Submitted to:

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Environmental and Social Impact Assessment (ESIA) for
East Assiut Substation
February 2016

Submitted by

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Environmental and Social Impact Assessment (ESIA) for East Assiut Substation

February 2016
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Placing trees around the SS site. Besides reducing the noise, the measures will reduce the impact on vibration and visual or aesthetic...........................................92
Periodic maintenance of the GIS SS and its interconnections. This includes the regular tightening, SS efficiency, oil quality, gas pressure, etc.
# ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>EEAA</td>
<td>Egyptian Environmental Affairs Agency</td>
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<td>EEHC</td>
<td>Egyptian Electricity Holding Company</td>
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<tr>
<td>EETC</td>
<td>Egyptian Electricity Transmission Company</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
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<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<tr>
<td>FGD</td>
<td>Focus Group Discussion</td>
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<tr>
<td>kV</td>
<td>Kilo Volt</td>
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<tr>
<td>IEA</td>
<td>International Energy Agency</td>
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<tr>
<td>MVA</td>
<td>Mega Volt Ampere</td>
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<tr>
<td>MW</td>
<td>Mega Watt</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>PS</td>
<td>Pumping Station</td>
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<tr>
<td>ARAP</td>
<td>Abbreviated Resettlement Action Plan</td>
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<tr>
<td>ROW</td>
<td>Right of Way</td>
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<td>SS</td>
<td>Substation</td>
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<tr>
<td>SSs</td>
<td>Substations</td>
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<tr>
<td>SSI</td>
<td>Semi Structured Interview</td>
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<tr>
<td>ToR</td>
<td>Term of Reference</td>
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<td>WW</td>
<td>Wastewater</td>
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</table>
ESIA for East Assiut Substation

Executive Summary

Introduction

Project Background

Egypt is witnessing a rapid expansion in urbanization and population, paralleled with a surge in demand for electricity. The rate of electricity coverage in 2009 was approximately 99.6 percent; according to International Energy Agency (IEA). This rate is among the highest rates in Africa with 100 percent connection rates at urban areas and 99.3 percent at rural areas. However, with the growing population, it is expected that the demand for energy will rise. It is calculated that the demand for energy has risen by 30% from 2007/2008 to 2011/2012; from 19,738 MW to 25,705 MW. In addition, the number of the customers has increased from 23.8 million to 28.1 million (during the fiscal year 2007/2008 to 2011/2012). The total transformers capacity reached 99.6 thousands MVA in middele of 2014 compared to 95.9 thousand MVA during 2013 with a percentage rate 3.9%. and the EETC has a planed to continue improving its service.

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 (based on the approval of the Cabinet (2005) and the Council of Governors approval (2005)), the Egyptian Electricity Transmission Company (EETC) together with the distribution companies need to provide additional substations and their interconnections. EETC is seeking financial assistance from NSG bank for built new substation construction (East Assuit substation) and operated it as part of transmission network. EETC is undertaking efforts to expand its services in response to growing demand for electricity, hence, to meet the plan of EEHC.

EcoConServ has been asked to prepare the ESIA study; according to the ToR which was signed between EETC and EcoConServ, to investigate the potential of the substation at East Assuit 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.

The ESIA Methodology

The ESIA is based on typical screening and scoping of substation construction and operation; to identify generally 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. EIA study form (B) for the substation will be submitted for EEAA with details about substation included baseline identification and assessment for each substation. 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 areas. The literature review (included both information provided by the client as well as web based resources), contributed to elaborating the ESIA study’s objectives mentioned above by assessing:

- Project background and description.
- 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.
- Environmental and social impact assessments.
- Environmental management plan included environmental and social mitigation measures and environmental monitoring plan.

According to ToR with EETC, EcoConServ conduct site visits were undertaken to collect primary data from the site. The visits also 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.
- Ideas for maximizing the positive benefits especially on people’s livelihoods and the economic development of the project.

Legislative and Regulatory Frameworks

Laws and Regulations in Egypt

- Environmental Law 4/1994
- Law 38/1967 on Public Cleanliness
- Law 93/63 on Discharge of Liquid Waste
- Law 87/2015 on Electricity Installation
- Law 67/2006 Electricity Law for protecting the consumers

International Guidelines

- IFC, EHS guidelines for electric power transmission and distribution, 2007
- IFC, EHS general EGS guideline, 2007
- IFC, EHS guidelines for construction and decommissioning, 2007

Project Description

Project Objectives

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. New constructed substation will improve power capacity at the area with minimum losses of transferred power.

**Project location**

The project located at

About 13.6 Km from east north of Abnub district and 0.5 Km from the East desert highway – Assuit governorate

**Project components**

6 cells double breaker (4x500kV + 2x500MVA transformers), the transformers have capacity 3x167MVA + two auxiliaries transformers with capacity 500 KVA.

Interconnection of the expansions of East Assuit substation with existing SS and network, connected with 500 kV network:

- Bani suif power station (1)
- Bani suif power station (2)
- East Sohag (1)
- East sohag (2)

10 cells (4x220kV + 2x500 MVA transformers + 3x125MVA transformer + busbar connection)

Interconnection of the expansions of east Assuit substation with existing SS and network, connected with 220 kV network:

**Project Alternatives**

**No Project Alternative**

The main objective of the project is to connect (East Assuit SS), Environmental and social impacts from the project are assessed and no significant impacts are anticipated.

All of the projects alternatives have been studied. The “No Action” alternative will result in the demand for electricity exceeding supply, with an increasing deficit as demand increases in future years. A lack of a secure and reliable electricity supply system has significant social and economic implications. The "No Action" option is not a viable or acceptable alternative to the proposed project. If the SS will not built, the consequences would be as follows:

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

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

Accordingly, SS sites is already plotted in the EETC plan to be built to serve the increase of the electricity demand from the surrounding new establishment and demand on new connections to residential, industrial, rural area around the substation. The selection of the proposed SSs locations have been considered length optimization thus reducing the cost as much as possible whilst at the same time 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.

Baseline

Climate

The governorate characterized by clarity most of the year days due to decreased of vapor which reduce clouds formation, the number of purely clear day about 16.8 day/month. Usually warm temperature characterize the governorate especially during summer has high temperature, owing to arid weather.

Geology

Wadi Al Assuity is characterized by high elevation topography ranges from 48 m at downstream area to 874 m in the water-divide area and upstream portion and slopes generally to the Nile River. It can be divided to four main units: high land areas (Tableland); alluvial plain; piedmont plain and hydrographic network. The first is bounded the eastern parts of Wadi Al Assuity and composed of hard limestone rocks of Eocene age, while the second, which belongs to Quaternary deposits, is extended in the downstream portions of the basin and the delta of the Wadi. Piedmont plain occupies the foot slope of the limestone tableland and composed of cobbles, boulders, gravels, sand and clay. Hydrographic network (streams) is dissected the tableland and drain their surface runoff into Nile river

Seismic condition

The study area is a part of nile valley and lies stable shelf of Egypt (Said 1961-1962) where major surface features are reflection of basement lines and the main fault systems are NW and N-S (youssef 1968 and El Shemi et al 1999)

Soil

Along the sides of the Nile valley, there occur, in many places at various heights above the cultivated alluvial floor, the remains of a series of gravel terraces which were evidently formed by the Nile at a recessive stage in the downward erosion of its channel since late pliocene times (Said, 1962). The Paleonile sediments consist of a long series of interbedded red brown fluviatile to fluviomarine clays and thin fine-grained sand silt laminae. These sediments crop out along the banks of the valley and many wadis which drain into it. The deposits of this interval belong to pliocene age (Said, 1981).
Hydrology

The River Nile and the groundwater are the main sources of water supply in Egypt. The Quaternary Aquifer is the main water-bearing formation in the entire Nile Valley consequently, in the area of interest.

Ecology

No particularly sensitive habitats are known to be present within the study area. Habitats here are thought to have been previously degraded by human activities.

Socio-economic

Assiut is an agriculture Governorate consists of 11 cities and Marakez (Districts) with 55 local units (mother villages), 235 satellite villages and 1,072 Izba and Nage (hamlets). Assiut is covering a total area of 25,926 km$^2$, the inhabited area counts for 1,659.48 km$^2$. The rural inhabited area represents 89.4 % (1,484.2 km$^2$) of the total inhabited area of the Governorate. The total number of population amounts to 3,876,000 with a density rate of 2,335 inhabitant /km$^2$ (Assiut Governorate Information Center, Directorate of Health, 2010)

Potential Impacts

The description and evaluation of the potential impacts and the level of their significance are comprehensively presented in the report in Section 6. The suggested mitigation measures for each impact during the construction phase & the operation phase, described in section 7, are believed to be adequate and sufficient to eliminate or mitigate any significant negative impacts generated from the project activity. For more details and for the full impact table please refer to chapter 6 from the ESIA report.

Considering this study is a preliminary ESIA for the substation SSs, and the study still in the scoping phase of the proposed projects, the environmental impact assessment presented in these chapter will be general potential impact of the construction and operation of substation, detailed environmental and social impact will be presented on each ESIA study separated for each substation according to its surrounding area and environment.

Mitigation measures

This section of the report is dedicated to the detailed description of suggested mitigation measures and procedural actions for expected adverse impacts resulting from the proposed SS. These measures/procedures are meant to be considered and adopted as appropriate by EETC and its subcontractor during construction and operation of the SS. A summary table for impact and mitigation measures during construction and operation phase present.

Table 1 Summary for impact and mitigation during construction phase.
### Impact of East Assiut Substation

<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood and severity</th>
<th>Significance</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During construction of Substation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>workers</td>
<td>Notification to the surrounding establishment prior to the construction of the SSs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Time management and construction schedule according to the IFC regulation provided by the contractor prior to the construction phase.</td>
</tr>
<tr>
<td>Impact on traffic</td>
<td>High likelihood to occur – short term, temporary and localized only on the main road mainly</td>
<td>Negligible</td>
<td>Time management for transporting the materials, equipment, debris, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clear sign surrounding construction site and the enter / exit gate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Coordination with traffic department (ministry of interior) for vehicles route and movement.</td>
</tr>
<tr>
<td>Impact on Air Quality</td>
<td>High likelihood to occur – short term, temporary and localized - Highly construction workers.</td>
<td>Medium impact on construction</td>
<td>Spraying the sandy soil with water (if needed, especially during the dry period).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>workers</td>
<td>Maneuver area and the parking area should be well paved.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Management of the number of vehicles at the same time for specific location and the scheduling the intensity of vehicles.</td>
</tr>
<tr>
<td>Impact on Hazardous materials and</td>
<td>Uncertain likelihood – Uncertain impact duration - Highly sensitive receptors include soil pollution and workers.</td>
<td>Low to Medium impact</td>
<td>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.</td>
</tr>
<tr>
<td>waste generation</td>
<td>Physical environment receptors with low sensitivity include groundwater, surface water and drinking water</td>
<td></td>
<td>Waste management submitted by the contractor for waste management (solid waste; hazardous and non-hazardous)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Protection of spillage including paved site for workshop or maintenance of vehicles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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 temporary onsite waste management for the workers in the ToR of the contractor.</td>
</tr>
</tbody>
</table>
## Impact

### Health and Safety
- **Likelihood and severity:** High likelihood to occur for the construction workers, Highly workers. Receptors with medium to high impact for the workers
- **Significance:**
- **Mitigation Measures:** 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
- **Likelihood and severity:** Low likelihood to occur
- **Significance:** Negligible impact
- **Mitigation Measures:** No mitigation measures is prepared, Technical specifications of the equipment is include the standard measures for natural disaster risks

### Impact on water resource (ground water, soil)
- **Likelihood and severity:** Low likelihood to occur
- **Significance:** Low impact on soil
- **Mitigation Measures:** Following standard protection for the ground and soil and proper waste management described on the section of waste management measures

### Impact of lighting
- **Likelihood and severity:** Low likelihood to occur for scattered residence and fauna (birds)
- **Significance:** Low to negligible impacts
- **Mitigation Measures:** Ground level lighting, Energy efficiency

### Impact on land use and Involuntary resettlement
- **Likelihood and severity:** Low likelihood to occur
- **Significance:** Very low or no impacts
- **Mitigation Measures:** No mitigation measures is prepared

### Creation of Job opportunities and flourishing Economics of construction site
- **Likelihood and severity:** Creating job opportunities for members of the local community
- **Significance:** High positive temporary impact
- **Mitigation Measures:** Coordination with the contractor to employ members of the local community as construction workers and guards
Environmental and Social Management Plan (ESMP) and Monitoring Plan

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 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 during operation and maintenance of the substation. HSE staff of
the substation 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.

**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 staffs are used to operate and
maintain the substation at all times. Aspects of occupational health and safety and emergency procedures are
to be emphasized.

In addition to this 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 operator in the existing substation, it is already established the safety
standard and regular training held for the staff member. The 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, in every substation, EETC provides the emergency plan map including the responsibility of each
staff during emergency and their contacts.
1. Introduction

1.1. Project Background

Egypt is witnessing a rapid expansion in urbanization and population, paralleled with a surge in demand for electricity. The rate of electricity coverage in 2009 was approximately 99.6 percent; according to International Energy Agency (IEA)\(^1\). This rate is among the highest rates in Africa with 100 percent connection rates at urban areas and 99.3 percent at rural areas. However, with the growing population, it is expected that the demand for energy will rise. It is calculated that the demand for energy has risen by 30% from 2007/2008 to 2011/2012; from 19,738 MW to 25,705 MW. In addition, the number of the customers has increased from 23.8 million to 28.1 million (during the fiscal year 2007/2008 to 2011/2012)\(^2\).

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 (based on the approval of the Cabinet (2005) and the Council of Governors approval (2005)), the Egyptian Electricity Transmission Company (EETC) together with the distribution companies need to provide additional substations and their interconnections.

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.

The NSA Bank has agreed to fund the construction and expansion of several substations and for electricity connection in Egypt in cooperation with the EETC, one of them is East Assuit substation which is undertaking efforts to expand its services in response to growing demand for electricity, hence, to meet the plan of EEHC.

EcoConServ has been asked to prepare the preliminary EIA study; according to the ToR which was signed between EETC and EcoConServ, to investigate the potential of East Assuit substation 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 EIA report for all project components involved.

1.2. Project Rationale of Substation

The overall objective of the proposed project is to meet the increasing demand for electricity and to improve access to electricity at the area of each substation. As well as provide electricity services for unconnected housings and small businesses / public or private services in the area. The new SS will

\(^1\)http://www.eia.gov/cabs/Egypt/pdf.pdf
\(^2\) Egyptian Electricity Holding Company (EEHC) Annual Report 2011/2012
provide electricity to the surrounding area in addition to some other surrounding areas. The proposed project will connect the new SS to existing surrounding SSs using interconnection lines (double breaker).

The construction of new SSs will provide stable electricity service at the surrounding area new rural developed area, as well as increase the electric capacity provided to the area and secure reliable power supply with minimum losses of transferred power. Please refer to Chapter 3 for detailed description of the project.

Conducting an EIA study is a requirement of the Egyptian Environmental Law and international guidelines for approving and funding developmental projects. EETC has prepared Terms of Reference (ToR) for the preparation of an environmental and social assessment for East Assuit Substation (SS). Accordingly, EcoConServ has prepared this Environmental and Social Impact Assessment (ESIA) and a preliminary EIA for six substations together to be presented for the bank.

1.3. Project objectives

Interconnection of the expansions of East Assuit substation with existing SS and network, connected with 500 kV network:

- Bani suif power station (1)
- Bani suif power station (2)
- East Sohag (1)
- East Sohag (2)

10 cells (4x220kV + 2x500 MVA transformers + 3x125MVA transformer + busbar connection)

Interconnection of the expansions of east Assuit substation with existing SS and network, connected with 220 kV network:

- El walidaya (1)
- Elwalidaya (2)
- West Malway (1)
- West Malway (2)

1.4. The ESIA Objectives

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.
- Assess the capacity of the implementing agencies to put into action the developed environmental and social management plan, during construction and operation phases.
- Develop a capacity building program to cover any identified gaps in the capacity of implementing agencies regarding environmental and social measures

1.5. The ESIA Methodology

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

- 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
2. Legislative and Regulatory Frameworks

2.1. Egyptian Laws, Regulations and Policies


The Environmental protection Law No. 4 of the year 1994 is the main Environmental Law in Egypt concerning the environment (Law 4/94). The EEAA sets criteria and conditions, monitors compliance, and has the power to take procedures against violators of these criteria and conditions. The Environmental protection Law No.4 was amended in March 2009 by Law 9 of the year 2009 (Law 9/2009).

The Executive Regulation of Law 4/94 was set out in 1995 (Decree 338), and it has been amended several times. It was first amended in 2005 (Decree 1741), then in August 2011 (Decree 1095), and finally in June 2012 (Decree 710). Then decree No. 964 of 2015. Law 9 dictates that the EEAA must be notified via registered letter with EIA study report of the establishment of any new facility from the competent authority (in our case EETC) the category of the EIA report is defined according to the EIA guidelines which will be discussed in the following paragraph (Article 20and 21 from the law). The EEAA shall be responsible to follow up the data included in the project register, to ensure conformity with the actual conditions, and the project's commitment to the self-monitoring plan.

A self-monitoring plan should be in place as indicated in the Executive Regulation. Annex 3 of D1741/2011, which is a register form for the impact of the facility on the environment, requires information regarding the self-monitoring plan which include the pollutants that are being monitored, sampling locations and schedule, and the standard methods followed for analyses. The facility owner or his representative shall notify the EEAA immediately, by means of registered letter with return receipt requested, of any deviation in the criteria and specifications of emitted or discharged pollutants and the procedures taken to rectify such deviations.


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 as social desk study about the project area will be included in the report.
- Obtaining a license for the handling of hazardous materials from the competent administrative authority (Ministry of Housing). Onsite generation rates of hazardous wastes shall be reduced. Safe storage of hazardous waste in solid containers with clear and visible marks for their hazard type and maintenance of an integrated record for waste handling is required by law.

- Disposal of excavation/construction waste at licensed locations through the local authority.

- Maintenance of work place noise levels and exposure periods within the regulatory limits. Strict prohibition of ambient noise higher than regulation limits for housing zones.

- Taking precautionary measures to control fugitive dust emissions during excavation and construction works.

- Compliance with the maximum permissible limits of air pollutants in the gas emissions at the project site.

**Air quality**

The facility must demonstrate that it will meet air emission standards (Article 34/D338, amended by D1741; Article 35/D338; and Article 36/D338, amended by D1741). The cumulative contaminant levels due to incremental effects when combined with emissions from all other sources in the area should not exceed the limits in Annex 5 of the Executive Regulation (D338, amended by D1741, D1095, and D710), which are presented in table 1. Moreover a baseline measurement for ambient air quality in the proposed project area is measured according to the parameters set in the following table, the results of the air quality is represented at area baseline section. The proposed facility (substation) doesn’t have any emissions during operation.

**Table 2-1**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Average Period</th>
<th>Maximum Limit for Industrial Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur Dioxide</td>
<td>1 hour</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>1 year</td>
<td>60</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>1 hour</td>
<td>30,000</td>
</tr>
<tr>
<td></td>
<td>8 hours</td>
<td>10,000</td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td>1 hour</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>1 year</td>
<td>80</td>
</tr>
<tr>
<td>Ozone</td>
<td>1 hour</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>8 hours</td>
<td>120</td>
</tr>
<tr>
<td>Total Suspended Particles</td>
<td>24 hours</td>
<td>230</td>
</tr>
<tr>
<td></td>
<td>1 year</td>
<td>125</td>
</tr>
</tbody>
</table>
### CONDITIONS WITHIN THE WORKPLACE

The facility must operate such that any possible leakage or emission of air pollutants inside the workplace will not affect workers’ health and safety (Article 45/D1095). The Facility owner or his representative is committed to provide Material Safety Data Sheets (MSDS) for Chemical substances, in Arabic Language, which are used within the facility. Furthermore, Annex 8/D1095 includes four tables presenting the following:

- The maximum limits of air pollutants inside workplace and confined places according.
- The minimum limit of air circulation rate required for adequate ventilation inside workplace and confined places.

According to Article 44 of D1095/2011, noise levels and exposure duration within the workplace should not exceed the limits set in Table 1 in Annex 7 of D1095, amended by D710. Permissible levels for areas applicable to the facility are presented in table 2, in addition to those limit criteria. The facility and the contractor should comply with other noise limits during construction and operation according to annex 7 from the executive regulation.

**Table 2-2 Maximum Permissible Limits for Noise Intensity inside the Workplace in dBA (Annex 7, D1095/2011)**

<table>
<thead>
<tr>
<th>Type of Place and Activity</th>
<th>Maximum Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work place with up to 8-hour shifts.</td>
<td>85</td>
</tr>
<tr>
<td>Administrative offices- work rooms for computers and similar equipment.</td>
<td>65</td>
</tr>
</tbody>
</table>

**Solid waste**
According to annex 11 from the executive regulation No 964 for year 2015, collecting and handling of solid waste, where the containers should be suitable dimension and collecting and separating of different waste types, the car transfer the waste from the facility/construction site should be licensed from the competent authority. As well as landfill for final disposal should be authorized.

2.1.2. 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.

2.1.3. 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 8th chapter of decree 44/2000) was issued for the bases and specifications of the treatment, handling and safe re-use of sludge.

The potential wastewater from the proposed project during construction supposed to be collected daily and transfer by licensed tractor of the local administrative unit for the project area, and during the operation the SS will be connected to the sewage system network, if it exist in the project area.

2.1.4. Electricity Law No. 87 of the Year 2015

In addition to Environmental Impact Assessment requirements, concerning the electricity sector installation, the People Assembly passes the bill of Electricity Law 87 that regulates all activities and developments related to the electricity sector.

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

2.1.5. Electricity Law No. 67 of the Year 2006

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

Under this law, an agency should be established for the protection of the consumer and his interests. The Egyptian Electric Utility & Consumer Protection Regulatory Agency is the authority competent for the protection of the consumer in the electricity sector. In regard of electricity tariff and collection fee, EETC is already provides the certain fees regulation and fees collection system, to provide all diverse consumers.

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

- Decree 458/2007; Egyptian Drinking Water Quality Standards adopted by the Ministry of Health;
- Law 102/1983; Natural Protectorates;
- Law 12/2003, Articles 204-207; Construction Work License; and
- Law 66/1973; Traffic law according to noise and emissions.

2.2. International guideline

2.2.1 International Finance Corporation (IFC) Sustainability Framework

The Sustainability Framework articulates IFC's strategic commitment to sustainable development and is an integral part of IFC approach to risk management. The IFC Sustainability Framework promotes sound environmental and social practices, encourages transparency and accountability, and contributes to positive development impacts. The Sustainability Framework consists of The Policy on Environmental and Social Sustainability, which defines IFC's commitments to environmental and social sustainability; The Performance Standards, which define clients' responsibilities for managing their environmental and social risks; The Access to Information Policy, which articulates IFC's commitment to transparency. The IFC Performance Standards have become globally recognized as a benchmark for environmental and social risk management in the private sector; they are as follows:

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

According to the IFC Policy on Environmental and Social Sustainability Report issued in January 2012, the proposed project is classified as Category C: Business activities with minimal or no adverse environmental or social risks and/or impacts.

2-2-1-1 IFC EHS General Guidelines

The EHS General Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent.

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

As stipulated in the IFC General EHS Guidelines, discharges of process wastewater, sanitary wastewater, wastewater from utility operations or stormwater to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria.

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

AIR QUALITY AND EMISSIONS

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

According to the EHS General air quality guidelines, the generation and release of emissions of any type should be managed through a combination of:

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

In general and as stipulated in the IFC General EHS Guidelines, air emissions should not result in pollutant concentrations that reach or exceed ambient air quality guidelines presented in table 3.

Table 2-3 IFC Ambient Air Quality Guidelines

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Average Period</th>
<th>Guideline Value (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur dioxide (SO₂)</td>
<td>24 hours</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125 (Interim target1-1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 (Interim target-2)</td>
</tr>
<tr>
<td></td>
<td>10 minutes</td>
<td>500</td>
</tr>
<tr>
<td>Nitrogen dioxide (NO₂)</td>
<td>1 year</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>1 hour</td>
<td>200</td>
</tr>
<tr>
<td>Particulate Matter (PM₁₀)</td>
<td>1 year</td>
<td>70 (Interim target-1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 (Interim target-2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 (Interim target-3)</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150 (Interim target-1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 (Interim target-2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75 (Interim target-3)</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>50</td>
</tr>
<tr>
<td>Particulate Matter (PM₂.₅)</td>
<td>1 year</td>
<td>35 (Interim target1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 (Interim target-2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 (Interim target-3)</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75 (Interim target-1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 (Interim target-2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>37.5 (Interim target-3)</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>25</td>
</tr>
<tr>
<td>Ozone</td>
<td>8 hours daily maximum</td>
<td>160 (Interim target-1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.
NOISE EMISSIONS

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

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

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

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

SOCIAL

Two IFC Performance Standards are related to the social aspects of the proposed project, namely 2 (Labour and Working Conditions) and 4 (Community Health, Safety, and Security).

IFC Performance Standard 2: Labour and Working Conditions recognize that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The main objectives of this performance standard include promoting compliance with national employment and labour laws, protecting workers, including vulnerable categories of workers such as children and promoting safe and healthy working conditions.

This performance standard applies to workers directly engaged by the project owner (direct workers), workers engaged through third parties to perform work related to the project for a substantial duration (contracted workers), as well as workers engaged by the project owner’s primary suppliers (supply chain workers). The performance standard states that workers should be engaged in the identification of labour risks and impacts. In addition, it presents other requirements related to child labour, forces labour and occupational health and safety.

IFC Performance Standard 4: Community Health, Safety, and Security addresses the project owner’s responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups. One of
the main objectives of this performance standard is to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected communities.

2-2-1-2 IFC –EHS guidelines for Eclectic Power Transmission and Distribution
This Guideline includes industry(Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas) relevant environmental impacts management techniques, environmental performance indicators and Monitoring. The guideline presents applicable limits for general public exposure to electric and magnetic fields published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the limits of exposure represent in the following table. For other environmental monitoring (air and noise) it is the same parameter set at general EHS guidelines.

Table 2-4 limits for general public exposure to electric and magnetic fields

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Electric field (V/m)</th>
<th>Magnetic field (µT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 HZ</td>
<td>5000</td>
<td>100</td>
</tr>
<tr>
<td>60 HZ</td>
<td>4150</td>
<td>83</td>
</tr>
</tbody>
</table>

Occupational H&S

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

Table 2-5

<table>
<thead>
<tr>
<th>Voltage range (kv)</th>
<th>Minimum working distance (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 to 242</td>
<td>1.5&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>4</sup> OSHA
The min. working distance and min. clear hot stick distance may be reduced provided that such distances are not less than the shortest distance between the energized part and a grounded surface.
3.  Project Description

3.1.  Project Objectives

Those objectives are in accordance to the EETC 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 EETC 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.

In accordance to provide stabilize power supply; ensure quality supply, guard against losses due to minimal power failures and blackouts in different area along Egypt different governorates, in accordance the EETC implement different substations include transformers to change voltage levels between high transmission voltages and lower distribution voltages, or at the interconnection of two different transmission voltages. Transform voltage from high to low, or the reverse, or perform any of several other important functions. The proposed substation (SS) will include transformers to change voltage levels between high transmission voltages and lower distribution voltages, or at the interconnection of two different transmission voltages.

3.2.  Proposed Technology

3.2.1.  Substation components

Power transformer

The primary function of a power transformer is to transform system voltage from one nominal level to another. The transformer has to be capable of carrying the power flow for its particular location in the system under various operating conditions and contingencies, such as line or transformer outages. The transformer has many different types for cooling depend on the used technology; the type of cooling used is based on the requirements of the specifications, the size of the transformer, and the manufacturer’s standard design.

Power circuit breaker

Circuit breaker is a device that closes and interrupts (opens) an electric circuit between separable contacts under both load and fault conditions. Double circuit breaker for 500Kv line is used at the proposed SS.

Metal –switchgear

Metal-clad switchgear serves the same system function as comparable elements in a conventional open bus-type substation. These elements may include main power switching or interrupting devices, disconnecting switches, buses, instrument and control power transformers, and control and auxiliary devices, as well as other devices.
Substation voltage regulator

Both three-phase and single-phase voltage regulators are used in distribution substations to regulate the load-side voltage. Substation regulators are one of the primary means, along with load-tap-changing power transformers, shunt capacitors, and distribution line regulators, for maintaining a proper level of voltage at a customer's service entrance. A very important function of substation voltage regulation is to correct for supply voltage variation. With the proper use of the control settings and line drop compensation, regulators can correct for load variations as well.

Other components

The SS include many other components as shunt capacitor equipment, air switch, instruments transformers, capacitors and coupling voltage, and automatic circuit closer is a self-controlled protective device used to interrupt and reclose automatically an alternating-current circuit through a predetermined sequence of opening and reclosing followed by resetting, lockout, or hold closed.

3.2.2. Substation Technology

Gas Insulated Switchgear (GIS) with SF6 gas will be used at new substations. GIS is a compact multi-component assembly enclosed a ground metallic housing in which the primary insulating medium is compressed Sulphur hexafluoride (SF6) gas. SF6 acts as insulation between live parts and the earthed metal closure.

The use of SF6 gas is one of the revolutionary technologies in addition to the technology of circuit breakers. The dielectric strength of SF6 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 SF6 gas as described above.

Regarding the pollution and other accidents that may occur during operation and maintenance, the GIS SS with SF6 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 3.7 below describe the main advantages of the GIS SS compared with other technologies (Conventional SS, Hybrid GIS SS)
3.3. Project Location

One of the most important factors in the design of SS is the location of the SS, which should considered the following factors:

- Location of present and future load center
- Location of existing distribution line
- Location of existing and future power generation
- Nearness to road, accessibility to heavy equipments.
- Availability at the site for maintenance requirements.
- Environmental condition (weather, soil resistivity, general topographic, habitat and fauna, …)
- Public safety and public concern
- Cultural resources

In accordance EETC usually allocate land for SS compatible with previous characteristic for SS site with minim impact on the surrounding environment.

EETC provide EcoConServ the proposed SS locations in accordance to prepare EIA report, to the proposed SS. The lines which will be connected to the new 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. A description of the projects locations and surroundings and the existing environmental and social conditions related to the different perspectives (environmental, social, human being, flora, fauna, cultural heritage sites, etc.) will be provided at section 5 from the report.

The proposed SS site is determined as the following coordinate:
Preliminary EIA for six Substations at different governorates

East assuit substation

Latitude: 27° 23' 30" N

Longitude: 31° 10' 2.40" E

The following map represents the proposed locations for East Assuit SS.
Figure 3.5 Map of the proposed location of East Assuit Substation
3.4. Proposed Project Components

The main components\(^6\) of the proposed East Assuit SS project are:

6 cells double breaker (4x500kV + 2x500MVA transformers), the transformers have capacity 3x167MVA + two auxiliaries transformers with capacity 500 KVA.

Interconnection of the expansions of East Assuit substation with existing SS and network, connected with 500 kV network:

- Bani suif power station (1)
- Bani suif power station (2)
- East Sohag (1)
- East sohag (2)

10 cells (4x220kV + 2x500 MVA transformers + 3x125MVA transformer + busbar connection)

Interconnection of the expansions of east Assuit substation with existing SS and network, connected with 220 kV network:

- El walidaya (1)
- Elwalidaya (2)
- West Malway (1)
- West Malway (2)

3.5. Description of Activities during Project Implementation

3.5.1. Description of Activities during Construction Phase

a. Construction of Substation

- **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 underground 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.

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\(^6\)Please refer to Task 1 on the Consultant Methodology of Description of the main project components.
• **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.

### 3.5.2. Description of Activities during Operation Phase

#### a. Operation of Substation

- **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.
- **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.

Besides all activities mentioned above, to ensure the knowledge and the skill of the operator of the SS, the regular training, including regular simulation during the emergency shall be organized and provided by EETC to the operators of the SS.
4. Project Alternatives

4.1. No Project Alternative

The main objective of the project is to connect East Assuit SS to the existing SSs. and network. The Environmental and social impacts from the project are assessed and no significant impacts are anticipated.

The proposed substation is located in desert area full about 0.5 from East desert highway and about 13.6 KM from the nearest village at Abnun district. It’s clear from the proposed SS location, there has no impact on the surrounding environment where the location of the station is very far from any residential and rural area.

The new substation are added to the network to address the increased demand of electricity in the different governorates

It is believed that there will be many benefits from the project that could over-weigh its limited environmental impacts such as providing fluent power supply to the consumers, in addition to the developmental and socio-economic benefits. Therefore the no-project alternative is not an environmental/social requirement.

If the six SSs were not built, the consequences would be as follows:

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

4.2. Alternative technology

The GIS technology with SF6 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), 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 SF6 gas insulated system is selected for those substations. However, if SF6 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/Route Alternatives

The selection of the SS location should be undertaken according to criteria that fulfills technical, environment as well as socioeconomic objectives in order to achieve the most feasible application.
Accordingly East Assuit SS the sites are already plotted during the EETC planning to be built and to serve the increase of the electricity demand from the surrounding area and demand on new connections to rural, and industrial areas around the substation.

Generally there are few environmental constraints for construction and operation the SS that are described in the ESMP screening criteria in Chapter 8. If these constraints were followed during the implementation (construction and operation phase) of the project there will be no environmental/social objection with regards to site selection of the SS.
5. Baseline for Environment and social

5.1. Project location

Assiut governorate is one of Egypt's ancient governorates. It belongs to the Middle Upper Egypt region that encompasses Assiut and New Valley governorates. Assiut governorate stretches for about 120 km along the Nile banks. The capital of the governorate is the city of Assiut. It has a latitude of 27.33 (27° 19' 60 N) and a longitude of 30.83 (30° 49' 60 E); it lies between two mountains, thus it is distinguished by a very hot and dry climate. It is also considered the trade capital of Upper Egypt. The governorate is bordered in the East by Assiut Eastern Mountain and the Red Sea governorate, in the West by Assiut Western Mountain and the New Valley governorate, in the North by Menia governorate, and by Souhag governorate in the South. total area of the governorate is 25926.00 Km²

The proposed SS located near Abnub district, about 13.6 Km from Abnub village, the following figure present Assuit 11 districts and the project location within Abnub district.

![Assiut governorate and project area](image)

Figure 5-1 Assiut governorate and project area

5.2. Air and climate

Egypt's climate is characterized by a combination of the hot, dry air masses over the Sahara and the cooler, damper maritime air masses from the North carried by Eastward moving depressions.
Throughout most of the year the hot, dry, tropical continental air masses dominate, but during the winter period air masses of both tropical maritime and polar maritime origin make brief incursions into Egypt from the North, and frequently bring rain. The Khamsin winds dominate in spring.

The governorate characterized by clarity most of the year days due to decreased of vapor which reduce clouds formation, the number of purely clear day about 16.8 day/month. Usually warm temperature characterize the governorate especially during summer has high temperature, owing to arid weather.

The nearest weather station to the proposed project is Abnub station, where it located near Abnub village about 13.6 Km from the proposed SS.

**Temperature**

The following table present the temperature at the study area which is in average 22.1°C, and high temperature average is 29.7°C, and low temperature average is 13.4°C.

<table>
<thead>
<tr>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average temp. °C</td>
<td>12.5</td>
<td>14.3</td>
<td>17.7</td>
<td>23</td>
<td>27</td>
<td>29.3</td>
<td>29.4</td>
<td>29</td>
<td>27</td>
<td>23.7</td>
<td>18.3</td>
<td>14</td>
</tr>
<tr>
<td>Average high temp °C</td>
<td>19.9</td>
<td>22.5</td>
<td>25.7</td>
<td>31</td>
<td>35.3</td>
<td>36.9</td>
<td>36.1</td>
<td>36.1</td>
<td>33.9</td>
<td>31.5</td>
<td>26</td>
<td>21.4</td>
</tr>
<tr>
<td>Average low temp °C</td>
<td>4</td>
<td>5.6</td>
<td>8.5</td>
<td>13.2</td>
<td>17.8</td>
<td>20</td>
<td>20.4</td>
<td>20.5</td>
<td>18.6</td>
<td>15.9</td>
<td>10.5</td>
<td>5.8</td>
</tr>
</tbody>
</table>


**Rainfall**

The area suffers from perception scarcity, the average rainfall during the year is about 0.7 mm and it is raining during February and March.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>mm.</td>
<td>-</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
</tr>
<tr>
<td>Days of Prec.</td>
<td>0.1</td>
<td>0.3</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
</tr>
</tbody>
</table>


**Flash flood**

During 1994 Assuit governorate exposed to a flash interval, where many rural villages was been damaged which lies under the feet of both eastern and western desert in face of Wadi el Nile (Nile valley) there are some of storm water drains all over the governorate.
Relative humidity

Relative humidity in the region as well as the Project Area is not and it is characterized by dry area. However the project area located at arid weather near agriculture area at the governorate so we can notice that the humidity is reach 38%. The following table presents the relative humidity at the proposed SS area.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>54.4</td>
<td>45.9</td>
<td>40.4</td>
<td>32.2</td>
<td>28.6</td>
<td>30.6</td>
<td>36.1</td>
<td>40.5</td>
<td>43.9</td>
<td>45</td>
<td>51.2</td>
<td>55.2</td>
</tr>
</tbody>
</table>

Table 5-3 relative humidity station

Source: http://www.weatherbase.com/

Wind speed

The average of wind speed in the governorate in general about 7.5 note/hours; the wind speed vary seasonally; the highest during spring is about 8.3 notes/hour and during summer it is about 7.9 note/hours. The following table present the wind speed at Abunb village which is near the proposed SS by 13.6 Km.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Km/h</td>
<td>12.6</td>
<td>13.3</td>
<td>15.1</td>
<td>15.8</td>
<td>15.8</td>
<td>16.9</td>
<td>15.5</td>
<td>14</td>
<td>14.8</td>
<td>11.9</td>
<td>10.8</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Table 5-4 wind speed at An station

Source: http://www.weatherbase.com/

Wind speed measurements were carried out by the governmental meteorological station which is located in Assiut University campus. The data were measured for a period of five years starting from 2006 to 2010 at the standard height of 10 m and averaged over one hour. Sixteen wind directions are considered, where the incident wind direction is varied from N to NNW in a clockwise rotation with a step of 22.5°.

Figure 5-2 wind rose at Assuit
Air quality

Governorate enjoy the clean air environment of rural agricultural area in Egypt except for seasons of incinerating farm waste and at areas close to industrial facilities where there are air emissions degrading air quality. Assiut-city has several sources of industrial pollution which include two thermal power plants, oil refineries, fertilizers, bricks, cement, and food industries. Moreover, the mobile sources such as vehicles, which are now considered one of the most high pollution sources due to their polluting emissions, as most of vehicles in Assiut city, are more than 10 years old. Also, accumulation of large quantities of municipal wastes as a result of the rapid increase in population and the limited capacity of municipalities in dealing with them have led to increased open burning of such wastes. The emissions of air pollutants from the burning of wastes have exacerbated risk due to their proximity to residential areas. In addition to the anthropogenic sources, there is another natural source of pollution, which is the desert surrounding Assiut, where seasonal winds transfer dusts from the desert resulting in higher concentrations of dusts during certain times of the year (Khamasin phenomenon).

Air quality at the study area

The air quality at the proposed site of the proposed substation is exhibiting acceptable levels of classic air pollutants in fact the levels are way below the national guidelines. Generation and dispersion of dust from increased vehicle traffic, especially during the construction phase, may reduce visibility, relative to baseline levels, and, together with combustion engine emissions, may affect ambient air quality. Concentration of dust particles, both total suspended particulate and respirable particulate matter and other pollutants from open burning, emissions from equipment and machinery used in construction, concrete batch plant operations and emissions from vehicles used to transport workers also contribute to air pollution. These impacts may affect the human environment and, typically, arise during the construction phase and, to a much lesser extent, during the operation phase, requiring monitoring and assessment of the natural and man-made air pollutants. The following table present the result of air quality monitoring at the proposed SS site. The result is for average 1 hours and Average 1 hours (µg/m³)

<table>
<thead>
<tr>
<th>Time</th>
<th>NO</th>
<th>NO₂</th>
<th>NOx</th>
<th>SO₂</th>
<th>CO</th>
<th>PM₁₀</th>
<th>T.S.P</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:AM</td>
<td>17.4</td>
<td>11.5</td>
<td>28.6</td>
<td>8.9</td>
<td>1.7</td>
<td>125.82</td>
<td>161.47</td>
</tr>
<tr>
<td>11:00</td>
<td>13</td>
<td>19.1</td>
<td>32</td>
<td>8.5</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:00</td>
<td>10.2</td>
<td>14</td>
<td>24.1</td>
<td>8.5</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:00</td>
<td>8.5</td>
<td>12.1</td>
<td>20.5</td>
<td>8.2</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
More details about the methodology of air samples and equipments used are submitted at Annex 1 from the report.

Site specific Noise

All the recorded rests showed compliance with the national and international guidelines for ambient air quality moreover most of the data recorded were way below the guidelines which indicates that the ambient air quality in the project areas is one of the best areas in Egypt in terms of ambient air quality which can be attributed to the absence of any major industrial sources.

Moreover the area is mainly desert with a very scarce source for any pollution other than the nearby highway. The following table presents the results of one hour average ambient noise measurements and their corresponding national and international permissible limits.

Table 5-6 noise level in the proposed SS site

<table>
<thead>
<tr>
<th>Time</th>
<th>LAeq</th>
<th>LA10</th>
<th>LA50</th>
<th>LA90</th>
<th>LA95</th>
<th>LCpeak</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00</td>
<td>53.82</td>
<td>50.52</td>
<td>46.05</td>
<td>39.93</td>
<td>37.27</td>
<td>116.97</td>
</tr>
<tr>
<td>11:00</td>
<td>57.96</td>
<td>49.06</td>
<td>34.62</td>
<td>28.4</td>
<td>27.83</td>
<td>121.52</td>
</tr>
<tr>
<td>12:00</td>
<td>53.12</td>
<td>56.87</td>
<td>47.47</td>
<td>39.7</td>
<td>37.8</td>
<td>104.96</td>
</tr>
<tr>
<td>13:00</td>
<td>54.5</td>
<td>57.38</td>
<td>49</td>
<td>41.11</td>
<td>39.06</td>
<td>105.77</td>
</tr>
<tr>
<td>14:00</td>
<td>57.9</td>
<td>52.54</td>
<td>41.9</td>
<td>36.13</td>
<td>34.77</td>
<td>93.7</td>
</tr>
</tbody>
</table>

Permissible Limits

<table>
<thead>
<tr>
<th>LAeq (dBA)</th>
<th>National Day-night</th>
<th>International Day-night</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-50</td>
<td>45-55</td>
<td></td>
</tr>
</tbody>
</table>
## Preliminary EIA for six Substations at different governorates

### Sound Level Equivalent & Percentile Recordings in dBA for 24 Hours

<table>
<thead>
<tr>
<th>Time</th>
<th>L\text{Aeq}</th>
<th>LA10</th>
<th>LA50</th>
<th>LA90</th>
<th>LA95</th>
<th>LCpeak</th>
<th>LAeq (dBA)</th>
<th>National Day-night</th>
<th>International Day-night</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:00</td>
<td>51.12</td>
<td>54.52</td>
<td>42.65</td>
<td>35.86</td>
<td>34.17</td>
<td>6.34</td>
<td>105.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:00</td>
<td>57.89</td>
<td>60.94</td>
<td>53.44</td>
<td>45.95</td>
<td>43.89</td>
<td>4.39</td>
<td>104.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17:00</td>
<td>54.5</td>
<td>58.67</td>
<td>49.75</td>
<td>38.61</td>
<td>36.17</td>
<td>9.24</td>
<td>99.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5.3. Land

#### 5.3.1. Geology

The study area of the proposed SS is very near to Wadi Al Assuity area, about so we can describe the geolgy and geomorphology of the site area by collect information about Wadi Al Assuity. Wadi El Assuity is part of three Wadi (valley) characterized the east desert from Assuan to the north.

Wadi Al Assuity is characterized by high elevation topography ranges from 48 m at downstream area to 874 m in the water-divide area and upstream portion and slopes generally to the Nile River. It can be divided to four main units: high land areas (Tableland); alluvial plain; piedmont plain and hydrographic network. The first is bounded the eastern parts of Wadi Al Assuity and composed of hard limestone rocks of Eocene age, while the second, which belongs to Quaternary deposits, is extended in the downstream portions of the basin and the delta of the Wadi. Piedmont plain occupies the foot slope of the limestone tableland and composed of cobbles, boulders, gravels, sand and clay. Hydrographic network (streams) is dissected the tableland and drain their surface runoff into Nile river.
Seismic hazardous

The study area is a part of nile valley and lies stable shelf of Egypt (Said 1961-1962) whwre major surface features are reflection of basement lines and the main fault systems are NW and N-S (youssef 1968 and El Shemi et al 1999). The main fault system are NW(clysmi), NE, E_W(Tethyian) and N-S in decreasing order. The following figure presents the main fault in wadi el Assuity area.
Figure 5-4 main fault in the area

5.3.2. Soil

This sub-zone overlooks the Nile with high scarps, cut by Wadis flowing towards the River Nile and the Red Sea mountains. The Wadis of the Eastern Desert are numerous, mostly deep, very steep and their soils display young stages of development. The most important Wadis are W. Qena, W. El Laquita; and W. El Assuity.

Along the sides of the Nile valley, there occur, in many places at various heights above the cultivated alluvial floor, the remains of a series of gravel terraces which were evidently formed by the Nile at a recessive stage in the downward erosion of its channel since late pliocene times (Said, 1962). The Paleonile sediments consist of a long series of interbedded red brown fluviatile to fluvimarine clays and thin fine-grained sand silt laminae. These sediments crop out along the banks of the valley and many wadis which drain into it. The deposits of this interval belong to pliocene age (Said, 1981).
5.4. Hydrology

River Nile and the groundwater are the main sources of water supply in Egypt. The Quaternary Aquifer is the main water-bearing formation in the entire Nile Valley consequently, in the area of interest.

5.4.1. Surface water

The Nile river is far from the proposed SS site about 18.9 Km. and no canals or drainage presented at the SS site.

5.4.2. Ground water

Groundwater at Governorate suffer from high concentrations of Phosphate, Ammonia in addition to heavy metals as iron, manganese, copper, zinc and other pollutants from fertilizers and pesticides which find its way to groundwater as well as to surface water bodies in violation to Law 48/1982.

A study for ground Water quality at Assuit governorate was been taken from some researcher\(^7\) during 2013, the quality assessment of water by synthesizing different available groundwater data. Samples of 796 groundwater wells had been used to determine the Un-weighted Arithmetic Water Quality Index (WQIUA) during the period from 2006 to 2013; to evaluate the suitability of groundwater for drinking. It is concluded that the groundwater of this study area is not suitable for drinking water.

From the following figure present the quality of ground water in each district, as we see that Abnub area where the project located, has very poor ground water.

\(^{7}\) Estimating and Plotting of Groundwater Quality Using WQIUA and GIS in Assiut Governorate, Egypt by Mohamed R. El Tahlawi, Mohamed Abo-El Kassem, Gamal. Y. Baghdadi, Hussein A. Saleem* Mining and Metallurgical Engineering Department, Faculty of Engineering, Assiut University, Assiut, Egypt
5.5. Ecology & Biodiversity

5.5.1. Sensitive Habitats
No particularly sensitive habitats are known to be present within the study area. Habitats here are thought to have been previously degraded by human activities.

5.5.2. Fauna
Given thousands of years of intensive human activities, the modern Nile Valley and Delta are essentially a man-made ecosystem. Animals now inhabiting the region are those that are able to tolerate human activities or those that can avoid contact with man. The intensive cultivation and widespread use of agrochemicals have contaminated the region adversely affecting many of the native animals.
No species of protected, endangered, threatened or rare plant or animal, including IUCN Red List species of animals and plants are known to inhabit in the project area or its surroundings were observed from the field visits.

No commercially important species are known within the project area. On the basis of plant longevity (duration)

5.6. Socioeconomic Baseline

Assiut is an agriculture Governorate consists of 11 cities and Marakez (Districts) with 55 local units (mother villages), 235 satellite villages and 1,072 Izba and Nage (hamlets). Assiut is covering a total area of 25,926 km², the inhabited area counts for 1,659.48 km². The rural inhabited area represents 89.4 % (1,484.2 km²) of the total inhabited area of the Governorate. The total number of population amounts to 3,876,000 with a density rate of 2,335 inhabitant/km² (Assiut Governorate Information Center, Directorate of Health, 2010)

The governorate is famous for production of cotton, wheat, maize, corn, fava beans, citrus, pomegranate, mangoes, grapes, and banana. The governorate adds to the industrial activities by hosting big industries such as: fertilizers, pharmaceuticals, cement, and petrol, as well as small industries such as kleem, carpets, and wood embellished with shells besides ivory products. Furthermore, 7 industrial zones in the governorate's markaz (conglomeration of villages) were also established. Assiut hosts many tourist attractions from different dynasties including: Pharaonic, Coptic, Islamic and modern highlights such as Mere Monuments, Hamameya Monuments area, el-Moharaq Monastery in Qoseih, Virgin Mary Monastery in Derinka Mountain, el-Farghal Mosque in Abo Teeg, el-Mugahedin Mosque in Assiut city, in addition to Assiut barrages and el-Assiuty Valley protectorate.

In 2010, Assiut total population is estimated at 3,876,000. Population in rural areas represents 72.8 % (AIC-CAPMAS). Males have increased at 51.4%; and females at 48.6%. Meanwhile, the average number of family members is 4.18.

<table>
<thead>
<tr>
<th>Natural increase</th>
<th>Death rate</th>
<th>Birth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>Rural</td>
<td>Total</td>
</tr>
<tr>
<td>15.7</td>
<td>26.8</td>
<td>23.9</td>
</tr>
</tbody>
</table>

Rate: per 1000 of population

Source: vital statistics, Capmas 2010
However we have to mention that the proposed SS site located in an isolated area about 13.6 east of Abnub district near the highway; so no residential community in the area. The propose SS allocated about 0.5 Km from the east desert highway. So the area consider desert area with no community intensity.

**Migration**

Migration has had a considerable impact on the population of the two governorates. A big number of the youth (males) participated in the Focus Groups Discussions (FGDs) expressed their desire to relocate and to move from their villages. Economic deterioration in their villages and lack of job opportunities are main factors influencing this desire.

**Employment rate**

At the national level, in 2007, the percentage of labor force (15+) was estimated at 32.4% of the total population with unemployment rate of 8.9% (Egypt Human Development Report 2010). In 2007, Assiut labor force (15+) was estimated at 28.3% of the population with unemployment rate of 8.3%. The unemployment rates in urban areas are higher than in rural areas. More than one third of the population of the governorate is involved in agricultural activities. In Assiut 39% of labor force are working on agriculture sector. The services sector is the main labor sector in Assiut, 48.3% of the labor force is working in the services sector (Egypt Human Development Report 2010).

**Table 5-8 unemployment rate**

<table>
<thead>
<tr>
<th>Unemployment rate %</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>8.3</td>
</tr>
<tr>
<td>Female</td>
<td>20.7</td>
</tr>
<tr>
<td>Urban</td>
<td>13.6</td>
</tr>
<tr>
<td>Rural</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Source: Human Development Report 2010

**Education**

In Assiut Governorate, In 2007/08, the literacy rate reached 60.9%, the gross primary enrolment ratio estimated at (100.9). The preparatory enrolment ratio estimated at 82.8, while the secondary enrolment ratio estimated at 61.7. These ratios can be applied to the project area (Egypt Human Development Report 2010).
6. Potential Environmental and Socioeconomic Impacts

6.1. Impact evaluation methodology

To ensure the accurate determination of project impacts; environmentally and socially, the EIA 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: high impacts, medium impacts and low impacts. High 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. Low 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. This shall include the socio – economic impact assessment.

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

Those impacts rated as low, medium or high are considered to require mitigation measures in order to eliminate the impact or, where this is not possible, to reduce their significance ranking to low or insignificant. These mitigation measures are set out in the following Chapter (7) and are supplemented by the additional measures proposed in the environmental and social management plan (ESMP) in Chapter (8).

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.
- **Time** – The time of which an impact commences or occurs can be vital to construction and maintenance operations.

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8 According to EEAA EIA Guideline, January 2009
Preliminary EIA for six Substations at different governorates

- 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. And usually the mitigation measures are been taken to minimizes as much as possible those impacts to low impacts.

### 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:
Table 1 Impact Evaluation Methodology

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Magnitude of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Level 1 Low Level 1 Level 1 Level 2</td>
</tr>
<tr>
<td>Medium</td>
<td>Level 1 Level 2 Level 2 Level 3</td>
</tr>
<tr>
<td>High</td>
<td>Level 2 Level 3 Level 3 Level 4</td>
</tr>
</tbody>
</table>

Where:

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

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 East Assuit 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 electric substations the impacts assessment in this chapter is divided into each of the project components. In addition, impact assessment is also differentiates between two phase of the proposed development; during construction phase and during operation and maintenance phase.

#### 6.2.1. Impact during Construction

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

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

1. **Noise**

   Construction of the SS at East Assuit 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 2 Expected construction equipment and Sound Levels

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Sound Level at operator dB (20 feet from the equipment)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
</tr>
<tr>
<td><strong>Earth Moving</strong></td>
<td></td>
</tr>
<tr>
<td>Front End Loader</td>
<td>88</td>
</tr>
<tr>
<td>Back Hoe</td>
<td>86.5</td>
</tr>
<tr>
<td>Bull Dozer</td>
<td>96</td>
</tr>
<tr>
<td>Roller</td>
<td>90</td>
</tr>
<tr>
<td>Grader</td>
<td>&lt;85</td>
</tr>
<tr>
<td>Truck</td>
<td>96</td>
</tr>
<tr>
<td><strong>Material Handling:</strong></td>
<td></td>
</tr>
<tr>
<td>Concrete Mixer</td>
<td>&lt;85</td>
</tr>
<tr>
<td>Concrete Pump</td>
<td>&lt;85</td>
</tr>
<tr>
<td>Crane</td>
<td>100</td>
</tr>
<tr>
<td>Derrick</td>
<td>&lt;85</td>
</tr>
<tr>
<td><strong>Power Units:</strong></td>
<td></td>
</tr>
<tr>
<td>Generators</td>
<td>&lt;85</td>
</tr>
<tr>
<td>Compressors</td>
<td>&lt;85</td>
</tr>
<tr>
<td><strong>Other Equipment:</strong></td>
<td></td>
</tr>
<tr>
<td>Poker Vibrator</td>
<td>94.5</td>
</tr>
<tr>
<td>Power Saw</td>
<td>88.5</td>
</tr>
</tbody>
</table>

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

- Onsite Workers

The maximum duration for construction of the SS (including sitting transformers, GIS and control panel) is expected to be 27 months.

During the construction phase, noise would be generated during day only; May the noise levels during construction exceed the limits for the study area however it will be in the same range of the baseline.
recorded level and it will be for short time. The noise intensity should not exceed the appropriate levels for the surrounding area for the SS (50dB during day time and 45db during evening time). The noise will be monitored during the construction phase, as we mention before according to construction schedule, the impact will be short and localized.

It is expected that the generated noise will mainly have an impact on the workers and the adjacent facility to the station. It is worth mentioning the location of the substation is very near to east desert highway; where the noise is almost high at all times of the day.

Regarding the construction of the SS, it is expected that the generated noise will mainly have an impact on workers. The impact on the construction workers will be medium impacts on construction workers.

2- Traffic impacts

The greatest potential for traffic impacts to occur arises during the short period where construction works peaks (transportation of raw materials, equipment, and foundation materials). 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; However we have to notice that the area where the SS located is very near to the east desert highway about 0.5 Km far only. The road to enter the SS area is just used for SS, so no pressure at all or rush hours in the area it seems as an isolated area.

The contractor should 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.

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.

Additional activities, such as entering and exit to the site will not have significant impacts on the road. In addition, there is sufficient storage area adjacent at each site, next to the road that the raw material can be placed, as well as the standby equipment.

Impact Significance Based on observation during the site visits, we can predict that 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 negligible impact.

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$_{10}$, PM$_{2.5}$)
- Exhaust of vehicles or equipment such as temporary generators, trucks, trolley, etc

**Impact Significance**

dust emissions will slightly negatively impact ambient air quality, particularly during the initial phases of construction. The substation has already buffer zone area so any of the above facility if it exist next to the substation, they will be isolating radius from the construction site. Therefore, it is expected that the dust impact will be minimize and only slightly impact the surrounding area; However we must notice that the surrounding area of the SS still desert and no agriculture land in a radius 500 m. from the SS.

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 (within less than 100 m) (no vicinity in the area) and the dust is expected to settle in close proximity to the construction site(s).
- The project will hire a qualified contractor with the high health and safety standards. In addition, the ToR for the contractor and the ESIA will provide 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 **medium impacts** for the workers in of the project area. Therefore, the dust control should be mitigated to reduce or minimize the impact to the pedestrian and residents as well as the workers.

Emissions of CO$_2$, 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 (NOx) 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 NOx 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. As the schedule presented the project will run for a short.
Therefore the impact is assessed as low impact. However, the air quality control or monitoring should be mitigated to further reduce the impact.

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. 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 project site, the project is located in a desert area, no sensitive establishment will be impacted due to the vibration generated during the construction phase. Consequently, negligible vibration impacts could be anticipated to occur.

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 oils, 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.

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 oils, 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 should recognized as hazardous waste.

**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. The impact on the soil quality is considered Medium due to the potential presence of hazardous wastes such as spent oils 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 of Medium significance 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- **Health and Safety**

As the site of all the substations is already localized with the fences prior to the construction of the substation for new substation, 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 area although public health may be a concern.

Potential safety and health impacts to 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.

**Impact significance**

Health and safety concerns for the (surrounding area) have no impacts, as it is described previously that the project site is localized at desert, within the existing fences of the proposed substation.

Medium to high impact is identified for the health and safety of the workers. The standard protection of the workers, especially for the workers that involved in the risk due to the height has to be put into mitigation measures and in the management and monitoring plan to minimize and reduce the significant impact.
7- Natural disaster risks

According to the baseline information which show no recorded major or low seismic activity in the site of the proposed SS for more details please revise the baseline section. Accordingly, it has been concluded that given the engineering measures incorporated into the design of the GIS SS, the potential environmental impacts of a seismic event during the construction of SS not anticipated to be significant so this impact would be considered a negligible impact. Possible mitigation measures have been already considered in the technical design.

8- Visual Resources and landscaping

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. And we have to mention that the area have many development projects (rural resorts/agriculture projects) right now. so the impact of construction the substation in.

Impact significance:

The impact associated to the visual resource is considered negligible impact, 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.

9- Lighting

During construction Lighting within the substation location is required for OH&S and security purposes. The presence of a new light source in an isolated area will change the night-light conditions in this immediate area, and will increase the potential for predator strikes against native fauna if exist.

The impact of lighting consider very low impact due to the presence of east desert highway (which is had lighted).

10- Natural Resource (soil and ground water)

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.
Regarding the surface water and potential pollution on the drinking water, it is not expected that the construction of the SSs 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 very low Impact which is believed to be fully controlled with the implementation of proposed mitigation measures such as standard construction precaution and prevention measures; including waste management (solid and liquid, hazardous and non-hazardous) in order to avoid accidents, pollution and spillage encountered during the construction.

**11- Land Use and involuntary resettlement**
The EETC has already received the governor’s decree to allocate site land for the construction of the proposed SS. From the field observation, for East Assuit substation, it is an empty land that has no other structures. Accordingly, there is no conflict for the future use of the land. In addition, there will be no involuntary physical resettlement resulting from construction activities.

Therefore, no impact associated to the land use and no involuntary resettlement; therefore, no mitigation measures will be developed.

**12- 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.

**13- Impact on Ecological**
The area designated for the project site is located at desert area, no ecological life was been register during our site visit or from collecting secondary data from other sources or study, this impact is considered: no impact.

**14- Creation of Job Opportunities and Flourishing Economies of Construction Sites**
The project can benefit from the opportunity of the construction activities to have a better relation with the surrounding community, facilitating later the acceptance of the project operation in the area. The project may participate in creating job opportunities for local people from the neighboring residential areas as construction workers and guards during the construction process. The job opportunities offered during the construction phase represent a temporary high positive impact, as it will add to the benefits of nearby resettlements from the project.
Summary of the significance impacts during construction of SS and underground cables are presented at Table below.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood and severity</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on Noise</td>
<td>High likelihood to occur – short term and temporary -</td>
<td>Medium Impact on construction workers</td>
</tr>
<tr>
<td>Impact on Traffic</td>
<td>High likelihood to occur – short term, temporary and localized only on the main road mainly</td>
<td>Negligible impact</td>
</tr>
<tr>
<td>Impact on Air Quality</td>
<td>High likelihood to occur – short term, temporary and localized - Highly construction workers.</td>
<td>Medium impact on construction workers</td>
</tr>
<tr>
<td>Impact on Vibration</td>
<td>Low likelihood to occur</td>
<td>Negligible impact</td>
</tr>
<tr>
<td>Impact on Hazardous materials and waste generation</td>
<td>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</td>
<td>Low to Medium impact</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>High likelihood to occur for the construction workers Highly workers.</td>
<td>Medium to high impact for the workers</td>
</tr>
<tr>
<td>Impact on natural disaster risks</td>
<td>Low likelihood to occur</td>
<td>Negligible impact</td>
</tr>
<tr>
<td>Impact on visual Resources And landscaping</td>
<td>Low likelihood to occur , desert isolated area</td>
<td>Negligible impact</td>
</tr>
<tr>
<td>Impact on water resource (ground water, soil)</td>
<td>Low likelihood to occur</td>
<td>Very low impact on soil,</td>
</tr>
<tr>
<td>Impact of lighting</td>
<td>Low likelihood to occur</td>
<td>Low to negligible impacts</td>
</tr>
<tr>
<td>Impact on land use and Involuntary resettlement</td>
<td>Low likelihood to occur</td>
<td>no impacts</td>
</tr>
<tr>
<td>Impact on archeological and cultural sites</td>
<td>Low likelihood to occur</td>
<td>no impacts</td>
</tr>
</tbody>
</table>
## Preliminary EIA for six Substations at different governorates

<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood and severity</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts on ecology</td>
<td>Low likelihood to occur</td>
<td>No impact</td>
</tr>
<tr>
<td>Creation of Job opportunities and flourishing</td>
<td>Creating job opportunities for members of the local community</td>
<td>High positive temporary impact</td>
</tr>
<tr>
<td>Economics of construction site</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Detailed mitigation measures are presented at the following chapter 7, and Chapter 8 present the ESMP and Monitoring Plan during construction phase.
6.2.2. Impact during Operation

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 of the substation, 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 each new substation. 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:

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. Full noise measurements will be conduct for each new substation.

Impact significance:

The maintenance, investigation and staff and vehicles movement is not expected to be significant or consireded very low impact. The number of vehicles will be limited during operation and maintenance, the staff will be using the ear protection. However, regarding the noise generated from the operation of substation, the impact of the surrounding environment will not be highly noticable. According to the measurement for existing SS, the nearby transformer side has the noise level of 78 dB. With the calculation of the expected noise generated by distance from the point of source (transformers), the noise level will be around 45.5 dB at distance of 50 m and 38.7 dB at distance of 100 m. the noise generated from the transformer will be around 37 dB. The impact to the sensitive receptors surrounding is clasified as low impact.

2- Traffic

During the operation and maintenance of the substation, there will be no expected impact. 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 east desert highway.

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; the gas emission is not expected and there is no impact generated from the substation during operation and maintenance phase.

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 low and there is no mitigation measure is prepared.

5- Hazardous and non-hazardous wastes

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 oils, hydraulic fluids, coolants, solvents, and cleaning agents). These wastes are typically; according to EEAA 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.

Impact significance:
Concerning the industrial wastes, accordingly, Medium negative impact shall be resulted due to the wastes generated. EEAA 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 and septic tank and it consider low impact of the wastes generated.

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 oils could be accidentally released to the environment is very high (over thousands of litters in every transformer, and, eventually, leakage of transformers oil is considered as being a great and serious environmental accident.

Impact Significance:

The soil contamination impact is considered low impact; Due to design of transformer which is unusual to leakage, however may during maintain or in rare case a leakage.
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 project site is already far from any community or human life, therefore, the impact can be classified as negligible. In addition, the SF6 gas insulated in the SS will eliminate the EMF exposure to the environment.

In addition, the medium impact is identified for the health and safety of the workers. However, concerning the high risk impact associated to the incident or emergency situation, i.e. during the fire, leakage, or other equipment faults.

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.

9- Visual Resources and landscaping

As the substation if an indoor facility, and the transformers side will be placed in the area on the middle of the infrastructure, as well as the fences is considered high and the site itself is higher than the existing establishment, visually, there will be no indication that this site is a substation. The infrastructure within the site will be well integrated with the surrounding establishment. Therefore, the impact associated to the visual resource is considered very low or negligible and no measure is developed.

10- Ecological Resources

As the operation and maintenance of SS, Depending on the size and purpose of the substation, the area affected could vary from less than one Fadden. Already the area don’t have any important flora or fauna there is no impact.

11- Socioeconomics
The area of proposed new substations suffers severe lack of infrastructure accessibility. The operation of the SS will increase the power capacity available to the area. This offers the local community a strong improvement in their living conditions. This will allow providing more stable electric current, avoiding damages to electric devices as well. Impact Significance: High positive Impact.

12- Creation of Job Opportunities and Flourishing Economies of during operation

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

The summary of the impact during operation of the SS will be presented at Table 5.3 below.
## Table 6.4 Significance of Expected Impacts Assessment during Operation Phase of Substation

<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood and severity</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on Noise</td>
<td>High likelihood to occur –especially during the night and the permanent workers at the substation.</td>
<td>Low to Medium Impact on worker</td>
</tr>
<tr>
<td>Impact on traffic</td>
<td>Low likelihood to occur</td>
<td>Negligible impact</td>
</tr>
<tr>
<td>Impact on Vibration</td>
<td>very low likelihood to occur</td>
<td>No impact</td>
</tr>
<tr>
<td>Impact on wastes generated (hazardous and non-hazardous, solid and liquid wastes)</td>
<td>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</td>
<td>Medium impact on industrial wastes generated (hazardous and non-hazardous) Low impact on domestic wastes (solid and liquid wastes)</td>
</tr>
<tr>
<td>Impact on soil contamination</td>
<td>High likelihood to occur, only during the incident of oil spillage from the transformers and possible vehicles.</td>
<td>Low impact</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>High likelihood to occur for the permanent workers</td>
<td>medium impact for the workers</td>
</tr>
<tr>
<td></td>
<td>High risk likelihood impact during the emergency and accident</td>
<td>High risk likelihood impact during the emergency and accident</td>
</tr>
<tr>
<td>Impact on natural disaster risks</td>
<td>Low likelihood to occur</td>
<td>Negligible impact</td>
</tr>
<tr>
<td>Impact</td>
<td>Likelihood and severity</td>
<td>Significance</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Impact on water resource (ground water, surface water and drinking water)</td>
<td>Low likelihood to occur</td>
<td>Low impact on soil</td>
</tr>
<tr>
<td>Ecological Resources</td>
<td>Low likelihood to occur</td>
<td>No impact</td>
</tr>
<tr>
<td>Socio Economy</td>
<td>Improving living conditions</td>
<td>High Positive impacts</td>
</tr>
<tr>
<td></td>
<td>Providing a stable electricity service</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing illegal connections</td>
<td></td>
</tr>
<tr>
<td>Creation of Job opportunities and flourishing Economics of construction site</td>
<td>Increasing the opportunity for opening small business and shops as a result of having a stable electricity service</td>
<td>Moderate positive impact</td>
</tr>
</tbody>
</table>

Detailed Mitigation Measures are presented at the following chapter; Chapter 6, ESMP and Monitoring Plan
7. Mitigation measures

EETC is committed to construct the SS and operating it to high environment, health and safety standard. This section of the report is dedicated to the detailed description of suggested mitigation measures and procedural actions for expected adverse impacts resulting from the proposed project. These measures/procedures are meant to be considered and adopted as appropriate by EETC contractor during construction phase and during operation it will be responsibilities of operated company and team.

All the mitigation, monitoring and management measures proposed below and in Section 8 of this report (the Environmental and Social Management Plan (ESMP)), will be adopted by the Project Company and imposed as conditions of contract on the contractors and any of sub-contractors employed to build the SS.

7.1 Mitigation measures during construction

The construction contractor/ company will be responsible for the designing and implementation of a detailed construction environmental management plan, a framework of which is included within the Environmental Management Plan Chapter of this EIA. This should include a detailed list of the potential environmental aspects associated with the construction process. The air and noise mitigation measures should be monitored by contractors on site.

Noise

Specific noise mitigation measures for the construction phase reflect standard good site management practices and include:

- Enforcement of vehicle speed limits, strict controls of vehicle routing and prohibition of light vehicle movements during night;
- Diesel engine vehicles and compression equipment will be equipped with effective silencers;
- Activities with highest noise emissions (e.g. piling) will be undertaken only during the day shift and between Saturday and Thursday and not during official holidays; and
- Personnel will use hearing protection when using or working in the vicinity of noisy equipment.

Traffic

Construction activities may cause traffic load on the area, however we have to notice that the site area already exist near Minya-Assiut desert road which is already had high loaded of different vehicles types, and the specific area of the proposed SS is a desert area. To minimize any inconvenience, hazards and damage caused to the road or any local neighbors’ (worker, owner of neighbor projects) the following mitigation and management measures shall be implemented:

- Abnormal load movements will be confirmed with the Competent Administrative Authority (CAA) and will adhere to prescribed routes. Their movement will be scheduled to avoid peak hours and notices will be published in advance to minimize disruption if required by the CAA;
- Consideration will be given to staggering construction shifts to split arrival and departure times;
- Scheduling of traffic will be undertaken to avoid the peak hours on the local road network wherever practicable; and
- Construction workers will be transported to the site by contract bus.
Air quality

Measurements will be conducted at the projects sites; during the daytime with some construction activities taking place at the location for the surrounding fences. The results for the gas emissions will be compared with the limits of environmental law no 4/1994 and its executive regulations. Wroth mention the construction activities will be locally, minimized and for short period. The mitigation measures will be proposed to control the emissions that are exceeding the permissible limit.

The following mitigation measure should be followed during design and construction levels:

- Access roads from the entrance to the site will be compacted and sprayed with water to minimize the dust generated from the vehicles and trucks;
- Ensuring that deliveries of plant equipment to the site are efficiently done to reduce the number of trips;
- Roads during construction will be compacted and graveled if necessary
- Not overloading trucks which transport sand and other dusty material and appropriately covering them to reduce air contamination.
- Using good condition vehicles to minimize the exhaust fumes and particulates emitted from them. They should be tested to ensure their compliance with the local standards.
- Activities that produce significant dust emissions will be monitored during periods of high winds and dust control measures will be adjusted to account for ambient conditions to minimize fugitive dust, e.g. the contractor will limit work activities which may generate dust if they pose an immediate danger or significant nuisance to the construction workforce or surrounding environment;
- Not allowing fires and material burning on the project site.

Hazardous waste and waste management

For the non-hazardous solid wastes, those that cannot be recycled will be disposed in a nearby 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. 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.

The lubrication oils, 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.

**Health and safety**

The following measures will be carried out in both the construction and operational phases:
- compliance with international standards for good practice;
- adherence to local and international guidance and codes of practice on EHS management;
- management, supervision, monitoring and record-keeping as set out in the plants operational manual;
- implementation of EHS procedures as a condition of all contracts;
- clear definition of the EHS roles and responsibilities of the companies contracted to work on site and to all their individual staff (including the nomination of EHS supervisors and coordinator);
- pre-construction and operation assessment of the EHS risks and hazards associated with construction and operation, including consideration of local cultural attitudes, education level of workforce and local work practices;
- provision of appropriate training on EHS issues for all employees on site, including initial induction and regular refresher training, taking into account local cultural issues;
- provision of health and safety information;
- regular inspection, review and recording of EHS performance; and
- Maintenance of a high standard of housekeeping at all times

**Natural resources (Ground water, soil)**

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. These measures include the following:

- Vehicles and personnel will be restricted from accessing areas not designated for construction to prevent accidental or unnecessary disturbance or compaction of the soil; and
- Protection of the soil from accidental pollution by bunding around proposed storage areas for fuel and chemicals
- Removal of waste materials unsuitable for re-use on site during construction to appropriate licensed landfill sites;
- Management of excavations during construction so as to avoid the generation of drainage pathways to underlying aquifers
- Spoil from construction activities will be monitored and controlled; waste materials which are unsuitable for reuse on-site

**Lighting**

Energy efficient practices and use of energy efficient equipment will be paramount in the design.
### 7-1 mitigation measures summary during construction

<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood and severity</th>
<th>Significance</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During construction of Substation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on Noise</td>
<td>High likelihood to occur – short term and temporary - Highly construction workers.</td>
<td>Medium Impact on construction workers</td>
<td>Application of the normal precautions normally taken by construction workers. Notification to the surrounding establishment prior to the construction of the SSs. Time management and construction schedule according to the IFC regulation provided by the contractor prior to the construction phase.</td>
</tr>
<tr>
<td>Impact on traffic</td>
<td>High likelihood to occur – short term, temporary and localized only on the main road mainly</td>
<td>Negligible</td>
<td>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 route and movement.</td>
</tr>
<tr>
<td>Impact on Air Quality</td>
<td>High likelihood to occur – short term, temporary and localized - Highly construction workers.</td>
<td>Medium impact on construction workers</td>
<td>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.</td>
</tr>
<tr>
<td>Impact on Hazardous materials and waste generation</td>
<td>Uncertain likelihood – Uncertain impact duration - Highly sensitive receptors include soil pollution and workers. Physical environment receptors with low sensitivity include groundwater, surface water and drinking water</td>
<td>Low to Medium impact</td>
<td>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 temporary onsite waste management for the workers in the ToR of the contractor.</td>
</tr>
</tbody>
</table>
## ESIA for East Assiut Substation

<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood and severity</th>
<th>Significance</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Safety</td>
<td>High likelihood to occur for the construction workers</td>
<td>medium to high impact for the workers</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>Highly workers. Receptors with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on natural disaster risks</td>
<td>Low likelihood to occur</td>
<td>Negligible impact</td>
<td>No mitigation measures is prepared Technical specifications of the equipment is include the standard measures for natural disaster risks</td>
</tr>
<tr>
<td>Impact on water resource (ground water, soil)</td>
<td>Low likelihood to occur</td>
<td>Low impact on soil</td>
<td>Following standard protection for the ground and soil and proper waste management described on the section of waste management measures</td>
</tr>
<tr>
<td>Impact of lighting</td>
<td>Low likelihood to occur for scattered residence and fauna (birds)</td>
<td>Low to negligible impacts</td>
<td>Ground level lighting Energy efficiency</td>
</tr>
<tr>
<td>Impact on land use and involuntary resettlement</td>
<td>Low likelihood to occur</td>
<td>Very low or no impacts</td>
<td>No mitigation measures is prepared</td>
</tr>
<tr>
<td>Creation of Job opportunities and flourishing Economics of construction site</td>
<td>Creating job opportunities for members of the local community</td>
<td>High positive temporary impact</td>
<td>Coordination with the contractor to employ members of the local community as construction workers and guards</td>
</tr>
</tbody>
</table>
7.2. Mitigation measures during operation

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.)

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. So as we see the noise will be very localized to the SS site, and the following measures will be followed to ensure minimize any impact on the surrounding area:

- Planting trees surrounding the SS site. Besides reducing the noise, the measures will reduce the impact on vibration and visual or aesthetic.
- 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).
- The standard protection, earmuff and helmet for the workers are sufficient to reduce the noise impacts.

Visual and landscaping

All plants will be indigenous species.

Hazardous waste and solid waste

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 reuse at the other SS. Otherwise, the unused transformer will be dispose 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 generate the waste and 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 EEAA 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.

**Natural resources (soil & ground water)**

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. In addition, the paved area at the SS site will also reduce any possible soil contamination.

**Health and safety**

The following mitigation and management measures will ensure that the health and safety of staff and any visitors on and to the site is not jeopardized during operation of the plant:

- Development and implementation of an Operational Health and Safety Plan with appropriate training;
- Provision of training in use of protection equipment and chemical handling;
- Clear marking of work site hazards and training in recognition of hazard symbols;
- Development of site emergency response plans;
- All personnel working or standing close to noisy equipment will be required to wear noise protectors; and
- Drinking water will be supplied to the plant via local filtration facilities which will comply with drinking water standards published by the World Health Organization
- All HSE standards national and IFCl guidelines for HSE transmission and distribution should be implemented
### Table 7-2 Mitigation measures during operation

<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood and severity</th>
<th>Significance</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During operation and maintenance of Substation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on Noise</td>
<td>High likelihood to occur – especially during the night and the permanent workers at the substation.</td>
<td>Low to medium impact on permanent workers</td>
<td>Application of the normal precautions normally taken such as planting trees. Besides reducing the visual impact, the green environment will be achieved as well. Standard protection for the workers will be provided at the substation.</td>
</tr>
<tr>
<td>Impact on wastes generated (hazardous and non-hazardous, solid and liquid wastes)</td>
<td>Uncertain likelihood – Uncertain impact duration - Highly sensitive receptors include soil pollution and workers. Physical environment receptors with low sensitivity include groundwater, surface water and drinking water</td>
<td>Medium impact on industrial wastes generated (hazardous and non-hazardous) Low impact on domestic wastes (solid and liquid wastes)</td>
<td>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.</td>
</tr>
<tr>
<td>Impact on soil contamination</td>
<td>High likelihood to occur, only during the incident of oil spillage from the transformers and possible vehicles.</td>
<td>Low to medium impact</td>
<td>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</td>
</tr>
</tbody>
</table>
## ESIA for East Assiut Substation

<table>
<thead>
<tr>
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<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health and Safety</strong></td>
<td>High likelihood to occur for the permanent workers</td>
<td>Minor impact for sensitive receptors (public and residents as well as existing establishment and sensitive receptors)</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>Low likelihood to occur for the surrounding establishment and sensitive receptors.</td>
<td>High risk likelihood impact during the emergency and accident</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High risk likelihood impact during the emergency and accident</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Impact on natural disaster risks</strong></td>
<td>Low likelihood to occur</td>
<td>Negligible impact</td>
<td>Technical specifications of the equipment is include the standard measures for natural disaster risks</td>
</tr>
<tr>
<td><strong>Impact on water resource (ground water, soil)</strong></td>
<td>Low likelihood to occur</td>
<td>Minor impact on groundwater, surface water and drinking water</td>
<td>Proper waste management according to EEAA regulations Monitoring plan will be implemented Provision of waste bins for temporary storage</td>
</tr>
<tr>
<td><strong>Socio Economy</strong></td>
<td>Improving living conditions</td>
<td>High Positive impacts</td>
<td>The distribution and collection company at EETC should have an awareness plan to connect beneficiaries legally. Increase awareness about the importance of having official connections</td>
</tr>
<tr>
<td></td>
<td>Providing a stable electricity service</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing illegal connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Creation of Job opportunities and flourishing Economics of construction site</strong></td>
<td>Increasing the opportunity for opening small business and shops as a result of having a stable electricity service</td>
<td>Moderate positive impact</td>
<td>No mitigation measures is prepared Awareness campaigns for community members to rationalize consumption of electricity service</td>
</tr>
</tbody>
</table>


8. Environmental and Social Management Plan (ESMP) and Monitoring Plan

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

- ESMP during construction and operation phase (including detailed mitigation measures) of Substation
- Guidance on Emergency Response Plans
- Roles and responsibilities in the implementation of the ESMP (during construction and operation phase) of Substation.
- Trainings
- Cost Estimation

8.1. Objective of the environmental management plan (EMP)

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

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

Definition of ESMP

The Environmental and Social Management Plan (ESMP) consists of a set of mitigation, management and monitoring measures to be taken during implementation of the project to avoid, reduce, mitigate, 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 5. 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.

Management Responsibilities

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

- EETC will contract an authorized and specialized consultant to prepare detailed designs and tender documents, for construction of substations, 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 during operation and maintenance of the substation. HSE staff of the substation 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.

Environment Training
All employees and subcontractors involved with the Proposed Project receive environmental instruction in relation to the EMP. Each person will be made aware and have an understanding of their obligations and duties detailed in this EMP.

8.2. Environmental Management Plan (ESMP) and Monitoring Plan during Construction Phase

8.2.1. Environmental Management Plan (ESMP) during Construction of the Substation

1. Management of noise and vibration during construction

Mitigation measures

For general measures to reduce the impact on construction to surrounding establishments nearby the construction, the measures are:

- Prior to the preparation of the construction of substations, the notification letter should be sent to the sensitive receptors for the project introduction and the duration of the project.
- 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.

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 and according to the HSE general guideline of IFC, 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).
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- 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.

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.
- The trucks and trolleys movement for equipment, construction materials and disposal of the construction debris should be done during the night. The loading and uploading 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
- 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.

3. Management of ambient air emission during construction

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 contactor 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.

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.

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.

5. Safety during Excavation and Trenching
ESIA for East Assiut Substation

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 failing into the excavation. Barriers must be of a strength that is capable of withstanding the weight of a person falling against the barrier. Barriers shall be readily visible by day or night.
- All persons in excavation must wear safety helmets and safety boots
- Vehicles and other machineries or construction equipment must not be allowed to come within 2 meters of an excavation unless working in connection with the excavation.

Monitoring Activities

- An inspection must be conducted at the end of the 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.

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.

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. Management of water resources and soil

Mitigation measures:

- Include the precaution and prevention of waste management to avoid ground 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.

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 quarterly 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.

10. Other socioeconomic impacts

**Mitigation measures:**

- The Distribution Company may be advised to start some awareness raising campaigns about the importance of legal connections at the area. As well as awareness campaigns 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.
- Reporting on the numbers of new requests for electricity legal connections.

Table 8-1 presents the ESMP matrix during construction and the Table 8-2 presents the Monitoring Plan during Construction phase.
### Table 8-1 Environmental Management Plan (ESMP) during Construction Phase

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During Preparation and Construction of the SS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise and vibration during site preparation, construction and installation of equipment</td>
<td>General measures for surrounding establishments and sensitive receptors</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notification letter of the introduction of project and duration to surrounding establishment and municipality</td>
<td>Contractor</td>
<td>-</td>
<td>Cover letter from EETC for approval of starting of the project</td>
</tr>
<tr>
<td></td>
<td>Clear sign and warning sign (can be seen during day and night) of the project (including duration)</td>
<td>Contractor as a part of ToR for EHS general requirements</td>
<td>None as a part of tender process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration of the working on site (including uploading and loading) are during day only (between 7AM – 5 PM)</td>
<td>Contractor</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mitigation measures for construction workers during preparation and construction</td>
<td>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</td>
<td>Contractor (through tendering activity)</td>
<td>None as a part of tender process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strictly standard equipment especially for ear protection during the work</td>
<td>Contractor (through tendering activity) related to the EHS requirements during construction works</td>
<td>None as a part of tender process</td>
<td></td>
</tr>
</tbody>
</table>
## Potential Impacts

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic destruction or congestion during transportation of construction materials, construction waste, equipment and movement of project vehicles and machineries</td>
<td>Approval from traffic department prior to the construction</td>
<td>Contractor</td>
<td>-</td>
<td>Cover letter from EETC for approval of starting of the project</td>
</tr>
<tr>
<td></td>
<td>Clear sign and warnings (including duration) of the project that can be seen during the day and night</td>
<td>Contractor as a part of the tender activities related to EHS requirements</td>
<td>None as a part of tender process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Movement of vehicles (for transporting materials, construction waste and SS equipment done during the night and loading and uploading done during the day within the site of the SS.)</td>
<td>Contractor in coordination with traffic department, if needed</td>
<td>None as a part of Contractor financial budget during the bidding activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Careful turn at the main road. The drivers and operators of the machineries should have training on safety utilization of their machines</td>
<td>Drivers and operators employed by the Contractor. It is the responsibility of the contractor for implementing regulations to the drivers and operators</td>
<td>None as a part of contractor responsibility</td>
<td></td>
</tr>
<tr>
<td><em><strong>Agreement for temporary storage and the final disposal to the designated landfill</strong></em></td>
<td>Agreement for temporary storage and the final disposal to the designated landfill</td>
<td>Based on the waste management plan submitted by the contractor and approval from EETC</td>
<td>None as a part of the ToR for waste management</td>
<td></td>
</tr>
<tr>
<td>Ambient Air Quality by dust emission and the air emission due to the exhaust gasses from the construction vehicles and</td>
<td>Localize and minimize the vehicle movements including limiting the speed</td>
<td>Contractor</td>
<td>As a part of their financial budget during the bidding activities</td>
<td>Low impact and temporary</td>
</tr>
<tr>
<td></td>
<td>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</td>
<td>Contractor</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
### Potential Impacts

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>machineries</td>
<td>components</td>
<td>Contractor</td>
<td>As a part of their financial budget during the bidding activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintaining the efficiency of the vehicles and machineries</td>
<td>Contractor</td>
<td>As a part of the ToR for waste management</td>
<td>Implementing the waste management submitted by the contractor and approved by EETC prior to the preparation and construction phase</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td>Contractor</td>
<td>As a part of the ToR for waste management</td>
<td>Implementing the waste management submitted by the contractor and approved by EETC prior to the preparation and construction phase</td>
</tr>
<tr>
<td>Waste generated (hazardous and non-hazardous, solid and liquid as well as construction waste and domestic waste)</td>
<td>Notification and contract, if needed for transporting hazardous and non-hazardous waste to their designated landfills.</td>
<td>Contractor</td>
<td>None, as a part of the contractor’s offers and responsibilities during preparation and construction phase</td>
<td>Implementing the waste management submitted by the contractor and approved by EETC prior to the preparation and construction phase</td>
</tr>
<tr>
<td></td>
<td>Separation of hazardous waste and non-hazardous waste for temporary storage</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Designated area or location should be included at the waste management plan submitted by the contractor and approved by the EETC</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construction waste should be hauled at the end of each business day to the officially approved disposal sites</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adequate trucks with standard precaution (coverage of the waste, not overloaded,</td>
<td>Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>Contractor</td>
<td>None, as a part of waste management</td>
<td>According to the waste management plan submitted to EETC</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>Contractor</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety impacts during excavation and trenching for the workers and surrounding communities and establishments</td>
<td>Excavation and trenching in accordance to the design and drawings.</td>
<td>Contractor</td>
<td>None as a part of contractor offers related to EHS requirements</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>Contractor</td>
<td>None as a part of contractor offers related to EHS requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard helmet and safety boots for the workers</td>
<td>Contractor</td>
<td>None as a part of contractor offers related to EHS requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety impacts during the</td>
<td>Provision of authorized and licensed personnel for heavy machineries</td>
<td>Contractor</td>
<td>None as a part of contractor</td>
<td></td>
</tr>
</tbody>
</table>
## Potential Impacts

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical and machineries use for the health and safety of the workers</td>
<td>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.</td>
<td>Institutional Responsibilities (enforcement and coordination)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and safety of the construction workers</td>
<td>Standard protection for the construction site workers</td>
<td>Contractor</td>
<td>None as a part of contractor offers related to EHS requirements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provided on job training for the construction workers prior to the preparation and construction phase (including working at the high construction)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identification of the existing underground networks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of heavy equipment movement, especially nearby other existing underground networks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water resources and soil pollution during construction</td>
<td>Precaution and prevention of waste management to prevent the soil and further water resource (groundwater)</td>
<td>Contractor</td>
<td>None, as a part of waste management</td>
<td>According to the waste management plan submitted to EETC</td>
</tr>
</tbody>
</table>
## Table 8-2 Environmental and Social Monitoring Plan

<table>
<thead>
<tr>
<th>Project activities</th>
<th>Parameters to be monitored</th>
<th>Locations</th>
<th>Measurements (methods and equipment)</th>
<th>Frequency of measurements</th>
<th>Cost Estimates ($)**</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site clearance</td>
<td>Worker’s injuries</td>
<td>Construction site location</td>
<td>Preparation of recording form of workers injuries during the construction</td>
<td>Monthly</td>
<td>None</td>
<td>Contractor</td>
</tr>
<tr>
<td>On the preparation stage, the tendering has been done to purchase the standard procedure for site clearance. However, the contractor shall put into consideration on their budget proposal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base camp preparation for the workers</td>
<td>Neighbors farm / projects’ complaints</td>
<td>Project construction sites</td>
<td>Recording of complaint and type of complaint</td>
<td>Once during the preparation and prior to start the construction phase</td>
<td>None</td>
<td>Contractor</td>
</tr>
<tr>
<td>Monitoring the traffic disturbance due to the vehicles and machineries movement and other related construction activities</td>
<td>Traffic complaint</td>
<td>Within 500 m from the construction site</td>
<td>Visual observation and recording complaint received</td>
<td>During the duration of the construction activities</td>
<td>None</td>
<td>Contractor</td>
</tr>
<tr>
<td>Monitoring ambient Air Quality during construction</td>
<td>Ambient air (gas emissions) PM, dust complaint</td>
<td>Within the site and surrounding establishments</td>
<td>Visual investigation and recording of the dust and ambient air increased due to</td>
<td>during the construction activities at</td>
<td>As a part of contractor’s</td>
<td></td>
</tr>
<tr>
<td>Project activities</td>
<td>Parameters to be monitored</td>
<td>Locations</td>
<td>Measurements (methods and equipment)</td>
<td>Frequency of measurements</td>
<td>Cost Estimates ($)**</td>
<td>Responsibilities</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>works</td>
<td></td>
<td></td>
<td>construction activities</td>
<td>different locations</td>
<td>financial offer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Recording and reporting of the complaints (monthly report)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring Noise and vibration Impacts at the project sites</td>
<td>Noise complaints from the neighboring farm/project</td>
<td>Project locations</td>
<td>Visual investigation and recording and documentation of complaints</td>
<td>during the construction activities at different locations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of construction waste and handling of hazardous waste</td>
<td>Amount of hazardous and nonhazardous waste generated</td>
<td>Project site locations</td>
<td>Estimation of the hazardous waste and non-hazardous waste in relation to the handling and transporting to the landfill</td>
<td>Weekly or monthly depending on the volume of waste</td>
<td>As a part of contractor's financial offer</td>
<td>Contractor</td>
</tr>
<tr>
<td>Monitoring soil contamination and water resource contaminations</td>
<td>Area of spillage</td>
<td>Project sites</td>
<td>Visual observation</td>
<td>weekly</td>
<td>As a part of contractor's financial offer for environmental monitoring</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Recording and documentation of spillage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring health and safety of the workers during the construction of the project components</td>
<td>Health records about occupational injuries</td>
<td>Clinic / hospital referred by the contractor</td>
<td>Medical reporting on received cases</td>
<td>on received case</td>
<td>The cost is undefined, depending on the cases</td>
<td>contractor</td>
</tr>
<tr>
<td>Storage of the machines and</td>
<td>Complaints from neighboring communities</td>
<td>Project sites</td>
<td>Recording and documentation</td>
<td>monthly</td>
<td>-</td>
<td>contractor</td>
</tr>
<tr>
<td>Project activities</td>
<td>Parameters to be monitored</td>
<td>Locations</td>
<td>Measurements (methods and equipment)</td>
<td>Frequency of measurements</td>
<td>Cost Estimates ($)**</td>
<td>Responsibilities</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------</td>
<td>-----------</td>
<td>--------------------------------------</td>
<td>---------------------------</td>
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<td>------------------</td>
</tr>
<tr>
<td>construction</td>
<td>and records and documentation of the temporary area for storage of materials or machineries</td>
<td>Construction site</td>
<td>Reporting labor origin governorates and calculating the natives ratio</td>
<td>Quarterly</td>
<td>-</td>
<td>Construction contractor</td>
</tr>
<tr>
<td>Impacts of culture and privacy of local communities</td>
<td>% of local labor to total labor</td>
<td>Construction site</td>
<td>Reporting labor origin governorates and calculating the natives ratio</td>
<td>Quarterly</td>
<td>-</td>
<td>Construction contractor</td>
</tr>
</tbody>
</table>
8.3. Environmental Management Plan (ESMP) and Monitoring Plan during Operation and Maintenance (O&M) Phase

8.3.1. Environmental Management Plan (ESMP) and Monitoring Plan During Operation and Maintenance (O&M) of the Substation

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:

1. 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:

- Planting trees surrounding the SS site. Besides reducing the noise, the measures will reduce the impact on vibration and visual or aesthetic.
- 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.

2. Management of the 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.
**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.

3. 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 interconnections underground cables.

4. 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.

The ESMP during O&M of the SS will be presented at the following table, Table 6.2. and the Monitoring plan (environmental and social monitoring plan) is presented at Table 6.3.
Table 8-3 Environmental and Social Management Plan (ESMP) during Operation and Maintenance

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During Operation and Maintenance of the SS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>General measures for surrounding establishments and sensitive receptors</td>
<td>Operators of SS</td>
<td>10,000 LE for annual maintenance of the trees (including cutting, watering, etc)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planting trees at surrounding the SS site. Besides reducing the noise, the measures will reduce the impact on vibration and visual or aesthetic.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mitigation measures for operators and staff of SS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standard procedures for health and safety of the workers according to IFC general EHS guidelines (including limitation of the duration and exposure to high noise) and management of concentration works of heavy machineries</td>
<td>Operators of SS</td>
<td>EETC</td>
<td>Around 5,000 LE annually for standard protection of staff</td>
</tr>
<tr>
<td></td>
<td>Standard equipment especially for ear protection during the work</td>
<td></td>
<td>EETC</td>
<td></td>
</tr>
<tr>
<td>Waste generated</td>
<td>Proper waste management (industrial wastes) including separation of waste, separate area for temporary waste, transporting and disposing the industrial waste to their designated landfills</td>
<td>Operators of SS</td>
<td>EETC</td>
<td>Undefined as the amount of wastes generated, especially for the industrial non-hazardous and hazardous waste are uncertain.</td>
</tr>
<tr>
<td>(hazardous and non-hazardous, solid and liquid industrial wastes as well as domestic waste)</td>
<td>Especially for hazardous waste, the storage, collection, transportation and disposal of hazardous waste should follow the EEAA regulations for</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## ESIA for East Assiut Substation

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>hazardous waste.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concerning domestic waste, the standard procedures for maintenance of the networks (including provision of waste bins) should be maintained</td>
<td>EETC operators of the SS</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public and operators and staff safety of the EMF exposure</td>
<td>Periodic maintenance of the GIS SS and its interconnections. This includes the regular tightening, SS efficiency, oil quality, gas pressure, etc.</td>
<td>EETC</td>
<td>100-150 USD per EMF meter</td>
<td>The cost estimation is based on one time purchased for one meter. It is advisable to purchase two machines for standby purposes.</td>
</tr>
<tr>
<td>EMF reading at the SS and surrounding site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trainings provided for potential risks during accidents (firefighting training, oil spillage, smoke detector, etc)</td>
<td>Provision of trainings provided by EETC as a general requirements</td>
<td>EETC</td>
<td>Undefined as the type of trainings and the duration of trainings are vary.</td>
<td>The cost estimation is included at annual trainings provided by EETC for their SS staffs.</td>
</tr>
<tr>
<td>Health and safety of the staff</td>
<td>Standard protection for the SS operators and staffs</td>
<td>EETC</td>
<td>None as a part of precaution of noise</td>
<td></td>
</tr>
</tbody>
</table>
Table 8-4 Environmental and Socioeconomic Monitoring Plan

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Proposed Mitigation Measures</th>
<th>Institutional Responsibilities (enforcement and coordination)</th>
<th>Cost Estimates ($)*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provided on job training for the staff for general health and safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

The record includes the recording and monitoring of the waste management on the SS (especially industrial waste management).

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.