electricity Zone, Misr El Wosta Electricity Zone, and Cairo Electricity Zone).

### 9.2.1 Phase I: Consultation activities conducted on the SS and the surrounding areas

The scoping activities for this project took place during June 2016. Primary data was collected by conducting several meetings with relevant governmental bodies, including EETC and its Cairo Zone as well as 6<sup>th</sup> of October City Authority. Additionally, 10 individual interviews and were conducted with residents closest to the project area. An additional tool to confirm collected data was on-site observations and informal meetings and discussions which were held with people residing and working in the project area. A total of 15 individuals have been interviewed during the scoping phase of this study; 7 males and 3 females. Considering the distance of the project area from 6<sup>th</sup> of October residential area, and hence the limited foreseen impact, scoping activities were limited in number.

### 9.2.2 Phase II: Consultation activities during the preparation of the RAP study

- **Scoping Meetings**

The consultant conducted several consultation activities while preparing the RAP study on the areas located along the routes of the OHTLs (during March and April 2018). Comments raised by participants were considered. Temporary land acquisition was raised as an important theme including questions about the compensation value. Number of the PAPs participated in those Meetings.

The scoping phase served to introduce the project within the project area as well as to identify the main characteristics of the project area and the views of the consulted group.

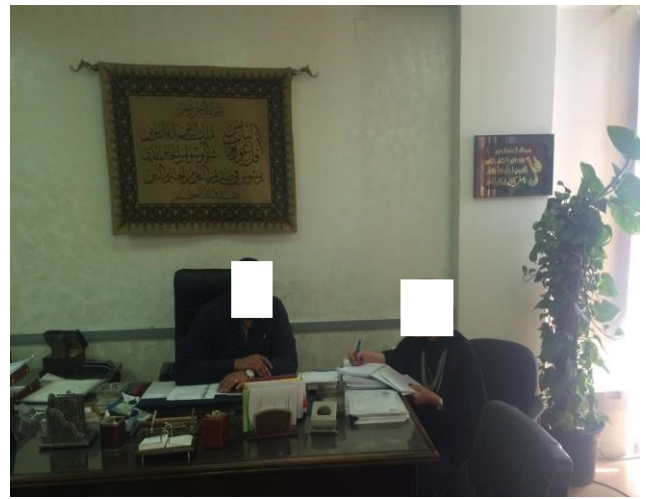
The main questions discussed during the consultation phase aimed to give the consultant some perspective about how the surveyed residents view the project area as well as their reaction to the project and the expected impacts from the proposed project.

**Table 9-2: Summary of Consultation Activities in project area**

Stakeholders		Number		Method
		Males	Females	
Governmental Organizations and Authorities	El Beheira Governorate Authority	2	1	Interviews
	Giza Governorate Authority	1	0	
	Sixth of October Authority	2	0	
	Wadi El Natroun Authority	3	1	
The residents in the project areas	Mayors, deputy mayors	4	0	Interviews FGD
	Women	0	19	
	Young people and Elderly	58	0	
	The owners and workers of the nearby farms	10	0	
Local Governmental Units(LGUs) and NGOs	Environmental administrations	4	2	Interviews
	Health departments	1	1	
	Local NGOs	3	3	
	Information Centers in Wadi El Natroun	1	0	
Project owner	Egyptian Electricity Transmission company	4	0	Interviews
	EETC- Misr El Wosta zone	1	0	
	EETC- West of Delta Zone	0	2	
	Cairo Electricity Zone	1	0	



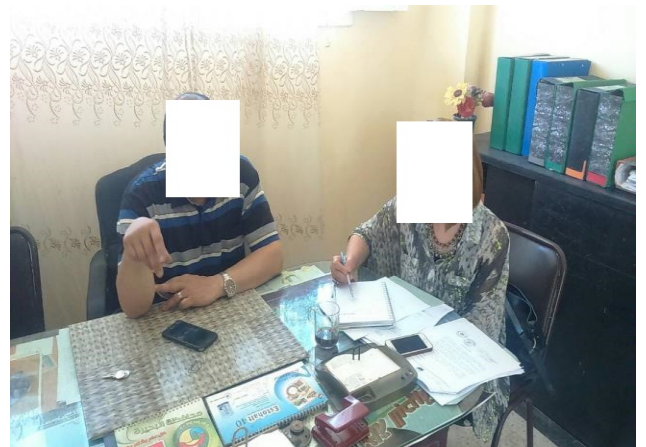
Official interview in El Beheira governorate



Official interview in El Giza governorate



Official interview in Wadi El Natroun  
(Information Center)



Official interview in Wadi El Natroun



During survey 6<sup>th</sup> of October lines



During survey Wadi El Natroun



Individual interview with a female in the project area (Abo Essa El-Sheikh hamlet)



Interview with the family of Hassan Sheisha

Figure 9-1: Photo interviews with project stakeholders and FGDs with PAPs

The results of the scoping meetings are presented as follows:

Table 9-3: Key comments and concerns that raised during the scoping consultation activities

Stakeholders	Comments/Concerns Raised
Governmental entities in Giza and El Beheira Governorates	- According to the interviews with the Governmental Entities in Giza, Beheira governorates and the local units of Wadi Al-Natroun, and 6 <sup>th</sup> of October cities, the majority of the officials emphasized on the importance of the project and its role in development. They reported that the project will have public benefits, and solve the problem of electricity shortages and interruptions.
District Authority in Wadi El Natroun, and 6 <sup>th</sup> of October District	- They confirmed that the project will help the community people in setting up commercial and industrial projects, constructing factories, and opening workshops which provide job opportunities for youth, and solve the unemployment problem; therefore it will improve their living standards. - The majority of the officials stressed on the importance of monitoring of the implementation of the international standards by the implementing entities, and implementing the projects with modern techniques in order to achieve the desired benefits of the project.
NGOs	- For NGOs, the meetings with them showed that, they are interested in the project and in raising the awareness of the community people about the project and the adopted grievance Mechanism, as well as, how the individuals can obtain their rights in case of any impacts occurred.

Stakeholders	Comments/Concerns Raised
<p><b>The residents in the project areas</b></p> <ul style="list-style-type: none"> <li>- Mayors, deputy mayors</li> <li>- Religious men</li> <li>- Women</li> <li>- Young people and Elderly</li> </ul>	<ul style="list-style-type: none"> <li>- The in-depth and focus group discussion with the community people in the project areas revealed that, most of them have information about the project and the construction works.</li> <li>- The meetings revealed remarkable and overwhelming public acceptance by the community people, who reported that the project will develop the area and the conditions of the residents, as well as, it will increase the production of the farms which suffer from the lack of water and energy.</li> <li>- For the opinions of the concerned people about the impacts of the project on them, the opinions are varied between positive and negative: <ul style="list-style-type: none"> <li>➤ Positive impacts: <ul style="list-style-type: none"> <li>○ Provide job opportunities in all fields</li> <li>○ Reduce electricity interruption</li> <li>○ Improve the economic conditions of the people</li> <li>○ Construction of factories, shops, clubs, cafes, and workshops</li> </ul> </li> <li>➤ Negative impacts: <ul style="list-style-type: none"> <li>○ High pressure will affect people health</li> <li>○ The impacts of electricity poles on the agricultural lands as each pole occupy one feddan.</li> </ul> </li> </ul> </li> </ul>
<p>Project owner Egyptian Electricity Transmission company</p>	<p>Meetings were held with the officials of the Egyptian Electricity Transmission Company, in order to:</p> <ul style="list-style-type: none"> <li>• Provide possible facilities for field work and extract the necessary permits to facilitate the task of researchers</li> <li>• Discuss the cognitive information to be disseminated among citizens about the project, and to clarify it in a simple way and in a language that appropriate with their culture,</li> <li>• Discuss and explain the grievance system in the Egyptian Electricity Transmission Company, in order to be discussed and explained to citizens in a simple way and in a language appropriate with their culture.</li> </ul>

- **Summary of Scoping Meetings consultation outcomes**

**The consultation outcomes revealed that:**

- A. The key message from the consultation events carried out for this project is that Public and government acceptance for and support to the project are very strong.
- B. The community people expressed their need to understand more about the overhead transmission line projects associated with the substation and in the area in general. In order to reduce the concerns of the community people and spread the knowledge the following is recommended:
  - Conduct orientation session in the project area, especially in the places that are preferred by the population such as mosques that guarantee the presence of large number of people.
  - Engage the stakeholders from NGOs that are working in the project area in the awareness programs, due to their ability to communicate with large number of citizens.

- The study recommends the importance of the religious men participation in the dissemination of knowledge and awareness among the individuals because they have the ability to persuade and consult
- C. The interviews and the focus group discussion revealed some concerns raised by the community regarding the project such as:
- The sample surveyed expressed their concerns in case of the project does not provide them with communication channels
  - Concerns regarding Environmental Health and Safety that resulted from the activities of the project
  - Future concerns of the community people regarding encroachment on agricultural lands and destruction of crops, especially in case of the project will not provide them appropriate compensation, which have been conducted within the framework of other projects related to the construction of the station.
- D. The study recommends the participation of the community people in sharing information about project with the other people especially the illiterate groups. (the recommendation is not obligated for the project)
- E. The study tried to raise awareness about the importance of the project, and inform the community people about grievance mechanism through individual and public consultation activities with the stakeholders.
- F. The study aimed to identify the most effective outreach channels that support continuous dialogue with the community, these channels are represented in:
- Religious men and mayors
  - NGOs in the project area
  - Some government officials in the local units.

• **Public Consultation Session on 26<sup>th</sup> November 2019**

In order to review the findings of the draft ESIA, and discuss all procedures related to resettlement and compensation; a public consultation event was held to allow various groups of stakeholders to come together and raise any comments on the drafted ESIA. EcoConServ consulting carried out several steps to announce for the event and invite stakeholders. (56) Persons attended the consultation event. (See Annex 3 the participants of the consultation session)

The session was held on 26th November 2019 in Yusef Al-Siddiq Markez Fayoum Governorate, which includes the largest number of PAPs.

In cooperation with the Consultant, invitees were informed of the date and location of the Public Consultation at least two weeks ahead. Participants were invited through:

- Invitations sent by EETC via Faxes and e-mails to the agricultural associations and the Directorate of Agriculture in the Governorates of Fayoum, Minya and Beheira.
- Telephone communication by EETC and the agricultural associations to all PAPs.
- Invitations sent by the consultant to governorate stakeholders

- An announcement about the date and place of the session was published in the agricultural associations and the headquarters of the local units, as well as in some public places such as mosques and cafes



**Figure 9-2: The announcement about the date and place of the public session**

The consultant explained the project (the location of the SS and the route of the HOTLs), and the procedures followed by the electricity company to estimate the compensating values. In addition to answering the questions and concerns of PAPs.









Figure 9-3: Photos of the attendees from the public consultation session

Table 9-4: Issues, Concerns and Topics Raised during the Public Consultation

Topic	Concern/question	Response of EETC representative
<b>Compensations</b>	<p>What is the policy for compensating land owners? Will the company buy the land or only rent it?</p> <p>Will private consultations be held with the affected farmers?</p> <p>Will agreements be made with them on how to receive compensation?</p> <p>What would happen if the project affected more than this plot of land?</p>	<p>Land owners will be compensated according to the prices of the crops at the agricultural cooperative. EETC announces the land requirements for the project. The value of the compensation is then determined according to the crops and the duration needed for the construction. In case the areas are not cultivated they are compensating by under a “passing rent” scheme.</p> <p>Consultation sessions will be held with the farmers in each area, before the start of the construction work sufficient period, and agreements will be concluded with them including compensatory value as is the case in all EETC projects.</p> <p>EETC will only buy the area under the tower, but the farmer will have the right to cultivate it and benefit from it.</p>
		<p>Indeed, EETC coordinates with the directorates of agriculture in the governorates of El-Beheira and Alexandria to address the agricultural associations and determine the ownership of the lands that the line passes, as well as determine the market value of crops and trees according to the season of agriculture</p>
		<p>EETC is committed to restoring the agricultural land in which the construction work was carried out</p>

Topic	Concern/question	Response of EETC representative
		<p>and returning it to its condition before excavation work began</p> <p>We will re-measure the affected lands after the construction and you will receive a full amount of money. You will attend the measuring process and the re-measuring. As well a representative from the governorate, local governmental unit and the Agriculture Association in order ensure that you will be fairly compensated.</p>
<p><b>the location of the OHTLs</b></p>	<p>Where will the OHTL pass?</p>	<p>The OHTL Maghagha/ 6<sup>th</sup> of October is of 150 km total distance, originates from 6<sup>th</sup> of October SS, in Giza Governorate, and passes through Fayoum Governorate, and ends in Maghagha SS located in southern border of Menia Governorate. The line from 6<sup>th</sup> of October SS runs on a desert land in parallel to Cairo-Al Wahat El Baharia road, then it crosses the road and passes parallel to Qaron Lake. Then crosses Wadi Al Natroun road and continues its path parallel to Wadi El Rayan Protectorate.</p> <p>Then it runs through uninhabited, uncultivated western desert in Beni Suef governorate and crosses Wadi El Rayan – Wadi El Hetan road to continue its path in desert lands. After that the line crosses Giza – Luxor road and eventually ending at West Maghagha SS.</p> <p>The OHTL Wadi El Natroun/ 6<sup>th</sup> of October. The OHTL routes is of a 50 km distance connecting Wadi El Natroun/ 6<sup>th</sup> of October SS originate from Wadi El Natroun SS and ends at 6<sup>th</sup> of October SS. All the OHTL routes lies in Giza governorate. The OHTL originating from Wadi El Natroun substation will run parallel to the south regional ring road, then shift south-east to run parallel to El Dabaa Corridor, afterwards break through unoccupied desert land towards 6<sup>th</sup> of October SS.</p>
<p><b>Activities of Construction Phase</b></p>	<p>What is the duration of construction work for this project?</p>	<p>The duration of construction is (20 months), construction will not be done for all the OHTLs route at the same time, The work will be divided according to a schedule (Time plan)</p>

Topic	Concern/question	Response of EETC representative
	<p>Are the routes of the OHTLs at an appropriate distance from other infrastructure underground?</p> <p>What procedures are used to coordinate with all stakeholders to maintain existing facilities in the project area?</p>	<p>EETC is compliant to all the regulations and instructions it has been provided by official authorities. Therefore, it should be emphasized that the routes of the OHTLs are not arbitrarily chosen. Rather, eetc has previously coordinated with the departments of General Utilities unit to ensure that the appropriate distance between the OHTLs and the neighboring utilities is taken into consideration.</p> <p>In general, all the towers are located in desert or agricultural lands away from the residential areas and the facilities located in these areas.</p>
	<p>How much land you will need?</p>	<p>EETC use various models and types of towers. The area of the basement of 500kv towers varies between 8 X 8 m.</p> <p>The excavation area for tower installation will be between 37 X 37 m, and 45 X 45 m maximum.</p>
	<p>Will there be permanent impacts on land productivity?</p>	<p>No it will only be affected during the construction phase. The land should return to its original productivity after that.</p>
<p><b>Right of Way RoW</b></p>	<p>Will the presence of the towers prevent construction on agricultural lands in the region?</p>	<p>The law prohibits construction under the OHTLs.</p> <p>According to the Electricity Law No.63 of year 1974, the RoW will constitute 25 m at each of the two sides of the transmission line which represent, also, the protection zone along the line route.</p> <p>Relevant laws and guidelines require maintaining a suitable Right of Way (RoW) distance in order to maintain safety of the general public and minimize exposure to Electromagnetic Fields (EMFs). Thus, the EMFs would effectively attenuate at the edge of this RoW.</p>
	<p>Is it possible to plant trees under the towers?</p>	<p>No it will not be possible to plant trees with extending Height not more than 7 m.</p>

## 10 Grievances and Redress Mechanism

**Objectives:** 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.

EETC will inform 6 of October City Council about the time of commencing the construction activities. Here comes the role of 6 of October City Council to inform the community about it through the following website

<https://almansoura.weladelbalad.com/>

**Disclosure of the GRM:** The Community people are fully informed about the Grievance procedures in simple language. The Consultant has disclosed information about GRM during the stakeholder engagement activities in May 2017 explaining the procedure, presenting the form structure, time frame and etc. Community people and the governmental units were informed about GRM through individual meetings and FGD.

**Mode of Grievance:** The contractor will accept all comments and complaints associated with the project from any stakeholder. Comments can be made via email, post, fax, on the telephone or in person. 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 tell their complaints. The site manager/EETC company will register all types of complaints.

**Response to grievances:** 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. Comments will be reviewed and taken into account in the project preparation; an individual response should be presented to each aggrieved person. The grievances should be documented in a Grievance log.

**Registration of GRM:** All grievances will be registered and acknowledged within 6 working days and responded to within one month. The project management will keep a grievance log and report on grievance management, as part of annual project progress reports, which will be available on the company (Misr El Wosta Distribution 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 : 00202 22616537
- By post or hand delivered to: Egyptian Energy Transmission Company, Emtedad Ramsis St., Abbasiya, Cairo
- Using grievance boxes that are installed at the LGU/NGOs in the nearby villages
- During construction to site manager (Contractors' side, who will be responsible to relay the grievance to EETC's project management):  
Site Manager : Eng. Talaat Gamal  
Mobile : +2 01095863000

**Confidentiality:** 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 name to be kept confidential.

**Management of GRM:** During construction of the project, grievances in relation to construction activities will be managed by the Company and the construction contractor(s). The Consultant has provide contact information for the contractor to residents of near hamlets.

A separate grievance mechanism is available in the same manner for workers, including employees of both the project-employed and contractors.

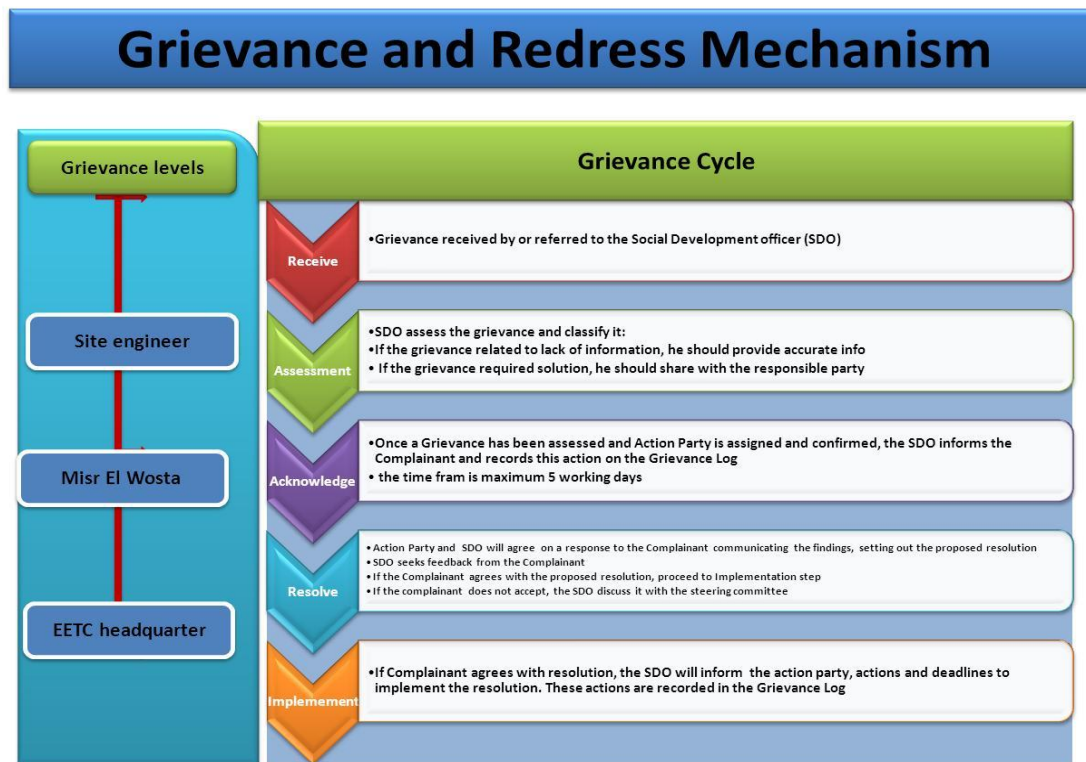


Figure 10-1: Grievance mechanism

### 10.1. Resources and Responsibilities

Regarding the responsible entity that will handle the grievances, it will be mainly the implementing agency (EETC). The Social Development Officers (SDOs) working within the EETC, and the resident engineers will address all grievances raised by community people related to project interventions. The SDO will be from three areas which are

Line	Zone
<ul style="list-style-type: none"> <li>500kV Wadi El Natroun/6th of October</li> <li>500kV, Wadi El Natroun</li> </ul>	West of Delta Electricity Zone
<ul style="list-style-type: none"> <li>500kV Maghagha/6th of October</li> </ul>	Misr El Wosta Zone
<ul style="list-style-type: none"> <li>220 Main October/ October</li> <li>220kV, North October/ 6th of October</li> </ul>	Cairo Electricity Zone

Line	Zone
• 220kV Motwreen/6th of October	

Compensation Coordinators (Social Development Officers) for the above stated zones are responsible for coordination between the agricultural associations and the PAPs. The PAPs can communicate directly with the coordinators and the project manager as the communication with the PAPs is within their responsibilities.

## Annex 1 Detailed Executive Regulation related to Law 4/1994 concerning EIA.

Law 4/1994 (amended by 9/2009 and 15/2015)

### Regulations for the Protection of Air Environment from Pollution

According to the provisions of Articles 34 through 40, 42, 43, and 47 in Law 4/1994 amended by Law 9/2009, and Article 42, annex 5,6 in the Executive Regulations, the project developer must ensure the following:

1. The site of the project must be selected properly to suit the project activity in order to ensure that the total pollution emitted by the proposed project during the construction and operation phases will not exceed the maximum permissible limits for the pollutants in the ambient air as listed below:

**Table 0-1 Maximum Limits of Outdoor Air Pollutants (Annex 5 of the Executive Regulations amended in 2012)**

Pollutant	Location Area	Maximum [µg/m <sup>3</sup> ]				Limit
		1hour	8hours	24hours	1Year	
Sulphur Dioxide	Urban	300		125	50	
	Industrial	350		150	60	
Carbon Monoxide	Urban		10	-	-	
	Industrial	30 mg/m <sup>3</sup>	mg/m <sup>3</sup>	-	-	
Nitrogen Dioxide	Urban	300	-	150	60	
	Industrial	300	-	150	80	
Ozone	Urban	180	120	-	-	
	Industrial	180	120	-	-	
Total Suspended Particles (TSP)	Urban	-	-	230	125	
	Industrial	-	-	230	125	
Particulate Matter less than 10 µm (PM <sub>10</sub> )	Urban	-	-	150	70	
	Industrial	-	-	150	70	
Particulate Matter less than 25 µm (PM <sub>2.5</sub> )	Urban	-	-	80	50	
	Industrial	-	-	80	50	
Suspended Particles Measured as Black Smokes	Urban	-	-	150	60	
	Industrial	-	-	150	60	
Lead	Urban	-	-	-	0.5	
	Industrial	-	-	-	1.0	
Ammonia (NH <sub>3</sub> )	Urban	-	-	120	-	



Pollutant	Location Area	Maximum Limit			
		[ $\mu\text{g}/\text{m}^3$ ]			
		1hour	8hours	24hours	1Year
	Industrial	-	-	120	-

Other limits include the allowable limits for pollutants emissions in air from the different sources which are detailed in annex 6 of the Executive regulations amended by decree 1095/2011, 710/2012 and 964/2015. The limits relevant to the current project scope are the pollution limit from asphalt mixing units which will be utilized to return the roads to their original state after the project completion, and the limits of emissions from vehicles which are shown in the following tables.

**Table 0-2 Allowable Emission levels from Asphalt mixing units (Table 12 of Annex 6 of the Executive Regulations amended in 2012)**

Maximum Allowable Emissions Level ( $\text{mg}/\text{m}^3$ )		
Total Suspended Solids (TSP)	Carbon Monoxide (CO)	Total Volatile Organic Compounds (VOCs)
50	500	50

- Reference conditions (at 13% O<sub>2</sub>, temperature of 273 Kelvin, and 1 atm pressure).
- The asphalt mixing unit should be placed at a minimum distance of 500 m from the nearest residential area, taking into consideration the prevailing wind direction.

**Table 0-3 Maximum allowable emissions from vehicles that operate using gasoline fuel (Table 23 of Annex 6 of the Executive Regulations amended in 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 0-4 Maximum allowable emissions from vehicles that operate using diesel fuel (Table 24 of Annex 6 of the Executive Regulations amended in 2012)**

Manufacturing Year (model)	Before the year 2003	From 2003 and later
Smoke density factor K ( $\text{m}^{-1}$ )	2.8	2.65

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

## Noise

Article 42 of the environmental law states that during the construction and operation phases of the project, the resulting noise levels must not exceed the sound intensity levels given by Table 3 of Annex 7 of the Executive Regulations when carrying out production, service or other activities, particularly

when operating machinery and equipment or using sirens and loudspeakers. The table lists the maximum permissible noise level limits according to area type as per the following designation:

- Sensitive areas to noise exposure;
- Residential suburbs with low traffic flow;
- Commercial and administrative areas in city center;
- Residential areas with some workshops, administrative activities, or recreational and entertainment activities overlooking public roads less than 12 meters,
- Areas overlooking public roads more than or equal 12 meters, or industrial areas with light industries; and
- Industrial Zone with heavy industries

**Table 0-5 Maximum permissible noise level limits for the project area (from Annex 7 of the Executive Regulations, Table 3)**

AREA TYPE	MAXIMUM PERMISSIBLE EQUIVALENT NOISE LEVEL [dB(A)]	
	Day	Night
	7 AM – 10 PM	10 PM – 7 AM
Sensitive areas to noise exposure	50	40
Residential suburbs with low traffic flow	55	45
Commercial and administrative areas in city center	60	50
Residential areas with some workshops, administrative activities, or recreational and entertainment activities overlooking public roads less than 12 meters	65	55
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

**Waste Management Regulations**

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 executive regulations 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 4/1994 which is equivalent to law 9/2009 and articles 28, 31 and 33 of the executive regulations, 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.

## Annex 2 Bird Life international tool's report for OHTLs

**220 kV OHTLs Main October / 6th of October - North October/ 6th of October -  
Motwreen/6th of October 3 OHTLs**



## Soaring Bird Sensitivity Map: A planning tool for wind energy and other sectors

### SEARCH SUMMARY

3.6.4 220 kV OHTLs Main October / 6th of October - North October/ 6th of October - Motwreen/6th of October  
3OHTLs

Countries: Egypt

Centroid: N29.973 E30.807 with 10 km buffer

Combined Sensitivity: Potential (0)

0 soaring bird species observed while a further 28 soaring bird species are thought to occur in this area.

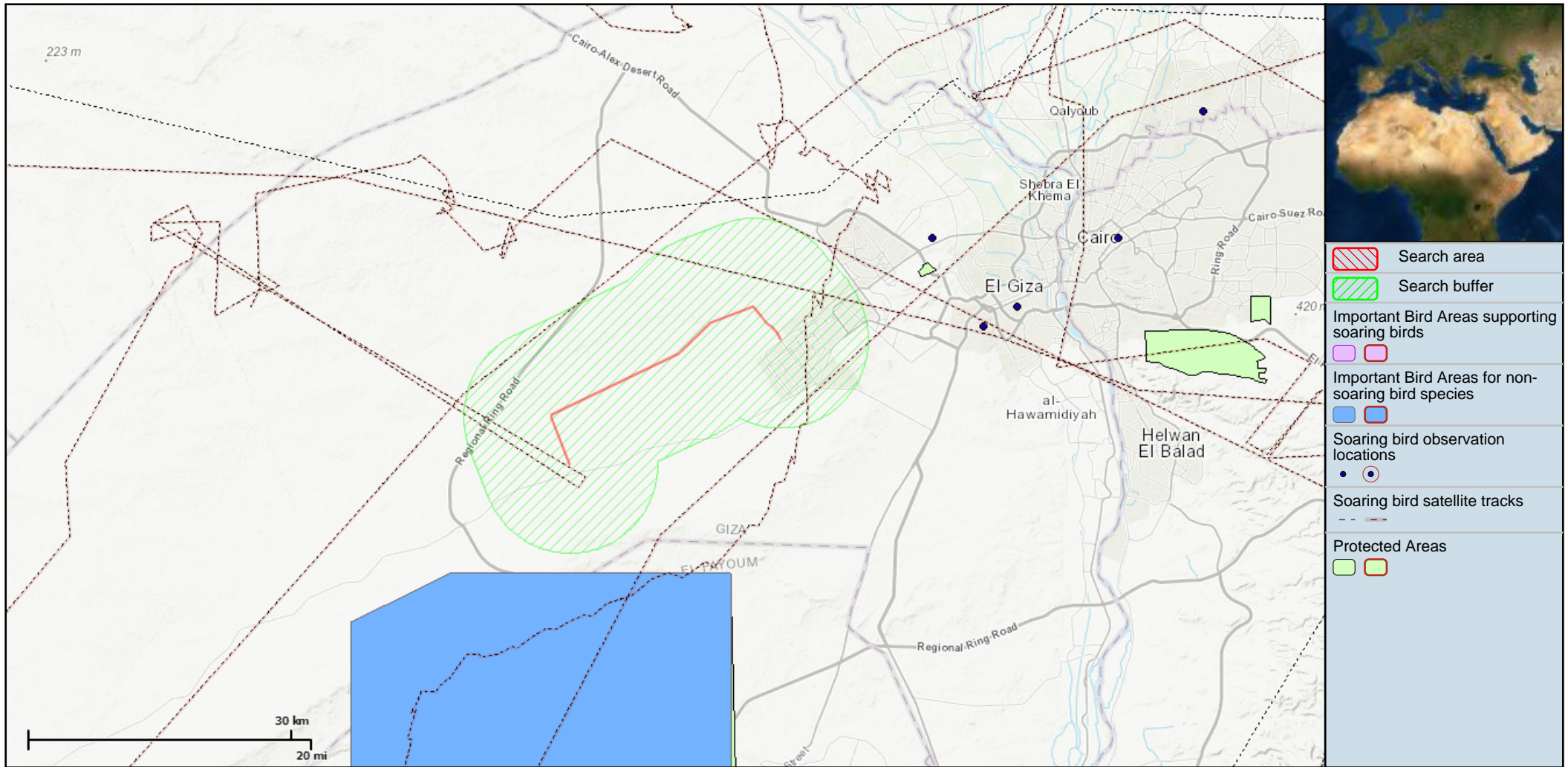
0 soaring bird observation locations.

0 IBAs supporting soaring birds plus a further 0 IBAs for non-soaring bird species.

0 protected sites.

4 satellite tracked migratory routes.

## MAP





## Soaring Bird Sensitivity Map: A planning tool for wind energy and other sectors

### GUIDANCE ON INTERPRETING SEARCH RESULTS

For each search that a user performs, the tool calculates a sensitivity value based on the available soaring bird data and assigns the location to one of six sensitivity categories (defined in more detail below). This calculation takes into account the proportion of each species' global population present, the global conservation status (IUCN Red List) of each species and the inherent collision vulnerability of each species based on their morphology and flight behaviour.

Information for this region is incomplete and an appropriate Environmental Impact Assessments (EIA) should always be undertaken to fully assess the sensitivity of a site. Further information on the underlying methodology can be found in the Instructions section of the web tool.

#### Sensitivity category: UNKNOWN

There are insufficient soaring bird data on which to base a sensitivity score. This should not, however, be interpreted as meaning that a site has no or low sensitivity.

#### Sensitivity category: POTENTIAL

A small number of soaring bird records exist within the defined search area suggesting that the site could be sensitive.

#### Sensitivity category: MEDIUM and HIGH

Soaring bird species are known to be present in significant numbers. Caution advised as development at this location may result in significant impacts on the populations of species present. Development may not be appropriate at or near to this location or may be appropriate only if special mitigation measures are put in place.

#### Sensitivity category: VERY HIGH and OUTSTANDING

Soaring bird species are known to be present in very significant numbers. Caution advised as development at this location may result in considerable impacts on the populations of species present. Wind energy development is unlikely to be appropriate at or near to this location.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SPECIES (28)

Name	Peak Count	Presence	SVI	Status	Global population	Source
Egyptian Vulture	-	expected	10	EN	37500	BirdLife species range map
Pallid Harrier	-	expected	8	NT	27000	BirdLife species range map
Lanner Falcon	-	expected	6	LC	550000	BirdLife species range map
Saker Falcon	-	expected	6	EN	21800	BirdLife species range map
Sooty Falcon	-	expected	6	NT	22500	BirdLife species range map
Peregrine Falcon	-	expected	6	LC	300000	BirdLife species range map
Eurasian Hobby	-	expected	6	LC	750000	BirdLife species range map
Common Kestrel	-	expected	6	LC	5250000	BirdLife species range map
Red-footed Falcon	-	expected	6	NT	550000	BirdLife species range map
Osprey	-	expected	7	LC	300000	BirdLife species range map
Great White Pelican	-	expected	10	LC	282500	BirdLife species range map
European Honey-buzzard	-	expected	7	LC	350000	BirdLife species range map
Glossy Ibis	-	expected	6	LC	1250000	BirdLife species range map
Egyptian Vulture	-	tracked	10	EN	37500	Bounas et al.
Eurasian Sparrowhawk	-	expected	6	LC	2750000	BirdLife species range map
Eastern Imperial Eagle	-	expected	9	VU	9250	BirdLife species range map





# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SPECIES (28)

Name	Peak Count	Presence	SVI	Status	Global population	Source
Steppe Eagle	-	expected	9	EN	95000	BirdLife species range map
Eurasian Buzzard	-	expected	7	LC	2900000	BirdLife species range map
Long-legged Buzzard	-	expected	7	LC	300000	BirdLife species range map
Western Marsh-harrier	-	expected	8	LC	750000	BirdLife species range map
Greater Spotted Eagle	-	expected	9	VU	9100	BirdLife species range map
Black-winged Kite	-	expected	6	LC	1000000	BirdLife species range map
Common Crane	-	expected	10	LC	497500	BirdLife species range map
Black Kite	-	expected	8	LC	1750000	BirdLife species range map
Dalmatian Pelican	-	expected	10	VU	11950	BirdLife species range map
Griffon Vulture	-	expected	10	LC	750000	BirdLife species range map
Merlin	-	expected	6	LC	1250000	BirdLife species range map
White Stork	-	tracked	10	LC	702000	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SATELLITE TRACKS (4)

Count	Species	Source
3	Egyptian Vulture	Bounas et al.
1	White Stork	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Egyptian Vulture	-	expected	10	EN	37500	BirdLife species range map
Pallid Harrier	-	expected	8	NT	27000	BirdLife species range map
Lanner Falcon	-	expected	6	LC	550000	BirdLife species range map
Saker Falcon	-	expected	6	EN	21800	BirdLife species range map
Sooty Falcon	-	expected	6	NT	22500	BirdLife species range map
Peregrine Falcon	-	expected	6	LC	300000	BirdLife species range map
Eurasian Hobby	-	expected	6	LC	750000	BirdLife species range map
Common Kestrel	-	expected	6	LC	5250000	BirdLife species range map
Red-footed Falcon	-	expected	6	NT	550000	BirdLife species range map
Osprey	-	expected	7	LC	300000	BirdLife species range map
Great White Pelican	-	expected	10	LC	282500	BirdLife species range map
European Honey-buzzard	-	expected	7	LC	350000	BirdLife species range map
Glossy Ibis	-	expected	6	LC	1250000	BirdLife species range map



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Egyptian Vulture	-	tracked	10	EN	37500	Bounas et al.
Name	SI	Type	Distance	Source		
Flight - 71	Unknown	Track	unavailable	Bounas et al.		
Flight - 77	Unknown	Track	unavailable	Bounas et al.		
Flight - 67	Unknown	Track	unavailable	Bounas et al.		
Eurasian Sparrowhawk	-	expected	6	LC	2750000	BirdLife species range map
Eastern Imperial Eagle	-	expected	9	VU	9250	BirdLife species range map
Steppe Eagle	-	expected	9	EN	95000	BirdLife species range map
Eurasian Buzzard	-	expected	7	LC	2900000	BirdLife species range map
Long-legged Buzzard	-	expected	7	LC	300000	BirdLife species range map
Western Marsh-harrier	-	expected	8	LC	750000	BirdLife species range map
Greater Spotted Eagle	-	expected	9	VU	9100	BirdLife species range map
Black-winged Kite	-	expected	6	LC	1000000	BirdLife species range map
Common Crane	-	expected	10	LC	497500	BirdLife species range map



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Black Kite	-	expected	8	LC	1750000	BirdLife species range map
Dalmatian Pelican	-	expected	10	VU	11950	BirdLife species range map
Griffon Vulture	-	expected	10	LC	750000	BirdLife species range map
Merlin	-	expected	6	LC	1250000	BirdLife species range map
White Stork	-	tracked	10	LC	702000	Müller et al.

Name	SI	Type	Distance	Source
Flight - 352	Unknown	Track	unavailable	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

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**500 kV OHTL Maghagha /6th of October SS**



## Soaring Bird Sensitivity Map: A planning tool for wind energy and other sectors

### SEARCH SUMMARY

3.6.3 500 kV OHTL Maghagha /6th of October SS

Route on border of Protectorates

Countries: Egypt

Centroid: N29.417 E30.367 with 10 km buffer

Combined Sensitivity: **Medium (0.002)**

0 soaring bird species observed while a further 28 soaring bird species are thought to occur in this area.

0 soaring bird observation locations.

0 IBAs supporting soaring birds plus a further 2 IBAs for non-soaring bird species.

4 protected sites.

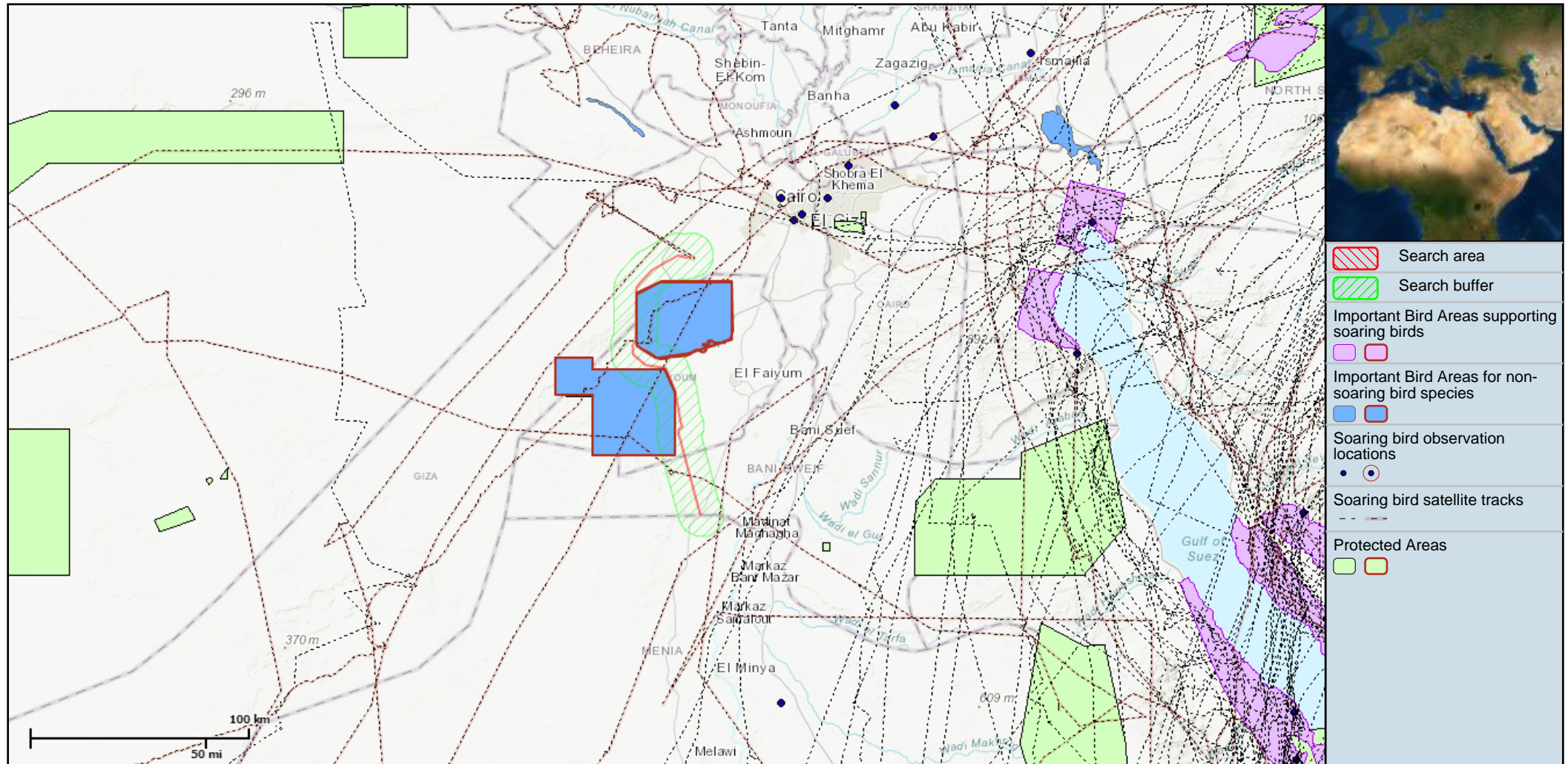
5 satellite tracked migratory routes.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## MAP





## Soaring Bird Sensitivity Map: A planning tool for wind energy and other sectors

### GUIDANCE ON INTERPRETING SEARCH RESULTS

For each search that a user performs, the tool calculates a sensitivity value based on the available soaring bird data and assigns the location to one of six sensitivity categories (defined in more detail below). This calculation takes into account the proportion of each species' global population present, the global conservation status (IUCN Red List) of each species and the inherent collision vulnerability of each species based on their morphology and flight behaviour.

Information for this region is incomplete and an appropriate Environmental Impact Assessments (EIA) should always be undertaken to fully assess the sensitivity of a site. Further information on the underlying methodology can be found in the Instructions section of the web tool.

Sensitivity category: UNKNOWN

There are insufficient soaring bird data on which to base a sensitivity score. This should not, however, be interpreted as meaning that a site has no or low sensitivity.

Sensitivity category: POTENTIAL

A small number of soaring bird records exist within the defined search area suggesting that the site could be sensitive.

Sensitivity category: MEDIUM and HIGH

Soaring bird species are known to be present in significant numbers. Caution advised as development at this location may result in significant impacts on the populations of species present. Development may not be appropriate at or near to this location or may be appropriate only if special mitigation measures are put in place.

Sensitivity category: VERY HIGH and OUTSTANDING

Soaring bird species are known to be present in very significant numbers. Caution advised as development at this location may result in considerable impacts on the populations of species present. Wind energy development is unlikely to be appropriate at or near to this location.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SPECIES (28)

Name	Peak Count	Presence	SVI	Status	Global population	Source
Glossy Ibis	-	expected	6	LC	1250000	BirdLife species range map
Pallid Harrier	-	expected	8	NT	27000	BirdLife species range map
Lanner Falcon	-	expected	6	LC	550000	BirdLife species range map
Saker Falcon	-	expected	6	EN	21800	BirdLife species range map
Sooty Falcon	-	expected	6	NT	22500	BirdLife species range map
Peregrine Falcon	-	expected	6	LC	300000	BirdLife species range map
Eurasian Hobby	-	expected	6	LC	750000	BirdLife species range map
Common Kestrel	-	expected	6	LC	5250000	BirdLife species range map
Red-footed Falcon	-	expected	6	NT	550000	BirdLife species range map
Osprey	-	expected	7	LC	300000	BirdLife species range map
Great White Pelican	-	expected	10	LC	282500	BirdLife species range map
European Honey-buzzard	-	expected	7	LC	350000	BirdLife species range map
Eurasian Spoonbill	-	expected	8	LC	64000	BirdLife species range map
Hen Harrier	-	expected	8	LC	300000	BirdLife species range map
Egyptian Vulture	-	tracked	10	EN	37500	Bounas et al.
Eurasian Sparrowhawk	-	expected	6	LC	2750000	BirdLife species range map



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SPECIES (28)

Name	Peak Count	Presence	SVI	Status	Global population	Source
Eastern Imperial Eagle	-	expected	9	VU	9250	BirdLife species range map
Steppe Eagle	-	expected	9	EN	95000	BirdLife species range map
Eurasian Buzzard	-	expected	7	LC	2900000	BirdLife species range map
Long-legged Buzzard	-	expected	7	LC	300000	BirdLife species range map
Western Marsh-harrier	-	expected	8	LC	750000	BirdLife species range map
Greater Spotted Eagle	-	expected	9	VU	9100	BirdLife species range map
Black-winged Kite	-	expected	6	LC	1000000	BirdLife species range map
Common Crane	-	expected	10	LC	497500	BirdLife species range map
Black Kite	-	expected	8	LC	1750000	BirdLife species range map
Dalmatian Pelican	-	expected	10	VU	11950	BirdLife species range map
Merlin	-	expected	6	LC	1250000	BirdLife species range map
White Stork	-	tracked	10	LC	702000	Ilias et al.



## Soaring Bird Sensitivity Map: A planning tool for wind energy and other sectors

### OTHER IBAS (2)

Name	Distance	Source
Lake Qarun Protected Area	0.23 km	Birdlife
Wadi El Rayan Protected Area	0.10 km	Birdlife



## Soaring Bird Sensitivity Map: A planning tool for wind energy and other sectors

### PROTECTED AREAS (4)

Name	IUCN Category	Status	Status Year	Distance
Lake Qarun Protected Area	Not Reported	Designated	2012	0.25 km
Qarun	VI	Designated	1989	0.23 km
Wadi El Rayan	VI	Designated	1989	0.11 km
Wadi El Rayan Protected Area	Not Reported	Designated	2012	0.09 km



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SATELLITE TRACKS (5)

Count	Species	Source
3	Egyptian Vulture	Bounas et al.
1	White Stork	Ilias et al.
1	White Stork	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Glossy Ibis	-	expected	6	LC	1250000	BirdLife species range map
Pallid Harrier	-	expected	8	NT	27000	BirdLife species range map
Lanner Falcon	-	expected	6	LC	550000	BirdLife species range map
Saker Falcon	-	expected	6	EN	21800	BirdLife species range map
Sooty Falcon	-	expected	6	NT	22500	BirdLife species range map
Peregrine Falcon	-	expected	6	LC	300000	BirdLife species range map
Eurasian Hobby	-	expected	6	LC	750000	BirdLife species range map
Common Kestrel	-	expected	6	LC	5250000	BirdLife species range map
Red-footed Falcon	-	expected	6	NT	550000	BirdLife species range map
Osprey	-	expected	7	LC	300000	BirdLife species range map
Great White Pelican	-	expected	10	LC	282500	BirdLife species range map
European Honey-buzzard	-	expected	7	LC	350000	BirdLife species range map
Eurasian Spoonbill	-	expected	8	LC	64000	BirdLife species range map
Hen Harrier	-	expected	8	LC	300000	BirdLife species range map





# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Egyptian Vulture	-	tracked	10	EN	37500	Bounas et al.
Name		SI	Type	Distance	Source	
Flight - 71		Unknown	Track	unavailable	Bounas et al.	
Flight - 77		Unknown	Track	unavailable	Bounas et al.	
Flight - 82		Unknown	Track	unavailable	Bounas et al.	
Eurasian Sparrowhawk	-	expected	6	LC	2750000	BirdLife species range map
Eastern Imperial Eagle	-	expected	9	VU	9250	BirdLife species range map
Steppe Eagle	-	expected	9	EN	95000	BirdLife species range map
Eurasian Buzzard	-	expected	7	LC	2900000	BirdLife species range map
Long-legged Buzzard	-	expected	7	LC	300000	BirdLife species range map
Western Marsh-harrier	-	expected	8	LC	750000	BirdLife species range map
Greater Spotted Eagle	-	expected	9	VU	9100	BirdLife species range map
Black-winged Kite	-	expected	6	LC	1000000	BirdLife species range map
Common Crane	-	expected	10	LC	497500	BirdLife species range map



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Black Kite	-	expected	8	LC	1750000	BirdLife species range map
Dalmatian Pelican	-	expected	10	VU	11950	BirdLife species range map
Merlin	-	expected	6	LC	1250000	BirdLife species range map
White Stork	-	tracked	10	LC	702000	Ilias et al.

Name	SI	Type	Distance	Source
Flight - 373	Unknown	Track	unavailable	Ilias et al.
Flight - 352	Unknown	Track	unavailable	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

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**500kV OHTL Wadi El Natroun/ 6th of October SS**



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SEARCH SUMMARY

Wadi el Natron 500 kV

6th October

Countries: Egypt

Centroid: N30.142 E30.667 with 10 km buffer

Combined Sensitivity: Potential (0)

0 soaring bird species observed while a further 26 soaring bird species are thought to occur in this area.

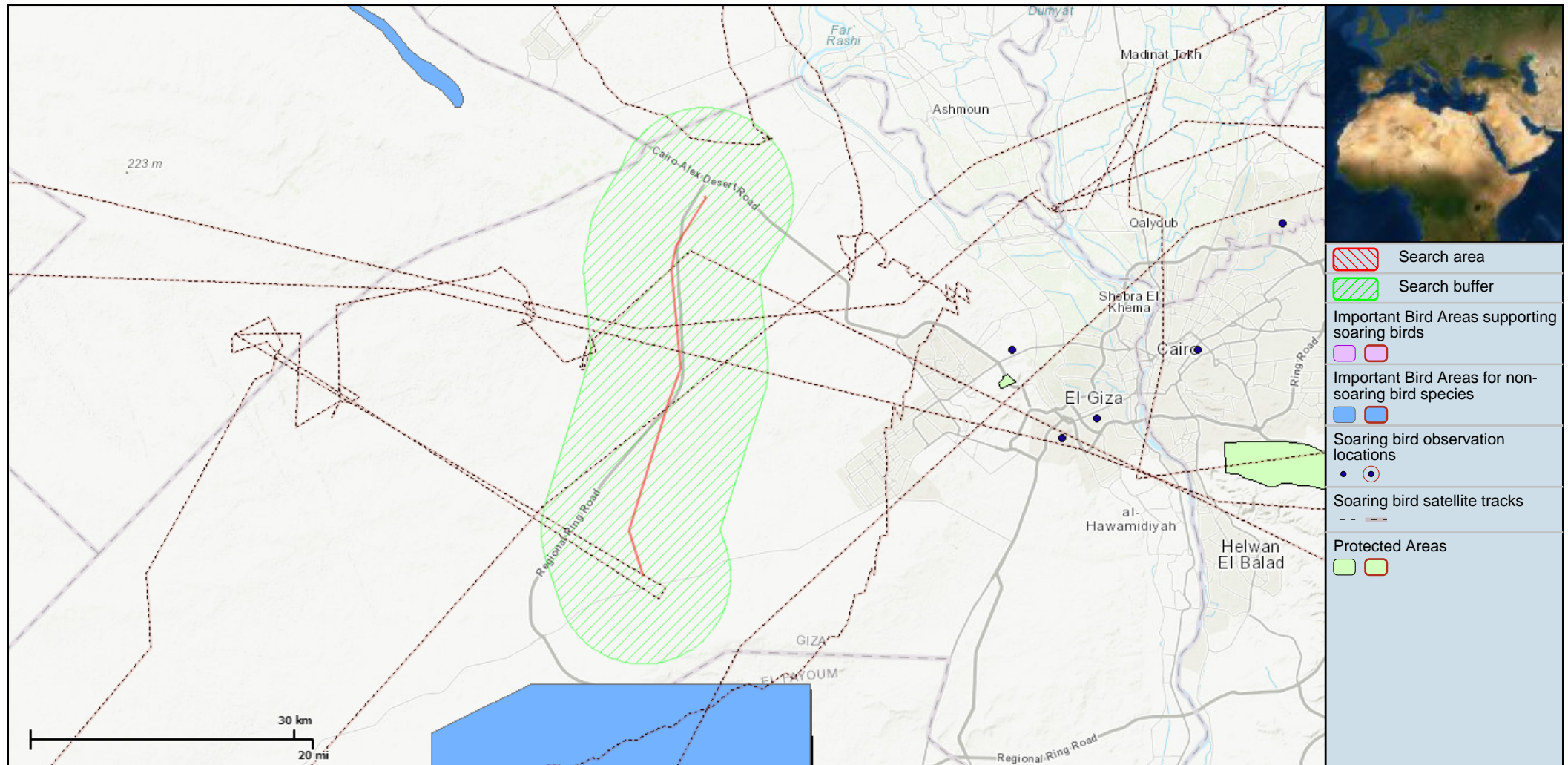
0 soaring bird observation locations.

0 IBAs supporting soaring birds plus a further 0 IBAs for non-soaring bird species.

0 protected sites.

5 satellite tracked migratory routes.

## MAP





## Soaring Bird Sensitivity Map: A planning tool for wind energy and other sectors

### GUIDANCE ON INTERPRETING SEARCH RESULTS

For each search that a user performs, the tool calculates a sensitivity value based on the available soaring bird data and assigns the location to one of six sensitivity categories (defined in more detail below). This calculation takes into account the proportion of each species' global population present, the global conservation status (IUCN Red List) of each species and the inherent collision vulnerability of each species based on their morphology and flight behaviour.

Information for this region is incomplete and an appropriate Environmental Impact Assessments (EIA) should always be undertaken to fully assess the sensitivity of a site. Further information on the underlying methodology can be found in the Instructions section of the web tool.

Sensitivity category: UNKNOWN

There are insufficient soaring bird data on which to base a sensitivity score. This should not, however, be interpreted as meaning that a site has no or low sensitivity.

Sensitivity category: POTENTIAL

A small number of soaring bird records exist within the defined search area suggesting that the site could be sensitive.

Sensitivity category: MEDIUM and HIGH

Soaring bird species are known to be present in significant numbers. Caution advised as development at this location may result in significant impacts on the populations of species present. Development may not be appropriate at or near to this location or may be appropriate only if special mitigation measures are put in place.

Sensitivity category: VERY HIGH and OUTSTANDING

Soaring bird species are known to be present in very significant numbers. Caution advised as development at this location may result in considerable impacts on the populations of species present. Wind energy development is unlikely to be appropriate at or near to this location.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SPECIES (26)

Name	Peak Count	Presence	SVI	Status	Global population	Source
Egyptian Vulture	-	expected	10	EN	37500	BirdLife species range map
Pallid Harrier	-	expected	8	NT	27000	BirdLife species range map
Lanner Falcon	-	expected	6	LC	550000	BirdLife species range map
Saker Falcon	-	expected	6	EN	21800	BirdLife species range map
Peregrine Falcon	-	expected	6	LC	300000	BirdLife species range map
Eurasian Hobby	-	expected	6	LC	750000	BirdLife species range map
Common Kestrel	-	expected	6	LC	5250000	BirdLife species range map
Red-footed Falcon	-	expected	6	NT	550000	BirdLife species range map
Osprey	-	expected	7	LC	300000	BirdLife species range map
Great White Pelican	-	expected	10	LC	282500	BirdLife species range map
European Honey-buzzard	-	expected	7	LC	350000	BirdLife species range map
Glossy Ibis	-	expected	6	LC	1250000	BirdLife species range map
Egyptian Vulture	-	tracked	10	EN	37500	Bounas et al.
Eurasian Sparrowhawk	-	expected	6	LC	2750000	BirdLife species range map
Eastern Imperial Eagle	-	expected	9	VU	9250	BirdLife species range map
Steppe Eagle	-	expected	9	EN	95000	BirdLife species range map





## Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

### SPECIES (26)

Name	Peak Count	Presence	SVI	Status	Global population	Source
Eurasian Buzzard	-	expected	7	LC	2900000	BirdLife species range map
Long-legged Buzzard	-	expected	7	LC	300000	BirdLife species range map
Western Marsh-harrier	-	expected	8	LC	750000	BirdLife species range map
Greater Spotted Eagle	-	expected	9	VU	9100	BirdLife species range map
Black-winged Kite	-	expected	6	LC	1000000	BirdLife species range map
Common Crane	-	expected	10	LC	497500	BirdLife species range map
Black Kite	-	expected	8	LC	1750000	BirdLife species range map
Dalmatian Pelican	-	expected	10	VU	11950	BirdLife species range map
Merlin	-	expected	6	LC	1250000	BirdLife species range map
White Stork	-	tracked	10	LC	702000	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## SATELLITE TRACKS (5)

Count	Species	Source
4	Egyptian Vulture	Bounas et al.
1	White Stork	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Egyptian Vulture	-	expected	10	EN	37500	BirdLife species range map
Pallid Harrier	-	expected	8	NT	27000	BirdLife species range map
Lanner Falcon	-	expected	6	LC	550000	BirdLife species range map
Saker Falcon	-	expected	6	EN	21800	BirdLife species range map
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Eurasian Hobby	-	expected	6	LC	750000	BirdLife species range map
Common Kestrel	-	expected	6	LC	5250000	BirdLife species range map
Red-footed Falcon	-	expected	6	NT	550000	BirdLife species range map
Osprey	-	expected	7	LC	300000	BirdLife species range map
Great White Pelican	-	expected	10	LC	282500	BirdLife species range map
European Honey-buzzard	-	expected	7	LC	350000	BirdLife species range map
Glossy Ibis	-	expected	6	LC	1250000	BirdLife species range map



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Egyptian Vulture	-	tracked	10	EN	37500	Bounas et al.

Name	SI	Type	Distance	Source
Flight - 71	Unknown	Track	unavailable	Bounas et al.
Flight - 77	Unknown	Track	unavailable	Bounas et al.
Flight - 82	Unknown	Track	unavailable	Bounas et al.
Flight - 67	Unknown	Track	unavailable	Bounas et al.

Eurasian Sparrowhawk	-	expected	6	LC	2750000	BirdLife species range map
Eastern Imperial Eagle	-	expected	9	VU	9250	BirdLife species range map
Steppe Eagle	-	expected	9	EN	95000	BirdLife species range map
Eurasian Buzzard	-	expected	7	LC	2900000	BirdLife species range map
Long-legged Buzzard	-	expected	7	LC	300000	BirdLife species range map
Western Marsh-harrier	-	expected	8	LC	750000	BirdLife species range map
Greater Spotted Eagle	-	expected	9	VU	9100	BirdLife species range map
Black-winged Kite	-	expected	6	LC	1000000	BirdLife species range map



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

## LOCATIONS BY SPECIES

Name	Peak Count	Presence	SVI	Status	Global population	Source
Common Crane	-	expected	10	LC	497500	BirdLife species range map
Black Kite	-	expected	8	LC	1750000	BirdLife species range map
Dalmatian Pelican	-	expected	10	VU	11950	BirdLife species range map
Merlin	-	expected	6	LC	1250000	BirdLife species range map
White Stork	-	tracked	10	LC	702000	Müller et al.

Name	SI	Type	Distance	Source
Flight - 352	Unknown	Track	unavailable	Müller et al.



# Soaring Bird Sensitivity Map:

A planning tool for wind energy and other sectors

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**Annex 3: Attendance sheets of the public consultation removed by EIB to protect the identity of participants.**

**Annex 4 Land Allocation Letter removed by EIB to protect personal information**