

Canal Sugar

ESIA for Beet Sugar Factory Project in West Minya – Minya Governorate (Revised Final Report)

Prepared by:



December 2019

Canal Sugar

ESIA for Beet Sugar Factory Project in West Minya – Minya Governorate (Revised Final Report)

Prepared by:



6 Dokki St. 12th Floor, Giza 12311
Tel.: (+2010) 164 81 84 – (+202) 376 015 95 – 374 956 86 / 96
Fax: (+202) 333 605 99
Email: environics@environics.org
Website: www.environics.org

December 2019

Table of Contents

List of Tables	v
List of Figures	vii
Executive Summary	viii
1. Introduction	1-1
1.1 Background	1-1
1.2 Project Rationale	1-1
1.3 Objective of the EIA	1-1
1.4 Scope of the ESIA	1-2
1.5 Structure of the Report	1-3
2. Legal and Administrative Framework	2-1
2.1 National Regulations	2-1
2.1.1 Regulations Related to Environmental Impact Assessment Study	2-1
2.1.2 Environmental Register	2-2
2.1.3 Air Quality	2-2
2.1.4 Noise	2-4
2.1.5 Solid Waste	2-5
2.1.6 Hazardous Substances and Waste	2-5
2.1.7 Contaminated Land	2-5
2.1.8 Wastewater Usage in Irrigation	2-5
2.1.9 Groundwater Utilization	2-8
2.1.10 Potable Water Guidelines	2-9
2.1.11 Biodiversity Protection	2-10
2.1.12 Legislations Related to Work Environment	2-10
2.1.13 Legislations Related to Protection of Woman	2-13
2.1.14 Legislations Related to Community Benefit	2-14
2.1.15 Legislation Applicable to Cultural Heritage	2-14
2.1.16 Laws Relating to Investment	2-14
2.2 International Financing Institutions Requirements	2-15
2.2.1 IFC performance Standards	2-15
2.2.2 AfDB Operational Safeguards	2-18
2.3 International Conventions	2-19
2.3.1 Biodiversity and Natural Resources	2-19
2.3.2 Climate Change	2-20
2.3.3 Cultural Heritage	2-21
2.3.4 Children's Rights	2-21
2.3.5 Women's Rights	2-21
2.3.6 International Labour Standards	2-22
3. Project Description	3-1
3.1 Project Location and Components	3-1
3.2 Description of the proposed project	3-2
3.2.1 Production of beet sugar	3-5
3.2.2 Primary and Secondary Products	3-9
3.2.3 Utilities and Service Units	3-9
3.2.4 Infrastructure Requirements	3-13

3.3	Emissions and Wastes	3-14
3.3.1	Emissions from the Construction Phase	3-14
3.3.2	Emissions from the Operational Phase	3-15
3.4	Social Aspects	3-17
3.4.1	Construction Phase	3-17
3.3.2	Operation Phase	3-18
3.4	Project Schedule	3-18
3.5	Workforce	3-20
4.	Description of Environmental Baseline	4-1
4.1	Methodology	4-2
	Physical Environment	4-2
	Biological Environment	4-2
	Socio-economic Environment	4-2
4.1	Physical Environment	4-3
4.1.1	Climate	4-3
4.1.2	Air quality and noise levels	4-6
4.1.3	Geology	4-8
4.1.4	Topography	4-11
4.1.5	Geomorphology	4-12
4.1.6	Seismic activity	4-12
4.1.7	Surface water	4-13
4.1.8	Groundwater	4-15
4.2	Biological baseline	4-16
4.2.1	Project hinterland	4-16
4.2.2	Project Site	4-20
4.3	Socio-economic environment	4-23
4.3.1	Demography	4-23
4.3.2	Education	4-24
4.3.3	Employment	4-25
4.3.4	Health	4-25
4.3.5	Infrastructure	4-25
4.3.6	Economic Activities	4-26
4.3.7	Surrounding Landuse	4-27
4.3.8	Vulnerable Groups	4-27
4.3.9	Archaeological sites	4-29
5.	Analysis of Alternatives	5-1
5.1	No Project Alternative	5-1
5.2	Site Alternatives	5-2
5.3	Technology Alternatives	5-3
5.3.1	Purification and Color Removal	5-3
5.4	Alternatives of Wastewater Disposal	5-4
5.5	Alternative Energy Sources	5-5
6.	Environmental and Social Impacts and Mitigation Measures	6-1
6.1	Methodology	6-1
6.1.1	Identification of Potential Environmental Impacts	6-1
6.1.2	Evaluation and Assessment of Impacts	6-2
6.1.3	Mitigation Measures	6-2

6.1.4	Residual impacts	6-2
6.2	Impact Identification	6-2
6.2.1	Scoped out Impacts	6-2
6.2.2	Positive Impacts	6-3
6.2.3	Potential Negative Impacts	6-3
6.3	Assessment of Potentially Significant Negative Impacts and Mitigation Measures	6-12
6.3.1	Construction Phase	6-12
6.3.2	Operation Phase	6-23
6.4	Impacts of the Environment on the Project	6-32
6.4.1	Seismic Effects	6-32
6.4.2	Flashflood Hazards	6-33
6.4.3	Impact of Sand Storms	6-34
6.4.4	Impacts of Venomous Species	6-34
6.5	Cumulative Impacts	6-37
7.	Environmental and Social Management and Monitoring Plan	7-1
7.1	Summary of Impacts	7-1
7.2	Summary of Mitigation Measures	7-2
7.3	Environmental and Social Responsibilities	7-20
7.3.1	Establishment of Health, Safety and Environment Department	7-20
7.3.2	Responsibility of HSE Staff	7-20
7.4	Environmental Management Procedures	7-22
7.4.1	Environmental Management Plan during the Construction Phase	7-22
7.4.2	Environmental Monitoring Plan during Construction	7-25
7.4.3	Environmental Management Plan during the Operational Phase	7-26
7.4.4	Environmental Monitoring Plan during Operation	7-31
7.4.5	Monitoring Performance and Inspection	7-34
7.4.6	Environmental Register	7-35
7.5	Social Management Plan	7-36
7.5.1	Labor and Working Conditions	7-36
7.5.2	Corporate Social Responsibility	7-36
7.5.3	Ongoing Consultation	7-36
7.5.4	Information Disclosure	7-37
7.5.5	Grievance Management	7-37
7.5.6	Socio-economic Monitoring	7-37
8.	Public Consultation and Disclosure	8-1
8.1	Methodology	8-1
8.2	Stakeholders Identification	8-1
8.3	Individual Scoping Meetings	8-2
8.3.1	Meeting with the EEAA	8-2
8.3.2	Environmental Management Unit in Minya Governorate	8-3
8.4	Public Consultation Session	8-3
8.5	Information Disclosure and Stakeholder Engagement	8-4
8.5.1	Identification of Stakeholders	8-5

8.5.2	Stakeholder Engagement Strategy	8-8
8.6	Grievance Management	8-11
8.6.1	External Grievances	8-12
8.6.2	Internal Grievances	8-15
8.6.3	Consultation and Raising Awareness on the Grievance Mechanism	8-17
9.	References	9-1

Annexes

- 1. Presidential Decree 530/2017 – Project Land Sale Contract and Land Handover Document – Technical and Financial Offer Submitted by TAQA**
- 2. Environics' Certification**
- 3. IDA and EEAA Approvals**
- 4. Basic Design of Industrial Processes**
- 5. Process Equipment List**
- 6. Project Master Plan**
- 7. Chemicals' Safety Data Sheets**
- 8. Ministry of Irrigation Approval on Groundwater Abstraction**
- 9. Certified Air Measurements Report**
- 10. Green House Gases Estimation**
- 11. Noise Level of Utilized Equipment**
- 12. Scoping Meetings and Public Consultation Details**
- 13. Grievance Form**

List of Tables

Table (2-1)	Maximum limits of external air pollutants	2-2
Table (2-2)	Maximum limits of air pollutants from power generation units and boilers	2-3
Table (2-3)	Limits for emissions from limestone, dolomite and gypsum kilns	2-4
Table (2-4)	Maximum limits for emissions of gases and fumes from other industries plant chimneys	2-4
Table (2-5)	Maximum allowable emissions from vehicles	2-4
Table (2-6)	Maximum allowable noise level in different areas	2-4
Table (2-7)	Maximum permissible limits for reuse of treated sewage water in irrigation of food crops and non-food crops	2-6
Table (2-8)	Categorization of the treated sewage water	2-6
Table (2-9)	Permitted plants and crops to be irrigated with the treated sewage water	2-7
Table (2-10)	Parameters Relevant To Potable Water Quality (Minister of Health Decree 458/2007)	2-9
Table (2-11)	Maximum emission limits in the work environment relevant to the proposed project	2-11
Table (2-12)	Maximum permissible limits noise	2-11
Table (2-13)	Maximum allowable Heat Stress limits	2-12
Table (3-1)	Sugar beet production of the different farms	3-2
Table (3-2)	Raw materials used in the proposed project	3-4
Table (3-3)	Main and secondary products	3-9
Table (3-4)	Sources and quantities of industrial wastewater	3-11
Table (3-5)	Data of the project's storage units	3-13
Table (3-6)	Groundwater usage distribution	3-14
Table (3-7)	Expected emissions from project stacks	3-16
Table (4-1)	Distance between the project site and the main cities	4-1
Table (4-2)	Monthly maximum and minimum air temperature and daily average (° C)	4-3
Table (4-3)	Monthly average wind speed (km / hour) during the period 2013-2018	4-4
Table (4-4)	Monthly average precipitation (mm/month)	4-5
Table (4-5)	Relative humidity (%)	4-5
Table (4-6)	Average measurements results for ambient air pollutants	4-7
Table (4-7)	Results of noise measurements from the different location	4-7
Table (4-8)	Sediment types and depths (m)	4-8
Table (4-9)	Analysis of the groundwater of the well near the project	4-16
Table (4-10)	Description of some of the important flora in the surrounding area	4-19
Table (4-11)	Threatened and/or protected fauna occurring in desert lands	4-19
Table (4-12)	Illiteracy Rate in Markaz Abu Qurqas and Markaz Mallawi	4-25
Table (4-13)	Unemployment Rate in Markaz Abu Qurqas and Mallawi	4-25
Table (4-14)	Number of health units in Markaz Mallawi and Markaz Abu Qurqas	4-25
Table (4-15)	Amount of potable water and sewage in Markaz Abu Qurqas and Markaz Mallawi	4-26

Table (4-16)	Distribution of labour force on economic activities by sex in Minya 2016 (hundreds)	4-28
Table (5-1)	Comparison between carbonation and Posphatation method	5-4
Table (6-1)	Summary of Potential Environmental Impacts	6-7
Table (6-2)	Average Noise Levels from Construction Equipment	6-14
Table (6-3)	Emissions from the Proposed Project's Stacks	6-24
Table (6-4)	Proposed Traffic Plan	6-30
Table (6-5)	Significance rating summary of the impacts of land reclamation activities during construction and operation	6-35
Table (7-1)	Impacts Classification	7-2
Table (7-2)	Summary of mitigation measures during construction phase	7-3
Table (7-3)	Summary of mitigation measures during operational phase	7-13
Table (7-4)	Self-monitoring plan for air emissions	7-32
Table (7-5)	Workplace Emission Monitoring Plan	7-33
Table (7-6)	Indicators and Frequency for monitoring of industrial waste water	7-33
Table (8-1)	Main Project stakeholders	8-1
Table (8-2)	Detailed list of Project stakeholders	8-6

List of Figures

Figure (3-1)	Location of the project and surrounding activities	3-1
Figure (3-2)	Project Layout	3-3
Figure (3-3)	Road network	3-4
Figure (3-4)	Production of beet sugar	3-8
Figure (3-5)	Carbon dioxide production and carbonization solution	3-9
Figure (3-6)	Detailed project schedule for the beet sugar factory project	3-19
Figure (3-7)	Workers housing complex and facilities	3-21
Figure (4-1)	Map showing the location of the proposed sugar plant	4-1
Figure (4-2)	Temperatures in Minya Governorate (° C)	4-3
Figure (4-3)	Annual wind direction (km/h) during the period 2013-2018	4-4
Figure (4-4)	Monthly rainfall rates (mm / month)	4-5
Figure (4-5)	Monthly relative humidity (%)	4-5
Figure (4-6)	Map of the project location, ambient air quality and noise measurements points	4-6
Figure (4-7)	Geological map showing the surface layer of the sediment in and around the project site	4-9
Figure (4-8)	Geological cross section showing the different layers of the project area	4-9
Figure (4-9)	Substrate with a mix of sand and pebbles at the project location	4-10
Figure (4-10)	Topographic map of the project area	4-11
Figure (4-11)	Substrate type of the proposed project site	4-12
Figure (4-12)	Distribution of seismic risk zones in Egypt	4-13
Figure (4-13)	Canal and drainage network for the Abu Qurqas and Malawi region	4-14
Figure (4-14)	Surface runoffs path at the project location	4-14
Figure (4-15)	Hydrogeological map of the project area	4-15
Figure (4-16)	Eastern and western areas of the project site	4-21
Figure (4-17)	Car wheel signs	4-21
Figure (4-18)	Fox tracks	4-21
Figure (4-19)	Scat of a carnivore	4-22
Figure (4-20)	Small mammal burrow	4-22
Figure (4-21)	Lizard burrow	4-22
Figure (4-22)	Lizard track	4-22
Figure (4-23)	characteristics of the gravelly substrate in the western zone	4-22
Figure (4-24)	signs of car wheels and surface run-offs	4-22
Figure (4-25)	Greater Hoopoe Lark (<i>Alaemon alaudipes</i>)	4-23
Figure (4-26)	Nearest residential communities to the project site	4-24
Figure (4-27)	Accommodation of Savola Group staff	4-24
Figure (4-28)	Land uses of neighboring areas	4-27
Figure (4-29)	Archaeological sites near the project location	4-29
Figure (5-1)	Evolution of total sugar production, consumption and self-sufficiency in Egypt (1972 - 2016)	5-1
Figure (5-2)	Electricity network interconnection diagram	5-6
Figure (5-3)	Proposed electricity grid layout	5-7
Figure (6-1)	Main streams network in Project Area	6-33

Executive Summary

1. Background

Canal Sugar Company is implementing an integrated investment project in West Minya that includes a facility for producing white sugar from beets, as well as reclamation of desert lands for the cultivation of beets needed for the production of sugar in addition to other crops.

The current ESIA study addresses the construction and operation stages of the white sugar production facility from beet. The facility area covers about 1 million square meters (240 feddans). The project will also produce molasses and dry pulp as by-products. The scope of the current study does not include the ESIA for Canal Sugar Company's agricultural land reclamation project involving the cultivation of beet and other crops.

According to the project ESIA categorization issued by the Egyptian Environmental Affairs Agency (EEAA) in 2015, beet sugar production projects are classified as Category “C” projects that require the preparation of a full-fledged EIA study. Category C is equivalent to category A in the equator principles III and the IFC / World Bank categorizations.

The ESIA aims to ensure that the proposed project is satisfying the environmental legal requirements of Egypt, and mainly Law 4/1994 on the environment, amended by Law 9 /2009 and its modified executive regulations (ERs) as well as international conventions and ensuring the AfDB's and IFC guidelines and operational safeguards are met, thus contributing to secure financing from international funding entities. Accordingly, the Project will be compliant with IFC standards and the applicable World Bank H&S Guidelines if the mitigation and management measures mentioned in the report are implemented.

As most of the impacts in the present study are assessed as low or moderate and can be addressed after implementation of the mitigation measures, the project can be categorized as Category B based on the Equator principles III, after implementation of mitigation measures. However, Environics followed a stricter categorization in line with the EEAA (national) and IFC / WB (international) categorizations for the project.

2. Legal and Administrative Framework

This section of the ESIA report provides a summary of environmental legislations relevant to the project. The summary includes national legislations and regulations, International Financing Institutions requirements including IFC Performance standards and AfDB Operational Safeguards, and international conventions to which Egypt is party.

3. Project Description

The project aims to produce white sugar from beet as a main product, molasses and dry pulp as secondary products. The production capacity of the project is 930,000 tons / year of white sugar.

The project is located in Giza / Luxor road, 38 km west of Minya city and about 30 km west from Mallawi. The project is surrounded by vacant desert areas. The site area is about 1 million m² (240 feddans). The project's production capacity will be 36,000 tons of beet / day. The Canal Sugar Company will use paved roads to transport beet, products and provide other services.

The project consists of the following components:

- Beet sugar production plant
- Carbon dioxide and limewater production unit.
- Steam and power generation plant
- It also includes other supporting utilities:
 - Storage facilities (tanks, silos, chemical store, etc.)
 - Industrial wastewater treatment unit
 - Limestone storage area
 - Lime mud storage area
 - Laboratories
 - Administrative offices
 - Workshops
 - Groundwater treatment unit
 - Domestic wastewater treatment unit

The Canal Sugar Company will obtain beet from the following sources:

- about 50% of the beet will be supplied from land reclamation for to the Canal Sugar Company
- about 50% of the beet will be supplied through contracts with farmers from El Minya, and also from the El Reef El Masry project.

The company will use natural gas as a source of energy, which will be supplied by Nile Valley Gas, a subsidiary of TAQA Gas.

All project phases will start after the completion and approval of the ESIA. The construction period is expected to take about 16 months.

The expected number of employees in the project will be almost 1000 workers during the construction phase. The operational phase is expected to reach 600 workers and the company will consider employment from the surrounding areas of the site and people from El Minya Governorate. The project will have housing complex for workers and engineers working in the beet sugar factory.

4. Description of Environmental Baseline

4.1 Physical Environment

The climate of Minya Governorate is characterized by a dry continental weather most of the year, with sunny days throughout the year and very low precipitation.

Air and noise measurements were carried out on 20/3/2018 at five different points. Air measurements included basic pollution indicators (particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide). The results of air quality and noise intensity are within the permissible limits stated in law 4/1994 and its 2012 amendments.

Rocky units in the study area are mainly sedimentary rocks belonging to both the Pliocene epoch and the Quaternary era/period. A geotechnical study for the project location was carried out in April 2018. The substrate type of the project site is divided into the following layers:

1. The surface layer, 1 m in depth, consisting of a mixture of sand, pebbles, silt, gravel and broken stones.
2. Layer with different sizes of pebbles mixed with sand and silt and a few traces of iron oxide. This is the main dominating layer observed at the project site. This layer is mainly found at depths of 1 m below the surface and reaches a thickness of 25 m.

Additionally, soil analysis was conducted for a maximum depth of 2 meters at two locations.

The topography of Minya governorate is divided into two regions; the Nile Valley region and elevated regions surrounding the Nile Valley. The proposed project is located within the elevated regions of the west, where the elevation gradually increases from the east at 26m to the west at 166m above sea level.

Minya Governorate is divided into three geomorphological units as follow:

- The Limestone structural plateau;
- The Old Alluvial plains; and
- The Young Alluvial plains.

The proposed project is located within the old alluvial plains, belonging to the Pleistocene epoch which is covered by sand, pebbles and clay.

In general Minya governorate is located within a low tectonic activity region with a low and limited impact. The project location is situated within a medium seismic hazard region with an average magnitude of 4 to 4.9 based on Richter magnitude scale.

The proposed project location is situated within the western desert of Minya Governorate which is devoid of any surface water. The site location includes drainage runoffs of the 3rd and 4th flashflood risk levels, which do not represent any high risk.

There are two ground water reservoirs; the quaternary aquifer and the limestone aquifer that belong to the Eocene epoch. The proposed project is located within the limestone aquifer zone with a medium to low productivity and which is fed by the Nubian aquifer and local precipitations.

4.2 Biological Environment

The project is bordered by the Giza – Luxor Road to the east and by agricultural lands to the south, north and west. The project site can be divided into two zones, the Eastern Zone and Western Zone, based on the soil characteristics and fauna signs and tracks.

The project site is free from any vegetation cover, and is not considered as an Important Bird Area (IBA) by BirdLife International. Additionally, no threatened or protected species were observed in the area although their presence in the hinterland was stated in the literature. Thus, there is a possibility that desert species, of the Western Desert, such as foxes, desert monitors, gazelles and hyenas, may occur as vagrant species.

4.3 Socio-economic Environment

The proposed project is located within the western desert of Minya governorate and the nearest administrative centers are Markaz Abu Qurqas and Markaz Mallawi.

The nearest residential area is located at 15.5 km away from the project site and is concentrated around the edges of Tuna drain. The second nearest residential area is Beni Khaled village located at a distance of 18.5 km. Moreover, there is a residential area for employees at Savola Group Company, 1 km south of the project location.

The number of educational institutions in Minya governorate reached 2028 schools with a total number of 227, 65 classes in 2005. The unemployment rate in the Governorate was 5.7% in 2006, which is considered relatively low compared to the national level (9.7%). The number of hospital facilities in Minya Governorate is 49, including 35 public hospitals and 14 private hospitals. The project site is connected to other governorates through a group of regional road networks.

The agricultural sector in Minya Governorate is the main economic activity, as it constitutes around 44% of the workforce in the governorate. Moreover, the governorate has a high potential for industrial investments and the region includes 4 industrial areas.

Minya Governorate is rich in historical sites, with 39 archaeological sites. On the other hand, no archaeological sites are reported within the project site and surroundings.

5. Analysis of Alternatives

The alternatives were assessed mainly using the environmental standards. This section investigates the following:

- No project alternative;
 - Site alternatives;
 - Technology alternatives; and
 - Alternatives for hazardous waste disposal.
-
- The project will meet the growing domestic demand and succeed in saving about 75% of sugar imports, thus greatly contributing to filling the current gap between sugar production and consumption in Egypt. On the other hand, the alternative of not establishing the project will lead to loss of employment opportunities, as it is expected that more than 1000 workers will be employed during the construction phase and 600 during the operation phase. Therefore, it is recommended to implement the proposed Canal Sugar project.
 - The project site is considered the most suitable for the following factors:
 - The main raw material (beet) required for the production of sugar is close to the facility;
 - Consistency of the project with the general perspective of agricultural processing projects;
 - The project is located in a desert area in western Minya; this will create a new society, consistent with the State's plan for the urban spread of the population;
 - Availability of the vast land needed for the project and its allocation by the competent authorities.
 - As per the technology, Canal Sugar Company decided to use carbonation method due to the efficiency of the purification process and the availability of raw materials, since Minya governorate is one of the regions in Egypt where most calcium carbonate is available; in the areas of Beni Khaled and Samalout. Also, the carbonation method is economically feasible as it is lower in cost compared to the other methods.
 - Canal Sugar Company will direct the sewage wastewater to the onsite domestic wastewater treatment facility so that part of the treated sewage wastewater will be re-directed to the company for irrigating green areas in the project site (decorative plants and fruitless trees) according to the requirements of the Egyptian Code (501/2015).
 - Alternative energy sources include power generators using natural gas or diesel (in case of emergency) as fuel, if needed, to generate electricity, while the remaining electricity needs will be supplied by the National Electricity Network. An ESIA will be carried out prior to the installation of electricity transmission lines. Canal Sugar is also considering the use of PV as part of the electricity source for the project. Also in this case, an ESIA will be carried out prior to PV installation. The project will require about

480,000 m³/day of natural gas, which will be supplied to the project through TAQA gas pipeline. The gas pipeline is an associated facility and the project will address it in a separate ESIA.

6. Environmental Impacts and Mitigation Measures

6.1 Irrelevant impacts

The present impacts have been scoped out from the present study:

- Impacts on “surface water quality” and “aquatic life”;
- Impacts on archeology; and
- Impact of flash floods.

6.2 Positive impacts

The project is planned to provide direct employment with an average of 1000 workers during construction and 600 workers during operation. The operation of the plant will result in about 40,000 indirect jobs resulting from the purchase of beet from farmers.

6.3 Potential Negative Impacts

The following tables summarize potential negative impacts during the construction and operation phases and relevant mitigation measures. The main ESIA study also presents related monitoring aspects including location, target/indicator, frequency, responsible and implementation entity and estimated cost.

6.4 Impacts of the Environment on the Project

- The project area is located in a medium-risk area with an average earthquake intensity of 4-4.9 on the Richter scale. The Egyptian Building Code will be followed to avoid any potential risks.
- To determine the possibility impact of the flash floods on the project area, a preliminary flood path mapping was developed. The location of the Beet Sugar Factory is not intersected by any flood streams, thus it is not exposed to flash flood risks.
- The area experiences sand storms during spring and autumn. This may pose potential health risk to workers such as eye irritation and dust inhalation. Mitigation measures would include:
 - Avoiding working during sand storms;
 - Ensuring that workers are wearing PPEs; and
 - Ensuring that all materials are stored properly.
- Venomous species may potentially be present in the desert area and may pose a risk to workers. In addition to the workplace health and safety measures, the company would ensure the presence of anti-venom.

Summary of mitigation measures during construction phase

Source of impact / Receptors	Mitigation measures
Air quality	<ul style="list-style-type: none"> • Apply dust suppression method using minimum water technologies • Apply dust management through slowing the driving speed of material transportation vehicles • Conduct maintenance of equipment and vehicles • Regularly inspection of construction equipment • Modify timing of construction where possible, to coincide with favorable climate conditions. • Prohibit and prevent open burning of any waste and ensure its proper storage and disposal with a certified contractor
Gas emissions and Greenhouse gases	<ul style="list-style-type: none"> • Ensure that technologies and equipment used in the project are new or with a high energy efficiency • If possible ensure that equipment and material used in the construction phase are obtained from a nearby area • Providing workers with awareness on maintaining good practice for machinery usage • Providing workers with awareness on energy efficiency and electricity consumption. • Maintaining good housekeeping practices • Properly store and dispose solid waste and sewage according to the national regulations. If possibly ensure that waste can be recycled is transferred to a certified contractor • Maintaining machinery and vehicles • Ensure that gas emissions are below international and national limits • Prohibit waste burning
Ambient noise	<ul style="list-style-type: none"> • Inspection and maintenance of all equipment and vehicles • Provide workers with the suitable PPEs
Soil and groundwater	<ul style="list-style-type: none"> • Ensure the proper implementation of site housekeeping and general cleaning procedures. • Compliance with spill prevention measures • Inspect all equipment before operation • Ensure periodic inspection of equipment and machinery to minimize spills • Store all materials, equipment and machines properly in designated areas. • Collection of construction wastes at designated collection sites, and store it in appropriate containers, in accordance with the national regulations and international requirements. • Avoid waste accumulation of construction and other wastes at the site. • Collecting the generated wastewater from workers in a closed and sealed insulated collection tank in compliance with the Egyptian regulations and ensure its discharge regularly by a licensed contractor. • The contractor will be obliged to transfer the wastewater to a safe discharge location and comply with the legal requirements in this regard. • Ensure that the diesel generator is well insulated.

Source of impact / Receptors	Mitigation measures
Terrestrial biodiversity	<ul style="list-style-type: none"> • Avoid working at night and avoid using high intensity lights • Ensure proper housekeeping practice. • Develop, implement and update the environmental management plan during the construction phase and safely disposing waste in accordance with the applicable regulations • Comply with all regulations and laws that prohibit the hunting of wild animals. • Develop, implement and update a suitable waste management plan • Provide awareness to the workers on the negative impacts of hunting any wild fauna.
Community impact	<ul style="list-style-type: none"> • Ensure that workers influx is done gradually • labor influx, will be controlled through a code of conduct integrated in the labor contract, and a specific focus of the community grievance system
Traffic	<ul style="list-style-type: none"> • Contractors will be required to abide with safety rules and periodic inspections of their • Contractors will be required to comply with traffic rules regarding speed limits, driver licenses and training, vehicle maintenance, coverage of bulk materials being transported, etc. • Random drug and alcohol analyses will be conducted for drivers. • Timing for the transportation of building materials will be set to avoid causing traffic congestion on the roads or at the unloading locations at site. • A traffic management plan will be developed during construction to ensure the safety of villages to prevent potential accidents • Properly cover transported material.
Public Health	<ul style="list-style-type: none"> • Same as traffic mitigation measures
Workplace Health and Safety	<ul style="list-style-type: none"> • Excavated areas during construction will be surrounded with a safety fence • The only passage for pedestrian access to the site should be through a gate where security personnel are present • The contractor will have a continuous presence on-site for close inspection and management of the construction activities. • The contractor will make available to the workers personal protective equipment (PPE) • All employees must wear appropriate (PPE) at all times while working at the construction site • Ensure workers are properly equipped against heat stress • Abiding to the instructions and regulations stated on safety signs at all times. • The contractor will also properly label stockpiled material, and provide proper access control measures • All material should be Transported, Stored and Used according to its safety data sheet • Fire extinguishers will be installed in designated places at the site • Tools, wood or other building materials should not be left around the workers at any time • Materials that are hazardous to workers will be disposed of without delay • Removal of pallets and empty wooden boxes from the construction site as soon as they are unloaded. • A clinic for simple medical care and follow-up will be established at the site to respond to minor incidents. • Prohibition of smoking or eating anywhere in the construction site, except in the allocated facilities

Source of impact / Receptors	Mitigation measures
	<ul style="list-style-type: none"> • Prohibition of open burning operations in any form on site • Notify workers prior to the commencement of work of the risks related to the proposed activities on site • All equipment will be inspected prior to the start of the work to ensure safety of the workers • On-site inspection of the conditions of all equipment will be conducted monthly • Only vehicles used for site construction will be allowed to enter the site • Prohibit the parking of vehicles in front of fire extinguishers, emergency exits or pedestrian corridors. • The movement of cranes and trucks within the construction site will be regulated through the traffic management plan and the speed limit • Ensure that all vehicles used in the construction work, are equipped with visual and audible alarms • Use of construction vehicles on site is allowed for authorized purposes only • Complying with cleanliness and lighting standards • Briefing of employees on safety instructions before entering the site for the first time. • Requiring contractors to take the necessary actions relating to reporting, investigation and taking the corrective actions for any in accordance with the Sugar Canal Company's reporting system • Provide training for fire fighting • Provide first aid training • Provide information sessions on material usage • Provide safety training on equipment usage • The contractor should provide TRA for each specific task including hazard identification that might be harmful, risk evaluation and control Measures • Canal Sugar should abide by Law 12/2003 • Canal Sugar should abide by the international regulations for health and safety including IFC standards and AfDB safeguards
Archeology	<ul style="list-style-type: none"> • Work should be stopped if any ruins are found during project implementation, • Complete the administrative procedure as well as the excavation and dislocation works prior to the project start-up to clear the area from any archeological remains that could delay the project activities. • Key measures shall be implemented in case of chance find in light of the national prevailing regulations.

Summary of mitigation measures during operational phase

Source of impact / Receptors	Mitigation measures
Air quality	<ul style="list-style-type: none"> • Same mitigation measures as the ones included in the construction phase in addition to the below measures: • Exhaust from natural gas burning used to generate steam from boilers will be dispersed to the outside air without treatment through a stack • Control odors through ventilation and highly efficient beet storage procedures such as the implementation of the "first-in-first-use" policy • Air emissions should be regularly monitored to ensure compliance as indicated in table 6-3 below. • Clean roads to ensure the reduction fugitive dust emissions. • The air generated from drying, cooling and handling of sugar will be passed through fabric filters to be recycled in the industrial process.
Gas emissions and Greenhouse gases	<ul style="list-style-type: none"> • Natural gas will be used to generate the heat needed for carbon activation. Emissions from this process are the result of natural gas combustion and carbon emissions. Heating will be carried out at high temperatures to ensure that the carbon-adsorbed compounds are decomposed into vapor and carbon dioxide. • Methane will be used as an energy source for boilers. But during the start-up methane will be generated in limited quantities and will therefore be ignited only. • Natural gas will be used as fuel in the limestone kiln, so it is expected that the concentration of pollutants will be below the allowable limits, as it is clean fuel. Wet scrubbing of the flue gases will also be conducted to increase the concentration of carbon dioxide, which will be directed to the process of refining the raw juice, and the excess quantity will be released to air. The wastewater from the gas scrubber will be directed to the wastewater treatment unit. • Proper waste management.
Ambient noise	<ul style="list-style-type: none"> • Potential noise generating machines and equipment are designed to meet statutory regulations concerning noise. • Acoustic enclosures are installed for noise generating equipment, wherever possible such as inverters and transformers • Workers at noise generating machinery and equipment will be provided with the suitable personal protective equipment (PPEs). • Regular inspection and maintenance of equipment.

Source of impact / Receptors	Mitigation measures
Soil and groundwater	<ul style="list-style-type: none"> • In addition to the measures stated in the construction phase, the below measures shall be followed: • Compact and transfer the limestone clay to storage area within the site. • Proper insulation of the limestone clay disposal area • Collect, properly store (insulated layer) and treat and re-use industrial wastewater in the industrial process or for beet irrigation according to the Egyptian Code 501/2015 • Collect, properly store (insulated layer) and treat sewage and re-use treated wastewater in irrigating green areas within the project site in accordance with the Egyptian Code 501/2015. • The spent oils will be collected in sealed well insulated drums and stored in the hazardous wastes storage area until they are transferred to Petrotrade. Medical wastes will be collected periodically and disposed of at the nearest hospital that has incinerator licensed from EEAA. • Ensure that wastewater lagoons are well insulated • Properly monitor waste water treatment lagoons and check for any leakage. In case of leakage take an immediate action according to local and international regulations. • As part of its EMP, the project will develop a waste management system. • Ensure proper management of soil • Properly store (in an insulated area) and label chemicals according to national and international standards • Maintain a hazardous chemical register • Offer training for spillage prevention • Ensure the presence of a spillage prevention kit on site • Ensure any machineries working with fuel and/or oil is properly stored in an area with insulated layers.
Terrestrial biodiversity	<ul style="list-style-type: none"> • Same as construction phase • The project will be provided with a fence to prevent animals from entering the site location • All transportation will be carried out on paved roads, and the drivers will be prohibited from driving on unpaved roads • The company will comply with all rules and regulations that prevent hunting of wild animals
Community impact	<ul style="list-style-type: none"> • Code of conduct will be integrated in the labor contract
Traffic	<ul style="list-style-type: none"> • Subcontractors will be required to follow the mitigation measures mentioned below • Prepare a schedule for transport vehicles • Avoid traffic peak times • Comply with traffic law requirement • Apply air emissions mitigation measures (described above) • Prepare a schedule for material and waste transport • Bulk material trucks will be covered, according to traffic rules.
Public health	<ul style="list-style-type: none"> • Same as traffic mitigation measures

Source of impact / Receptors	Mitigation measures
Workplace Health and Safety	<ul style="list-style-type: none"> • Same mitigation measures as the ones included in the construction phase • Properly insulate sources of heat • Ensure that noise is within the limits in the regulations • Provide personnel working close to noise sources with ear plugs • comply with occupational health and safety standards • Ensure that the operating machineries and equipment meet the legal requirements of noise limit • First aid training shall be provided along with a first aid kit and first aid attendants • On site ambulance shall be provided 24/7 with proper tools and equipment • IFC performance standard of labor and working conditions shall be maintained. • Security personnel should be selected based on screening process • The client will also implement the health and safety operational safeguard of the AfDB • Child labor and forced labor shall be avoided • A management plan for controlling any forced labor or exploitation will be put in place prior to the start of the project.
Archeology	<ul style="list-style-type: none"> • Work should be stopped if any ruins are found during project implementation, • Key measures shall be implemented in case of chance find in light of the national prevailing regulations.

6.5 Cumulative Impacts

The Beet Sugar Factory does not interfere with any wildlife routes, and is not expected to contribute to high congestion and traffic after implementation of the aforementioned mitigation measures. Moreover, the project is not expected to have no high negative impacts on natural resource with the mentioned precautionary approaches.

Additionally, the surrounding agricultural or economic activities are very few and small in land compared to the current project and thus, do not pose any risks as a cumulative impact. Additionally Canal Sugar will be obtaining sugar beet from the surrounding agricultural lands.

7. Environmental Management and Monitoring Plan

The environmental management plan consists of a set of mitigation and monitoring measures that needs to be taken into account in order to eliminate, offset or reduce negative environmental and social impacts to acceptable levels. The management plan is a practical document that will be updated regularly by the project team to ensure that any potential changes within the facility are taken into consideration.

7.1 Environmental and Social Responsibilities

The company will establish a Health, Safety and Environment (HSE) Department and will appoint the following staff:

- An occupational health and safety manager
- Two safety engineers
- Three supervisors
- One security supervisor
- One Community Liaison Officer (CLO)
- Few safety watches, and;
- One doctor/nurse

The HSE committee will include the following:

- Director of safety committee: project manager of contractor
- Vice-director of safety committee: safety manager of contractor
- Members: Deputy Project manager, specialty supervisors, safety supervisors of contractors.

7.2 Environmental Management Procedures

Construction phase

The environmental dimension will be incorporated throughout the construction of the plant. It is worth mentioning that contractor will be responsible for the preparation, and implementation of the environmental management plan. However, Canal Sugar will monitor the performance of the contractor to check his adherence to the plan. Moreover, the contractor will adopt various policies to reduce the hazards and risks to the labor and the facility. The following

shows the minimum policies that the contractor will follow:

- Solid Waste Management
- Wastewater Management
- Hazardous Wastes Management
- Preventive Maintenance
- Antiquities excavation
- Transportation management
- Emergency Preparedness and Response Plans
- Employee Training and Awareness

Monitoring during construction

Monitoring results will be fed into the decision making process as a trigger for the implementation of corrective actions, in order to maintain compliance with environmental laws and regulations, ensure environmental protection and workplace safety, as well as to ensure appropriate operation of the mitigation measures and management plans. Monitoring aspects would include:

- Ambient Air Quality
- Point Source Air Emissions
- Workplace Monitoring

Operation phase

Canal Sugar will be responsible for the preparation, implementation, and monitoring of the environmental management plan during the operation phase to include:

- Management of Raw Materials
- Controlling Odors
- Housekeeping
- Preventive Maintenance
- Spill Prevention
- Solid Waste Management
- Hazardous Materials and Waste
- Staff Training and Awareness
- Transportation management
- Emergency and Fire Alarm Plans

Monitoring during operation

Environmental monitoring is a dynamic process. Regular updates and modifications as needed shall be carried out based on the results of the first monitoring round. Monitoring aspects would include:

- Ambient Air Quality
- Ambient noise
- Heat stress
- Emissions in the work environment
- Monitoring of treated domestic and industrial wastewater
- Monitoring of Hazardous Materials and Waste

Monitoring Performance and Inspection

In addition to the periodic monitoring activities detailed in the above sections,

self-auditing and periodical inspection is necessary for ensuring maximum safety and environmental protection. The following activities will be carried out in relevance to inspection and auditing:

- Emergency and fire-fighting system
- Inspection of emergency and critical equipment

Environmental Register

The company will prepare an environmental register to record its activities. The Environmental Register will be prepared in accordance with the requirements stated in Annex 3 of the Executive Regulations of Law 4/1994 and its amendments.

7.3 Social Management Plan

It is of key importance for Canal Sugar to have a close and proactive communication with the local communities near the project area and to disclose the Project information for transparency and to enhance credibility. A stakeholder engagement and management plan was developed and its main aspects include:

- Labor and Working Conditions
- Corporate Social Responsibility
- On-going Consultation
- Information Disclosure
- Grievance Management
- Socio-economic Monitoring

8. Public Consultation and Disclosure

8.1 Stakeholders Identification

Stakeholders have been identified considering the following factors:

- Project's nature and activities;
- Geographical extension of the project; and
- Environmental aspects of the project.

8.2 Individual Scoping Meetings

Individual meetings were carried out in the scoping phase of the ESIA with the following stakeholders:

- Central Administration for Environmental Impact Assessment, EEAA; and
- Department of Environmental Affairs, Minya Governorate.

8.3 Public Consultation Session

The public consultation session was held on 9/5/2018 in the Liberation Hall – Minya for Conferences and Celebrations in Minya City. Twenty-seven stakeholders representing different entities attended the meeting. The main points discussed through the session included:

- Expected employment and quality of required labor;

- Sewage and industrial wastewater management;
- Method of management of sewage resulting from the establishment of the project; and
- Recommendations to communicate with the governorate officials to open a U-turn near the project site to facilitate transport operations.

8.4 Information Disclosure and Stakeholder Engagement

The IFC Performance Standard PS 5 recognizes the importance of an open and transparent engagement between the client, its workers, local communities, and directly or indirectly affected by the Project. Stakeholder engagement is central to building strong, constructive, and responsive relationships which are essential for the successful management of the project's environmental and social impacts and issues. To be effective, it should be initiated at an early stage of the project cycle.

Stakeholder Engagement Strategy

Stakeholder engagement is an ongoing process, and as such, future engagement activities may be adjusted to ensure that information disclosure and consultation activities are effective and meaningful for stakeholders. The Stakeholder Engagement Plan (SEP) will be discussed with key stakeholders as a first stage of engagement and then updated, as required based on feedback received.

Grievance Management

Canal Sugar aims at minimizing grievances through managing impacts and through pre-emptive community engagement designed to anticipate and address potential issues before they become grievances.

1. Introduction

1.1 Background

Canal Sugar Company is an investment company implementing an integrated investment project that includes a facility for producing white sugar from beets, as well as reclamation of desert lands for the cultivation of beets needed for the production of sugar in addition to other crops. The integrated project is located in West Minya. The agreements related to the project have been signed by Canal Sugar Company of the UAE Jamal Al Ghurair Group and the General Authority for Reconstruction and Agricultural Development Projects. The project is subject to Investment Law No. 72 of 2017.

The agreement comes within the framework of the State's plans to attract more domestic and foreign investments and provide the necessary facilities to contribute to achieving sustainable development in various sectors and at the national level, especially in Upper Egypt. The integrated project aims to increase agricultural land, encourage industrial development activities based on agriculture and complementary industries, and provide more direct and indirect employment opportunities. The project's investments reach about one billion dollars.

1.2 Project Rationale

The current ESIA addresses the construction and operation stages of the white sugar production facility from beet. The facility area covers about 1 million square meters (240 feddans). The project will also produce molasses and dry pulp as by-products. To date the factory employs 2,000 workers.

According to presidential decree number 530 of 2017, an area of 240 feddans (almost 1 million m²) of the State-owned land in West Minya region has been allocated for the General Authority for Reconstruction and Agricultural Development Projects. **Annex 1** of this ESIA includes a copy of this decree. The General Authority for Reconstruction and Agricultural Development Projects has signed a contract with Canal Sugar Company to establish a white sugar (produced from beet) factory, which is the proposed project under assessment in this ESIA. The project will significantly contribute to decreasing the shortage of local sugar demand and aims at reducing the amount of imported sugar to 75%. **Annex 1** also includes a copy of the sale contract of the project land to Canal Sugar Company as well as the land handover document to the company.

1.3 Objective of the ESIA

According to the project ESIA categorization issued by the Egyptian Environmental Affairs Agency (EEAA) in 2015, beet sugar production projects are classified as Category “C” projects that require the preparation of a full-fledged EIA study. Accordingly, the company commissioned Environics, a EEAA-certified consultancy firm, to prepare a Category “C”

ESIA study aiming at assessing the environmental impacts of the project (**Annex 2** in this ESIA includes Environics' Certification).

Category C is equivalent to category A in the equator principles III and the World Bank categorizations. Category A includes *“Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented”*.

The objective of the ESIA is to ensure that the project is environmentally sound and sustainable, and that any negative environmental consequences are recognized early in the project cycle and taken into account before project implementation.

The study also aims at complying with the requirements of the Environment Law 4/1994 amended by Law 9/2009 and Law 105/2015 and its Executive Regulations No. 338 of 1995, amended by Decrees 1741/2005, 1095/2011, 710/2012, 964/2015 and 1963/2017. Moreover, the project also takes into consideration the requirements of the International Financing Institutions (IFIs), focusing on IFC performance standards and AfDB operational safeguards. Accordingly, the Project will be compliant with IFC standards and the applicable World Bank H&S Guidelines if the mitigation and management measures mentioned in the report are implemented.

It is important to note that most of the impacts in the present study are assessed as low or moderate and can be addressed after implementation of the mitigation measures. Therefore, the project can be categorized as Category B based on the Equator principles III, after implementation of mitigation measures. However, Environics followed a stricter categorization in line with the EEAA (national) and IFC / WB (international) categorizations for the project.

Canal Sugar has obtained the Industrial Development Authority (IDA) approval on the project on the 2nd of July 2018¹. The beet sugar factory ESIA has been submitted to the EEAA in May 2018 and revised in September 2018 to integrate the EEAA comments. The EEAA approval has been obtained on the 3rd of October 2018. IDA and EEAA approvals are included in **Annex 3**. The current ESIA has been revised and upgraded to meet the IFIs requirements.

1.4 Scope of the ESIA

The scope of the ESIA includes the construction and operation stages of the White Sugar production facility, affiliated to Sugar Canal Company. The production capacity of the project is 5,400 tons/day for 150 days beet season for a total of 930,000 tons/year of high purity white sugar, 270 thousand tons/year of molasses and 356 thousand tons/year of dry pulp which will be used to produce animal fodder. The main activities of this study include the

¹ The IDA approval is conditioned to the submission of a set of studies and other approvals from different concerned authorities.

following:

- Production of white sugar from beet (during the harvesting season)
- Carbon dioxide production unit and carbonization solution.
- Steam and power generation plant
- It also includes other utility units:
 - Storage facilities
 - Industrial wastewater treatment unit
 - Domestic wastewater treatment unit
 - Groundwater treatment unit
 - Limestone laydown area
 - Laydown of limestone mud.
 - Housing of workers

Canal Sugar Company will obtain beet from the following sources:

- About 50% of the beet will be supplied from land reclamation performed by Canal Sugar Company
- About 50% of the beet will be supplied through contracting local farmers from El Minya and from the El Reef El Masry Project.

The company will use natural gas as a source of energy, which will be supplied by Nile Valley Gas, a subsidiary of TAQA. The contract related to supplying natural gas to the project is being finalized, and **Annex 1** of this ESIA includes a copy of the Technical and Financial Offer submitted by TAQA.

On the other hand, the company will use paved roads to transport beet and other materials as well as products.

The scope of the current study does not include the environmental impact assessment for Canal Sugar Company's agricultural land reclamation project involving the cultivation of beet and other crops, according to the contract with the General Authority for Agricultural Reconstruction and Development Projects of the Ministry of Agriculture. The ESIA also does not include workers' housing which will be located outside the factory site.

1.5 Structure of the Report

The EIA study includes:

- Chapter 1: Introduction to the proposed project and scope and objectives of the study
- Chapter 2: Legal and administrative framework relevant to the project
- Chapter 3: Project description, inputs and outputs
- Chapter 4: Description of the environmental baseline of the project area
- Chapter 5: Proposed alternatives to the project
- Chapter 6: Assessment of potential environmental impacts and proposed mitigation measures
- Chapter 7: Environmental management plan framework and self-monitoring of the proposed project
- Chapter 8: Public Consultation and Disclosure

2. Legal and Administrative Framework

This section of the ESIA report provides a summary of environmental legislations relevant to the project. The summary includes both national and international regulations including relevant conventions, IFC Performance standards as well as AfDB Operational Safeguards. **If different standards for the same parameter are mentioned, Canal Sugar will adopt the most stringent standard.**

2.1 National Regulations

2.1.1 Regulations Related to Environmental Impact Assessment Study

In accordance with Law 4/1994 (amended by Laws 9/2009 and 105/2015) for environmental protection and its Executive Regulations, the owner of the project must prepare an ESIA study to be submitted along with a request for a license to establish a new project or for the expansion of an existing project. Hence, environmental requirements are incorporated into the licensing system.

According to the law, the ESIA study should be submitted to the competent administrative authority, where the project is within the scope of its competence. The competent administrative authority shall evaluate the environmental impacts of the project and then send the study to the EEAA to be reviewed and responded upon in a maximum period of 30 days. In case of no response from EEAA during this period, this is considered as an approval on the EIA study. The owner of the project must be informed with the result of EEAA's review process and, if approved, the project's owner must also be informed with the construction and operation phases' conditions. The owner of the project has the right to appeal the result in case of rejection within 30 days from the date of notification thereof. The competent administrative authority for this project is the General Authority for Industrial Development.

According to the Egyptian Environmental Impact Assessment Guidelines issued by EEAA in 2009, and the classification lists of projects issued in 2016, the projects were classified into four categories based on the severity of the potential impacts; as they reflect the increasing level of assessment for the environmental impacts. These four categories are as follows:

- Category (A) projects: for enterprises and projects with low environmental impacts.
- Category (B) projects: for enterprises and projects that can have significant environmental impacts.
- Category (B) Scoped projects: for enterprises and projects that can have significant environmental impacts and specific components are to be studied.
- Category (C) projects: for enterprises and projects that require a full environmental impact assessment because of the severe environmental impacts they may cause.

The proposed sugar production project is classified as a category (C) project

which requires the preparation of a full environmental impact assessment study, including community consultation activities.

2.1.2 Environmental Register

Article 22 of Law 4/1994 and article 17 of its amended Executive Regulations (amended by decree 1741/2005) oblige the owner of the establishment to maintain an environmental record of the activities of the establishment (environmental register), Annex 3 states the contents of the environmental register. According to the law, the facility must notify the EEAA of any environmental violations.

2.1.3 Air Quality

Law No. 4 of 1994 (amended by Law 105/2015) and its amended Executive Regulations by decree 710 of 2012 and decree 964 of 2015 specify the maximum limits for air pollutants as follows:

- Annex 5 of the Executive Regulations for Law No. 4 of 1994 (as amended by decree 710 of 2012) states the permissible maximum limits of ambient air pollutants (Table 2 - 1).
- Annex 6 of the Executive Regulations for Law No. 4 of 1994 (amended by decree 964 of 2015), states the maximum permissible limits for air pollutants from power generation units and boilers (Table 2-2).
- The maximum limits for emissions from lime, dolomite and gypsum kilns have been extracted from the Executive Regulations for the Law No. 4 of 1994 (amended by decree 710 of 2012) as they will be used in the production process (Lime kiln) (Table 2-3).
- The maximum stack emissions limits for sugar factories are not stated in the law. Therefore, other industries' maximum limits were used as thresholds. These were extracted from Annex 6 of decree 710/2012 as shown in Table 2-4.
- Annex 6 of the Executive Regulations of Law No. 4 of 1994 (amended by decree 964 of 2015), states the maximum limits for vehicle exhausts (Table 2-5).

The IFC ambient air quality¹ was obtained and compared to the national limits in Tables 2-1, 2-2 and 2-3 from different sources.

Table 2-1: Maximum limits of ambient air pollutants

Pollutant	Average Period	IFC Standards ($\mu\text{g}/\text{m}^3$)	National Requirement (Industrial Areas) ($\mu\text{g}/\text{m}^3$)
Sulphur dioxide (SO ₂)	10 minutes	500	-

¹IFC (2007). Environmental Health and Safety guidelines.

Pollutant	Average Period	IFC Standards ($\mu\text{g}/\text{m}^3$)	National Requirement (Industrial Areas) ($\mu\text{g}/\text{m}^3$)
	1 hour	-	350
	24 hours	20	150
	1 year	-	60
Carbon monoxide (CO)	1 hour	-	30 mg/m^3
	8 hours	-	10 mg/m^3
Nitrogen dioxide (NO ₂)	1 hour	200	300
	24 hours	-	150
	1 year	40	80
Total suspended particles (TSP)	24 hours	-	230
	1 year	-	125
Respirable particles (PM ₁₀)	24 hours	50	150
	1 year	20	70
Respirable particles (PM _{2.5})	24 hours	25	80
	1 year	10	50
Suspended Particles (measured as black smoke)	24 hours	-	150
	1 year	-	60

Table 2-2: Maximum limits of air pollutants from power generation units and boilers

Pollutant	IFC Standards		Egyptian Standards	
	Maximum Limit for Emissions (mg/m^3 from exhaust)		Maximum Limit for Emissions (mg/m^3 from exhaust)	
	NG	Diesel	NG	Diesel
Carbon monoxide CO	NA	NA	100	250
Sulphur dioxide SO ₂	NA	2000	150	1300
NO _x	200 (spark ignition)	460	500	500
	400 dual fuel			
	1600 pressure ignition			
Total Particulates	NA	100	50	100

Table 2-3: Limits for emissions from limestone, dolomite and gypsum kilns

Pollutants	Maximum allowable limits (mg / m ³)	
	IFC standards	Egyptian Standards
Total Suspended Particulates (TSP)	50	50
Sulphur dioxide (SO ₂)	400	400
Nitrogen oxides (NO _x)	500	500
Hydrogen Chloride (HCl)	10	10
Carbon Monoxide (CO)	-	250

Table 2-4: Maximum limits for emissions of gases and fumes from other industries plant chimneys

Contaminant	Maximum allowable limit (mg / m ³)
Total Suspended Particulates (TSP)	50
Nitrogen Oxides (NO _x)	300
Sulphur Oxides (SO _x)	100
Total Organic matter	50
Total Heavy Metals	2
Carbon Monoxide (CO)	250

Table 2-5: Maximum allowable emissions from vehicles

Fuel Type	Pollutants	Maximum Allowable Emissions according to the Egyptian Standards
Gasoline	CO (%)	200
	HC (ppm)	1.2
Diesel	Smoke Density Coefficient (Km ⁻¹)	2.65

2.1.4 Noise

Article 42 of Law 4/1994 (amended by Laws 9/2009 and 105/2015) and Article 44 of the amended Executive Regulations (decree 710/2012/) set maximum limits for noise levels. Table 2-6 shows the maximum ambient noise levels for different areas within the project location in accordance with Table (3) of Annex (7) in the amended regulations and IFC Health and Safety guidelines.

Table 2-6 : Maximum allowable noise level in different areas

Area and activity	Maximum allowable limit of equivalent noise (a) L _{Aeq}			
	IFC		National	
	Day (7 am - 10 pm)	Night (10 pm - 7 am)	Day (7 am - 10 pm)	Night (10 pm - 7 am)
Areas along roads of 12 m width or more, industrial zones with light industries and some other activities	70	70	70	60

2.1.5 Solid Waste

Article 37, of the Environment Law 4/1994 (amended by Laws 9/2009 and 105/2015) and articles 38 and 39 of its Executive Regulations (amended by decree 1741/2005) discuss the collection and transfer of solid waste.

Article 79 of Law 4 / 1994 and Article 41 of the Executive Regulations (amended by decree 1741/2005) discuss the precautionary measures to be taken while maintenance during operation phase, shutdown phase of the project and the transportation of the resulting waste or dust so as to prevent their volatilities.

Law 38/1967 concerned with the hygiene and its Executive Regulations (decree No. 134 of 1968) regulate collection, transport, storage and disposal of solid waste.

2.1.6 Hazardous Substances and Waste

The facility will dispose hazardous waste in compliance with the environmental requirements of Law 4/1994 (amended by Laws 9/2009 and 105/2015) and its amended Executive Regulations. Article 26 (amended by decree 1095/2011) and articles 28 and 29 (amended by decree 1741/2005) of the Executive Regulations discuss hazardous substances and hazardous waste management regulations and procedures. Moreover Article 31 of the executive regulations of law 4/1994 indicates the requirements for storing hazardous materials.

The facility will dispose wastewater in compliance with the Minister of Housing Decree no 44/2000 and its ER. Article 10 of the law regulates the requirements of wastewater disposal structures “trenches” and stipulates that they should be lined with cement

2.1.7 Contaminated Land

Specific regulations for soil contamination have not been developed yet in Egypt. Land Contamination has been addressed as general stipulations of the Civil Code regarding the actor/committer’s responsibility of the harm resulting due to his/her actions. In addition, stipulations of the amended ER of Law /4/1994 related to proper handling and management of the hazardous substances and waste (Article 33 of the ER) state that the owner or manager in charge of the establishment, from which hazardous wastes are generated, is obliged to decontaminate the facility, soil and the site in case of relocation or its the activity has been stopped.

2.1.8 Wastewater Usage in Irrigation

The project will use the treated wastewater to cultivate the green areas on the project’s site. Al Canal Company for Sugar will comply with the requirements of Egyptian Code No. 501/2015 for the usage of treated waste water in agriculture.

The consultative team held a meeting on 15/4/2018 with Dr. Nada Ashour (General Director of Environmental Management in Minya Governorate). It was agreed at the meeting to comply with the above-mentioned Egyptian code.

Table 2-7 shows the maximum permissible limits for the reuse of the treated sewage water in irrigation of food crops and non-food crops according to the Egyptian code.

Table 2-7 Maximum permissible limits for reuse of treated sewage water in irrigation of food crops and non-food crops

Parameter	Maximum limit (mg/L)	
	Long-term Use ⁽¹⁾	Short-term Use ⁽²⁾
Aluminum (Al)	5.00	20.00
Arsenic (As)	0.10	2.00
Beryllium (Be)	0.10	0.50
Copper (Cu)	0.20	5.00
Fluoride (F)	1.50	15.00
Iron (Fe)	5.00	20.00
Lithium (Li)	2.50	2.50
Manganese (Mn)	0.20	10.00
Nickel (Ni)	0.20	2.00
Lead (Pb)	5.00	10.00
Selenium (Se)	0.02	0.02
Cadmium (Cd)	0.01	0.05
Zinc (Zn)	5.00	10.00
Chromium (Cr)	0.10	1.00
Mercury (Hg)	0.002	0.002
Vanadium (V)	0.10	1.00
Cobalt (Co)	0.05	5.00
Boron (B)	1.00	2.00
Molybdenum (Mo)	0.01	0.05
Phenol	0.002	0.002
Total Dissolved Solids (TDS)	2000 ⁽³⁾	3000
Total Phosphorus (Total PO ₄)	30	30
Sulphates (SO ₄)	500	500
Bicarbonate (HCO ₃)	400	400
Sodium Adsorption Ratio (SAR)	6 – 9	6 – 9
Sodium (Na)	230	230
Magnesium (Mg)	100	100
Calcium (Ca)	230	230
Source: FAO, 1992, National Academy of Science – National Academy of Engineering (1973)		
(1) For water used continuously on all soils		
(2) For water used for a period of up to 20 years on fine - textured neutral or alkaline soils		
(3) Waters of higher concentration of TDS can be used in landscape irrigation of golf courses considering the salinity of irrigation water and salt tolerance for each grass species		

Reuse of the treated sewage water in irrigation is conditioned to the category of treated sewage water as shown in table 2-8.

Table 2-8: Categorization of the treated sewage water

Category of treatment		A	B	C	D
Requirements					
Maximum physical and	Total Suspended Solids-TSS (mg/L)	15	30	50	300

Category of treatment		A	B	C	D
Requirements					
chemical limits	Turbidity (NTU)	5	ND	ND	ND
	Biological Oxygen Demand-BOD ₅ (mg/L)	15	30	80	350
Maximum microbiological limits	E-Coli (MPN/100 mL)	20	100	1000	ND
	Intestinal nematodes/Liter	1	ND*	ND*	ND*
MPN=Most Probable Number ND=Not Determined *Conditions of unexposed workers to risks during irrigation should be strictly applied					

Table 2-9 shows the types of plants authorized to be irrigated with treated water.

Table 2-9: Permitted plants and crops to be irrigated with the treated sewage water

Category of treatment	Sub Group	Agricultural Group	Description
A	1-1	Landscape irrigation for educational facilities Public and private access parks and lawns	All types of grass, fence plants and flowers
	1-2	Fruit crops	Fruits eaten raw without peeling, like apples, apricots, peach, grapes..etc.
B	2-1	Dry grain crops and cooked and processed vegetables	All types of vegetables (processed) and dry strategic crops like Wheat, Barley, Corn, Rice, Lentils, Sesame
	2-2	Fruit crops	Deciduous trees and evergreen trees like citrus, olive, palm, mango, pecan, pomegranate, figs for drying
	2-3	Medicinal crops	Like Anise, Roselle, Cumin, Khallet, Fenugreek, Moghat, Fennel, Chamomile, Marmara
C	3-1	Dry grain crops and fruit crops and medicinal crops listed in category (B)	The same species in addition to sunflower plant and Sugar beet in condition of avoiding spray irrigation
	3-2	Non-food seeds	Seed production for the key food crops like Wheat, Corn and all fruit seeds types in condition of cultivation of these seeds in their sustainable locations afterwards

Category of treatment	Sub Group	Agricultural Group	Description
	3-3	All kinds of seedlings that are transplanted to sustainable fields	Seedlings of olive, pomegranate, citrus, bananas, palm, figs, mango, apples, pear
	3-4	Roses and piking flowers	Like local roses, eagle roses, ..etc
	3-5	Trees suitable for planting on the highroads and green belts	Like Casuarina, Eucalyptus and Ornamental palm trees
	3-6	Fiber crops	Like cotton, linen...etc.
	3-7	Fodder and legumes crops	All types of Sorghum
	3-8	Mulberry used to produce silk	All types of berries
	3-9	Ornamental plants and trees plantation	Like <i>Ficus Decora</i> , <i>Ficus Nitida</i> , Acacia
D	4-1	Solid biomass crops	All crops converted to charcoal (compressed tablets) like willow, Moringa
	4-2	Liquid biomass crops	All crops used in production of biodiesel and energy oils like Soybean, Jojoba, Jatropha, Castor
	4-3	Cellulose producing crops	Non-food crops used for glucose production and its derivatives like ethanol, acetic acid
	4-4	Lumber trees	All wood producing trees like Kaya, Camphor, Mahogany

2.1.9 Groundwater Utilization

Law 12/1984 for Irrigation and Drainage states the following:

Article 46 of Law 12/1984, prohibits construction of groundwater wells without a permit from the Ministry of Water Resources and Irrigation, and according to the rules set by the Ministry. In case of wells located in lands under Law 143/1981 concerning Desert Lands, the Ministry of Irrigation permit should be issued after obtaining the approval of the General Authority for Urbanization and Agricultural Development.

Article 47 of the Law specifies that the quantity of extracted water cannot exceed that indicated in the permit.

Articles 17 to 38 of the ERs (14717/1987) of Law 12/1984 present the different steps, requirements and technical specifications for obtaining a permit, which include, but not limited to, the purpose of constructing the well, description of water salinity, well dimensions, permitted uptake flow rate.

Article 20 of the ER stipulates that the Ministry of Irrigation establishes records of wells permitted at the regional level. The Ministry of Irrigation is to carry out regular monitoring and follow up on the permitted wells. A copy

of monitoring results is to be submitted to the institute of groundwater research.

2.1.10 Potable Water Guidelines

The decree of the Minister of Health 458/2007 provides the acceptable categories as follows:

- Physical parameters: such as colour, odour, turbidity and pH.
- Inorganic parameters: such as hardness, dissolved salts, sulphates and chlorides and metallic
- Heavy metals and organic pesticides
- Microbiological parameters
- Radioactive substances

Table (2-10) below shows example of parameters relevant to potable water quality for drinking and domestic purposes according to national law

Table (2-10): Parameters Relevant To Potable Water Quality (Minister of Health Decree 458/2007)

Parameter	Maximum allowable limits (mg/l)
<i>Physical Parameters</i>	
Dissolved salts at 120°C	1000
Total hardness (as CaCO ₃)	500
Sulphates (SO ₄)	250
Chlorides (Cl)	250
Iron (Fe)	0.3
Manganese (Mn)	0.4
Copper (Cu)	2.0
Zinc (Zn)	3.0
Sodium (Na)	200
Aluminium (Al)	0.2
<i>Microbiology parameters</i>	
Total bacteria count	<ul style="list-style-type: none"> – not exceeding 50cell/cm³ at 37°C for 24 hrs – not exceeding 50cell/cm³ at 22°C for 48 hrs
Total coliform	<ul style="list-style-type: none"> – 95% of the samples up to 100cm³ examined /year should be totally free of coliforms – No sample should exceed 2 cell/100 cm³ provided that this limit does not occur in two successive samples from one sampling source.
Streptococcus pyogenes	– none
Algae	– microcystene should not exceed 1µg/l in case of blue green algal bloom
Microscopic examination	– totally free of living protozoa and pathogenic organisms

2.1.11 Biodiversity Protection

Law 4/1994 (amended by Laws 9/2009 and 105/2015) concerning Environmental Protection and its Executive Regulations are concerned with the protection of biodiversity. The ecological importance of the site is insignificant as it is devoid of flora and fauna of concern to which the law refers. Accordingly, the legal stipulations would not apply to the factory's activities. However, in case of presence of vagrant animals, Annex 4 of the Executive Regulations of law 4/1994, amended by decree 1095 /2011, defines the wild animals and plants prohibited from being hunted, killed or captured, as:

- **First:** Birds, wild animals, faunal and aquatic living organisms, or parts of them, or their derivatives; which are forbidden to be hunted, killed, commercialized, raised, possessed, transported, exported, imported or traded living or dead, including
- **Second:** Flora forbidden to be collected, imported, exported, cultivated or commercialized.
- **Third:** Faunal and floral living organisms threatened by extinction, or those raised or cultivated outside their natural habitats without having obtained a permit from the EEAA.

2.1.12 Legislations Related to Work Environment

a. Workplace health and safety

The Labor Law No. 12/2003 regulates the working conditions and manages the relationship between workers. The law also deals with individual employment contracts, conditions of employment, wages and leave, negotiations and collective labor agreements, disputes as well as the provision of vocational training, in parts of the law from the first book to the fourth. The fifth book deals with occupational health and safety requirements. A number of ministerial decisions have been issued to clarify the various provisions of the law.

Articles 43 and 45 of Law 4 / 1994 (amended by Law 105/2015) and articles 44, 45, 46 (amended by decree 1095/2011) and article 47 (amended by decree 1741/2005) of the Executive Regulations obligate the enterprise to provide protection equipment and all necessary safety measures for workers to protect them against noise, thermal exhaust and gaseous emissions within workplace. Furthermore, article 32 of decree 211/2003 of the Minister of Manpower and Immigration addressed the prevention of high voltage hazards at power generation plants; as it describes the occupational safety measures while handling and maintaining electrical, wire and cable equipment. In addition, Article 211 of the labor law 12/2003 and article 34 of decree 211 /2003 determine the requirements for the prevention of physical, chemical, biological and mechanical hazards in the workplace in addition to records of medical supervision of employees.

b. Gaseous emissions

Articles 43 to 45 of Law 4/ 1994 (amended by Law 105/2015) and articles 44, 45, 46 (amended by decree 1095/2011) and article 47 (amended by decree

1741/2005) of the Executive Regulations state that the owner of the establishment must provide protective equipment for workers and all necessary safety measures for noise reduction, thermal exhaustion and gas emissions inside working spaces.

In addition, the mentioned articles obligate the facility owner to provide a good ventilation system in all indoor and semi-enclosed areas, ensuring that exposure times to gas emissions within the working environment comply with the maximum allowable limits.

Table 2-11 summarizes the maximum emission limits in the work environment related to the proposed project and as set out in Annex 8 of the Executive Regulations amended by decree 1095/2011 of Law 4 / 1994 (amended by Law 105/2015).

The company shall also comply with the IFC guidelines of air quality in workplaces stating that employers should take appropriate measures to maintain air quality in the work area.

Table 2-11: Maximum emission limits in the work environment relevant to the proposed project

Emission	Average concentration in 8 hours (mg/m ³)
Calcium carbonate	10
Calcium oxide	2
Total particulates	10
Respirable particulates	3

c. Noise

Law 4 /1994 (amended by Law 105/2015) sets the maximum permissible noise levels within the workplace (in dB) in Annex 7 of the Executive Regulation (amended by decree 964 /2015). Table (2 - 12) shows these limits and compares them with the IFC limits.

If noise level is more than 85 dB in workplaces with up to 8 working hours, the facility is obliged to reduce the exposure time by half with each increase in noise level by 3 dB with appropriate ear plugs.

Table 2-12: Maximum permissible limits noise

IFC Standards			National Laws	
Location /activity	Equivalent level LAeq,8h (dB)	Maximum LAmax,fast (dB)	Type of Place and Activity	Maximum Permissible Noise Level (dB LAeq)
Heavy Industry (no demand for oral communication)	85	110	Workplace (workshops and factories) with up to 8 hour shifts	85

IFC Standards			National Laws	
Location /activity	Equivalent level LAeq,8h (dB)	Maximum L _{Amax,fast} (dB)	Type of Place and Activity	Maximum Permissible Noise Level (dB LA _{eq})
Open offices, control rooms, service counters or similar	45 - 50	-	Administrative offices - Work rooms for computers, typewriters and similar equipment	65
			Work rooms for activities requiring routine mental concentration - public areas of banks – control rooms in industrial activities - Restaurants and cafeterias	60

d. Heat Stress

Annex 9 of decree 1095/2011 regulates the maximum exposure limits to heat stress in the workplace. Table 2-13 shows the exposure limits that apply to the facility. The project shall also follow the guidelines presented by the IFC in its occupational health and safety guidelines regarding heat stress.

Table 2-13: Maximum allowable Heat Stress limits

Active Work Duration	Average Heat Stress (° C)		
	Light Work	Intermediate Work	Extensive Work
Continuous Work	30	26.7	25
75% Work, 25% Rest	30.6	28	25.9
50% Work, 50% Rest	31.4	29.4	27.9
25% Work, 75% Rest	32.2	31.1	30

e. Seasonal work

Article 6 of the Ministry of Labor and Immigration decrees 213/2003 and 329/2015 for seasonal work state that the project owner must provide transportation to the project and accommodation to the seasonal staff free of charge without any salary deduction. Article 10, addresses the responsibility of project owners for provision of medical services to seasonal workers.

f. Child labor

Article 64 of the Child Law 12/1996 states that “*children shall not be employed for work before reaching the age of fifteen (15) calendar years*”.

Articles from 98 to 103 of the Labor Law 12/2003 (amended by law 90/2005), address working conditions for children and obligations on the owner who has child labor working in their project Minister of Labor decree 118/2003 concerning child labour describe terms and conditions for recruiting a child such as providing periodical medical examinations, first aid, good working

environment, PPEs and a list includes names, age date of recruitment for each child and post it clearly at the site as well as providing healthy meals.

Ministerial Labor Decree 118/2003 concerning child labor includes the following:

- Article 1 indicates a list of jobs where it is prohibited to employ a child under 18 years old.
- Article 2 indicates a list of jobs where it is prohibited to employ a child under 16 years old. It includes jobs which require a lot of physical and mental work. It also includes jobs that put them at physical chemical or biological risks.
- Articles 3 to 8 describe terms and conditions for recruiting a child such as providing periodical medical examinations, first aid, good working environment, PPEs and a list includes names, age date of recruitment for each child and post it i clearly at the site as well as providing healthy meals.

g. Vulnerable groups

Article 35 of Labor law 12/2003 states that it is prohibited to cluster wages based on cultural, religious, gender and gender differences.

Law 10/2018 related to the Rights of People with Disabilities is concerned with provision of equal rights to this group. It includes their rights to have a life insurance, social insurance, freedom in choices, chances of work opportunities that do not surpass their physical disability limit.

2.1.13 Legislations Related to Protection of Woman

Article 2 of the law organizing the National Council for Women Law 30/2018, states that the council's objective is to promote and protect women's rights and freedom, and to provide them with equal opportunities.

Article 2 of Labor law 12/2003 conditions that health and safety precautions shall be taken into considerations for working women to avoid any health deteriorations that might prevent their pregnancy ability and precautions shall align with the national laws.

Articles 88 to 97 of Labor Law 12/2003 amended by law 90/2005, notes the requirements for women working hours, vacations and pregnancy leave etc.

The National Strategy for Combating Violence against Women (2015 – 2020) has been developed in 2015 and its general objective is to combat all forms of violence against women and girls. It is based on four pillars, namely prevention, protection, intervention and legal procedures. The Strategy includes the detailed executive action plans of the agencies participating in the preparation and execution of the National Strategy, drawn on the basis of the four pillars. It also includes the indicators for measuring the impact of the National Strategy.

2.1.14 Legislations Related to Community Benefit

Article 15 in the Investment Law 72/2017 and article 2 in its Executive Regulation 2310/2017 address the investors' social responsibility and provide examples of areas to invest in for the sake of achieving development and sustainability. Investors may allocate part of their annual profit that do not exceed 10% of the annual profit share for community development programs.

2.1.15 Legislation Applicable to Cultural Heritage

Law 117/1983 promulgating the Antiquities' Protection Law, as amended by Law 3/2010, deals with the protection of antiquities. It is the main law in Egypt regarding the protection of archaeological and historical sites. The Ministry of State for Antiquities (MSA) is the authority concerned with the supervision of all archaeological affairs and sites in the country (Article 5).

The Ministry of State for Antiquities (MSA) is responsible for discovery of antiquities and all exploration activities on Egyptian territory. MSA must be notified in the event that an unrecorded ruin is found by any person (Article 23). Although there are no cultural heritage areas in the site vicinity, relevant regulations for unlikely cases of chance finds still apply.

According to the Egyptian procedure, when a project is implemented in an area containing archeological remains, two different cases may arise, each requiring a different procedure:

- If the area is property of the State, it is subject to the Supreme Council of Antiquities decision and a request should be presented to the Council who would carry out a survey and excavations financed by the investor, and the remains will be transported to a location specified by the Council. The cost of the operation is decided by the inspecting committee according to the effort required and is paid to the regional inspecting office to carry out the job. As an alternative, the investor could directly pay for the excavation and relocation activities. This should be the likely case if any ruins are found at the proposed project location.
- If the area is recorded as an archaeological area, a request should be presented to the Head of the Supreme Council of Antiquities, and, usually, the case is submitted to the Antiquities Permanent Committee which is convened monthly. Generally, this ends with an acceptance of the project activities when the project is considered of national importance while the remains are of modest value and, thus, they are dislocated to another place. This is not the case for the proposed project as the area is not recorded as an archaeological area.

2.1.16 Laws Relating to Investment

The Company is subject to Investment Law 72/2017 and its Executive Regulation 2310/2017. According to the law, the General Authority for Investment is responsible for all procedures, licenses and approvals related to projects subject to the Investment Law.

Article 2 of the Executive Regulations stipulates that "an investor must allocate a percentage of his profits to participate in community development outside the scope of his project through participation in all or some of the following areas:

- Take measures to protect and improve the environmental status, improve environmental conditions in society and address various environmental problems, for example:
 - a. Develop mechanisms for recycling
 - b. Use of treatment plants for wastewater treatment and reuse
 - c. Use of renewable energy
 - d. Reduce greenhouse gas emissions or develop projects for adaptation to the effects of climate change.

Article 40 of the Executive Regulations stipulates that “within the framework of the economic development plan of the country, the competent authority shall issue the necessary approvals, permits or licenses for the establishment of investment activities on the lands specified for investment before they are allocated to investors. The concerned authorities shall provide the Authority with such approvals, permits or licenses within a period not exceeding sixty days from the date of the request to obtain such approvals, permits or licenses.

The Authority shall promote for the lands that acquired all approvals, permits or licenses, and receive requests from investors, knowing that the fees and other financial charges to the competent financial authorities’ approvals, permits or licenses are to be collected from the investors upon completion of the land allocation procedures.

In all cases, the investor is obliged to obtain the necessary approvals, permits or licenses to start practicing the activity as the case may be. The investor is also committed to implement the activities time schedule submitted to the competent authority in the time specified for each activity in the schedule.

2.2 International Financing Institutions Requirements

In addition to Law 4/1994, this ESIA is prepared according to the requirements of the international finance institutions particularly the IFC and the AfDB. In this context, the IFC and AfDB require the project to abide by its Performance Standards and Operational Safeguards, respectively, to ensure that they are environmentally sound and sustainable. Performance Standards (PSs) and Operational Safeguards (OSs) are applied to manage social and environmental risks and impacts.

2.2.1 IFC performance Standards

The performance standards define clients' roles and responsibilities for managing their projects and the requirements. The standards also include requirements to disclose information. The IFC PSs are:

- **Performance Standard 1: Social and Environmental Assessment and Management System**

This performance standard establishes the importance for:

1. Integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects;
2. Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them;
3. The client's management of social and environmental performance throughout the life of the project.

This performance standard is relevant to most projects and applies to the current one. The current ESIA is also in consistence with this performance standard.

- **Performance Standard 2: Labor and Working Conditions**

This performance standard emphasizes the relation between the economic growth and the well-being of a company in one side, and establishing a relationship with the workers as a valuable asset that requires a healthy and safe work environment as well as protection for basic rights of workers. It also recognizes the need for employment creation and income generation as an approach for economic growth.

This performance standard is applied in the current project; more specifically regarding employment creation as well as ensuring the safe environment of the workplace.

- **Performance Standard 3: Pollution Prevention and Abatement**

This performance standard recognizes that industrial activities often generate increased levels of pollution to air, water and land, which can have potential adverse impact on the surrounding environment.

The performance standard applies to the potential emissions and wastes (solid and liquid) from different sources of this project and their potential impacts.

- **Performance Standard 4: Community Health, Safety and Security**

This performance standard recognizes that the project activities and infrastructure can increase the potential for community exposure to risks and impacts arising from equipment accidents, structural failure and releases of hazardous materials. Impacts may also arise from exposure to diseases and the use of safety and security personnel.

The project is located in the desert away from residential areas. Mitigation measures stated by this ESIA and the design mitigation measure are to decrease the impact of the project on its surroundings neighbours.

- **Performance Standard 5: Land Acquisition and Involuntary Resettlement**

This performance standard recognizes that the project design minimizes economic and physical displacement, balancing social environmental and financial costs and benefits.

This standard does not apply to the proposed project since the activities will not involve any involuntary resettlement or change in the land use, The land on which the project is to be implemented belongs to the General Authority for Reconstruction Projects & Agricultural Development. Canal Sugar obtained its contract lease from the government and it officially rents the land from the General Authority for Construction Projects & Agricultural Development.

- **Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management**

This performance standard addresses how projects can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources.

As a significant part of the ESIA, the biological baseline in the project area was investigated through a field visit to the site location. No threatened flora or fauna were observed in the area. However, mitigation measures for biodiversity protection will be stated in the ESIA.

- **Performance Standard 7: Indigenous Peoples**

This performance standard aims at preventing adverse impacts of the projects on communities of Indigenous peoples and to provide opportunities for development benefits.

Provisions of this performance standard do not apply to the proposed project as the State does not recognize the presence of any indigenous communities in Egypt. While any national acknowledgement of indigenous groups is valid to help determine the potential presence of indigenous people, it is understood that it is not the sole determinant that is used for assessing the applicability of PS 7. On the other hand, the nearest communities are composed of Nile Valley populations (Egyptians) and no Bedouins to whom Indigenous People Criteria could apply are present in the area.

- **Performance Standards 8: Cultural Heritage**

The objective of this performance standard is to protect the cultural heritage from the adverse impacts of the project activities and support its preservation.

There are no recorded archaeological sites within or in close proximity to the site of the proposed project. However, in case of chance finds the procedures stated in the Egyptian regulations will apply.

2.2.2 AfDB Operational Safeguards

The bank adopts five operational safeguards (OS) based on the Integrated Safeguard System document entitled Policy Statement and Operational Safeguards (2013)².

OS1 states the requirements the borrower needs to undertake including identifying, assessing and managing environmental and social impacts of their project and taking into consideration the climate change factor, OS1 also provides stakeholders participation during the consultation process to ensure that all issues affecting the community is addressed properly. OS2, OS3, OS4 and OS5 support the application of OS1 and provide precise requirements for diverse environmental and social concerns encompassing gender differences and assessment processes. The specific aims of OS2-OS5 are in the following paragraphs.

This OS is fundamental and is applicable to the sugar factory project since it is required in the Egyptian laws to perform an Environmental Impact Assessment (including the social impacts) before commencing any project.

OS2. It is concerned with the involuntary resettlement of communities due to land acquisition, population displacement and compensation. It requires the project to avoid any involuntary resettlement if possible or reduce resettlement impacts.

It aims to offer the involuntary resettled communities compensation and assistance in their living standards and improving their livelihood through resettlement plans. The OS outlines the requirements and procedures for such cases.

This OS does not apply to the sugar factory project since the land officially belongs to the General Authority for Reconstruction Projects & Agricultural Development. Canal Sugar obtained its contract lease from the government and it officially rented the land from the General Authority for Construction Projects & Agricultural Development.

OS3. It is concerned with biodiversity, renewable resources and ecosystem services and states the requirements for the borrowers including the identification and implementation of opportunities to conserve biodiversity and sustainable usage of biodiversity and resources.

This OS applies to the to the sugar factory project since the project will use ground water.

OS4. It is concerned with pollution prevention and management of hazardous waste. It states the key requirements for pollution avoidance and prevention that **burrower** needs to follow and the sustainable usage of natural

²AfDB (2013) Integrated Safeguards system. Policy Statement and operational Safeguards. Compliance and Safeguards Division

resources. It sets criteria required for pesticide management, waste management and hazardous material, GHG emissions, pollution prevention, health and safety and resource efficiency.

This OS applies to the sugar factory project since the project will produce solid waste and GHG emissions from machinery used.

OS5. It is concerned with labor conditions, health and safety. The OS sets out the main requirements for the client to protect workers' rights. This includes **requirements** such as avoiding recruiting children, avoidance of forced labor; maintain a good occupational health and safety, ensuring equal opportunities non-gender nor race nor religious biased.

This OS applies to the sugar factory project since the project will recruit and lodge around 1000 workers during the construction phase and 600 workers during the operational phase.

The OSs aligns the bank's operations with international conventions related. It also obliges compliance with internationally accepted environmental standards, particularly the World Bank Group Environmental Health and Safety (EHS) Guidelines.

The World Bank EHS Guidelines are technical reference documents with general **and** industry specific examples of Good International Industry Practice (GIIP). The EHS guidelines for sugar manufacturing³ provides best practice to reduce environmental impacts of sugar manufacturing activities including solid waste management, wastewater management and air emissions best practice. The guidelines also include occupational health and safety measures against physical, biological and chemical hazards in addition to community health and safety measures. Lastly, it provides performance indicators for the Environment and for health and safety.

2.3 International Conventions

Egypt is a signatory to a number of international and regional agreements and conventions that are related to the environment and society. The section below presents international conventions to which Egypt has signed and that are relevant to the project activities.

2.3.1 Biodiversity and Natural Resources

- ***African Convention on the Conservation of Nature and Natural Resources, Algiers, 1968. Egypt signed this convention on 15 September 1968, ratified it on 12 April 1972 and it entered into force on 12 May 1972***

The convention recognizes the economic, social, cultural and environmental importance of natural resources including renewable and non-renewable resources as well as the soil, water, flora and fauna. It

³ World Bank (2007). Environmental, Health, and Safety Guidelines for Sugar Manufacturing

aims to promote and enhance environmental protection and to encourage sustainable use of natural resources and to synchronize policies in the different fields. It requires all parties to adopt measures to reach these aims and to implement preventative measure to avoid land degradation and soil deterioration. It also requires parties to sustainably manage their water resources and to prevent pollution and excessive abstraction of water.

- **Global Convention on the Protection of Biological Diversity, 1992**

It recognizes the importance of biological diversity in offering ecosystem services such as re-creational, ecological, economic, educational services etc. and its importance in maintaining life. The convention emphasizes that countries and states are responsible to preserve their biological diversity and that specific human activities negatively affects their presence. It also recognizes the challenge in lack of information and studies. It as well emphasizes the importance of in-situ conservation to maintain biodiversity and notes that ex-situ conservation also has a role in its preservation. It recognizes as well that the priority of developing countries include social and economic progress and lowering poverty. It highlights the importance of sustainable use as the answer to poverty elimination and development. Egypt signed this convention on 9 June 1992, ratified the convention on 2 May 1994 and was put into force on 31 August 1994.

2.3.2 Climate Change

- ***The United Nations Framework Convention on Climate Change (UNFCCC), 1992. Egypt signed this convention on 9 June 1992 and ratified it on 5 December 1994. It entered into force on 5 March 1995***

It provides an intergovernmental framework to face climate change issues. Recognizing that the climate is a common shared resource affected by anthropogenic human emissions. It recognizes the importance of marine environments as well as terrestrial ones in acting as reservoirs for Carbon and greenhouse gases. It also emphasizes the importance of scientific, economic and practical sectors in tackling climate change problems and the importance of continuous monitoring and assessment. In addition, it promotes the diffusion and transfer of technologies that reduce anthropogenic emissions of greenhouse gases in sectors including industry and agriculture.

- ***Kyoto Protocol setting internationally binding emission reduction targets, 1997. Egypt signed this protocol on 15 March 1999, ratified it on 12 January 2005. It entered into force on 12 April 2005 Which is an agreement to the UNFCCC convention***

The protocol aims to commit its joined parties to specific international emission targets and aims to strengthen the global response to temperature rise. It recognizes that currently developed countries are the main cause of the presently high emissions of GHG in the atmosphere a result of 150 industrial years. It provides flexibility on how the countries

reach their target (e.g. increase in forests to compensate their emissions). The protocol sets internationally binding emission reduction targets for its members.

- ***Paris Agreement for strengthening global response to climate change threats, 2015. Egypt signed the agreement on 22 April 2016 and ratified it on 29th June 2017***

Brings together nations to fight climate change and adapt to it while helping developing countries to do so without ignoring their national objectives. It globally aims to keep an overall temperature rise of less than 2° C this year and to pursue more efforts to lower the increase of rise even further by 1.5 ° C. It promotes the decrease of GHG emissions and encourages sustainable development, production and consumption.

2.3.3 Cultural Heritage

- ***World Heritage Convention, 1972. Egypt ratified the convention on 7 February 1974***

The convention sets guidelines for parties to help them identify locations that can be world heritage sites and means to conserve them. The convention provides managing guidelines and possibly financial assistance. Moreover, raising awareness and education is also encouraged in order to improve the protection of those sites.

2.3.4 Children's Rights

- ***Convention on the Rights of the Child (CRC), 1989. Egypt ratified the agreement on. Egypt signed the agreement on 5 February 1990, and ratified 6 July 1990***

The convention recognizes that all family members should have equal rights, freedom and justice. It recognizes that everyone should have rights and freedom with no discrimination by race, gender, culture, language, ethnicity, religion, social status and income. It states that a healthy family environment and a healthy society are crucial for the development of the child. It also states that a child needs to have legal rights to protect its needs and mental maturity prior and after birth. It recognizes the importance of global cooperation in improving the lives of children in different regions. Furthermore, it also gives attention to children in challenging environments and circumstances and recognizes their need for special attention.

2.3.5 Women's Rights

- ***Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), 1979. Egypt signed the agreement on 16 July, 1980 and ratified it on September 18, 1981***

The convention focuses on the prevention of discriminatory behavior against woman and mandates ratifying parties to ensure that their laws and regulations should incorporate policies against women's discrimination, and promoting gender equality.

2.3.6 International Labour Standards

The International Labor Standards (ILSs) are legal instruments, developed by the ILO's constituents (governments, employers and workers). These set the basic principles and rights at work⁴. They are either conventions, legally binding international treaties that may be ratified by member states, or recommendations, which serve as non-binding guidelines.

The eight fundamental conventions are:

- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87), Ratified on 6 November 1957
- Right to Organise and Collective Bargaining Convention, 1949 (No. 98), Ratified on 3 July 1949
- Forced Labour Convention, 1930 (No. 29), Ratified on 29 November 1955
- Abolition of Forced Labour Convention, 1957 (No. 105), Ratified on 23 October 1958
- Minimum Age Convention, 1973 (No. 138), Ratified on 9 June 1999
- Worst Forms of Child Labour Convention, 1999 (No. 182), Ratified on 6 May 2002
- Equal Remuneration Convention, 1951 (No. 100), Ratified on 26 July 1960
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111), Ratified on 10 May 1960

The four governance conventions are:

- Labour Inspection Convention, 1947 (No. 81), Ratified on 11 October 1956
- Employment Policy Convention, 1964 (No. 122) , Not Ratified
- Labour Inspection (Agriculture) Convention, 1969 (No. 129), Ratified on 20 June 2003
- Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144), Ratified on 25 March 1982

⁴ International Labour Organization (ILO)

3. Project Description

3.1 Project Location and Components

The project aims to produce white sugar from beet as a main product, molasses and dry pulp as secondary products. The production capacity of the project is 930,000 tons / year of white sugar.

The site area is about 1 million m² (240 feddans). The project's production capacity will be 36,000 tons of beet / day. The Canal Sugar Company will use paved roads to transport beet, products and provide other services.

The project is located in Giza / Luxor road, 38 km west of Minya city and about 30 km west from Mallawi. The project is surrounded by vacant desert areas. The landuse in the vicinity of the project location is as follows:

- East: Giza / Luxor road and privately owned farms
- West: desert land owned by Canal Sugar Company
- South: desert land owned by Canal Sugar Company, worker housing of Savola Company (about 1km to the south), and sugar beet farm.
- North: empty desert land and agricultural lands.

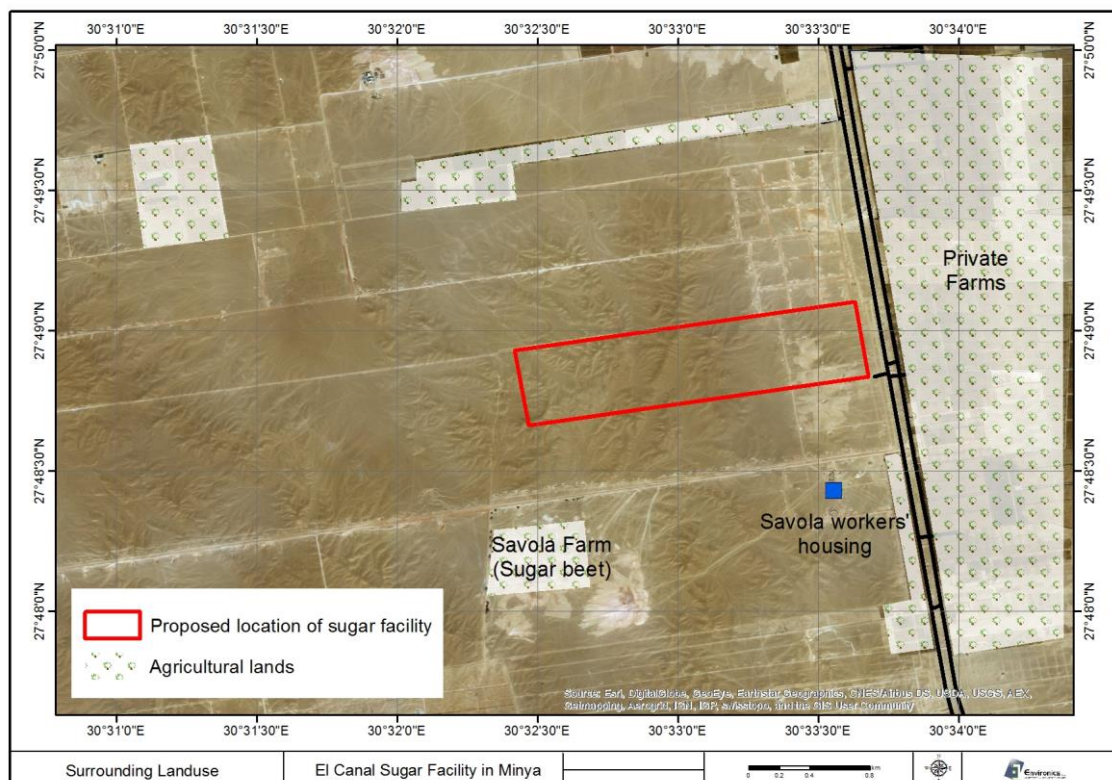


Figure 3-1: Location of the project and surrounding activities

As per Canal Sugar visit to neighboring farms, sugar cane, wheat, corn, sugar beet are the main crops being planted by the neighboring farms.

3.2 Description of the Proposed Project

The project consists of the following components:

- Beet sugar production plant
- Carbon dioxide and limewater production unit.
- Steam and power generation plant
- It also includes other supporting utilities:
 - Storage facilities (tanks, silos, chemical store, etc.)
 - Industrial wastewater treatment unit
 - Limestone storage area
 - Lime mud storage area
 - Laboratories
 - Administrative offices
 - Workshops
 - Groundwater treatment unit
 - Domestic wastewater treatment unit

The Canal Sugar Company will obtain beet from the following sources:

- about 50% of the beet will be supplied from land reclamation for to the Canal Sugar Company
- about 50% of the beet will be supplied through contracts with farmers from El Minya, and also from El Reef El Masry project.

The table below shows sugar beet production of the different farms

Table 3-1: Sugar beet production of the different farms

Neighboring farms	Feddans	Average yield	
Savola	20,000	35	700,000
Oasis	6,000	35	210,000
Dakhleya	10,000	35	350,000
other (larger scale)	5,000	35	175,000
	41,000		1,435,000
Canal Sugar	47,500	39	1,852,500
Small scale farmers	3		
Total farms	200		
Ave yield	26		
Total small scale farms			15,600
Total beet (IN and OUT)			3,303,100

Beetroot will be partially sourced from the farm via internal roads network; check the following layout (Figure 3-2).

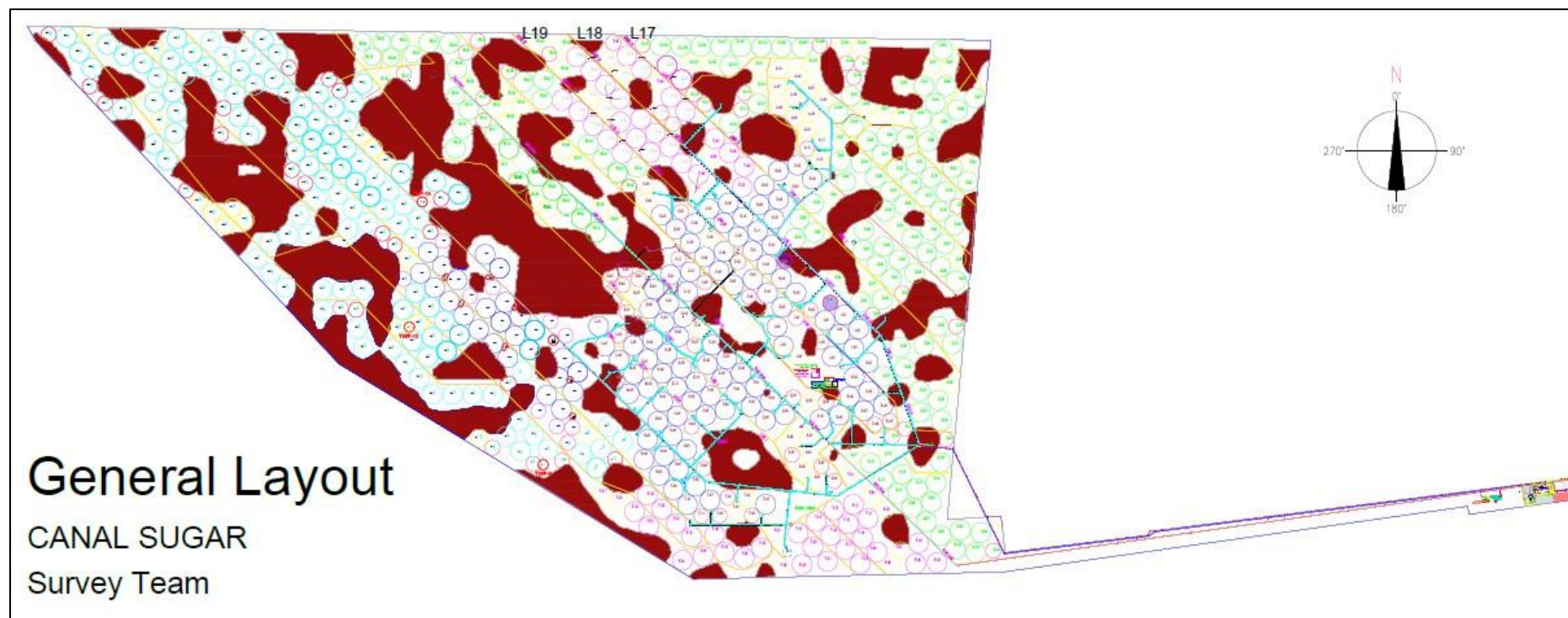


Figure 3-2: Project layout

The company will use natural gas as a source of energy, which will be supplied by Nile Valley Gas a subsidiary company of TAQA Gas. The contracts related to supplying natural gas to the project is being finalized, and **Annex 1** of this ESIA includes the Technical and Financial Offer submitted by TAQA.

Table 3-2 shows the quantities of raw materials used in the proposed project. **Annex 7** shows the safety data sheets for the used chemicals.

Table 3-2: Raw materials used in the proposed project

Raw materials	Quantity (ton / day)
beet	36000
Limestone	1800
Pesticides	7.2
Anti-foam materials	3.6
Gypsum	54
Caustic Soda	118
Magnesium oxide	2
Filtration aids	10.5
fermentation materials	0.29

Limestone, pesticides, anti-foam materials, gypsum, caustic soda, magnesium oxide, filtration aids, and fermentation materials all will be sourced via the Cairo – Assiut Desert Road (Figure 3-3). The project will prepare a transportation management plan within its ESMS development stage.

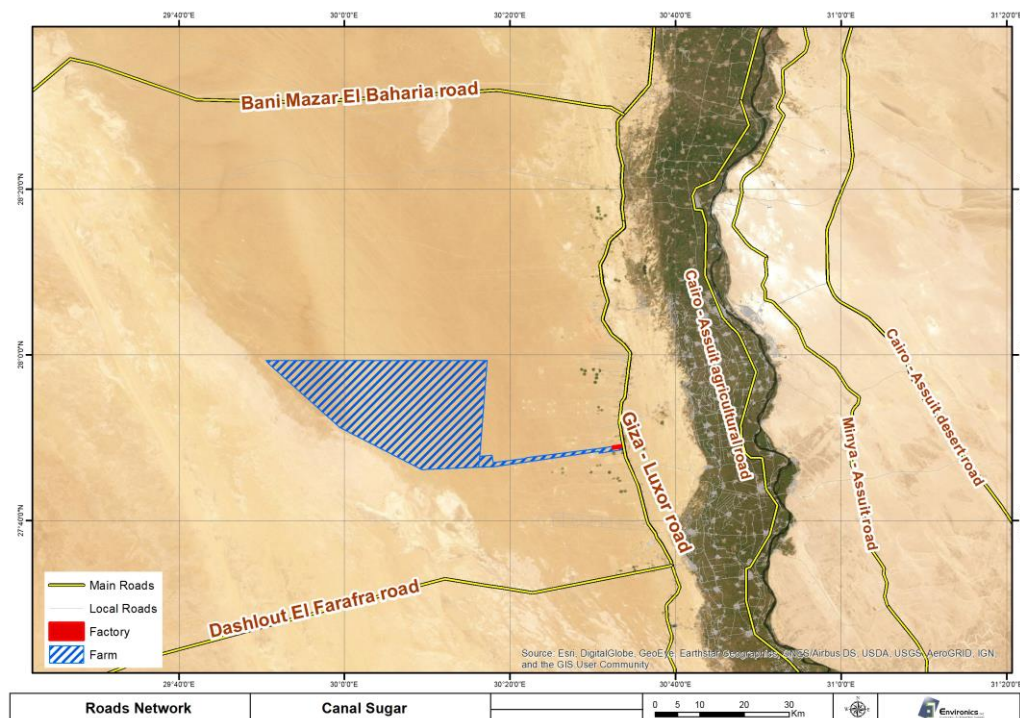


Figure 3-3: Road network

The following sections describe the production process for producing of white sugar.

3.2.1 Production of Beet Sugar

The production of white sugar involves the following industrial stages.

- **Beet receipt, weighing, and sampling**
36,000 tons of beet will be trucked daily from the company farmlands to the facility. The capacity of the truck is about 25 tons. The trucks will drive through a designated road between the farmland and the facility. The beet shipment is weighed and sampled to identify the sugar content. Upon approval of the shipment, it is unloaded into an underground receiving area and conveyed by belt conveyors to the beet hopper.
- **Beet washing**
The beet is transported to two washing tanks, each with a capacity of 24,000 tons / day. The beet is conveyed then cleaned (washed from mud, herbs and adhered stones). High pressure water is used at the end of this stage to ensure beet cleanliness. Mud, herbs and stones washed away from this phase are collected and sold as soil conditioner and fodder. The used wash water is treated and re-used in the washing process.
- **Extracting the juice**
After the washing process, beet is transferred to slicing operations to obtain small-sized beet slices. The slices are transferred to the extraction tower. Sugar is extracted in the extraction tower by hot water (temperature ranging from 55 to 70 ° C). This process produces raw juice extract and beet pulp. Two extraction towers (with capacity 18,000 tons / day each) will be used.
- **Pulp processing**
The wet pulp (90% moisture) resulting from the extraction process is pressed in a mechanical press, and the resulting juice is pumped back to the extraction tower. The pulp is then transferred to the pulp drying area until it is sold.
- **Preparation of carbonation solution**
Limestone is burned in a vertical kiln to produce quicklime (CaO) and carbon dioxide to be used in the beet extract processing. The kiln capacity is about 1800 tons / day of limestone. Natural gas fuel will be used at consumption rate of 170,000 m³ / day. The limestone is fed into the vertical kiln by conveyor belts, and quicklime is transferred from the kiln base to storage. Quicklime is transferred to a tank to add water to produce the milk of lime (Ca(OH)₂).

The gases resulting from the lime kiln pass through a gas scrubber to separate carbon dioxide from associated gases, where Sulfur dioxide (SO₂) and (NO_x) are absorbed. Carbon dioxide is collected and used in the carbonation process of raw juice.

- **Purifying raw juice**
Raw juice, rich in sugar, is purified at the carbonation stage, which

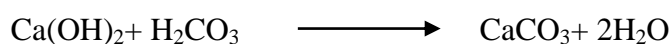
consists of two phases. The target of the process is to:

- Remove about 30-40% of non-sugars
- Neutralize any acidic reactions
- Preventing reduction in sucrose concentration
- Purification of the juice
- Remove small particles

The carbonation solution is mixed with the raw juice through two stages. The first stage is the primary cold calcination, which involves addition of limited amounts of carbonation solution. The capacity of the primary stage is about 39720 tons/day. This phase assists in the removal of colloids and the deposition of insoluble calcium salts.

The mixture is then sent to the hot calcinations unit, where a large quantity of carbonation solution is added. The capacity of the hot calcination stage is about 4008 tons/day. This phase aids the decomposition of amides. The temperature at this stage reaches 80 ° C and the pH reaches 12.

Carbon dioxide (CO₂) is bubbled through the raw juice and the carbonation solution in the carbonation process; which involves two stages. The capacity of the first stage is about 42 thousand tons/day. Carbon dioxide is bubbled in large quantities at this stage and calcium carbonate is formed, which absorbs impurities and precipitates (lime mud). Calcium carbonate is formed by the following reaction:



This phase helps absorbing colorants, the surface active matter and the non-sugary components. The juice is pumped to a filter press to separate lime mud. The lime mud amount resulting from the process is almost 102 tons/h with 30% moisture content. It is then collected, dried, then sold to farmers as a soil conditioner.

After the filtration stage, the resulting solution goes to the second carbonation unit with a capacity of about 27 thousand tons / day. Fewer Carbon dioxide amounts are added at this stage. The aim of this stage is to reduce the soluble calcium salts content in the juice, and improve juice purity. Physical separations are performed, and the light juice produced at this phase is transferred to the decalcification stage.

- **Decalcification stage**

The light juice is pumped to the ion exchange to eliminate suspended lime particles which might deposit in the evaporators. Decalcification converts low solubility salts into highly soluble sodium salts.

This process consists of 3 ion exchangers where two are functional while the third is regenerated. The regeneration produces water reused in the process of juice extraction.

- **Juice concentration**

The juice is concentrated by pumping it into 6 evaporators concentrating

the sugar in the juice from 16% to 75%. The steam from the primary evaporators is used to heat the evaporators next in the process. Then the concentrated juice is transferred to the crystallization stage.

The juice from the pre-final evaporator is filtered through a carbon filter to reduce turbidity. Saturated carbon is reactivated / regenerated by heating in a furnace. The furnace operates at high temperatures, so as to eliminate the adsorbed materials in the carbon. Adsorbed organic compounds at these high temperatures are combusted into carbon dioxide and vapor. The combustion products of the furnace regeneration are released directly into the atmosphere without treatment.

This stage generates combustion emissions used for heating the primary evaporators before purging them to the atmosphere without treatment. Steam produced from this stage is sent to the steam line. Condensed steam from the evaporators is collected and used for initial heating of the light juice and then used as recovery water for boilers.

- **Crystallization process**

The concentrated juice is sent to the crystallization unit of a capacity of 7400 tons / day, where cooling and sugar crystals are formed. The product of the crystallization process is then pumped into cyclones (Centrifugal separation equipment) to separate the crystals as a final product (sugar) and the liquid. The liquid is sent other crystallizers with a capacity of 2700 tons per day and 1300 tons / day. This stage produces sugar as a final product and molasses as a byproduct.

The pH of the molasses is adjusted and then stored in a 5000-ton basin. The molasses storage basin is firmly sealed.

- **Drying, storage and packaging**

The sugar will contain some moisture after passing through the central centrifugal process, which requires drying by steam-heated air in a heat exchanger. Cool air is also used directly to cool the sugar inside the cooler.

Heating and cooling occur within the same unit which is divided into two sections. The capacity of the dryer and cooler is 6000 tons / day.

The dryer produces air containing sugar particulates, thus, the air is blown through a tissue filter to separate the sugar particles. The filtered sugar particles are recovered in the process again.

Dry sugar is lifted by a sealed vertical bucket to screens/sieves separating small and large grains, and each is stored in a separate silo. Sugar is stored in appropriate conditions to assure its safety. It is then packed in plastic bags. Sugar silos and packaging devices are connected to fabric filters that separate any fugitive sugar particles and recover them.

Figure 3-4 shows the stages of sugar processing and Figure 3-5 shows the carbonization solution production process.

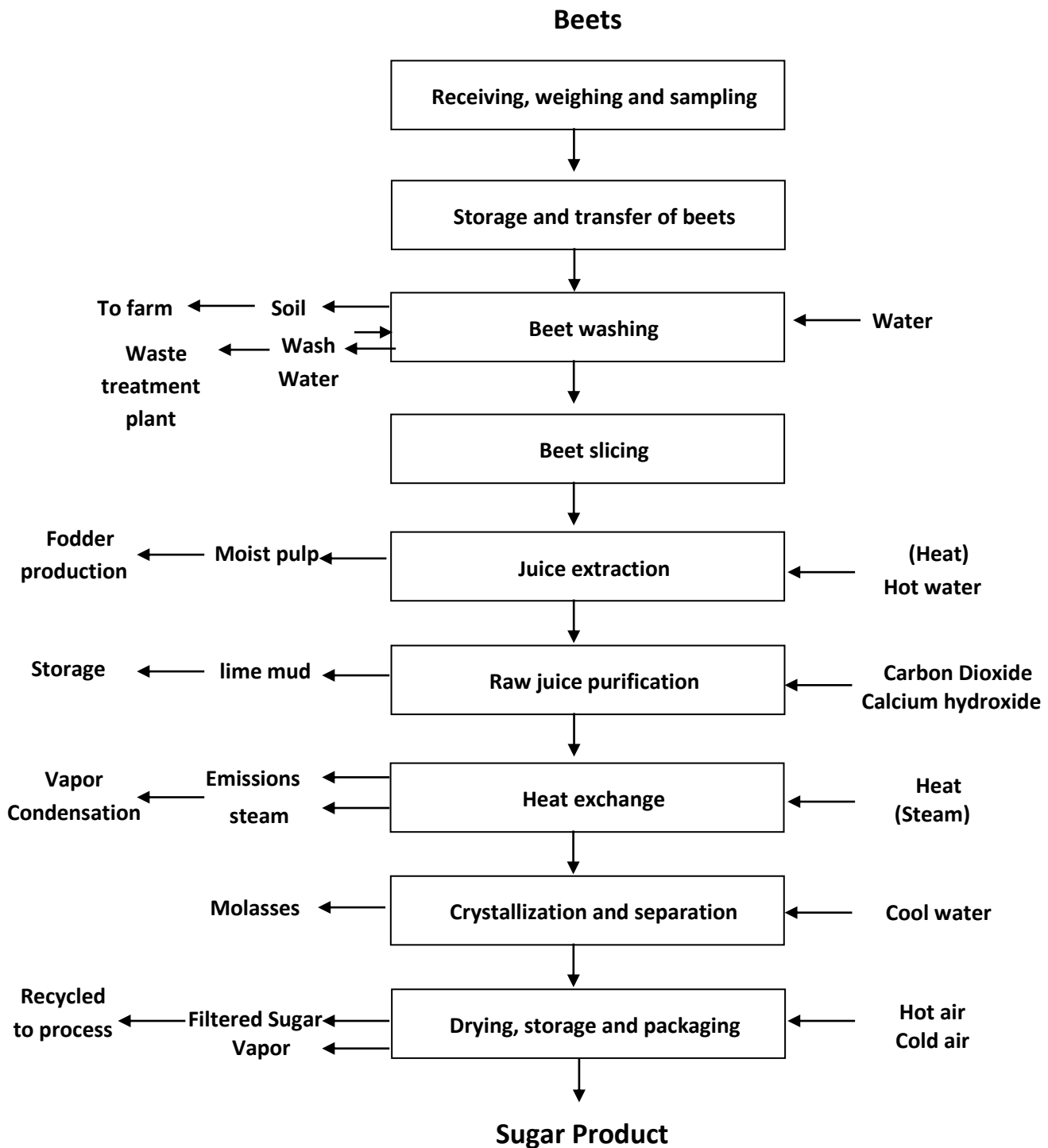


Figure 3-4: Production of beet sugar

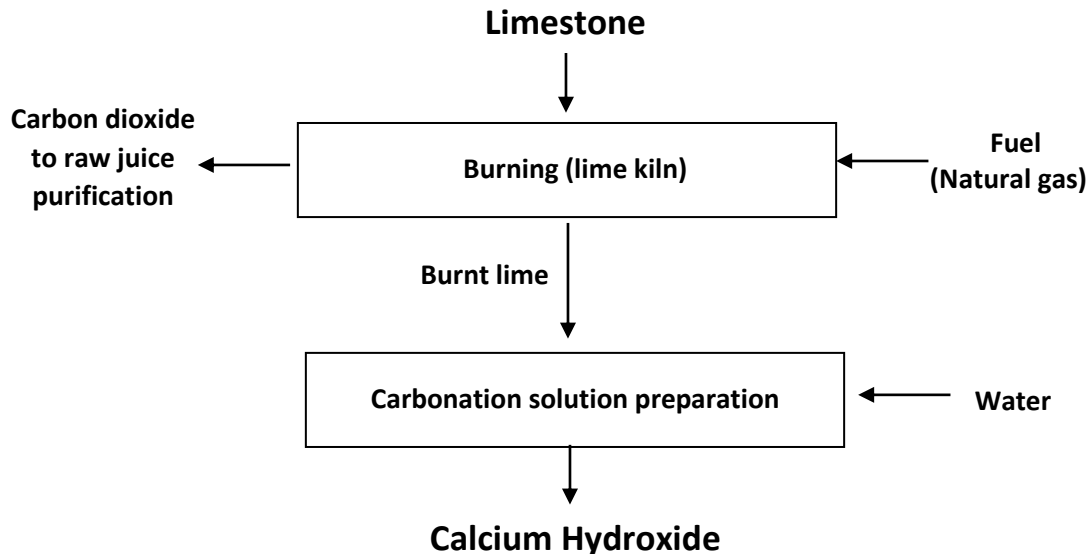


Figure 3-5: Carbon dioxide production and carbonization solution

Annex 4 shows the basic design of industrial processes, while **Annex 5** shows a list of the equipment used based on the basic design and electrical power. **Annex 6** includes the master plan of the project.

3.2.2 Primary and Secondary Products

Table 3-2 shows the types and quantities of the main and secondary products of the project:

Table 3-3: Main and secondary products

Product	Ton / year
High purity white sugar	930 thousand
Molasses	270 thousand
Dry pulp	325 thousand

The annual production capacity was calculated according to the operating hours of the facility, 150 days/year for the beet process.

3.2.3 Utilities and Service Units

a. Water source

Water will be obtained from a specified well which will serve both the factory and the housing unit which will have their separate treatment process described in the following b and c sections.

b. Potable groundwater treatment unit

Water with low salinity will be abstracted from the well. The estimated water quantity is 200 m³/day. The process of potable water treatment (200 m³/day) is as follows:

- Primary filtration process by disc filters for sand and solids removal.

- Media filtration for fine solids removal.
- Activated carbon for TOC, color, taste, charged impurities.
- Reverse osmosis plant for salt content adjustment if applicable.
- Disinfecting the water from the previous processes by UV.
- Water will be distributed to the housing and non- process buildings.
- Treatment facility waste will be treated as a domestic waste in domestic sewage treatment plant

c. Industrial process groundwater treatment unit

Groundwater collected from the designated well (with an estimated rate of 250 m³/hr) will be treated and used for boiler feed (150 m³/hr) and for process feed (100 m³/hr). First, 250 m³/hr of water from the designated well will be collected in one equalized feed tank. Then the two processes at the treatment unit will be conducted as follow:

1. Demineralization water for boiler feed (150 m³/hr)
 - Primary treatment for removing solids, sand and clay will be performed
 - Chemical treatment for inorganic salt removal as iron, manganese, hardness and charged molecules will be conducted.
 - Reverse osmosis unit for salt separation of 150 m³/hr capacity will be used.
 - Demineralization system for ion traces adsorption and pH adjustment will be used.
2. Soft water for process feed (100 m³/hr)
 - Primary treatment for removing solids, sand and clay will be performed
 - Softener columns will be used to eliminate all hardness water ions (calcium, magnesium, strontium, silicon, barium) in all its salt forms.

The residues generated from the treatment process will be mixed in a drain pit for collecting all waste types generated from water treatment and pumped to the industrial wastewater treatment collection lagoons. Estimated wastewater capacity from this process is 50m³/hr. The wastewater sources generations include:

- Regeneration for the softener system including acid and basic chemicals that neutralize and form a salty water
- Media filter back wash process
- Backwash process performed once every 2 days with estimated quantity 30 m³/time
- Regeneration for the demineralization system includes utilization of acids and alkalis for backwashing the demineralization media. The result of backwash, flushing is highly acidic or basic effluents
- Reverse osmosis reject water with salinity more than feed water.

Such wastewater will be mixed with other industrial process wastewater for organic load dilution purposes.

d. Domestic wastewater treatment unit

The estimated amount of domestic wastewater is 180 m³/day. Wastewater streams will be collected from different housings, non-process buildings locations via collection pits, pumped to domestic sewage treatment plant.

Wastes from kitchen and laundry will be collected to prior treatment to remove the oily and solid contaminants, and then merged with domestic waste. The following steps will be conducted in the treatment unit for domestic waste:

- All collected wastewater will be pumped in a screening chamber then an equalization tank for degassing and mixing by aeration blowers.
- Activated sludge process will be used for organics digestion.
- Treated water will be exposed to a disinfectant and then filtered via media filters.
- The final treated produced water will be used for local landscape and inedible plants irrigation
- Accumulated excess sludge more than process requirements to be separated and dried in sludge drying bed.
- Water from sludge drying will be returned back to the equalization tank.
- Dried sludge will be collected and sent for disposal through a third party licensed by the EEAA as per contract, or will be used as a soil conditioner for landscaping .

The treated water (180 m³/day) will be used for irrigating green areas and inedible plants inside the facility premises, according to local regulations, instead of using groundwater. Table (2-7) in Section 2.1.8 of Chapter 2, shows the concentration limits of treated sewage wastewater to be used in green area irrigation in the facility, as per the Egyptian Code No. 501/2015.

e. Industrial wastewater treatment unit

The estimated amount of industrial waste water is 30000m³/day. Industrial wastewater is produced from the sources listed in Table 3-4.

Table 3-4: Sources and quantities of industrial wastewater

Sources of industrial wastewater	Organic load	Expected Quantity (m ³ /hr)
Beet washing station	Muddy water with low organic load	900
Beet end	High organic load	30
Diffuser and mixer	High organic load	50
Industrial processes and ion exchangers regeneration process	High organic load	70
Boiler blowdown	Zero organic load	60
Process water blowdown and RO reject and media filters backwash	Zero organic load	40
Sequential Evaporation process	High organic load	100
General waste trench in all production processes	High organic load	
Total (in hr).		1250

The treatment process of industrial wastewater will depend on the concentration of organic content (Table 3-4).

High organic load waste

- All waste collected will be deposited in a pond called heavy load waste pond or facultative pond
- The waste accumulated in the facultative pond that contains anaerobic bacteria in the bottom away of the oxygen and other aerobic bacteria in presence of atmospheric oxygen, both react with the organic compounds to be decomposed to smaller organic compounds.
- The waste water with low load in the facultative pond should be pumped to other pond for removing the accumulated gasses called (degassing pond).
- Degassing pond produce water ready for aerobic lagoon that contains aerators for increasing the dissolved oxygen and for digesting the remaining organic compounds by activated sludge.
- After the aerobic treatment of waste , enhancement or polishing for the treated water specifications by filtration process for separate sludge , and removing water color , odors, remaining solids , and make disinfection for removing microorganisms .
- All the treated wastewater will be reused in the beet washing station at a rate of 900 m³/hr.

Low organic load waste

- Low organic load water is collected in decanting lined ponds (Polyethylene of 1 cm thickness) for sedimentation then pumped in irrigation system in the inedible plants and landscaping at a rate of 900 m³/hr.
- Muddy water form beet washing station pumped to low organic load ponds and the decanted mud to be pumped dried over land and collected manually and used as fertilizers.

The company will comply with the relevant Egyptian Code No. 501/2015 detailed in Chapter 2, Section 2.1.8 of this ESIA.

The project will prepare wastewater management plan within its ESMS development stage.

f. Steam production

Natural gas will be used in the generation of steam through the use of two steam boilers at a total capacity of 175 tons/hr at 2.5 bar and 126 ° C. Natural gas or diesel (in case of emergency) will be used as fuel if needed. The boiler stack height is 65 meters, and has a diameter of 1.2 meters.

No steam turbines will be used only low pressure boilers which generate process steam will be used, as required.

g. Electricity generation unit

Natural gas or diesel (in case of emergency) will be used as fuel if needed to generate electricity. . The remaining electricity needs will be supplied

by the National Electricity Network in the region.

h. Storage units

Table 3-5 shows the storage units in the project:

Table 3-5: Data of the project's storage units

Storage unit	Stored material	Capacity (ton)	Dimensions (m)		UST/AST	Material of construction	Insulation
			Height	Width			
Beet receiving pile	Beet	48000	260	190	AST	Concrete	Concrete base
Limestone warehouse	Limestone	30000 (Storage for 15 days)	40	90	AST	Steel	Reinforced concrete base
Lime mud loading area	Lime mud		--		AST	--	Reinforced concrete ground with a slope and a system for collecting water
Water tank	Firefighting water	Specified in the detailed design	Specified in the detailed design		UST	Concrete	Concrete base
Fuel tank	Diesel fuel	35000	Specified in the detailed design		AST	Concrete / Stainless steel	Concrete base
2 white sugar silos	White sugar (final product)	160000 tons (for each silo)	Silo train 100 m		AST	Stainless steel with concrete conical base	Membrane and water base insulation
Active lime tank	Limestone	---	Specified in the detailed design		AST	Specified in the detailed design	Specified in the detailed design
Molasses tank	Molasses	5000	Specified in the detailed design		AST	Specified in the detailed design	Specified in the detailed design

3.2.4 Infrastructure Requirements

• Water

The project consumes about 250 m³/hr (6000 m³/day) of recovery water for the industrial process and boilers. Water will be abstracted from a groundwater well within the project area. **Annex 8** of this ESIA, includes the approval of the Ministry of Water Resources and Irrigation for groundwater abstraction. **Annex 8** also includes the terms for groundwater usage which involves:

- Monitoring well abstraction by installing a flow-meter for each well, and a remote monitoring system in which every well has an installed sensor connected to the Ministry officials
- The Canal Sugar Company is committed to issuing detailed assessments identifying the capacity of the aquifer according to the area specified in the contract. Accordingly, Canal Sugar Company has carried out assessments through (IRZ) Company. Moreover, Schlumberger is currently performing another detailed aquifer study and modeling on behalf of Canal Sugar.

Generally, the beet sugar production is considered a water producing industry due to the huge water content in beet crops. Thus, huge amounts of clean water condensate (from steam) are produced and recycled within

the process without treatment. The production process requires 1840 m³/hr of water supplied by recycling and reusing process water, any losses are recovered by 250 m³/hr of water supplied by well groundwater.

Table 3-6: Groundwater usage distribution

Water use	Expected Quantity (m ³ / day)
Industrial use make up water	3600
Water boiler make up water	2400
Total	6000

The project will prepare a resources management plan within its ESMS development stage.

- **Natural gas**

The project will require about 480,000 m³ /day of natural gas, which will be supplied to the project through TAQA gas pipeline. Annex 1 includes the correspondence documents between The Canal Sugar Company and TAQA for natural gas supply to the facility. The gas pipeline is an associated facility and the project will address it in a separate ESIA, which will include the delineation of the pipeline's Area of Influence.

3.3 Emissions and Wastes

3.3.1 Emissions from the Construction Phase

The construction phase includes the following activities:

- Drilling and site preparation
- Construction of concrete bases
- Buildings' construction and connecting utilities
- Finishing
- Mechanical and electrical works
- Paving internal streets and surrounding the site
- Growing gardens
- Operation start-up

Generally, the construction phase is expected to involve the environmental aspects described below.

- **Air emissions**

Construction equipment and transportation cause dust and air emissions from vehicles and trucks at the site for a temporary period.

Dust will be generated from vehicles traffic on un-paved roads, earth clearance, and site excavation.

Vehicles and other construction machinery are other sources of gaseous emissions, including NO_x, CO, SO₂ and PM₁₀.

Although vehicle exhaust emissions will be released close to ground level (i.e. close to the breathing zone of receptors), these emissions will

generally be released in open areas where rapid dispersion and dilution will take place due to the open area and wind speed.

Contractors will be required to provide preventive maintenance and control emissions to keep as low as possible to meet the relevant legal environmental requirements.

- **Wastewater**

As a result of the construction phase, wastewater is estimated to be 27 m³/day. Domestic wastewater will be collected in above ground tanks. The tanks will be regularly emptied through a licensed contractor for safe disposal as per the national regulations.

- **Solid waste**

The project produces solid waste, such as municipal waste and drilling/excavation waste. Solid waste will be collected and stored properly. The storage areas/ containers will be regularly emptied through a licensed contractor for safe disposal as per the national regulations.

- **Hazardous waste**

The project produces hazardous waste, as consumed oils resulting from the maintenance of trucks and equipment. Empty paint containers used in finishing processes are considered hazardous waste. Hazardous waste will be collected and stored properly to avoid leakage. The storage areas or containers will be regularly emptied through a licensed contractor for safe disposal as per the national regulations.

- **Storage of hazardous materials**

Hazardous material in general will be properly stored, labeled and its Material Safety Data Sheet (MSDS) will be attached to it. Storage and handling will be carried out according to the requirements of article 31 of the ER of law 4/1994, with proper firefighting systems etc.

- **Impact on workers' health and safety**

Construction activities usually involve risks to workers' safety, as slipping and falling. Traffic during construction may also pose risks to the safety and security of workers due to possible traffic accidents if precautions are not considered.

More details are provided in the impact assessment chapter.

3.3.2 Emissions from the Operational Phase

- **Air emissions**

Air emissions are result from the following sources:

- Emissions from boiler stacks using natural gas fuel
- Sugar dust resulting from drying, screening, packaging and ventilation fans during storage.
- Emissions from the carbon regeneration/reactivation furnace
- Methane emissions from wastewater treatment. Methane will be used

as an energy source for boilers. But during start-up, methane will be generated in small amounts and will be ignited.

- Emissions from the lime kiln, which will be sent to scrubbers to purify carbon dioxide for use in the industrial process. The rest of the gases will be released via a stack.

Table 3-7 shows the expected emissions from project stacks.

Table 3-7: Expected emissions from project stacks

Stack	Diameter (m)	Height (m)	Solid particles Total (mg/m ³)	Sulfur oxides (mg/m ³)	Nitrogen Oxides (mg/m ³)	Monoxide carbon (mg/m ³)	Organic Materials Total (mg/m ³)
Boiler stacks	1.2	65	Less than 50	N/N	200	N/A	N/A
Maximum allowable limits according to Law 4/1994 Table 1 Annex 6 of the Executive Regulations 2015 (mg/m ³)	N/A	N/A	50	150	500	100	N/A
Activated carbon kiln Stack	1.4	30	Less than 50	N/N	200	Less than 100	Less than 50
Maximum allowable limits according to Law 4/1994 Table 22 Annex 6 of the Executive Regulations 2012 (mg/m ³)	N/A	N/A	50	100	300	250	50
Lime furnace Stack	1.3	45	Less than 50	Less than 200	Less than 500	Less than 100	1.3
Maximum allowable limits according to Law 4/1994 Table 7 Annex 6 of the Executive Regulations 2012 (mg/m ³)	N/A	N/A	50	400	500	250	N/A

N/A: Not applicable; N/N: Not noticeable

Canal Sugar will be committed to adhere to the maximum limits of gas emissions stipulated in Table (1) of Annex (6) in ERs for Law 4/1994 modified by law 105/2015. The company will also adhere to IFC requirements regarding diesel fuel burning (Section 2.1.3 in Chapter 2).

- **Wastewater**

Domestic waste water will be treated according to the Egyptian Code No. 501/2015 (see section 2.1.8 in chapter 2) during the operational phase and will be used in landscaping of inedible plants.

- **Solid Waste**

Solid waste generated from beet sugar production is as follows:

- Rotten beet, beet pieces and herbs
- Sediment/mud from beet washing, sold to farmers
- Municipal waste and packaging waste disposed by a waste contractor
- Lime sludge from the carbonation stage, 1560 tons/day, and will be piled in a special allocated storage area within the facility site till it is

- sold as a soil enhancer
 - Sludge accumulated in the bottom of the lagoons system from the wastewater treatment plant, will be collected and stored and delivered to a certified contractor for safe disposal.
 - Sludge from domestic wastewater treatment to be separated and dried in sludge drying bed.
 - Sludge squeezed from treated domestic water will be returned back to the equalization tank. Dried sludge will be collected manually and sent to a safe area designated by the Governorate through a licensed waste contractor.
- **Hazardous Wastes**
Hazardous wastes from beet sugar production are:
 - Waste oils from maintenance operations (to be sold)
 - Medical waste from the clinic (to be delivered to a hospital for incineration)
 - Hazardous waste will be collected according to the legal requirements and disposed via a certified contractor.
- **Storage of hazardous materials**
Hazardous material in general will be properly stored, labeled and its MSDS will be attached to it. Storage and handling will be carried out according to the requirements of article 31 of the ER of law 4/1994, with proper firefighting systems etc.
- **Workplace environment**
The following illustrates the impact on the workplace environment:
 - Noise from compressors, pumps, centrifugal equipment, , boilers and evaporators
 - Heat stress at the boilers, evaporators and limestone kiln
 - Fugitive emissions and potential odors from beet storage, industrial wastewater treatment, suspended particulates, and vapors.
 - Canal sugar will ensure that workers use the suitable PPEs and apply proper safety measures to avoid any health hazards.
 -
 - The project ESMS plans will include air, noise and dust management and monitoring plans as well as hazardous materials and solid and hazardous waste management plans during construction and operation phases. In addition to a detailed project EHS plans addressing the different occupational health and safety aspects.

3.4 Social Aspects

This section presents the main project-related social aspects. More details are provided in Chapter 6: Environmental Impacts and Mitigation Measures.

3.4.1 Construction Phase

- **Socio-economic impact**
Construction activities might involve workers influx to the site. The impact

of workers influx on neighboring areas is not expected as the area is located in a desert land, not in the heart of the governorate and the workers accommodation will be on site away from residential areas.

Canal Sugar team has also visited the nearby villages as part of their social role to investigate the potential impact, several villagers claimed that road side small food shops, grocery shops, and vehicle maintenance shops have witnessed a flourish in sales ever since canal sugar started its preconstruction phase.

- **Community health and safety impact**

No residential areas are located near the facility. Savola workers housing is the nearest human cluster located at about 1 km south of the project area. This housing area may potentially be affected by noise and air emissions during the construction phase if such emissions are not properly mitigated and managed. Potential impact on community health and safety may also arise by the movement of vehicles for the transportation of construction material if no proper management measures are followed.

3.4.2 Operation Phase

- **Socio-economic impact**

. Potential adverse impacts from workers influx on neighboring areas is not expected as the area is located in a desert land, not in the heart of the governorate as previously mentioned and the workers accommodation will be within the project vicinity in the project housing unit, as well as cafeteria, mosque and other facilities. This will therefore, mitigate any potential pressure on public services in the area.

- **Community health and safety impact**

As previously mentioned the only nearby housing unit is the Savola Company Workers accommodation. Emissions that may impact the workers are air emissions and noise if no mitigation measures are put in place. Moreover, incremental increase of traffic loads resulting from transportation of material and products may have adverse community health and safety impacts if no measures are put in place. However, material transportation is not expected to be a frequent activity.

The project ESMS plans will include a detailed stakeholders' engagement plan and community grievance mechanism addressing construction and operation phases.

3.5 Project Schedule

The project timetable (Figure 3-6) is shown in the table below taking into account that all project phases will start after the completion and approval of the ESIA. The construction period is expected to take about 16 months. According to beet supply, the Canal Sugar Company will implement the land reclamation project involving planting beet (out of the scope of this ESIA) in stages, 4 years after obtaining the necessary approvals and certifications.

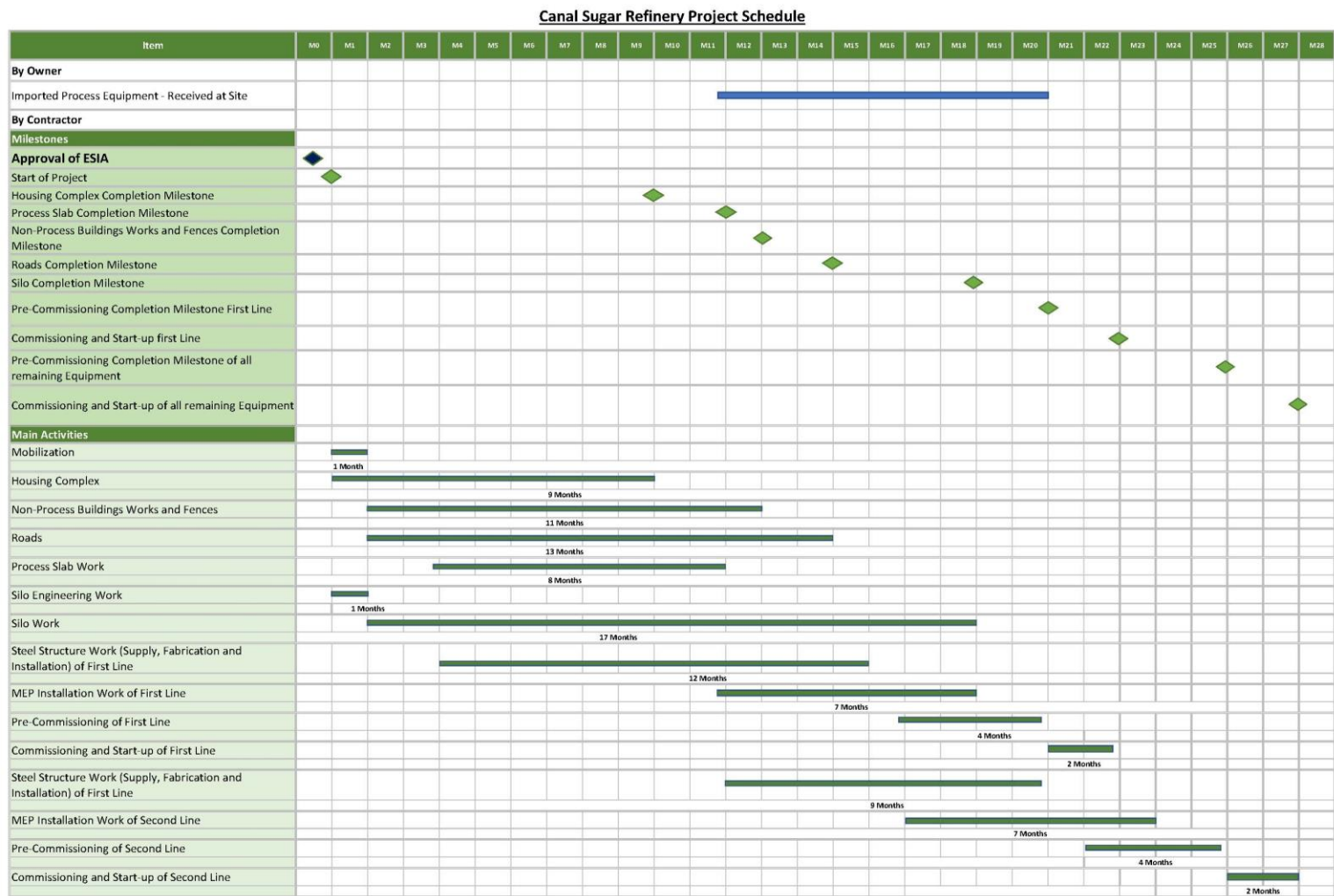


Figure 3-6: Detailed project schedule for the beet sugar factory project

3.6 Workforce

The expected number of employees in the project will be almost 1000 workers during the construction phase. The operational phase is expected to reach 600 workers and the company will consider employment from the surrounding areas of the site and people from El Minya Governorate. The project will have housing complex for workers and engineers working in the beet sugar factory. The complex will comprise facilities and services that include the following (Figure 3-7):

- Laundry
- Cafeteria
- Mosque
- Gym
- Ground water treatment unit (for the manufacturing plant and the housing unit)
- Domestic waste water treatment unit

Building Model	Designated For	Occupancy	No. of Buildings	No. of Units	No. of Employees
A1	Labours	Double Room	6	32	384
A2	Supervisors	Single Room	2	32	64
A3	Engineers	Single Studio	3	32	96
A4	Managers	1 Bedroom Suite	1	8	8
A5	Managers	2 Bedroom Suite	2	8	16
A6	Top Managers	3 Bedroom Villa	4	1	4
Total					572

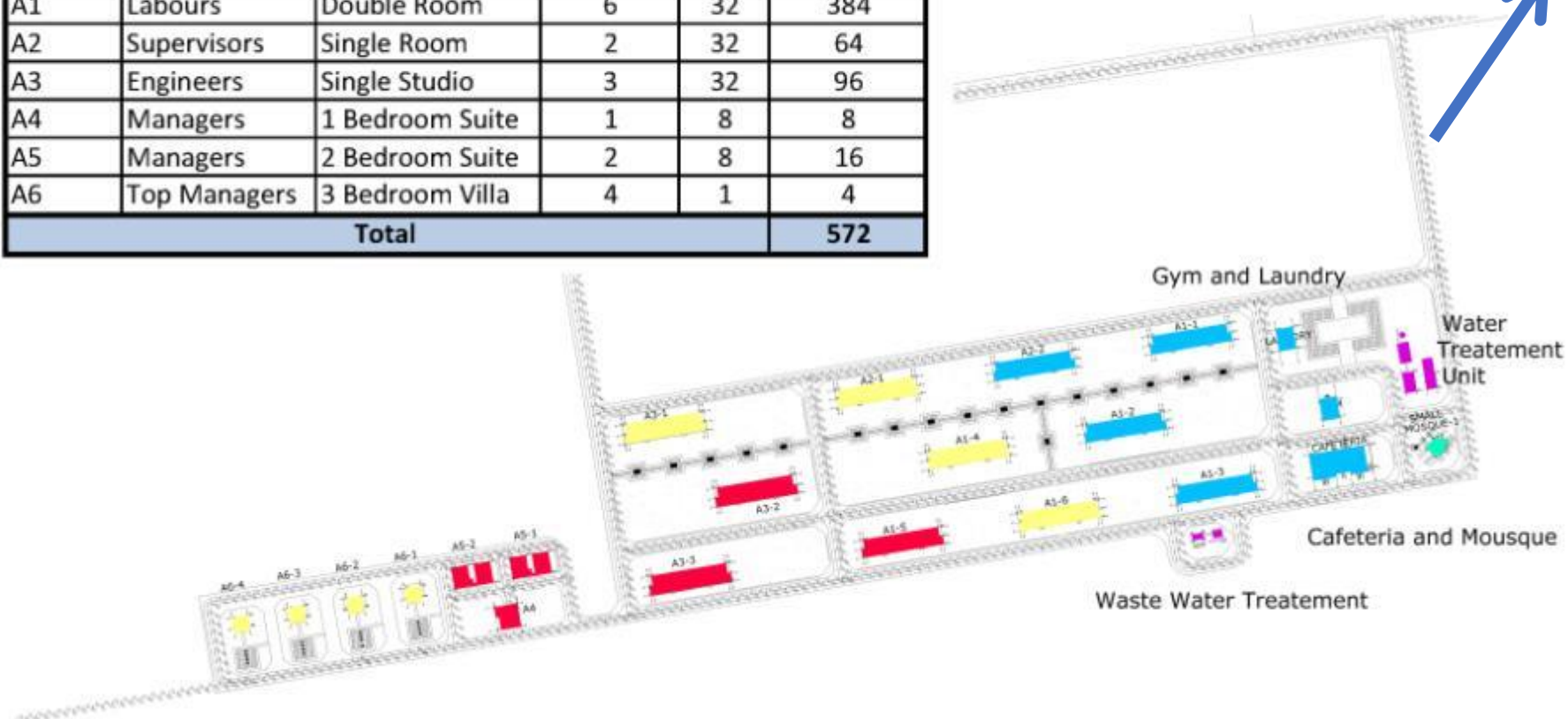
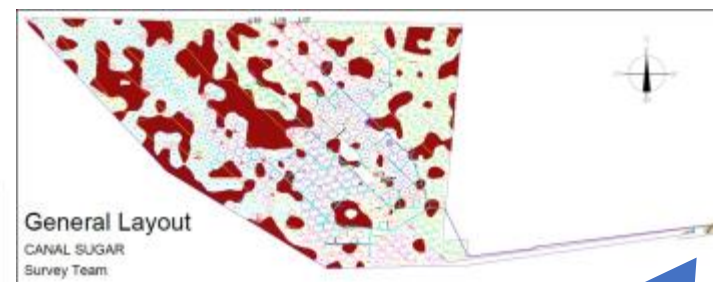


Figure 3-7: Workers housing complex and facilities

4. Description of Environmental and Social Baseline

The proposed sugar factory project of Canal Sugar Company is located in the western desert region of Minya Governorate on the Giza-Luxor desert road, about 38 km southwest of Minya.

The following figure (Figure 4-1) shows the location of the proposed sugar plant, which can be accessed through:

- Cairo / Assiut road (Eastern Desert road) which connects the project with the Red Sea Governorate in the east and with the governorates of Lower Egypt to the North and the governorates of Upper Egypt to the south.
- Giza / Luxor road (Western Desert road), which connects the project with the New Valley Governorate in the west and with the governorates of Lower Egypt to the North and Upper Egypt to the south.
- Three main axes connect the Aswan agricultural road with the Giza / Luxor road (Western desert road) while passing through the three main cities; Minya, Abu Qurqas and Mallawi.

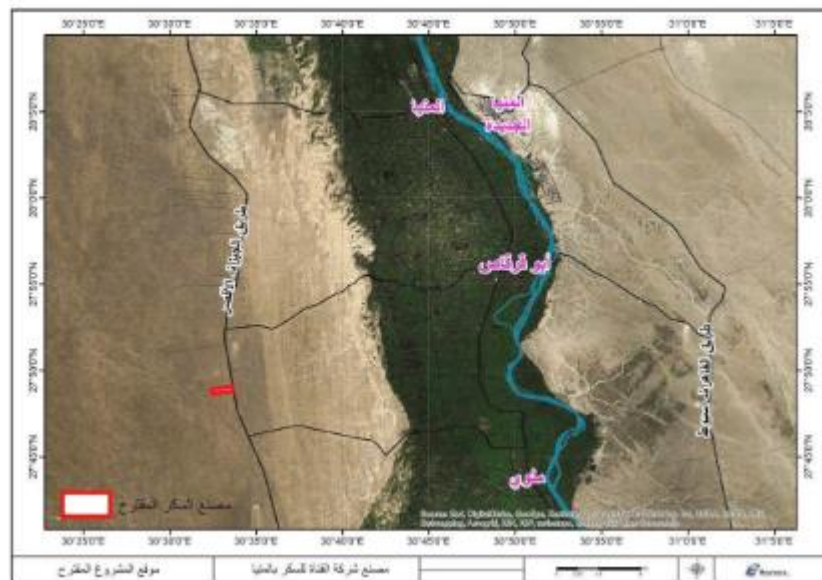


Figure 4-1: Map showing the location of the proposed sugar plant

The following table (4-1) shows the distance between the project location and the main cities nearby.

Table 4-1: Distance between the project site and the main cities

Cities	Distance (km) from proposed factory location
Minya	38
Abu Qurqas	32
Mallawi	30

4.1 Methodology

A description of the environmental status of the site and the hinterland has been carried out, to include physical, biological and socio-economic conditions. Baseline information has been obtained through intensive literature review and previous studies and reports on the area as well as from a field visit to the site carried out in March 2018 and interviews with local stakeholders.

A site visit to the project location has been carried out to:

- Collect qualitative environmental and social baseline information on the project area and surroundings;
- Determining the presence of any sensitivities neighbouring the project location; and
- Ground verification of data collected from literature and previous studies.

4.1.1 Physical Environment

Information was gathered from published material previous reports interpretation of geological and hydrogeological maps and analysis of satellite images. Data collected onsite were integrated and used to refine desktop information. Photographs and coordinates were taken to record the characteristic features of the area.

4.1.2 Biological Environment

Information and data on the wider area were gathered from previous direct observations, published material, reports analysis of satellite images and from recent studies performed by Environics and other entities. Data and information on biodiversity of the project site and immediate surroundings were mainly obtained from a site survey that included a visual assessment of the area and interviews with local personnel. The field survey included both floral and faunal investigations. The area was inspected for signs of wildlife (direct observations, scats, tracks, burrows, etc.). Findings were recorded using a GPS and digital photography.

4.1.3 Socio-economic Environment

The social assessment of the project area and vicinity mainly relied on desktop activities. Field-based techniques were used to refine collected data. Review of secondary data sources include, but are not limited to:

- GIS maps of the project area and surroundings;
- Former technical reports in adjacent areas and localities; and
- CAPMAS data.

Field-based activities include, but are not limited to:

- Site reconnaissance of the area;
- Scoping meetings with representatives of central and local governmental agencies; and

- Scoping meetings with neighboring farms, and local community in Balansoura village.

4.2 Physical Environment

4.2.1 Climate

The climate of Minya Governorate is characterized by a dry continental weather most of the year, with sunny days throughout the year and very low precipitation. The following is a general description of the climate, including information on temperature, wind velocity, direction, precipitation and relative humidity. The meteorological data relied on measurements from the Minya Meteorological Station. The data was obtained from the Environmental Description Report of the northern part of Upper Egypt issued by the General Authority for Urban Planning (2010).

a. Temperature

The project area is located in an arid desert region, with an average temperature ranging between 20.3° C in January and 37.0° C in June. The minimum temperature ranges between 4.3° C in January and 21.4° C in August. The annual average of the daily temperature is 22.5° C.

Table 4-2: Monthly maximum and minimum air temperature and daily average (° C)

Air temperature	Month												Annual average
	January	February	March	April	May	June	July	August	September	October	November	December	
Minimum (° C)	4.3	5.3	8.4	12.7	16.9	19.6	20.8	21.4	19.8	15.9	10.4	5.9	13.4
Maximum (° C)	20.3	22.1	25.5	31.1	33.5	37	36.8	36	34.4	31.4	25.8	21.2	29.6
Average (° C)	11.8	13.4	16.8	21.9	26.2	28.6	28.9	28.2	26.5	22.2	17.6	13	22

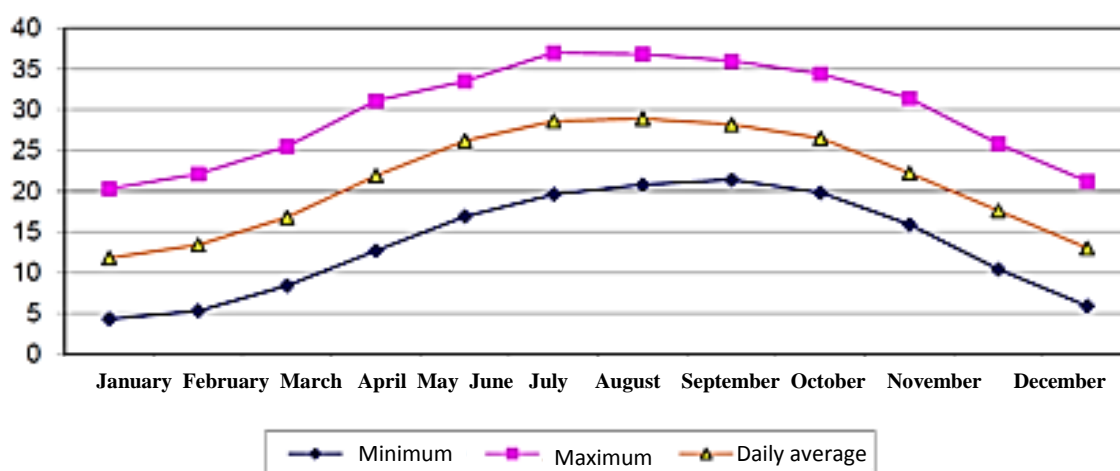


Figure 4-2: Temperatures in Minya Governorate (° C)

Source: Minya Station, Environmental Description Report of the northern part of Upper Egypt, General Authority for Urban Planning, 2010

b. Wind

According to the "wind finder" database for the 5 years period between 2013 and 2018, the northern winds dominate most of the year (34.2%), followed by

The north-western winds (15.9%) and the north eastern winds (14.6%). The least prevailing winds are west and south west winds, where both do not exceed 3.3% (Figure 4-3). The wind speed ranges between 9-15 km per hour during the year (Table 4-3).

Table 4-3: Monthly average wind speed (km / hour) during the period 2013-2018

Wind speed	Month												Annual average
	January	February	March	April	May	June	July	August	September	October	November	December	
(Km / h)	9	11	11	13	15	15	13	13	15	13	9	9	11

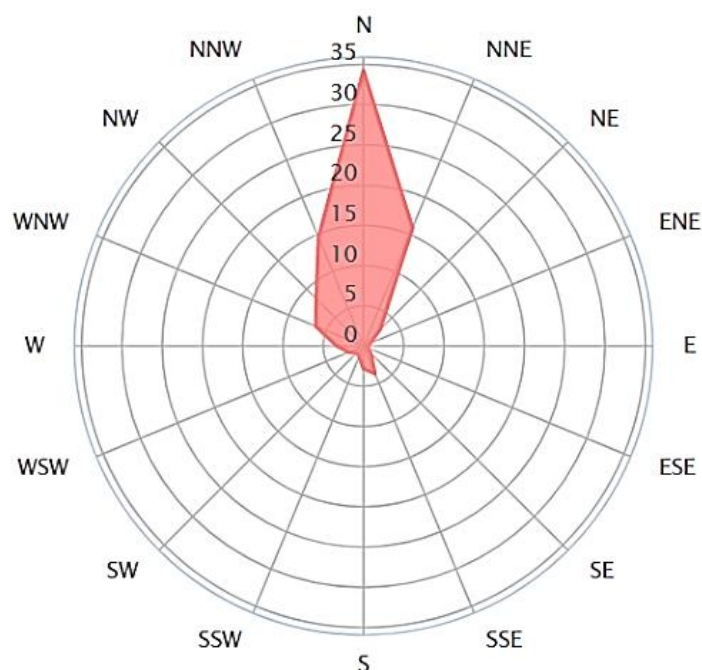


Figure 4-3: Annual wind direction (km/h) during the period 2013-2018

Source: Minya station www.windfinder.com, during 5 years from 2013 to 2018

c. Precipitation

Precipitation is rare in Minya. The maximum amount of rainfall occurs during the winter months and more specifically in February and March. The latter has the highest amount of rainfall, where it reaches 1.6 mm. The rest of the months have a dry weather. In fact, the annual rainfall does not exceed 4.4 mm/year (Table 4-4 and Figure 4-4).

Table (4-4): Monthly average precipitation (mm/month)

Rainfall	Month												Annual
	January	February	March	April	May	June	July	August	September	October	November	December	
(Mm / month)	0.4	1.1	1.6	0	0.3	0	0	0	0	0	0.7	0.3	4.4

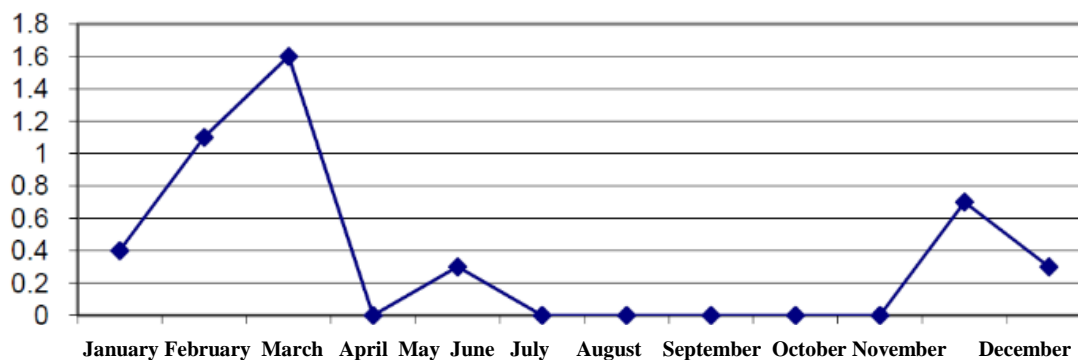


Figure 4-4: Monthly rainfall rates (mm / month)

Source: Minya Station, Environmental Description Report of the northern part of Upper Egypt, General Authority for Urban Planning, 2010

d. Relative humidity

The annual average relative humidity is 53%. In December the relative humidity reached its peak with a value of 68%, followed by January and November. Humidity level was at its lowest in June and May.

Table 4-5: Relative humidity (%)

Relative humidity	Month												Annual average
	January	February	March	April	May	June	July	August	September	October	November	December	
(%)	65	57	53	44	38	41	48	52	53	56	63	68	53

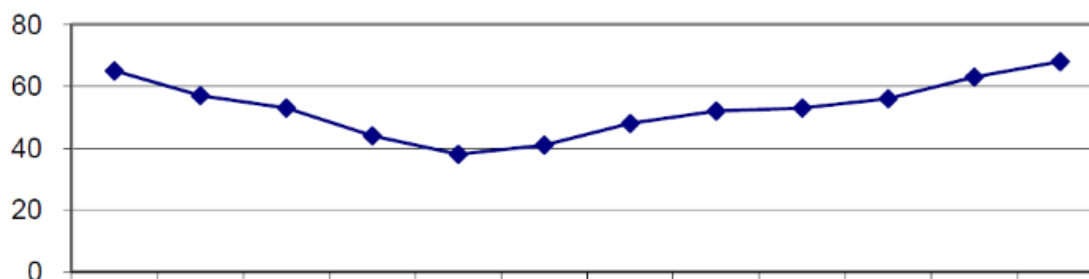


Figure 4-5: Monthly relative humidity (%)

Source: Minya Station, Environmental Description Report of the northern part of Upper Egypt, General Authority for Urban Planning, 2010

4.2.2 Air quality and noise levels

Data for the air quality of the project area was obtained from site measurements carried out by the Environics team in collaboration with the Development Research and Technological Planning Center (DRTPC) – Cairo University. These measurements were recorded on 20/3/2018 at five different points distributed as follow:

- Location No. P1 east of the project site, located on Giza-Luxor highway
- Location No. P2 west of the project site
- Location No. P3 northern area within the project site
- Location No. P4 south of the project site
- Location No. P5 in the center of the project site.

Figure 4-6 shows the location of the measurements points.

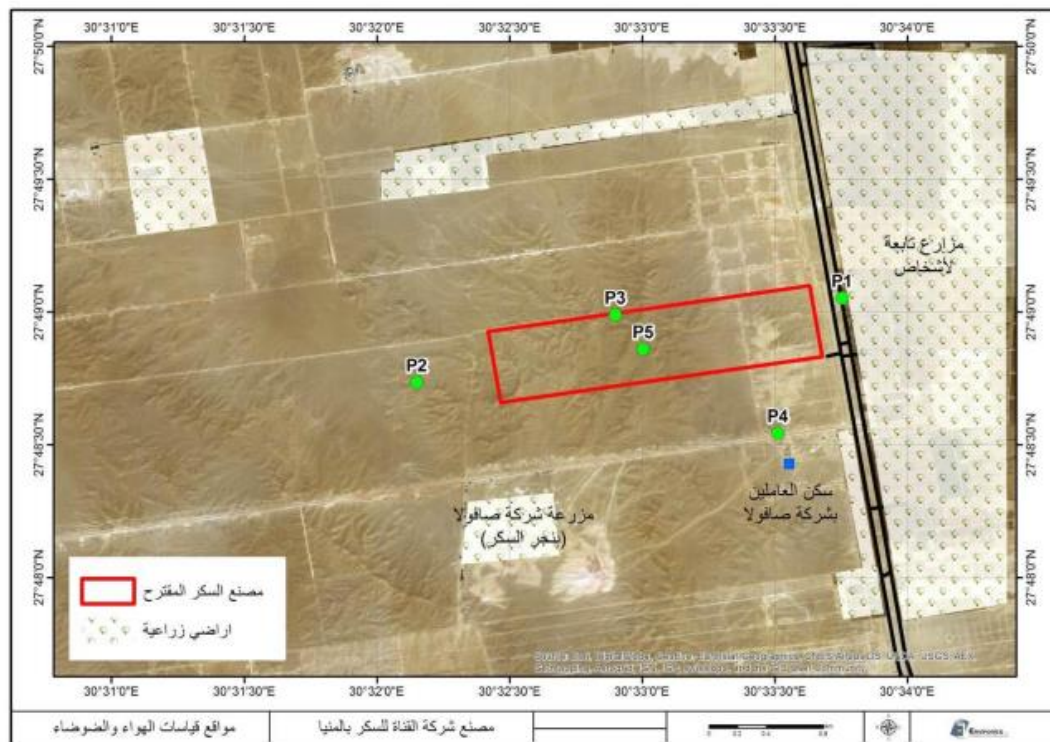


Figure 4-6: Map of the project location, ambient air quality and noise measurements points

Measurements were carried out on the basic pollution indicators (particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide).

Table 4-6: Average measurements results for ambient air pollutants

Measurements locations	PM10 concentration (Micrograms / m ³)	CO concentration (Mg / m ³)	concentration SO ₂ (Mg / m ³)	concentration NO ₂ (Micrograms / m ³)	Comparison with the legal limits
Wind speed: 1.2 m / s , wind direction: southeast, relative humidity: 30%, air temperature: 28 ° C, measurement time per concentration ≈ 1 hr					
Location no. P1 east of the project site, located on Giza –Luxor highway	130	6.0	285	200	Compliant
Location no. P2 west of the project site	80	3.3	143	100	Compliant
Location no. P3 on the northern part within the project site	100	4.0	143	100	Compliant
Location no. P4 south of the project site	120	3.5	143	100	Compliant
Location no. P5 center of the project site	130	3.0	143	100	Compliant
Maximum permissible limits for ambient air quality (Annex 5) in Decree No. 710/2012	hour	-	30	350	300
	8 hour	-	.	-	-
	24 hour	150	-	150	150

It is worth mentioning that 32 vehicles passed during the measurement session at location P1. The measurement results were compared with the maximum limits for ambient air pollution stated in Annex 5 and for noise limits stated in Annex 7 of the amended Executive Regulations of Law 4 / 1994 and its 2012 amendments. Concerning air emissions, the limits for urban areas were selected in the comparison to ensure stringent measures. This is because the prospected land use of the area has not yet been determined; however, agricultural activities are currently dominating the area.

Table (4-6) shows the average results of measurements for ambient air pollutants, and Table (4-7) shows the results of noise intensity measurements.

Table 4-7: Results of noise measurements from the different location

Location of measurement points	Noise (dB)
Location no. P1 east of the project site, located on Giza highway Luxor	64.9
Location no. P2 west of the project site	40.1
Location no. P3 northern part within the project site	43.5
Location no. P4 south of the project site	52.4
Location no. P5 center of the project site	47.4
The maximum permissible levels of noise according to Table 3, Annex 7 of Decree no. 710/2012	Day 70
	Night 60

The results of air quality and noise intensity are within the permissible limits stated in law 4/1994 and its 2012 amendments. **Annex 9** contains the measurements report conducted by the Development Research and Technological Planning Center (DRTPC), Cairo University.

It is worth mentioning that Dr. Nada Ashour (Director of the Environmental Affairs Agency Department in Minya Governorate) confirmed, during the public consultation, that the monitoring stations in Minya governorate recorded high concentrations of pollutants that exceed the legal limits, and specifically for the total suspended particles (TSP) and particulate matter (PM10). Dr. Ashour, requested that the Environmental Impact Assessment study should take this issue into consideration. Consequently, this request was noted down in order to address the issue during the project's operation and during inspection from the competent authorities. Accordingly, one of the reasons why the TSP and PM10 concentrations are high is the basic characteristics of the air quality within the governorate.

On the other hand, it should be noted that the baseline measurements conducted for the current study is around the project site, which is free from any industrial and commercial activities whose emissions affect the air quality recorded during the continuous monitoring from Minya stations that Dr. Nada Ashour referred to.

4.2.3 Geology

Rocky units in the study area are mainly sedimentary rocks belonging to both the Pliocene epoch and the Quaternary era/period. The following is a brief description of the stratigraphic sequence in the study area (Figure 4-7).

1. Sediments from the Quaternary Era (Quaternary Deposits)

Pleistocene epoch sediments within this era appear on the surface of the floodplain edges west of Minya city in the Western Desert. These sediments are composed of sand and gravel with some clay. The thickness of the Pleistocene sediments in Minya is 50 meters at the edges of the Nile Valley and gradually increases to 300 meters and above at center of the Nile Valley.

2. Sediments from the Pliocene Era

These sediments are located below the Pleistocene stratum and above the Eocene sediments. The sediments consist of clay with sandy mixtures.

The main rocky units at the project site are deposits from the quaternary era (Pleistocene sediments) consisting of sand and pebbles. Figure 4-8 shows the stratigraphic sequence of the deposits.

Table 4-8: Sediment types and depths (m)

	Type of sediment	Depth (meters)
Pleistocene sediments	Sand, gravel and clay	0 - 65
Pliocene sediments	Mud and sand	65 - >100

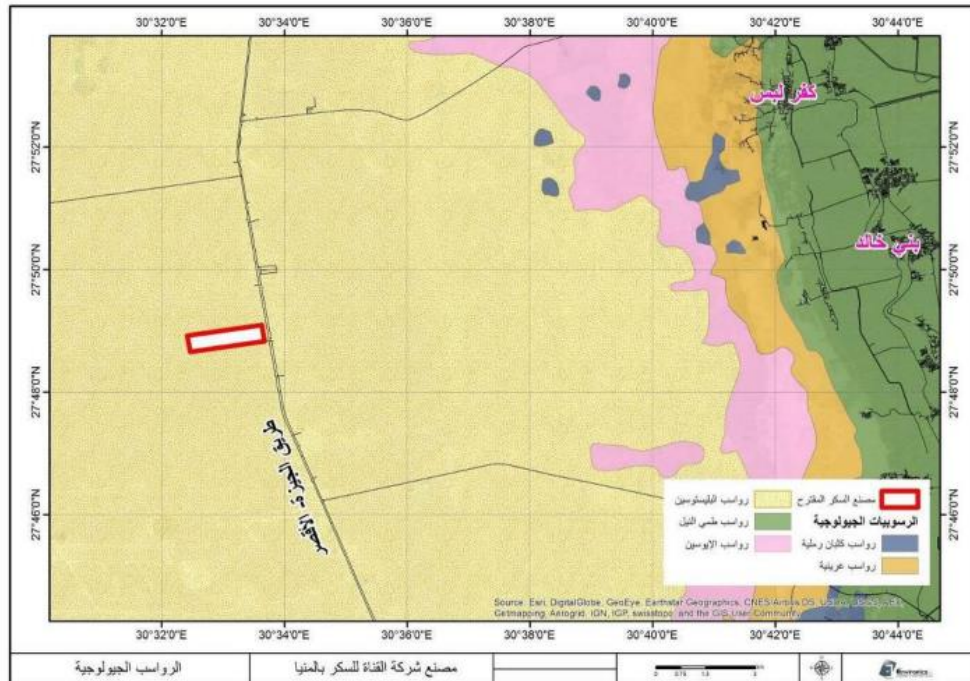


Figure (4-7): Geological map showing the surface layer of the sediment in and around the project site

Source: Geological Map of Egypt, Egyptian General Petroleum Corporation, 1987

Unit No.	Layer No.	Depth (m)	Thickness (m)	Texture	Sedimentary Facies	Depositional Environment	Lithology	Age	Elev. (m)
1	1	10	50 -75 Average 62.5	Fine	Sandy	Fluvial	Sand and gravel with clay lenses	Pleistocene	160
		20							150
		30							140
		40							130
		50							120
		60							110
2	1	70	> 100	Fine	Clayey	Marine	Clay	Pliocene	100
		80							90
		90							80
		100							70
		110							60
		120							50
		130							40
		140							30
		150							20

Figure 4-8: Geological cross section showing the different layers of the project area

Source: Geotechnical Encyclopedia of Egypt – Al Minya Governorate, General Authority For Educational Buildings, 2003



Figure (4-9): Substrate with a mix of sand and pebbles at the project location

Source: Site visit: 8/3/2018

Geology of the project site

Canal Sugar company conducted a geotechnical study for the project location in collaboration with A & A Consultants. Samples from the project area were obtained on April 2018. In total 75 samples were acquired (53 samples at 20m depth and 22 samples at 30m depth).

The substrate type of the project site is divided into the following layers:

1. The surface layer, 1 m in depth, consisting of a mixture of sand, pebbles, silt, gravel and broken stones.
2. Layer with different sizes of pebbles mixed with sand and silt and a few traces of iron oxide. This is the main dominating layer observed at the project site. This layer is mainly found at depths of 1 m below the surface and reaches a thickness of 25 m.

Additionally, soil analysis was conducted for a maximum depth of 2 meters at two locations. It was found that the pH level was 7, and the total dissolved salts were at a level of 0.57% (from the total weight). Moreover,

salt concentration in the sodium chloride was 0.28% (from the total weight) and sulfate concentration in the sulfur trioxide was 0.2% (from the total weight).

4.2.4 Topography

The topography of Minya governorate is divided into two regions; the Nile Valley region and elevated regions surrounding the Nile valley. The Nile valley region has a flat surface that slopes from south to north at 44 m to 33 m above sea level respectively. The elevated regions at the east of the Nile Valley have a height range between 110m and 415m and the elevated regions at the west have a height range between 135m and 350m.

The proposed project is located within the elevated regions of the west, where the elevation gradually increases from the east at 26m to the west at 166m above sea level (Figure 4-10).

The maximum height reached at the project site is 138m, and the lowest height is 121m, and the average surface inclination is 4.3% which indicates the evenness and homogeneity of the area (Figure 4-11).

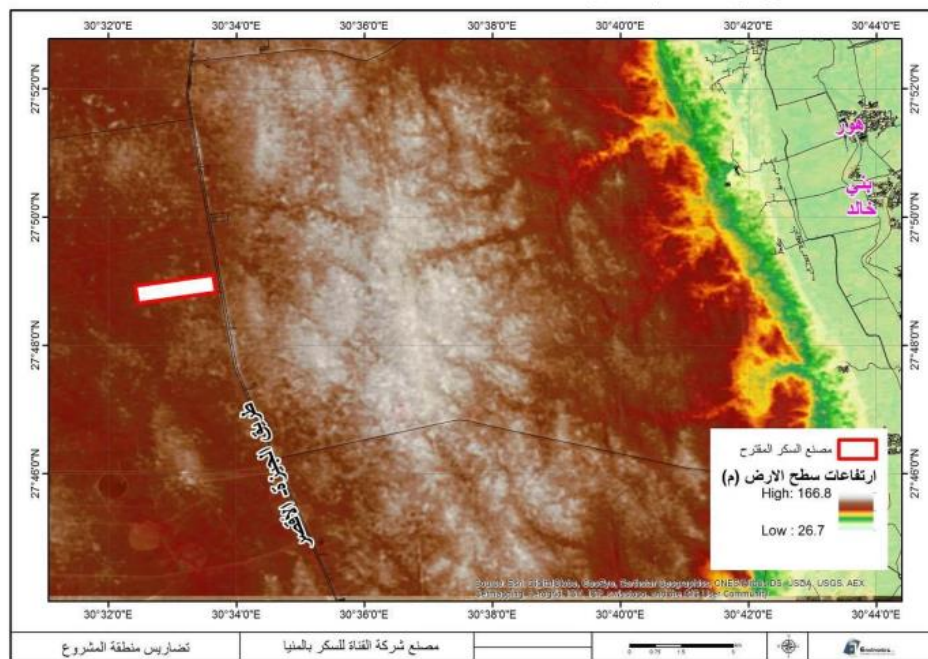


Figure 4-10: Topographic map of the project area

Source: Digital Elevation Model ASTER GDEM v.2 - 1 arc second, NASA



Figure 4-11: Substrate type of the proposed project site
(Source: Site visit on 8/3/2018)

4.2.5 Geomorphology

Minya Governorate is divided into three geomorphological units as follow:

- The **Limestone structural plateau**, the Nile Valley passes through rocks of the Eocene limestone plateau, which is the foundation of the valley. The Nile River separates the limestone plateau into two hills, one at the east of the Nile and the other at the west of the Nile. This plateau is composed of limestone, marl and sandstone from the Eocene.
- The **Old Alluvial plains**, located between the western structural plateau and the young alluvial plains situated along the Nile River. These plains are covered with sand, pebbles and clay dating back to the Pleistocene.
- The **Young Alluvial plains**, located along the Nile River, and are composed of agricultural lands, canals and drains. These plains are covered by silt and mud from the Holocene.

The proposed project is located within the old alluvial plains, belonging to the Pleistocene epoch which is covered by sand, pebbles and clay. The old alluvial plains are in the form of terraces with different elevations that are higher than the young alluvial plains located along the Nile River.

4.2.6 Seismic activity

According to the environmental description report of Minya governorate issued in 2007, in general the governorate is located within a low tectonic activity region with a low and limited impact. Areas with seismic activities are located at the far west and northwest of the governorate.

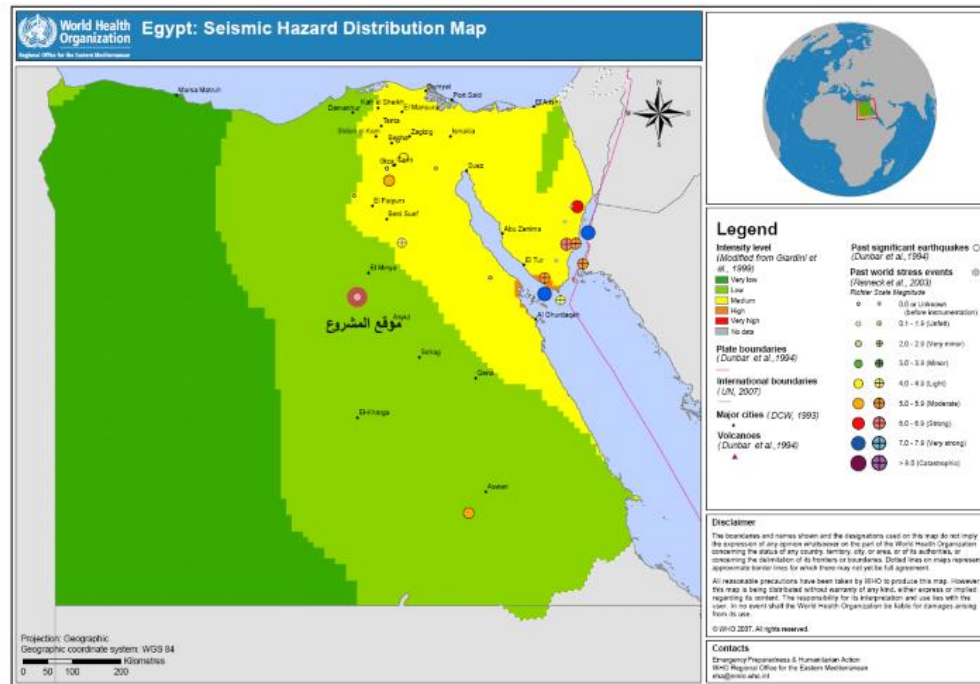


Figure 4-12: Distribution of seismic risk zones in Egypt

Source: World Health Organization, 2007

Figure 4-12 is a map produced by the World Health Organization (WHO) that shows the distribution of seismic hazards in Egypt. It can be concluded from the map that the project location is situated within a medium seismic hazard region with an average magnitude of 4 to 4.9 based on Richter magnitude scale. Therefore, during the construction phase of the project it is necessary to follow the Egyptian construction code in order to mitigate potential risks.

4.2.7 Surface water

The proposed project location is situated within the western desert of Minya Governorate. This area is devoid of any surface water. The closest surface water is Tuna drain located at a distance of 16 km east of the proposed project site and Bahr Youssef Canal at a distance of 18 km east of the proposed site. Figure 4-13 describes the Nile River, canal and drainage network.

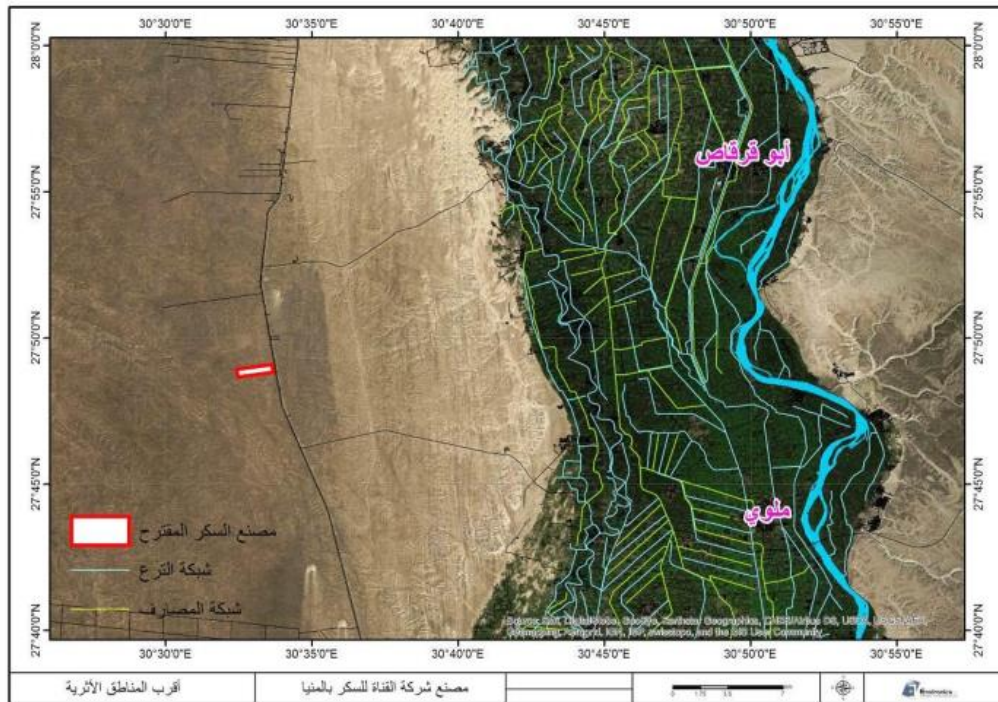


Figure 4-13: Canal and drainage network for the Abu Qurqas and Malawi region

The location includes drainage runoffs. According to the Environmental Description Report of the northern part of Upper Egypt, issued by the General Authority for Urban Planning in 2010, these runoffs are of the 3rd and 4th flashflood risk levels, which do not represent any high risk. The report divides the flashflood risk categories into 8 categories. Figure 4-14 shows the surface runoffs at the project site.



Figure 4-14: Surface runoffs path at the project location

Source: Field visit on 8/3/2018

4.2.8 Groundwater

There are two ground water reservoirs; quaternary aquifer and limestone aquifer that belong to the Eocene epoch. The quaternary aquifer is the main ground water reservoir in Minya Governorate. The sediments from the quaternary period around the Nile Valley at Minya Governorate are divided into two hydrogeological units: a semi permeable Holocene layer and the Pleistocene aquifer. The Holocene layer has a thickness ranging between 1 meter to 15+ meters, and consists of silt and clay. The Pleistocene aquifer is located below the Holocene layer, and consists of crushed sand, pebbles and clay. Pliocene sediments consisting of clay are present below this aquifer. The Pleistocene aquifer has a thickness ranging between 50 meters at the edges of the valley to 300 + meters at the center of the valley. Thus, the Pleistocene reservoir has a high production level.

The groundwater level of the quaternary aquifer decreases from south to north with a range between 34+ m in the south and 30+ m in the north. Water flow within the aquifer follows the same pattern of the Nile River. The reservoir is fed directly from canals, drains and irrigation networks of agricultural lands. At times, ground water obtained from the aquifer is discharged in the Nile River or re-injected into ground water reservoirs.

The proposed project is located within the limestone aquifer zone with a medium to low productivity and which is fed by the Nubian aquifer and local precipitation (Figure 4-15).

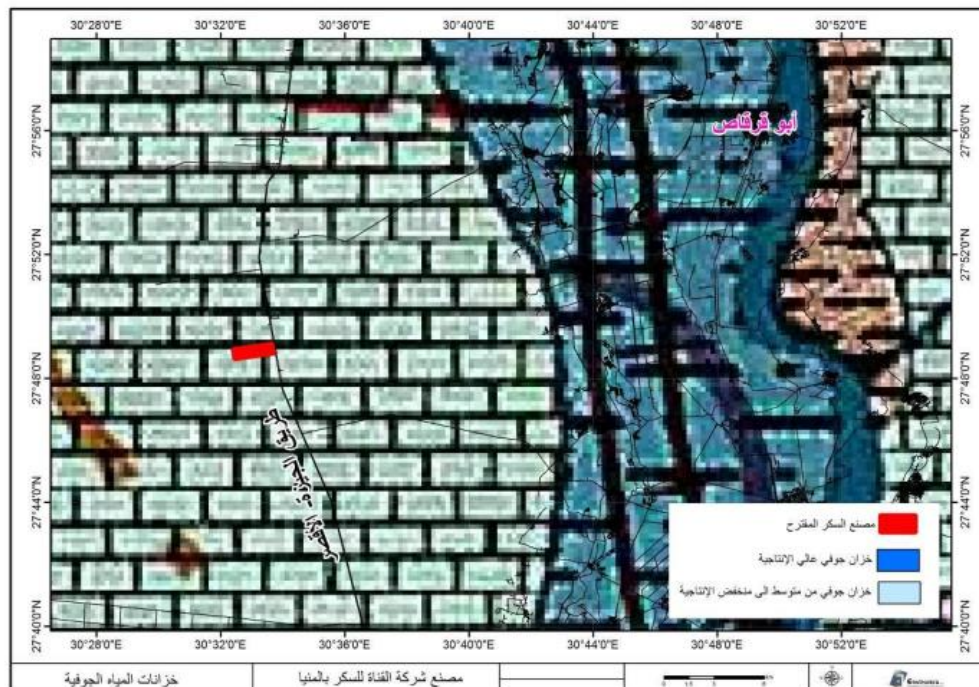


Figure 4-15: Hydrogeological map of the project area

(Source: Hydrogeological Map of Egypt, Research Institute for Groundwater, 1999)

According to the environmental description Report of Minya governorate (2007), the limestone aquifer belongs to the middle Eocene era and is located

under the ancient riverbeds on the eastern and western edges of the Nile Valley. The aquifer is composed of fractured limestone rocks and it has a thickness ranging between 40 meters to 80 meters, and discharge rate ranging between 40 m³ / h to 80 m³ / h. According to the Egyptian Geotechnical Encyclopedia of Minya Governorate issued by the General Authority for Educational Buildings, the groundwater depth within the project site is 100 meters.

Project Location

Based on the geotechnical report of the contracting party conducted on the project site location, no groundwater was found in the analyzed soil samples obtained up to 30 meters below the surface. Additionally, ground water samples were obtained from a ground water well located at a distance of 7 km away from the project location on 17.5.2018. Table 4-9 shows the results of the ground water analysis.

Table 4-9: Analysis of the groundwater of the well near the project

Pollutant	Value
Potential hydrogen (pH)	7,8
Total dissolved solids (mg / l)	700
Hardness (mg / l)	580
Chloride (mg / L)	150
Nitrate (mg / l)	0,6
Nitrite (mg / l)	0,06
Suspended solids TSS (mg / l)	None
Iron (mg / l)	0,04

4.3 Biological Environment

4.3.1 Project hinterland

a. Habitats

The project is based in Minya Governorate, which contains four major habitats described below:

- **Agricultural habitats**
Agricultural lands containing different types of crops mainly cotton, wheat, corn, rice, vegetables, fruits, medicinal plants and fodder. Agricultural lands in Minya also include animal and fish production activities (EEAA, 2007).
- **Urban areas**
Urban areas include residential and recreational areas. Those areas have a biodiversity associated with human activities.
- **Desert areas**
The Minya governorate encompasses a large area of the western desert characterized by a substantially dry sandy plateau with very little

precipitation (EEAA, 2003).

- **The Nile Valley**

The Nile River and nearby wetlands are considered as one of the most important habitats for biodiversity. The quality of those habitats decreased due to the multiple anthropogenic stressors including the use of pesticides and chemical fertilizers in agriculture.

b. Flora of the hinterland

The project hinterland is located within the desert area of the governorate and thus, vegetation of the hinterland is mainly composed of desert plants. Most of the vegetation of the Governorate is located around the Nile Valley away from the project site, which is located in the western desert.

Common dominant plants that were previously identified include the Mugworts (*Artemisia* sp.), Lemon grass (*Cymbopogon proximus*), Bermuda grass or Dog's tooth grass (*Cynodon dactylon*), Manna Tree (*Alhagi graecorum*), the Bitter apple (*Citrullus colocynthis*), Common wormwood (*Artemisia absinthium*), Field bindweed (*Convolvulus arvensis*) and Bihtinay (*Zygophyllum album*).

Trees of the area include Sycamore fig (*Ficus sycomorus*), Gum Arabic Tree (*Acacia nilotica*), Cinnamon tree (*Cinnamomum* sp.) and Ironwood (*Casuarina* sp.), and Willow (*Salix* sp.) (EEAA, 2007).

c. Fauna of the hinterland

- **Amphibians and Reptiles**

Among the amphibians that may be present in the area, the Nile Valley Toad (*Sclerophrys kassassii*), the Egyptian Toad (*Sclerophrys regularis*) and the Green Toad (*Bufo viridis*) (Bahaa El Din, 2006).

There are various lizard species that may be present in the area, and they include the Turkish Gecko (*Hemidactylus turcicus*), the Elegant Gecko (*Stenodactylus sthenodactylus*) both are widespread and the Egyptian Fan-toed Gecko (*Ptyodactylus hasselquistii*). Lizards of desert areas include the Sand Gecko (*Stenodactylus petrii*). Vegetated sandy areas may include Bosc's Lizard (*Acanthodactylus boskianus*) and Steudner's Pigmy Gecko (*Tropicolotes steudneri*).

Other species that may be present also include the African Chameleon (*Chamaeleo africanus*) which is observed at cultivated lands next to the Nile, the Long-footed Lizard (*Acanthodactylus longipes*), which occurs in the sandy areas and the Desert Monitor (*Varanus griseus*) in desert areas.

As for snakes, there are various species occurring in the area and include the Sand Boa (*Eryx colubrinus*), Diced Water Snake (*Natrix tessellata*), Flowered Racer (*Platycephalus florulentus*), African Beauty Snake (*Psammophis sibilans*), Egyptian Cobra (*Naja haje*) and Nubian Spitting Cobra (*Naja nubiae*), all found around the Nile Valley. In desert

regions, the Spitted Racer (*Platyceps rogersi*), Saharan Cliff Racer (*Platyceps saharicus*) and Sand Viper (*Cerastes vipera*) are found (Baha El Din, 2006).

- **Birds**

There are about 90 different species of birds in the governorate where 40 species are resident birds, 9 species are native birds and 7 species are rare while the rest constitute migratory birds.

Among the 40 resident species, the Little Grebe (*Tachybaptus ruficollis*), Barn owl (*Tyto alba*), Senegal Thick-knee (*Burhinus senegalensis*), Black-shouldered Kite (*Elanus axillaris*), Little Owl (*Athene noctua*), Desert Lark (*Ammomanes deserti*), Greater Hoopoe-lark (*Alaemon alaudipes*), Hooded Crow (*Corvus corone*) and Pied Kingfisher (*Ceryle rudis*) are found.

Migratory birds include the Great White Egret (*Ardea alba*), Common Buzzard (*Buteo buteo*), The Common Pochard (*Aythya ferina*) and the Song Thrush (*Turdus philomelos*).

Rare bird species include The Great Crested Grebe (*Podiceps cristatus*), and Greenshank (*Tringa nebularia*) and Egyptian Vulture (*Neophron percnopterus*) (EEAA, 2007). The latter might be only found in the Nile Valley and does not occur in the Western Desert (Tharwat, 1997).

- **Mammals**

Most of the mammals in this region are characterized by their nocturnal activities and are hardly seen during the day (EEAA, 2007). Among the ones commonly found in agricultural and farmland, the Long Eared Hedgehog (*Hemiechinus auritus*). The Dorcas Gazelle (*Gazella dorcas*) may be possibly present in the area (Hoath, 2009; Basuony *et al.*, 2010).

Bats and rodents constitute the largest percentage of mammals in Minya governorate (EEAA, 2007). There are various bat species in the area including The Egyptian Fruit Bat (*Rousettus egyptiacus*) found in agricultural and urban areas, The Lesser Rat Tailed Bat (*Rhinopoma hardwickii*) found in buildings at desert margins, Geoffroy's Trident Leaf-nosed Bat (*Asellia tridens*) found in desert areas and Kuhl's Pipistrelle (*Pipistrellus Kuhl*) found in urban areas (Hoath, 2009).

Rodents that are expected to be present in the area include Anderson's Gerbil (*Gerbillus andersoni*) and the Lesser Egyptian Gerbil (*Gerbillus gerbillus*) both are essentially species of sandy areas. There are also rodents that are associated with human activities such as The House Mouse (*Mus musculus*) (Hoath, 2009; Basuony *et al.*, 2010).

The Golden Wolf (*Canis lupaster*) is among the carnivores that may possibly be found in the area near desert and agricultural areas. Foxes that may be present include the Red Fox (*Vulpes vulpes*) in agricultural areas and both Rüppell's Sand Fox (*Vulpes rueppellii*) and the Fennec

Fox (*Vulpes zerda*) in desert areas. The Striped Hyena (*Hyaena hyaena*) was previously recorded at desert margins of the Nile.

Additionally two cats may be present in the region; the Wild Cat (*Felis silvestris*) at desert areas and the Jungle Cat (*Felis Chaus*) in agricultural areas (Hoath, 2009; Basuony et al., 2010).

d. Biodiversity value of the project hinterland

The hinterland includes important vegetation in terms of economic, medicinal and ecological importance. Table (4-10) identifies the usage of some of the important flora in the area.

Table 4-10: Description of some of the important flora in the surrounding area

Scientific name	Common name	Usage
<i>Cymbopogon proximus</i>	Lemon grass	Used as a diuretic in medicine ⁽¹⁾
<i>Cynodon dactylon</i>	Bermuda grass or Dog's tooth grass	Multi-benefit: grazing, used as fuel, ecological importance, treatment of epilepsy and diarrhea, convulsions etc. ^{(2) (3)}
<i>Convolvulus arvensis</i>	Field bindweed	Multi-benefit: grazing, used as fuel, ecological importance, medical research ^{(3) (4)}
<i>Alhagi graecorum</i>	Manna Tree	Multi-benefit: grazing, used as fuel, it has ecological importance, medicinal usage: treatment of migraines, rheumatism etc. ^{(3) (5)}
<i>Citrullus colocynthis</i>	Bitter apple	Multi-benefit: grazing used as fuel, ecological importance, Medicinal: treatment of cancer, Diabetes, anti-inflammatory and microbes ^{(3) (6)}
<i>Zygophyllum album</i>	Bihtinay	Multiple- benefit: Ecological importance, Medicinal such as pain killer and tooth ache medicine, it is also used in washing clothes etc. ^{(3) (7)}

References: (1) El-Tahir & Abdel-Kader, (2008); (2) Nagori, (2011); (3) Bidak et al. (2015); (4) Kaur & Kalia (2012); (5) Ahmad et al. (2015); (6) Al Hussain et al. (2014); (7) Belmimoun et al. (2017)

The Dorcas Gazelle (*Gazella dorcas*) and Egyptian Vulture (*Neophron percnopterus*) are among the locally and internationally threatened species based on the IUCN criteria. Whereas species that are only threatened on a local level include the Fennex Fox (*Vulpes zerda*), Anderson's Gerbil (*Gerbillus andersoni*), African Chameleon (*Chameleo africanus*), Desert Monitor (*Varanus griseus*), Sand Boa (*Eryx colubrinus*) and Nubian Spitting Cobra (*Naja nubiae*). The Striped Hyena (*Hyaena hyaena*) is threatened at the international level.

Rare species of the area include the Golden Wolf (*Canis lupaster*), Wild Cat (*Felis silvestris*), Great Crested Grebe (*Podiceps cristatus*) and Greenshank (*Tringa nebularia*) (Table, 4-11).

Table 4-11: Threatened and/or protected fauna potentially occurring in desert lands

Scientific name	Common name	National classification	International classification
<i>Gazella dorcas</i>	Dorcas Gazelle	VU	VU
<i>Vulpes zerda</i>	Fennec Fox	EN	LC
<i>Hyaena hyaena</i>	Striped Hyena	LC	NT
<i>Gerbillus andersoni</i>	Anderson's Gerbil	VU	LC
<i>Canis lupaster</i>	Golden Wolf	Rare	LC

Scientific name	Common name	National classification	International classification
<i>Felis silvestris</i>	Wild Cat	Rare	LC
<i>Chamaeleo africanus</i>	The African chameleon	VU	LC
<i>Varanus griseus</i>	The desert monitor	NT	NE
<i>Eryx colubrinus</i>	Theban Sand Boa	VU	NE
<i>Naja nubiae</i>	The Nubian Spitting Cobra	NT	NE
<i>Podiceps cristatus</i>	Great Crested Grebe	Rare	LC
<i>Neophron percnopterus</i>	Egyptian Vulture	Rare	EN
<i>Tringa nebularia</i>	Greenshank	Rare	LC

CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, NE: Not Evaluated, DD: Data Deficient, LC: Least Concern

In addition, three endangered birds of prey might be present in the area according to BirdLife species distribution maps. These are the Steppe Eagle (*Aquila nipalensis*) and Saker Falcon (*Falco cherrug*) as passage migrants, and the Egyptian Vulture (*Neophron percnopterus*) as passage migrant and native breeding. On the other hand, there is no evidence of the presence of these species within the project wider area, neither from local literature nor from field surveys, and according to Tharwat (1997) these species do not occur in the Western Desert.

4.3.2 Project Site

a. Habitats

A site visit was conducted at the project location on the 8th of March 2018¹. The project site is located about 25 km away from the Nile River and within the desert area of the Western Desert. The project is bordered by the Giza – Luxor Road to the east and by agricultural lands to the south, north and west. It was concluded from the survey that the project site is free from any vegetation cover and that the area can be divided into two zones, the Eastern Zone and Western Zone, based on the soil characteristics and fauna signs and tracks.

¹ The site visit covered the location of the proposed Beet Sugar Factory only; an additional site visit was carried out for the land reclamation project and is described in the ESIA for Land Reclamation.

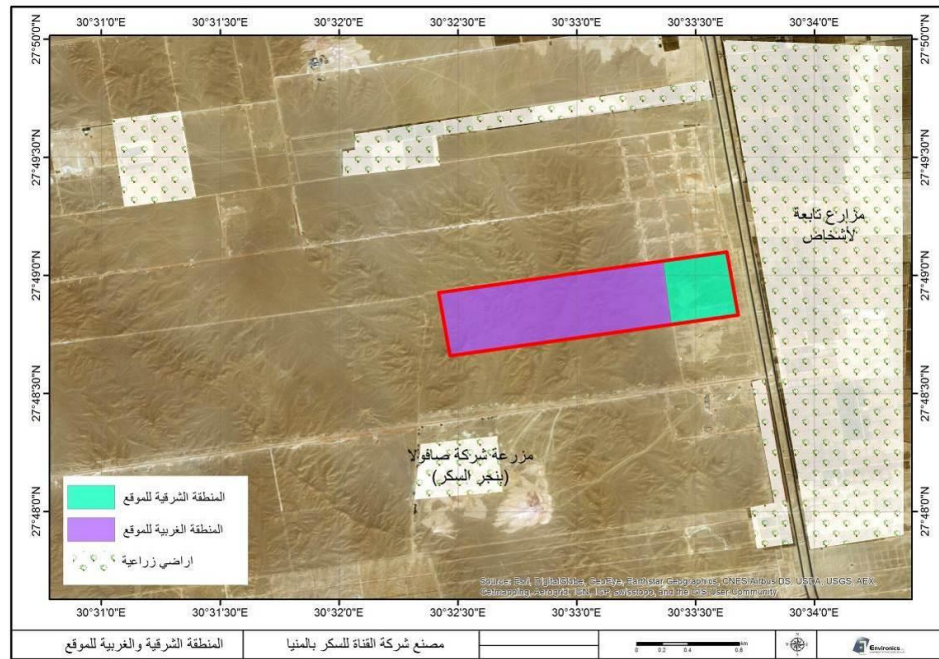


Figure 4-16: Eastern and western zones of the project site

- **Eastern zone**

- The eastern zone is located close to the road, and is composed of a sandy and gravely plain in the first 500 m
- Anthropogenic activities were noticed and they include holes and car wheel traces (Figure, 4-17).
- Tracks of foxes, lizards and rodents were also observed at the southern part of the eastern zone (Figures 4-18, 4-19, 4-20, 4-21 and 4-22).
- Tracks of rodents were also observed at the northern part of the eastern zone.



Figure 4-17: Car wheel signs



Figure 4-18: Fox tracks



Figure 4-19: Scat of a carnivore



Figure 4-20: Small mammal burrow



Figure 4-21: Lizard burrow



Figure 4-22: Lizard track

- **Western zone**

- Topographic homogeneity gradually decreases moving west. It was also noticed that gravel and surface run-offs increased at those areas (Figures 4-23 and 4-24).
- Anthropogenic activities were also observed and they include holes and car wheel traces.
- Additionally, the Greater Hoopoe Lark (*Alaemon alaudipes*) was seen in the southern part of the western zone (Figure 4-25).



Figure 4-23: Characteristics of the gravelly substrate in the western zone



Figure 4-24: Signs of car wheels and surface run-offs



Figure 4-25: Greater Hoopoe Lark (*Alaemon alaudipes*)

b. Biodiversity value of the project site

The project site is free from any vegetation cover, and is not considered as an Important Bird Area (IBA) by BirdLife International. Additionally, no threatened or protected species were observed in the area although their presence in the hinterland was stated in the literature. Thus, there is a possibility that desert species, of the Western Desert, such as foxes, desert monitors and gazelles may occur as vagrant species.

4.4 Socio-economic Environment

4.4.1 Demography

The proposed project is located within the western desert of Minya governorate and the nearest administrative centers are Markaz Abu Qurqas and Markaz Mallawi.

About 82% of the total population of Minya lives in rural areas. The most populated area is around the Nile Valley region (EEAA, 2007). The population size of the governorate was 419, 929, 9 in 2006 (CAPMAS, 2006) and reached a size of 549, 709, 5 in 2017 (CAPMAS, 2017). On a Markaz level, the population size of Abu Qurqas was 467,716 in 2006, about 11% of the total population of the governorate, and in Malawi the population size was a bit higher with a total of 562,841 inhabitants in 2006, which is about 13.5% of the total population of the governorate (CAPMAS, 2006).

The nearest residential area is located at 15.5 km away from the project site and is concentrated around the edges of Tuna drain. The second nearest residential area is Beni Khaled village located at a distance of 18.5 km (Figure 4-26). Additionally, there is a residential area for employees at Savola Group Company, 1 km south of the project location as presented in Figure 4-27.

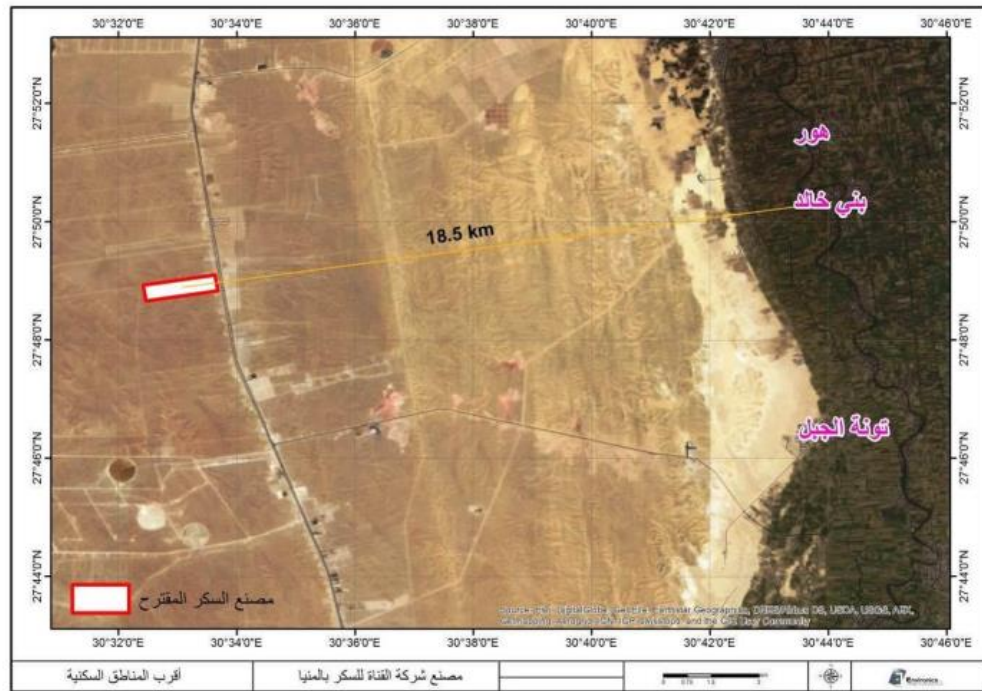


Figure 4-26: Nearest residential communities to the project site



Figure 4-27: Accommodation of Savola Group staff

Source: Field visit on 8/3/2018

4.4.2 Education

The illiteracy rate in Minya governorate was 37% in 2017 (age group 10 years +). The percentage of illiterate female was higher than the male with a value of 45% and 29% respectively; both percentages are higher than the national average illiteracy rate (25%) (CAPMAS, 2017).

On a Markaz level, the number of illiterate individuals in Abu Qurqas was 161,082 with a value of 45.4% of the total number of inhabitants (age group 10+). As for Markaz Mallawi, the number of illiterate individuals was 203,824

with a value of 48.5%. The values of illiteracy rates on the Markaz levels are much higher than the governorate level.

Table 4-12: Illiteracy Rate in Markaz Abu Qurqas and Markaz Mallawi

Markaz	Population (+ 10 years)	Illiteracy number	Illiteracy rate
Abu Qurqas	354,935	161,082	45.4%
Mallawi	420,074	203,824	48.5%

Moreover, Minya governorate encompasses elementary, preparatory and secondary schools in addition to technical, military/ physical and hospitality secondary schools. It also includes a school for the deaf and blind. The number of educational institutions in the governorate reached 2028 schools with a total number of 227, 65 classes in 2005 (EEAA, 2007).

4.4.3 Employment

The unemployment rate in Minya Governorate was 5.7% in 2006 (CAPMAS, 2016), which is considered relatively low compared to the national level (9.7%).

Unemployment rate in Markaz Abu Qurqas was 6% in 2006 and in Markaz Mallawi was 7.9%, which is higher than the total rate in the governorate and less than the national rate.

Table 4-13: Unemployment Rate in Markaz Abu Qurqas and Markaz Mallawi

Markaz	Population above 15 years	Labor force above 15 years	Unemployment rate
Abu Qurqas	296,652	155,211	6%
Mallawi	346,391	136,498	7.9%

4.4.4 Health

The number of hospital facilities in Minya Governorate is 49, including 35 public hospitals and 14 private hospitals (CAPMAS, 2014). On a markaz level, there is a public hospital, 2 private hospitals and 10 ambulance cars in Markaz Abu Qurqas. Markaz Mallawi on the other hand, has 1 public hospital, 3 specialized hospitals, 1 private hospital and 12 ambulance cars.

Table 4-14: Number of health units in Markaz Abu Qurqas and Markaz Mallawi

Markaz	Public Hospitals	Specialized hospitals	Private hospitals	Number of ambulance cars
Abu Qurqas	1	0	2	10
Mallawi	1	3	1	12

Source: Description of Egypt Governorates Book, Information and Decision Support Center, 2010

4.4.5 Infrastructure

The amount of potable water within Markaz Abu Qurqas was 40.4 thousand m³/day in 2010, the amount of consumed water was 33.76 thousand m³/day and

the amount of sewage produced is 40 thousand m³/day. Concerning electricity, there are 112.41 thousand households connected to the national grid.

As for Markaz Mallawi, the amount of potable water was 53.5 thousand m³/day and the amount of consumed water was 43.51 thousand m³/day. Concerning electricity, there are 135.83 thousand households connected to the national grid.

Table 4-15: Amount of potable water and sewage in Markaz Abu Qurqas and Markaz Mallawi

Markaz	Amount of drinking water (m ³ /day)	Amount of consumed drinking water (m ³ /day)	Amount of sewage (m ³ / day)
Abu Qurqas	4.40 thousand	33.76 thousand	40 thousand
Mallawi	53.3 thousand	43.51 thousand	---

Source: Description of Egypt Governorates Book, Information and Decision Support Center, 2010

The project site is connected to other governorates through a group of regional road networks, Giza / Luxor road (Western Desert road), Aswan agricultural road, and Cairo / Assiut road (Eastern desert road). The project is specifically located at a distance of 100 km north of Assiut International Airport.

4.4.6 Economic Activities

The agricultural sector in Minya Governorate is the main economic activity, where the cultivated land is about 427,225 feddan and the crop land is about 784,278 feddan. The agricultural sector constitutes around 44% of the workforce in the governorate. Characteristic crops of the governorate include wheat and alfalfa crops, both are amongst the most important winter crops, which constitute an area of 80% of the total winter crop area. Corn is considered one of the important summer crops of the governorate with an area of 295,043 fedan, 67% of the total summer crop area.

Moreover, the governorate has a high potential for industrial investments. The region includes 4 industrial areas, Zone 32 for heavy industries at Sheikh Fadl of Markaz Beni Mazar, the industrial zone of Sararya, the industrial zone at Matahra east of the Nile and the industrial area of New Menia.

Additionally it was previously proposed to construct 3 other industrial zones in collaboration with the Industrial Development Authority to plan for the land use of the following areas:

- The industrial area located on the Western desert road in front of Tuna El Gebal village within Markaz Mallawi for agricultural industries. The Proposed project falls close to this industrial zone.
- The industrial area located on the eastern desert road in front of Markaz Mallawi for crafting industries.
- The industrial area at sheikh Fadl with a surface area of 300 fedans, for mining industries, marble cutting and limestone grinding.

4.4.7 Surrounding Landuse

The project is located next to the Giza / Luxor road and is surrounded by empty desert lands. Nonetheless there are some existing activities at the neighbouring sites, as shown in Figure 4-28, as follow:

- Eastern side, Giza/ Luxor road and private farms.
- Western side, empty desert land belonging to Canal Sugar Company.
- Southern side, empty desert land belonging to Canal Sugar Company followed by a housing unit for Savola Group employees, and a sugar beet farmland.
- Northern side, empty desert land followed by agricultural lands.



Figure 4-28: Land uses of neighboring areas

4.4.8 Vulnerable Groups

• Children

Poor families tend to have their children work to gain extra income. Exact figures are not available as surveys are not conducted in that matter, which will still be deceiving due to its illegal nature. Although there are many laws that regulate child labor under certain conditions, specifying ages and standards, agricultural children workers are not addressed within the national labor laws (Ahmed & Jureidini, 2010).

The national child labor survey (ILO and CAPMAS, 2012) showed that about 9.3% of Egyptian children aged 5-17 years old are involved in child labor. Rural Upper Egypt has the highest number of child labor (14.4%). The highest sector of child labor in Egypt is agriculture (63.5%). Likewise, child labor constitute a big part of labor in agriculture in Minya, and as the law **excludes** child agricultural workers from child labor laws, children in Minya form a vulnerable

group as they work without rules protecting them. Moreover, children are pushed by their families to work due to poverty which makes them even more vulnerable (ILO and CAPMAS, 2012).

- **Gender issues**

Women are considered to be vulnerable in Upper Egypt with high rate of traditional patriarchy. Minya has a low female participation rate in the governorate's labor market of 29%. Moreover, they are underpaid where the Gender Pay Gap (GPG) is equal to 44.5% in favor of males which is considered the highest across Egypt (Mohamed *et al.*, 2015).

Agriculture as mentioned before is the main economic activity and employs a considerable portion of the labor force (about 44%). Agriculture also represents the highest portion for female employment. Table 4-15 below presents the distribution of those employed in Minya across different economic activities.

Table 4-16: Distribution of labour force on economic activities by sex in Minya 2016 (hundreds)

Labor force	Agriculture & Fishing	Mining & Quarrying	Manufacturing	Electricity	Water services
Male	4749	89	587	48	146
Female	1864	0	87	3	5
Total	6613	89	674	51	151
Labor force	Construction & Building	Trade, retail, wholesale & repair	Transportation & Storage	Hotel & restaurants	Communication
Male	1500	1035	729	262	27
Female	20	327	0	17	4
Total	1520	1362	729	279	31
Labor force	Finance & insurance	Real estate	Scientific & technical specialties	Administrative	Social services
Male	50	13	72	43	771
Female	4	0	18	2	211
Total	54	13	90	45	982
Labor force	Education	Health	Arts & Culture	Other services	Domestic for other families
Male	747	165	25	228	64
Female	506	128	8	24	181
Total	1253	293	33	252	245

Source: CAPMAS, 2017

4.4.9 Archaeological sites

Minya Governorate is rich in historical sites, with 39 archaeological sites (Supreme Council of Antiquities, 2004). According to the Atlas of archaeological sites issued by the Geographical Information Center of the Supreme Council of Antiquities, the nearest archaeological sites to the project area are Tuna El Gebal, 17 km southeast of the site, Alashmonin, 25 km east of the site in Markaz Mallawi and Balansoura, 17.5 km northeast of the site at Markaz Abu Qurqas (Figure 4-29).

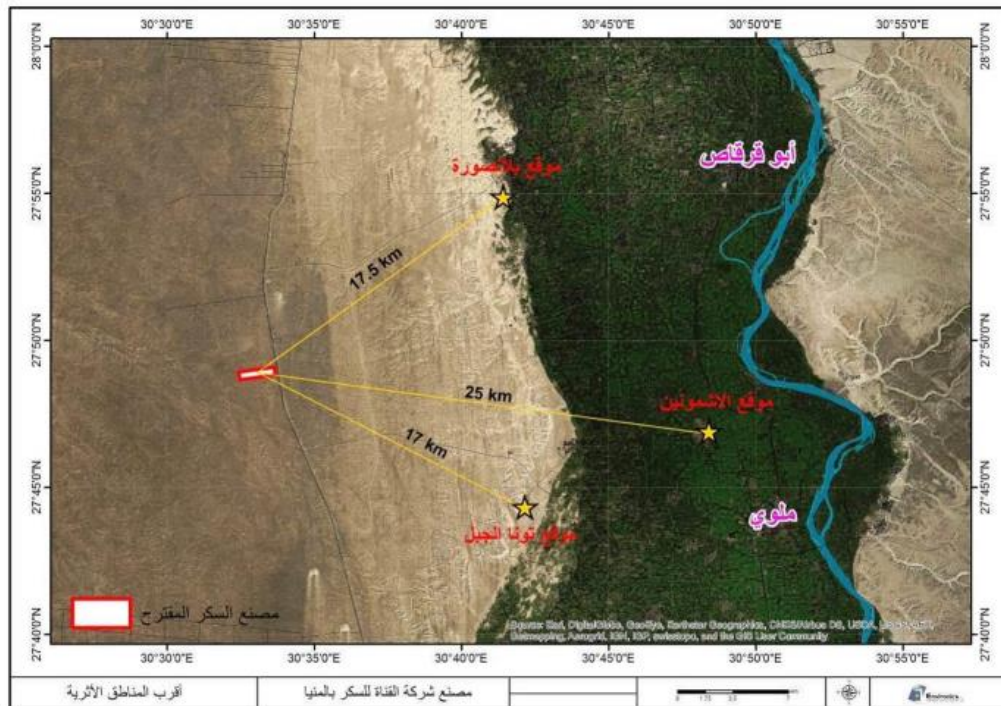


Figure 4-29: Archaeological sites near the project location

Source: Atlas of Archaeological Sites, Supreme Council of Antiquities, 2004

a. Tuna Gebal

The area includes Pharaonic, Greek and Roman ruins, temples and tombs. The region includes the tomb of the priest Petosiers of the Ptolemaic period, the Isadora cemetery of the Greek era, and one of the border paintings of the city of Akhnaton and the Roman legends (Ministry of Planning, 2018). The area is a destination for many visitors and belongs to the Supreme Council of Antiquities.

b. Alashmonin

The region includes ruins from the Pharaonic, Greek and Roman eras, belonging to the Supreme Council of Antiquities. The area includes various temples from various empires such as the Pharaonic Temple of Ramses II, the Greek Temple of Philippe Arheidos and the Ptolemaic Temple of King Ptolemy III. There are traces of ancient Egyptian cities and remains of granite columns, which historians believe to be the remains of a market of the Greek era (Ministry of Planning, 2018).

c. Balansoura

The area includes antiquities dating back to the Ptolemaic period, as well as hieroglyphic ruins. The area is currently under the supervision of the Supreme Council of Antiquities and subject to the law of antiquities protection.

On the other hand, no archaeological sites are reported within the project site and surroundings.

5. Analysis of Alternatives

This chapter discusses the different alternatives to the project. The alternatives were assessed mainly using the environmental standards. This section investigates the following:

- No Project Alternative
- Site Alternatives
- Technology Alternatives
- Alternatives for hazardous waste disposal.

5.1 No Project Alternative

Despite the increase in sugar production in Egypt as a result of the increase in the area planted with sugar crops, the local market is suffering from a deficit in the local supply of sugar and an increase in the import of sugar. The quantity of imported beet sugar in 2016/2017 was about 353 thousand tons (Source: Central Agency for Public Mobilization and Statistics). The local production of beet sugar in 2016 was 1,265,597 thousand tons compared to 1,347,283 thousand tons in 2015 (Source: Annual Report of Sugar Crops - Ministry of Agriculture). This led to a deficiency in sugar production in 2016 by 7.4% over the previous year. The curve in Figure 5-1 shows the change in total sugar production, consumption and self-sufficiency in Egypt (from year 1972 to year 2016).

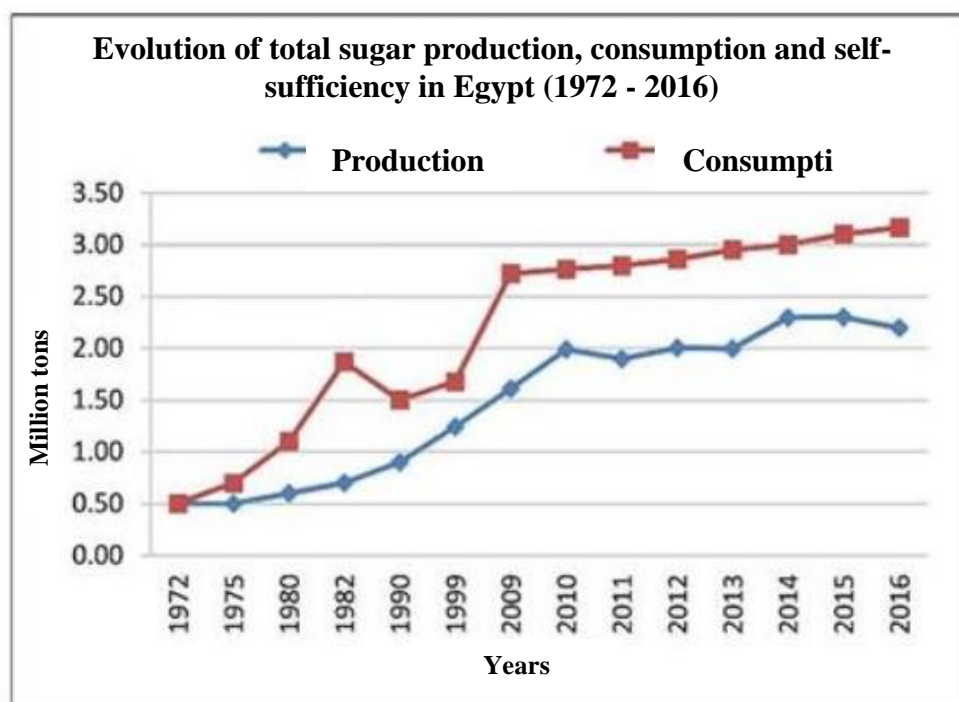


Figure 5-1: Evolution of total sugar production, consumption and self-sufficiency in Egypt (1972 - 2016)

The project will meet the growing domestic demand and succeed in saving about 75% of sugar imports, thus greatly contributing to filling the current gap

between sugar production and consumption in Egypt.

The alternative of not establishing the project will lead to loss of employment opportunities, as it is expected that more than 1000 workers will be employed during the construction phase, and 600 during the operation phase.

The project also achieves the following:

- Meeting the State's plans to increase opportunities for domestic and foreign investment
- Contribute to fulfill the current gap in Egypt; between the demand of the local market and the domestic production.
- Increase employment opportunities in Minya governorate in particular and Egypt in general and thus reduce unemployment rates.
- The project is consistent with the state's plans for the development of Upper Egypt governorates, including Minya governorate, which includes the development of the desert areas.
- The project also includes the reclamation of desert lands, which is consistent with Egypt's plan to increase agricultural lands and reduce desertification in Egypt.

Therefore, it is recommended to implement the proposed Canal Sugar project, and the "No Project" alternative is not further considered.

5.2 Site Alternatives

The project is an investment in cooperation between the General Authority for Reconstruction and Agricultural Development Projects and Canal Sugar Company owned by Al-Gharair Group in UAE, also in cooperation between Ministry of Investment and International Cooperation, Ministry of Agriculture and Land Reclamation and Minya Governorate.

As explained in chapter 1 of this ESIA, an area of 240 acres is allocated for the General Authority for Reconstruction and Agricultural Development Projects – according to the Presidential Decree attached in Annex (1) – which has allocated the area to the Canal Sugar Company. The company will set up a white sugar production plant close to the agricultural land that will be rehabilitated in West Minya.

The project site is considered the most suitable for the following factors:

- The main raw material (beet) required for the production of sugar is close to the facility, which saves transportation expenses and reduces fuel consumption. Thus, the proximity of the main raw material to the facility will reduce the resulting environmental impacts.
- Consistency of the project with the general perspective of agricultural processing projects, which depends on the proximity of the manufacturing facilities from the agricultural raw materials.
- The project is located in a desert area in western Minya, this will create a new society (Agricultural - industrial), consistent with the state's plan for the urban spread of the population. This will also reduce the population concentration rates around the Nile Valley.
- Availability of the vast land needed for the project and its allocation by

the competent authorities. Annex (1) includes the land sale contract and the receipt document of the land to Canal Sugar Company.

5.3 Technology Alternatives

This section describes and compares the technological alternatives used in the production processes, especially purification and color removal process as it is considered as the main process in production. The rest of the operations are conventional operations used in this industry and considered as simple technologies, based on washing, cleaning and cutting the beet and then applying pressure to it to extract sugar.

5.3.1 Purification and Color Removal

There are various methods that are used worldwide in the purification and color removal phase. These methods include the following:

- Carbonation (conventional method)
- Oxidation
- Advanced oxidation
- Phosphatation
- Use of sulfur dioxide

- **Carbonation (Conventional method)**

The treatment is done in several stages, starting by mixing the milk of lime to precipitate the non-sugary substances in the form of calcium salts then introducing carbon dioxide gas to increase the precipitation of calcium in the form of calcium carbonate, and the filtration processes are carried out in the later stages.

- **Oxidation**

In this method, hydrogen peroxide is mixed with iron ions in an acidic medium at specific concentrations and at a specific reaction time to purify the sugar solution and remove the color. However, the high cost and high reactivity of hydrogen peroxide are negative factors that have prevented this method's application in sugar plants worldwide.

- **Advanced oxidation**

In this method Ozone is used instead of hydrogen peroxide with iron ions, or by mixing ozone with hydrogen peroxide at specific rates. Despite the efficiency of this method, it is relatively expensive compared to the carbonation method.

- **Phosphatation**

Phosphoric acid and phosphate salts are used to form calcium phosphate to purify the sucrose solution. Phosphatation method is usually not used as it produces a large quantity of clay wastes consisting of calcium phosphate and undesired impurities. These wastes are not easily precipitated, and will require an additional high-cost method for separation and then safe disposal in a certified landfill, unlike the carbonation method which produces a byproduct that can be sold as a fertilizer. Table 5-1 shows a comparison between carbonation and Phosphatation methods to purify the sucrose solution.

Table 5-1: Comparison between carbonation and Posphatation methods

	Carbonation	<u>Posphatation</u>
Used Chemicals	Milk of Lime followed by carbon dioxide	Phosphoric acid with phosphate salts followed by milk of lime
Precipitated Substances	Calcium carbonate	Calcium Phosphate
Method of separation of Precipitated Substances	Separated by filter cloth under pressure	Air flotation method is used to separate the precipitated substances by abrasion. This method does not separate large solid particles (larger than 200 microns) which have weak buoyancy characteristics and therefore an additional separation phase is required to ensure that the product is free from impurities.
Color Removal	Achieves color removal almost up to 55%	Achieves color removal approximately up to 25-30%
Cost	Low cost of used chemicals	Phosphoric acid is very expensive compared to the chemicals used in the carbonation method. The additional separation phase also requires higher equipment and operational cost.

- **Use of sulfur dioxide**

Many countries nowadays do not recommend the use of sulfur dioxide in white sugar production because of the potential health risks related to consumption of sugar containing sulfur residues.

Canal Sugar Company decided to use carbonation method due to the efficiency of the purification process and the availability of raw materials, since Minya governorate is one of the regions in Egypt where most calcium carbonate is available, in the areas of Beni Khaled and Samalout. Also, the carbonation method is economically feasible as it is lower in cost compared to the other methods.

5.4 Alternatives of Wastewater Disposal

As explained in Chapter 3 of this ESIA, the company will manage the domestic (sewage) and industrial wastewater separately and will comply with the local environmental legal requirements, primarily the Egyptian Code No. 501/2015 and ministerial decree No. 44/2000. The following illustrates the studied alternatives and the best alternative that has been chosen for disposal of sanitary or industrial wastewater.

Alternative 1: Water storage and disposal

This alternative is based on not treating wastewater. Wastewater will be collected in an insulated tank, and periodically pumped and transferred to the nearest sewage treatment plant through a certified contractor to be disposed through the public sewage network or in drainages and canals.

This alternative has a severe negative environmental impact, due to the disposal of industrial wastewater that can be treated and utilized by recycling

it in the production processes or using it in landscaping, in addition to the possibility of using treated domestic/sewage wastewater in afforestation and growing decorative plants and fruitless trees, according to legal requirements.

Therefore, this alternative was not considered for further investigation.

Alternative 2: Use of treated wastewater for irrigation

Canal Sugar Company will direct the sewage wastewater to the onsite domestic wastewater treatment facility so that part of the treated sewage wastewater will be re-directed to the company for irrigating green areas in the project site (decorative plants and fruitless trees) according to the requirements of the Egyptian Code (501/2015). The excess treated wastewater can be discharged in the closest sewage network.

This alternative also includes the treatment of industrial wastewater in the treatment plant at the project site (shown in section 3.2.3.2 of Chapter 3), so that quantity of processed industrial drainage is used for landscaping while the other quantity is recycled in industrial processes. The company will comply with the requirements of the Egyptian Code No. 501/2015 when using industrial treated wastewater in irrigation.

This alternative will enable the company to save quantities of water drawn from underground wells (used in industrial processes or in irrigation). Therefore, this alternative works in the favor of preserving the natural aquifers and taking into consideration the scarcity of water resources in the project's area.

The second alternative was chosen due to the great value of water resources. Water treatment and reuse options are environmentally preferable; taking into consideration that the company will comply with the legal requirements.

5.5 Alternative Energy Sources

- **Steam Turbine**

The project took into consideration to include a steam turbine generating 30 MW to supply the major electrical energy needs for the facility. The advantages of a steam turbine are its capability of using and burning several types of fuels, its practicability, small size and low vibration. It is not affected by weather conditions as it operates within a closed area. It is considered as an efficient and reliable system. However, it has a long start up time and requires other important components such as cooling towers, boilers etc. (ThermoGen Power, 2019). Therefore, steam turbines will not be used (only low pressure boilers which generate process steam), the project will not make use of steam to generate electricity.

- **Power generators**

Natural gas or diesel (in case of emergency) will be used as fuel, if needed, to generate electricity.

- **National Electricity Grid**

The remaining electricity needs will be supplied by the National Electricity Network in the region. Advantages of using it is the low investment cost. However, shortage in electricity and high energy losses in the transmission phase may occur, the latter contributes to atmospheric emissions. The project will rely on the National Electricity Grid as a remaining energy source.

Canal Sugar has communicated with the Egyptian Electricity Transmission Company (EETC) regarding the construction of transmission lines as an associated facility to connect the Canal Sugar integrated project (the farm and the factory), located in western Minya, to 220 kV West Mallawi Substation to secure the electricity needs of the project.

Accordingly, Canal Sugar 220/33kV substation (Located within the farm area) will be interconnected with the nearest point of National Grid “West Mallawi 220/66/11kV Substation” through 220kV double circuit overhead transmission line (about 52 km total route length where 20km is located outside of the Canal Sugar Lands). The Farm loads will be supplied directly from Canal Sugar 220/33kV substation through 33kV Line feeders based on distribution network design and pumps location.

The factory will be supplied through 33/11kV substation located within the Factory borders. The Factory 33/11kV substation will be connected to Canal Sugar 220/33kV substation (located at the farm area) through 33kV double circuit overhead transmission line (about 32 km route length within Canal Sugar Land) (Figure 5-2 and 5-3).

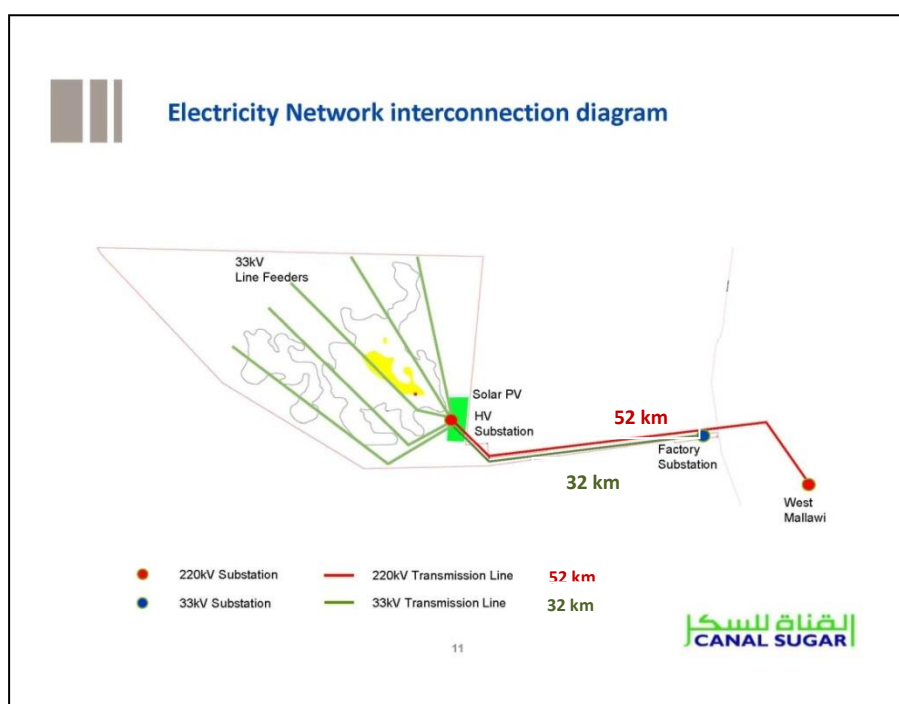


Figure 5-2: Electricity network interconnection diagram

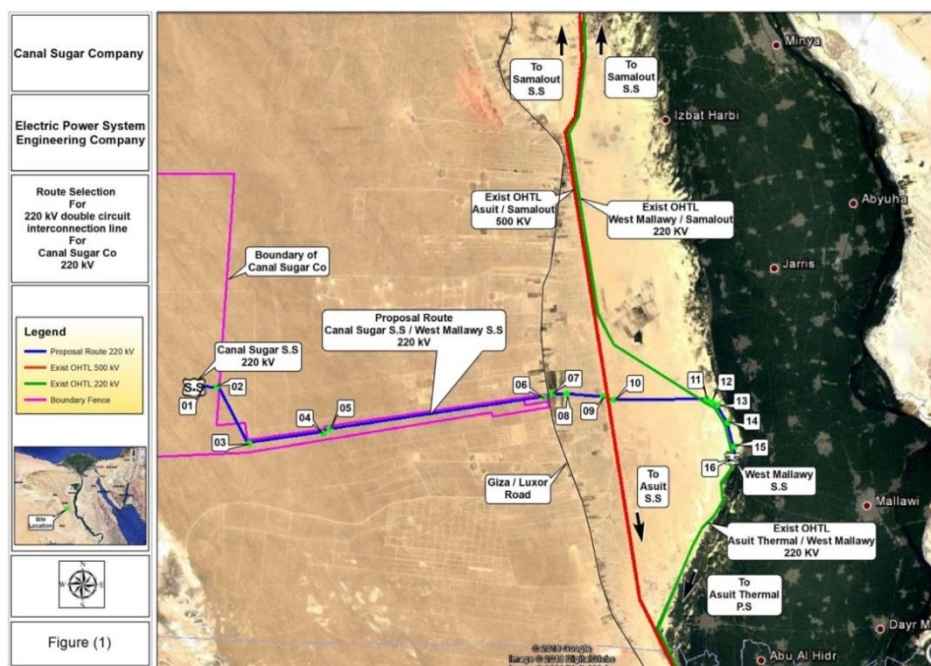


Figure 5-3: Proposed electricity grid layout

As construction activities have already started, an ESIA for the transmission lines cannot be carried out. Instead, an Environmental and Social Audit will be conducted to review the current construction activities as well proposed measures for forthcoming activities.

• PV Panels

Solar power is renowned for being pollution-free and low greenhouse gases emissions during its operational phase, and low long-term cost for electricity generation. It is a good alternative to oil and fossil fuel but can only cover a minor share of electricity requirements. Moreover, it has an initial high cost, requires large spaces and low production in winter months or during bad weather.

Canal Sugar is considering using PV as part of the electricity source for the project in order to reduce its emissions, and is working towards the needed documents to do so.

If Canal Sugar decides to install PV panels, an ESIA will be carried out prior to installation.

• Natural gas

The project will require about 480,000 m³/day of natural gas, which will be supplied to the project through TAQA gas pipeline. The gas pipeline is an associated facility and the project will address it in a separate ESIA.

6. Environmental and Social Impacts and Mitigation Measures

6.1 Methodology

Environmental assessment was carried out to cover potential impacts of the project on the environment as well as impacts of the environment on the project. The assessment was carried out in three main steps, as follows:

1. Identification of potential impacts
2. Evaluation and assessment of the impacts in terms of their significance
3. Identification/ proposing mitigation measures for minimizing the effects of the significant impacts.
4. Detailing residual impacts

6.1.1 Identification of Potential Environmental Impacts

Potential interactions between different project activities (during construction and operation phases) and environmental receptors/ resources (determined from baseline information) have been assessed. Such interactions may result in negative or positive impacts.

Generally, impacts are assessed to determine their impact on the following receptors and natural, biological and socio-economic resources:

- Air quality
- Noise level
- Soil and groundwater quality
- Terrestrial life
- Public health
- Employment
- Workplace health and safety
- Socio-economic environment
- Traffic
- Archeological impact

In general, Leopold matrix has been designed so that the key potential impacts associated with the project become immediately apparent. The layout of the matrix is arranged as follows:

- The “x” axis of the matrix consists of a list of activities presented according to construction and operation activities. It also consists of the list of aspects associated with each activity or group of activities.
- The “y” axis consists of the resources and receptors susceptible to impacts.

Based on the analysis of the baseline environmental conditions and the nature of the receiving environment, some aspects were found to be irrelevant to specific activities of this particular project. These are identified as "scoped out

impacts”. Accordingly, Leopold matrix has been modified so that the key potential impacts associated with the project become immediately apparent, as shown in Table 6-1.

6.1.2 Evaluation and Assessment of Impacts

The potential project-related impacts were assessed to determine their significance. Impact evaluation is based on pre-set criteria including, impact magnitude, duration, planned mitigation measures, regulatory standards and sensitivity of environmental receptors.

Irrelevant, insignificant and/ or significant impacts have been identified based on impact identification and assessment. Mitigation measures were proposed for significant impacts, and insignificant impacts were incorporated into the project's environmental management plan.

6.1.3 Mitigation Measures

Mitigation measures are either incorporated as integral part of the project design or through environmental management and monitoring measures. By implementing both types of mitigation measures, the residual impacts, which are those potentially, remaining after implementing the mitigation measures, will be minimal/insignificant/ acceptable. As much as possible, the avoidance and prevention of impacts is favored over minimization, mitigation or compensation. Based on the impact identification and evaluation process, irrelevant impacts are scoped out of the assessment process, and mitigation measures are proposed for significant impacts, while minor impacts are integrated within the management plans of the facility. Mitigation measures take into consideration the performance standards of the IFC as well as project specific guidelines for crop production and AfDB guidance notes.

6.1.4 Residual impacts

Residual impacts will be evaluated and stated after the implementation of all mitigation measures stated.

6.2 Impact Identification

The methodology described above was used to identify and evaluate the project impacts described below:

6.2.1 Scoped out Impacts

This step would facilitate eliminating and scoping out irrelevant impacts taking into consideration the following:

- Type of project
- Location
- Characteristics of the surrounding environment.
- Receptor sensitivity or importance: depends on its nature, value, scarcity etc. There are three types of receptors:

- On site receptors encompassing workplace health and safety
- Receptors surrounding the site such as ambient air, traffic and noise
- Final sinks/receptors such as groundwater.

Examination of the environmental setting of the area and the construction and the operational processes has shown that the following impacts are irrelevant:

Impacts on “surface water quality” and “aquatic life”

There is no surface water in the project area (Nile River or lakes, etc). The nearest water body is located to the east of the site about 16 km away (Tuna drainage). Therefore, the impacts on surface water and aquatic life are irrelevant to the project.

6.2.2 Positive Impacts

The factory project is planned to provide direct employment with an average of 1000 workers during construction and 600 workers during operation. The operation of the plant will result in **sustainable income generation** to local farmers resulting from the purchase of beet from farmers. The vast majority of the skilled workforce will be from all over Egypt, with priority given to workers from Minya Governorate. The adopted employment policy will have a positive socio-economic impact on the surrounding community.

In addition to income generation, the job opportunities that will be provided will include the following:

- 2,500 during the pre-construction phase of the farm and factory;
- During the factory and farm operation phase, new jobs will be created, expected at 2,000 new employees.

Moreover, the project will result in the following benefits:

- Meeting the national plans to increase domestic and foreign investment opportunities
- Contribute to bridge the current gap in Egypt between the needs of the market and the extent to which domestic production is met
- Increase employment opportunities in the governorate and Egypt in general and thus reduce the unemployment rate
- Consistency with the national plans for the development of Upper Egypt governorates, including Minya governorate, which encompasses the development of desert hinterlands
- The project is based on integrated agricultural manufacturing, in line with the national plan to increase agricultural land, reduce desertification in Egypt and integrate development.
- The project is also planning to provide opportunities for women and vulnerable groups (equal opportunities). The recruitment policy for the operation phase is still being developed.

6.2.3 Potential Negative Impacts

After exclusion of the irrelevant impacts and identifying the positive impacts, the remaining “potential negative impacts” were assessed on the Area of

Influence (i.e. mainly the project area and immediate surroundings) based on the following criteria. Impacts that may extend beyond this area (i.e. district, regional, etc.) are also categorized according to the adopted spatial scale.

- The **temporal scale** or duration of the impact;
- The **spatial scale** or size of the impact;
- The **severity scale** or intensity of the impact;
- The **MAGNITUDE** of the impact, based on assessing the above three criteria; and
- The overall **SIGNIFICANCE** of the impact, considering the magnitude of an impact in combination with the importance/quality/value/sensitivity of the receptor or resource, in the absence of quantified standards.

A more detailed explanation on the adopted methodology is provided hereafter.

1. The **temporal scale** defines the significance of the impact at various time scales, as an indication of the duration of the impact.

Category	Description
Short term	Less than 5 years. Impacts will be of short duration
Medium term	Between 5 and 20 years
Long term	Between 20 and 40 years (a generation) and from a human perspective essentially permanent.
Permanent and/or irreversible	Over 40 years and resulting in a permanent and lasting change that will always be there.

2. The **spatial scale** (size) defines the physical extent of the impact.

Category	Description
Localized	At localized scale and a few hundred meters in extent
Study area	The project area and its immediate
District	District level – Markaz
Regional	Provincial level – Governorate
National	County wide – Egypt
Global	Global scale

3. The **severity scale** (intensity) is used in order to scientifically evaluate how severe negative impacts would be on a particular affected system or a particular affected party. It is a methodology that attempts to remove any value judgments from the assessment, although it relies on the professional judgment of the specialist.

Category	Description
Very severe	An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example, the permanent change to topography resulting

Category	Description
	from a quarry.
Severe	Impacts that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these. For example, the clearing of vegetation.
Moderately severe	Impacts that could be mitigated. For example, constructing a narrow road through vegetation with a low conservation value.
Slight	Mitigation is either integrated in the project design or is very easy, cheap, less time consuming or not necessary.
No effect	The system(s) or party(ies) is not affected by the proposed development

4. The MAGNITUDE scale is an attempt to evaluate the importance of a particular impact taking into account the temporal, spatial and severity scales.

Temporal scale + spatial scale + severity scale = Magnitude of impact:

- Large
- Medium
- Small
- Negligible

For some impacts, especially noise, air and water pollution, significance can be assessed directly against numerical criteria and standards. If exceeding, further mitigation must be incorporated by the Project to reduce the magnitude of the impact (and the significance of its effect).

For other impacts nominal levels of magnitude (small, medium, large) may be adopted based on widely recognized factors such as: the nature of a change (what is affected and how); its duration and reversibility, size or intensity and, for unplanned events, likelihood of occurrence.

Some activities will result in changes to the environment that may be immeasurable or undetectable or within the range of normal natural variation. Such changes will be assessed as having no impact or to be of negligible magnitude and will not lead to significant effects.

5. SIGNIFICANCE

In evaluating significance, the ESIA process is seeking to inform regulators and stakeholders about the effects of the project in a way that helps them make decisions on whether to approve and allows them to develop suitable conditions to attach to an approval. The evaluation of significance should ideally demonstrate legal compliance at least (e.g. compliance with quantified standards, avoidance of effects on legally protected resources).

In the absence of quantified standards, significance can be evaluated through considering the magnitude of an impact in combination with the

importance/quality/value (and sometimes sensitivity) of the receptor or resource that is affected.

Impacts/effects of more than minor significance may warrant re-examination to see if an impact magnitude can be reduced further. Different mitigation options may be examined and the reasons for selecting one and rejecting others explained. Some impacts/effects that cannot be adequately mitigated may need to be addressed through the consideration of offsets or compensation.

SIGNIFICANCE SCALE

Magnitude of impact	Sensitivity / Vulnerability / importance of Resource / Receptor		
	Low	Medium	High
Negligible	Insignificant	Insignificant	Insignificant
Small	Insignificant	Minor	Moderate
Medium	Minor	Moderate	Major
Large	Moderate	Major	Major

Adoption of mitigation measures can decrease the magnitude of the impact but not the sensitivity and/or vulnerability and/or importance of the resource and/or receptor.

Table 6-1 summarizes the potential impacts of the Canal Sugar Project through the Leopold Matrix modified according to the components of the project, its environmental aspects and related impacts

Table 6-1: Summary of potential environmental impacts

(-) / I_d Negative impacts/ Insignificant due to integrated mitigation measures in design
 (-) / I_m Negative impacts/ Insignificant when applying EMP
 NA Not applicable
 + Positive impacts

		Environmental Attributes										
Activities (Sources of impacts)	Aspects	Physical Environment				Biological Environment	Socio-economic					
		Air Quality	Greenhouse gases	Noise	Groundwater Quality	Terrestrial Life	Public Health	Community impact	Employment	Work place H & S	Traffic	Archeology
Construction Phase												
Laying of Foundation Civil Works Construction Works Piping Instruments Electrical Painting and Finishing	<ul style="list-style-type: none">Dust EmissionsEmissions (vehicles, equipment & material)	- /I _m	-/I _m	NA	NA	-/I _m	/I _m -	NA	+	-/I _m	NA	- /I _m
	<ul style="list-style-type: none">Noise (vehicles & equipment)	NA	NA	-/I _m	NA	/I _m -	/I _m -	NA		-/I _m	NA	NA
	<ul style="list-style-type: none">Construction Waste (solid & hazardous wastes)	NA	/I _m -	NA	-/I _m	/I _m -	/I _m -			-/I _m	- /I _m	- /I _m
	<ul style="list-style-type: none">Accidents (vehicles & equipment)Spills (vehicles & equipment)	NA	NA	NA	NA	NA	/I _m -	NA		-/I _m	NA	NA
Activities related to Workforce	<ul style="list-style-type: none">Municipal Solid WasteSewage	NA	-/I _m	NA	-/I _m	-/I _m	/I _m -	NA		-/I _m	- /I _m	- /I _m
	<ul style="list-style-type: none">Workers influx	NA	NA	NA	NA	NA	NA	- /I _m		NA	- /I _m	- /I _m
	<ul style="list-style-type: none">Physical stress and mechanical stress	NA	NA	NA	NA	NA	NA	NA		-/I _m	NA	- /I _m

		Environmental Attributes											
Activities (Sources of impacts)	Aspects	Physical Environment				Biological Environment	Socio-economic						
		Air Quality	Greenhouse gases	Noise	Groundwater Quality	Terrestrial Life	Public Health	Community impact	Employment	Work place H & S	Traffic	Archeology	
Operation Phase													
Beet Sugar Production													
Receiving, weighing and storing beets	• Vehicle emissions	-/I _m	-/I _m	NA	NA	-/I _m	-/I _m	NA	+	-/I _m	- /I _m	- /I _m	
	• Noise	NA	NA	-/I _m	NA	NA	-/I _m	NA		-/I _m	NA	NA	
Beet washing	• Noise	NA	NA	-/I _d	NA	NA	NA	NA		- /I _{d&m}	NA	NA	
	• Solid wastes (mud, grass, gravel, sand)	NA	-/I _m	NA	- /I _{d&m}	NA	NA	NA		- /I _{d&m}	NA	- /I _m	
juice Extraction	• Noise	NA	NA	NA	NA	NA	NA	NA		- /I _{d&m}	NA	NA	
Pressing, drying and granulation	• Particulate matter	-/I _d	NA	NA	NA	-/I _d	NA	NA		- /I _{d&m}	NA	NA	
	• Noise	NA	NA	- /I _{d&m}	NA	NA	NA	NA		- /I _{d&m}	NA	NA	
	• Filtrate	NA	NA	NA	-/I _d	NA	NA	NA		- /I _{d&m}	NA	NA	
juice purification and carbonation	• Sludge wastes	NA	-/I _m	NA	-/I _m	NA	-/I _m	NA		-/I _m	- /I _m	- /I _m	
Preparation of carbonization solution	• Air emissions (particulates and exhaust gases)	-/I _d	-/I _m	NA	NA	-/I _d	-/I _d	NA		- /I _{d&m}	NA	NA	

		Environmental Attributes										
Activities (Sources of impacts)	Aspects	Physical Environment				Biological Environment	Socio-economic					
		Air Quality	Greenhouse gases	Noise	Groundwater Quality	Terrestrial Life	Public Health	Community impact	Employment	Work place H & S	Traffic	Archeology
	<ul style="list-style-type: none"> Heat stress Noise 	NA	NA	- /I _{d&m}	NA	NA	NA	NA		- /I _{d&m}	NA	NA
De-calcination	<ul style="list-style-type: none"> Wastewater from ion exchangers activation 	NA	-/I _m	NA	-/I _d	NA	NA	NA		-/I _m	NA	- /I _m
Juice concentration	<ul style="list-style-type: none"> Air emissions from GAC activation 	-/I _d	-/I _m	- /I _{d&m}	NA	NA	NA	NA		- /I _{d&m}	NA	NA
	<ul style="list-style-type: none"> Heat stress 	NA	NA	NA	NA	NA	NA	NA		- /I _{d&m}	NA	NA
Crystallization and centrifugation	<ul style="list-style-type: none"> Heat stress Noise 	NA	NA	- /I _{d&m}	NA	NA	NA	NA		- /I _{d&m}	NA	NA
Drying and cooling	<ul style="list-style-type: none"> Fugitive sugar particles 	-/I _d	NA	NA	NA	-/I _d	-/I _d	NA		- /I _{d&m}	NA	NA
Packaging	<ul style="list-style-type: none"> Fugitive sugar particles from transportation 	-/I _d	NA	NA	NA	NA	-/I _d	NA		- /I _{d&m}	- /I _m	- /I _m
	<ul style="list-style-type: none"> Packaging wastes 	NA	NA	NA	-/I _m	NA	NA	NA		-/I _m	- /I _m	- /I _m
Transportation activities through paved roads	<ul style="list-style-type: none"> Exhaust gases 	- /I _m	-/I _m	NA	NA	-/I _m	NA	NA		-/I _m	NA	- /I _m
	<ul style="list-style-type: none"> Noise 	NA	NA	-/I _m	NA	-/I _m	NA	NA		-/I _m	NA	NA
	<ul style="list-style-type: none"> Traffic 	NA	NA	NA	NA	NA	NA	NA		NA	- /I _m	- /I _m

		Environmental Attributes										
Activities (Sources of impacts)	Aspects	Physical Environment				Biological Environment	Socio-economic					
		Air Quality	Greenhouse gases	Noise	Groundwater Quality	Terrestrial Life	Public Health	Community impact	Employment	Work place H & S	Traffic	Archeology
	• Potential accidents	NA	NA	NA	NA	NA	-/I _m	NA		-/I _m	- /I _m	NA
Maintenance activities	• Spent oils	NA	NA	NA	-/I _m	NA	NA	NA		-/I _m	- /I _m	- /I _m
Utilities												
Steam turbine	• Noise • Heat stress	NA	NA	- /I _{d&m}	NA	-/I _{d&m}	NA	NA		- /I _{d&m}	NA	NA
Boilers and water softeners	• Heat stress • Noise	NA	NA	-/I _d	NA	-/I _d	NA	NA		- /I _{d&m}	NA	NA
	• Stack air emissions	-/I _d	- /I _{d&m}	NA	NA	NA	-/I _d	NA		NA	NA	- /I _m
	• Blowout wastewater (TDS and Temp.) • Backwash wastewater	NA		NA	- /I _{d&m}	NA	NA	NA		NA	NA	- /I _m
Pumps and compressors	• Noise	NA	NA	-/I _d	-/I _m	NA	NA	NA	+	- /I _{d&m}	NA	NA
	• Spent oils and greases	NA	NA	NA	-/I _m	NA	NA	NA		-/I _m	NA	- /I _m
Industrial Wastewater Treatment unit	• Treated effluent • Semisolid Sludge	NA	-/I _m	NA	- /I _{d&m}	NA	- /I _{d&m}	NA		- /I _{d&m}	NA	- /I _m
	• Odor	NA	NA	NA	NA	NA	NA	NA		- /I _{d&m}	NA	NA

		Environmental Attributes										
Activities (Sources of impacts)	Aspects	Physical Environment				Biological Environment	Socio-economic					
		Air Quality	Greenhouse gases	Noise	Groundwater Quality	Terrestrial Life	Public Health	Community impact	Employment	Work place H & S	Traffic	Archeology
Offices & Administration activities	<ul style="list-style-type: none">• Municipal Solid Waste• Sewage	NA	-/I _m	NA	-/I _m	-/I _m	-/I _m	NA		-/I _m	-/I _m	- /I _m
Activities related to work force	<ul style="list-style-type: none">• Workers influx	NA	NA	NA	NA	NA	NA	- /I _m		NA	- /I _m	- /I _m

6.3 Assessment of Potentially Significant Negative Impacts and Mitigation Measures

6.3.1 Construction Phase

Mitigation measures during the construction phase of industrial projects are based mainly on the environmental management procedures, which include preventive maintenance measures for construction equipment, materials and waste trucks, monitoring procedures, supervision and follow-up, sewage management for construction workers and waste management in general.

Like all major projects, Sugar Canal Company will contract turnkey contractor to implement the project. This usually includes the involvement of companies having EHS management systems that implement applicable plans and procedures according to the nature of the project and location. In this context, relevant mitigation measures will be taken as described below.

Sugar Canal Company will prepare an EHS management plan. The company will require construction contractor to implement management measures consistent with this plan. This commitment will be followed through the system of preparing of monitoring reports and documents showing compliance with this detailed plan and procedures.

Moreover, whenever third parties such as contractors are involved, their roles and capacities, and the degree of control the project will exert over them will be well established by the company, as well as the requirement to include the required mitigation and management measures in contracts with sub-contractors.

On the other hand, it should be taken into consideration that construction works are carried out in successive stages not simultaneously, and the utilization of different construction equipment and machinery will be done intermittently and not continuously. Therefore, potential / expected negative impacts are not generated at the same time.

a. Air Quality

Construction activities may result in *slight, localized, short term* (16 months), air quality impacts in the form of dust / particulate matter, and emissions from construction equipment and transport vehicles. Potential emissions include total suspended particulates (TSP) and dust emissions from diesel generator and excavation, backfilling and trucks traffic activities. The potential receptors of the ambient air quality are located far away as the nearest residential community is located about 15.5 km away, the closest neighboring housing area is Savola Company worker's housing. However, these emissions are expected to be limited and localized at the site and affecting mainly the work environment. Therefore, the magnitude of impacts is deemed SMALL. The vulnerability of the receptor is Medium, therefore, the significance of this impact is MINOR.

Mitigation Measures

The company will ensure that contractors will carry out the necessary measures to minimize the potential impacts. Potential effective mitigation measures include:

- Dust suppression using minimum water consuming technologies
- Dust management through slowing the driving speed of material transportation vehicles
- Providing workers with awareness on maintaining good practice driving and machinery usage
- Provide workers with proper PPEs
- Maintaining machinery and vehicles in good working conditions to minimize fugitive emissions
- Carry out the tests stipulated under the current legislation for generator sets
- Modify timing of construction where possible, to coincide with favorable climate conditions.
- **Prohibit and prevent open burning** of any waste and ensure its proper storage and disposal with a certified contractor

Residual Impacts

The above mitigation measures are anticipated to be efficient for minimizing the potential impacts. Therefore, the residual impacts of construction on the air quality are **INSIGNIFICANT**.

Gas emissions and Greenhouse gases

The emissions during this phase are moderate, general, and short-duration (about 16 months of construction).

Vehicles and machinery used during the construction phase will result in gas emissions including GHG emissions from fuel burning. A diesel generator will also be used for electricity supply during the whole construction phase. Accordingly, GHGs during construction include the release of Carbon dioxide (CO₂) and Nitrous oxide (N₂O). Additionally improper solid waste storage and sewage mismanagement from the workers at the site may also result in methane (CH₄) release and carbon dioxide (CO₂) release, two main GHGs.

Additionally transport vehicles and construction equipment may also cause the release of other gases including nitrogen oxides (NO_x) and sulphur oxides (SO_x). Moreover, incomplete fuel combustion may release carbon monoxide (CO). NO_x and CO may be indirect contributors to GHGs.

The construction phase will be for a period 16 months and will employ about 1000 workers, entailing energy use, as well as sewage and waste generation. Therefore, construction activities may result in *slight, localized, short term* impacts. The vulnerability of the receptor is Medium, therefore, the significance of gas emissions prior to mitigation measures is deemed is **MINOR**.

Mitigation Measures

- Ensure that technologies and equipment used in the project are new or with a high energy efficiency
- If possible ensure that equipment and material used in the construction phase are obtained from a nearby area to reduce transport emissions
- Providing workers with awareness on maintaining good practice for machinery usage
- Providing workers with awareness on energy efficiency and electricity consumption.
- Maintaining good housekeeping practices
- Properly store solid waste and sewage according to the national regulations and ensure their proper disposal with a certified waste contractor. If possibly ensure that waste can be recycled is transferred to a certified contractor
- Maintaining machinery and vehicles in good working and ensure regular maintenance
- Ensure that gas emissions are below international and national limits
- **Prohibit** waste burning

Residual Impacts

The above mitigation measures are anticipated to be efficient for minimizing the potential impacts. Therefore, the residual impacts of construction on gas emissions and GHG is deemed **INSIGNIFICANT**.

b. Ambient noise

The use of construction equipment may result in *slight, localized, short term* (16 months), noise levels, with SMALL magnitude. The vulnerability of receptors from ambient noise is Low being located far away, as the nearest residential community is located about 15.5 km away, the closest neighboring housing area is Savola Company worker's housing. However, these impacts are expected to be limited and localized at the site and affecting mainly the work environment (Medium vulnerability). Thus, assessment of noise emission prior to mitigation measures is deemed **INSIGNIFICANT** for communities and **MINOR** for onsite workers. Table 6-2 shows typical noise levels, in decibels, expected at 5 meter distance from construction machinery.

Table 6-2: Average Noise Levels from Construction Equipment

Equipment Type	Noise Level (dB)	Maximum permissible limit according to law 4/1194
Bulldozer	90	Maximum 85 dB for 8 hrs
Loader	80	
Drilling equipment	80	
Excavator	90	

Mitigation Measures

- When construction equipment are used, such as during site excavation, earth moving and land grading, workers will be provided with the suitable PPEs (example: ear plugs) to minimize possible impacts from noise.

- Maintain machinery and vehicles in good working conditions to minimize noise generation and ensure that they do not exceed permissible limits.

Residual Impacts

Taking into account the mitigation measures mentioned above, as well as the intermittent and localized nature of the generated noise, it is expected that residual impacts of noise will be **INSIGNIFICANT** to **MINOR**.

c. Soil and Groundwater

Generally, construction activities are unlikely (low probability) to result in soil contamination that will need future decontamination and clean-up activities. Potential impacts during construction phase generally result from domestic wastewater management, material and waste storage, accidental spills from machinery, and potential spills from the diesel generator.

Wastes generated during construction mainly consist of municipal and construction wastes that will be collected by an approved contractor to be disposed of in designated landfill sites.

The impact on soil quality is therefore *slight, localized and short term*. The magnitude is NEGLIGIBLE given the low probability of such events. Soil and groundwater vulnerability are Low, as such impacts on soil can be easily contained, and because groundwater is deep, far from the reach of such potential impacts. The impact assessment significance of the construction phase on soil and groundwater is thus deemed **INSIGNIFICANT**.

Mitigation Measures

Contractors will be required to take actions to prevent spillages thus minimizing potential impacts on soil to the lowest level. Contracts with construction contractors will also include periodic inspection of equipment, which will contribute to reduce spillages and leakages.

Mitigation measures will be included in the contracts, which will mainly include the following:

- Ensure the proper implementation of site housekeeping and general cleaning procedures.
- Compliance with spill prevention measures to control and minimizing potential impacts.
- Inspect all equipment before operation to ensure that potential leakages are prevented.
- Ensure periodic inspection of equipment and machinery which will contribute to minimizing spills and leaks.
- Store all materials, equipment and machines properly in designated areas.
- Collection of construction wastes at designated collection sites, and store it in appropriate containers, in accordance with the national regulations and international requirements.

- Avoid waste accumulation of construction and other wastes at the site.
- Keep the construction site in a clean and tidy condition at all times.
- Collecting the generated wastewater from workers in a closed and sealed **insulated** collection tank in compliance with the Egyptian regulations and ensure its discharge regularly by a licensed contractor. The contractor will be obliged to transfer the wastewater to a safe discharge location and comply with the legal requirements in this regard.
- Ensure that the diesel generator is well insulated. **Ensure that it is located within a constructed insulated layer.**

Residual Impacts

Construction activities are not expected to result in contamination of soil or groundwater in a manner that requires remediation or replacement of soil. The available information on the project area indicates that the depth of the groundwater is large and reaches about 100 mbgl, which indicates that residual impacts after the application of the above mitigation measures are **INSIGNIFICANT**.

d. Biological Environment

Impacts on terrestrial biodiversity may include disturbances from noise, dust and light emissions. Those stressors may drive fauna away from the site. The site specific location is composed of a sandy substrate covered with gravel, stones and boulders with potential of vegetation growth. The project site is located within the Middle Limestone Plateau which is an extremely arid part of the Western Desert and practically rainless. Vegetation cover is mainly absent with the exception of few scattered desert shrubs. The site area represents a small part of the vast western desert plain and is not considered a critical habitat. No biodiversity was observed at the project site. Additionally there are no protected areas within or biologically important areas nearby. Thus, it is expected that the above stressors are unlikely to impact the biodiversity.

Meanwhile, as observed in the pre-construction phase **of the Canal Sugar's project**, solid waste sewage and wastewater mismanagement has resulted in the growth of marginal vegetation and may have potentially attracted pests and vermin. If those activities continue without mitigation measures, it could potentially result in negatively impacting vagrant desert species who may potentially consume waste, although its possibility is very low as no fauna of concern was observed in the area. **Canal Sugar has taken this this issue into account during the construction phases.**

Disturbance to wildlife

The construction phase has a duration of 16 months. Thus, it is expected that disturbance on biodiversity would be *slight*, of *short term* and affecting the *study area*. Their magnitude is considered SMALL. Given the Low importance of the receptors, these impacts are deemed **INSIGNIFICANT.**

Habitat modification

Construction activities will lead to a total modification of the desert habitat allocated for the facility, turning it from a natural habitat to a man-made habitat. This impact is deemed **permanent and irreversible** (unless the project is terminated), involves the *study area*, but *slight* given that the project site is very small when compared to extension of the Western Desert. The magnitude is considered MEDIUM. Given the Low importance of the receptors, this impact is deemed **MINOR**.

Mitigation Measures

- Avoid working at night and usage of high-power lights;
- Ensure proper housekeeping practice.
- Develop, implement and update a waste management plan to include collection, storage, transport and disposal in an environmentally sustainable manner, to avoid using waste as a shelter by exotic species of rodents and pests.
- Provide awareness to the workers on the negative impacts of hunting any wild fauna.
- The company will abide by all regulations and laws that prohibit the hunting of wild animals

Residual Impacts

By implementing the above measures, the residual impacts of disturbance on terrestrial life are **INSIGNIFICANT**. On the other hands, impacts of habitat modification will remain **MINOR**.

e. Impact on local community

Potential pressures on the available resources and utilities before the workers camp is established may result due to potential workers influx to the area, as the company is planning to hire workers mainly from the surrounding communities. The pressure on utilities is considered *slight* at the *district* level during the *short term* construction phase as the main workers accommodation will be within the project area. Therefore it is expected that the construction phase will have a SMALL magnitude impact. The vulnerability of the community to such impact is Low and the overall impact is deemed **INSIGNIFICANT**.

On the other hand, workers influx may have positive socio-economic impacts as results of providing potential services, such as waste management, maintenance, catering supply, etc.

Mitigation measures

In all cases, disturbance/annoyance potentially caused by the labor influx, will be controlled through a code of conduct integrated in the labor contract, and a specific focus of the community grievance system. Labor influx will be done gradually. A management plan for the grievance mechanism shall be developed prior to the start of the project.

Residual impacts

The impacts are expected to be **INSIGNIFICANT**.

f. Traffic

The only source of potential impacts on traffic is the movement of vehicles transporting building materials or waste on roads. The construction phase may potentially increase traffic caused by transport vehicles for construction material etc. Since the construction phase is a short term activity with a *slight* impact at the *regional* level, the magnitude is SMALL. Vulnerability of regional roads to increased traffic is Medium; therefore the significance of this impact is considered **MINOR**.

Mitigation Measures

- Contractors will be required to abide with safety rules and periodic inspections of their vehicles to ensure safety requirements are met on the road.
- In addition, contractors will be required to comply with traffic rules regarding speed limits, driver licenses and training, vehicle maintenance, coverage of bulk materials being transported, etc. In addition, random drug and alcohol analyses will be conducted for drivers.
- Moreover, timing for the transportation of building materials will be set to avoid causing traffic congestion on the roads or at the unloading locations at site. Taking into consideration that the main road used is the Giza - Luxor Road, which is a highway with a width of about 12 meters.
- It is also taken into account that the area surrounding the site is uninhabited. The nearest residential community is located about 15.5 km away. It is a group of residential buildings located on the banks of the Tuna drainage and the village of Bani Khalid is about 18.5 km. In addition, Savola's housing complex is about 1 km south of the project site which is not located within the Company trucks' route transporting construction materials.
- A traffic management plan will be developed during construction to ensure the safety of villages near the road (east of Giza-Luxor Road) to prevent potential accidents and to maintain the safety of the residents of these villages.
- Properly cover transported material.

Residual Impacts

Through the implementation of the above mitigation measures, the expected residual impact on traffic is deemed **INSIGNIFICANT**.

g. Public Health

Impacts on public health may include emissions into the air, noise and waste. However, it should be noted that the area surrounding the project site is uninhabited. As previously mentioned, the nearest residential community is located about 15.5 km away. There is a housing area located about 1 km south of the project and is the housing of the workers of Savola Company. This housing area is maybe affected by such emissions. In all cases the mitigation measures noted in the air, noise and soil and ground water sections mentioned previously will offset those impacts.

Meanwhile, the most likely source for offsite impact on public health is the movement of vehicles transporting building materials or waste on roads. The construction phase may potentially increase traffic caused by transport vehicles for construction material etc. **This is assessed as a *slight* and *short term* impact at the *district* level.** The impact magnitude of this phase on public health is deemed SMALL. The receptor's vulnerability is Medium and the overall significance is **MINOR**.

Mitigation Measures

Mitigation measures are the same as the ones mentioned in the traffic section.

Residual Impacts

Through implementation of the above mitigation measures, the expected residual impact on the workers' health is **INSIGNIFICANT**.

h. Workplace Health and Safety

Potential impacts on workers' health and safety during construction could arise from the following hazards:

- Physical hazards
High noise levels from machines and vehicles, slipping of the workers and chemical hazards from material handling and exposure to dust emissions from equipment. Additionally physical stress may arise from heat and mechanical accidents.
- Transport hazards
Accidents during transportation
- Chemical hazards
Exposure to chemicals and pesticides during handling.,
- Bio-hazards
Moreover, solid waste and sewage mismanagement may pose health concerns as they play a role in the increase of pest and disease influx to the area.

These impacts are ***moderately severe***, involving the *study area* and ***short term*** (16 months construction phase). The magnitude of the impacts on workers is deemed Medium. Worker's vulnerability prior to mitigation measures is Medium. Therefore, the significance of this impact is **MODERATE**.

Mitigation Measures

The following measures will be taken to protect construction workers **and will be communicated within the agreements with the sub-contractors.**

- Site fencing
 - Excavated areas during construction will be surrounded with a safety fence of a reasonable height, depending on the ground conditions, to restrict access.
 - The only passage for pedestrian access to the site should be through a gate where security personnel are present, ensuring that unauthorized persons do not enter.
- Supervising
 - The contractor will have a continuous presence on-site for close inspection and management of the construction activities.
 - The contractor will make available to the workers personal protective equipment (PPE)
 - All employees must wear appropriate personal protective equipment at all times while working at the construction site. Workers will be required to wear helmets, safety shoes, jackets, earplugs and ear protection in case of noise. Additional PPEs will be provided according to the nature of the work.
 - Abiding to the instructions and regulations stated on safety signs at all times.
- Storage and management of materials
 - The contractor will also properly label stockpiled material, and provide proper access control measures to prevent accidental exposure.
 - All materials should be transported, stored and used according to their safety data sheet.
 - Fire extinguishers will be installed in designated places at the site.
 - To reduce the risk of accidents, tools, wood or other building materials should not be left around the workers at any time.
 - Timber with prominent nails or other materials that are hazardous to workers will be disposed of without delay.
 - Removal of pallets and empty wooden boxes from the construction site as soon as they are unloaded.
- Welfare measures
 - A clinic for simple medical care and follow-up will be established at the site to respond to minor incidents. The team will also be trained to assist in such incidents. For major accidents, a communications network will be available to call the ambulance to take the injured person to the nearest hospital. A doctor will be available on a daily basis during morning and evening.
 - Prohibition of smoking or eating anywhere in the construction site, except in the allocated facilities and locations.
 - Prohibition of open burning operations in any form on site.
 - Notify workers prior to the commencement of work of the risks related to the proposed activities on site.
 - The company will adopt policies and measures to avoid child labor.

- Equipment maintenance
 - All equipment will be inspected prior to the start of the work to ensure safety of the workers. On-site inspection of the conditions of all equipment will be conducted monthly.
- Managing equipment and vehicle usage
 - Only vehicles used for site construction will be allowed to enter the site.
 - Prohibit the parking of vehicles in front of fire extinguishers, emergency exits or pedestrian corridors.
 - The movement of cranes and trucks within the construction site will be regulated through the traffic management plan and the speed limit shall not exceed the maximum limit set by the site management (15-20 km/h).
 - Ensure that all vehicles used in the construction work, where possible, are equipped with visual and audible alarms while moving in the reverse direction. Alternatively, guidance should be available when moving in the reverse direction.
 - Use of construction vehicles on the site is allowed for authorized purposes only.
- Housekeeping
 - Complying with cleanliness and lighting standards.
- Training and capacity building
 - Briefing of employees on safety instructions before entering the site for the first time. After that, ID cards are given to allow them to enter the site.
 - Requiring contractors to take the necessary actions relating to reporting, investigation and taking the corrective actions for any incident or other health and safety aspects in accordance with the Sugar Canal Company's reporting system.
 - Provide training for fire fighting
 - Provide first aid training
 - Provide information sessions on material usage
 - Provide safety training on equipment usage

In general, all employees shall be provided with induction training. Induction training should at minimum include an introduction on the environmental and social commitments; detailed training on the emergency procedures, health and safety plan; and workers code of conduct.

- Task Risk Assessment.
 - The contractor should provide TRA for each specific task including hazard identification that might be harmful, risk evaluation and control measures.

In general Canal Sugar will abide by all national occupational health and safety regulations (Law 12/2003) as well as the international regulations for health and safety including IFC standards and AfDB safeguards.

Residual Impacts

Through implementation of the above mitigation measures, the expected residual impact on the workers' health and safety is **MINOR**.

i. Impacts on archeology

No cultural heritage components exist within the project area. Moreover, there are no registered antiquities within or in close proximity to the proposed project location. In any case, key measures to implement in case of chance find in light of the national prevailing regulations shall be conducted. Procedures for chance finds will be prepared within the project ESMS development.

The project site is property of the State and not recorded as an archaeological area. Therefore, according to Law 117/1983 (amended by Law 3/2010) concerning Antiquities' Protection, in case ruins are found at the proposed project location a request should be presented to the Supreme Council of Antiquities who would carry out a survey and excavations financed by the investor, and the remains will be transported to a location specified by the Council. The following procedure is proposed:

- Canal Sugar should contact the Supreme Council of Antiquities explaining in its request the nature of the project, its national importance, how it was approved, and including attached maps presenting the location of project activities.
- The Supreme Council for Antiquities will send an inspecting committee from their regional office to survey the area who will present a report to the Council.
- The Supreme Council for Antiquities will take their decision based on the report presented by their regional office.

It is important to consult and to deal directly with the regional archeological office staff in order to be sure that they finalize their task in a short period of time and because they are the decision-makers as the Supreme Council for Antiquities will rely on their opinion in taking the final decision.

As works should be stopped if any ruins are found during project implementation, it is recommended to complete the administrative procedure as well as the excavation and dislocation works prior to the project start-up to clear the area from any archeological remains that could delay the project activities.

In case archeological remains are found, the impact will be *severe*, *localized* and short term during the construction activities. Since no archeological remains are expected within the project location, the magnitude is deemed SMALL. However, the importance of these remains

is High and therefore the significance would be **MODERATE**. Potential impacts on archeology are however, **UNKNOWN**.

Residual Impacts

If archeological remains are found, implementation of the chance find procedure would reduce potential impacts to **MINOR**. However, potential impacts on archeology are to be deemed **UNKNOWN**.

6.3.2 Operation Phase

a. Air Quality

The project will mainly use natural gas as fuel. However, dust and particulate matter emissions from the sugar processing process are expected to be generated mainly from the use of machinery /vehicles for material transport and the stand-by diesel generator, which may result in the generation of Total Suspended Particles (TSP) emissions, Sugar particulates from sugar drying, sieving, packaging and from ventilation fans during storage. Odors caused by fermentation of organic materials and the treatment of industrial and domestic wastewater.

Moreover, as previously mentioned the nearest residential area is located far away. Only Savola's workers housing is located next to the facility. This is assessed to have a long term *slight* and *localized* impact of SMALL magnitude. The vulnerability of Savola's workers is Medium and overall significance of this impact **MINOR**.

Mitigation Measures

Mitigation measures are the same as the ones included in the construction phase. Additionally implementing the following:

- Odors will be controlled through ventilation and highly efficient beet storage procedures such as the implementation of the "first-in-first-use" policy and the final and intermediate products.
- Air emissions should be regularly monitored to ensure compliance as indicated in Table 6-3 below.
- Clean roads to ensure the reduction fugitive dust emissions.
- The air generated from drying, cooling and handling of sugar will be passed through fabric filters to be recycled in the industrial process.

Canal Sugar will develop a detailed management system which would include a procedure to measure and monitor stack emissions and ambient air quality within the ESMS development stage.

Residual Impacts

The above mitigation measures are anticipated to be efficient for minimizing the potential impacts. Therefore, the residual impacts of operational activities on the air quality are deemed **INSIGNIFICANT**.

Table 6-3 provides the expected emissions for the proposed project.

Table 6-3: Emissions from the proposed Project's stacks

Stack	Diameter (m)	Height (m)	TSP (mg/m ³)	SO _x (mg/m ³)	NO _x (mg/m ³)	Carbon monoxide (mg/m ³)	TOC (mg/m ³)
Boiler Stack	1.2	65	<50	NN	200	NN	NA
Maximum Limit - Law 4/1994 Table 1 Annex 6 - Executive Regulations 2015 (mg / m ³)	NA	NA	50	150	500	100	NA
Carbon Activation Kiln Stack	1.4	30	<50	NN	200	<100	<50
Maximum Limit - Law 4/1994 Table 22 Annex 6 - Executive Regulations 2015 (mg / m ³)	NA	NA	50	100	300	250	50
Lime Kiln Stack	1.3	45	<50	<200	<500	<100	1.3
Maximum Limit - Law 4/1994 Table 7 Annex 6 - Executive Regulations 2015 (mg / m ³)	NA	NA	50	400	500	250	NA

Greenhouse gases emissions

Fuel combustion from equipment and transport vehicles and energy usage will result in the release of CO₂ and NO_x may present another source of GHG. Furthermore, improper municipal solid waste and sewage management may also result in GHGs emission. Since the project is general and long-term, the assessment of gas emission prior to mitigation measures is deemed medium. Emission sources may also include the following:

- GHGs emissions from boiler stacks that will use natural gas as fuel.
- GHGs emissions from the carbon activation furnace
- Methane emissions from anaerobic treatment of wastewater
- Emissions from the lime kiln, that will be passed on gas scrubbers to purify CO₂ and use it in the industrial process.

An estimation of the total amount of greenhouse gases (GHGs) in kilotons of carbon dioxide equivalent (kt CO₂ eq) for Canal Sugar facility during the operation phase has been carried out and is provided in **Annex 10**.

Estimation results indicate that the facility benchmark is 0.326 t CO₂ equivalent/tonne of refined sugar. According to a study of emission intensity benchmarks for the South African carbon tax, the benchmark value for sugar industry is 0.58 t CO₂ equivalent tonne of refined sugar. Therefore, the emissions generated from facility operation are below the benchmark. Moreover, the presence of vast green areas (the beet farm) will compensate GHGs emissions from the operation. These emissions being below quantified standards, the significance is deemed **MINOR**.

Mitigation Measures

Although the facility would generate modest amounts of GHGs, the following mitigation measures would be implemented, in addition to those included in the construction phase:

- Natural gas will be used to generate the heat needed for carbon activation. Emissions from this process are the result of natural gas combustion and carbon emissions. Heating will be carried out at high temperatures to ensure that the carbon-adsorbed compounds are decomposed into vapor and carbon dioxide.
- Methane will be used as an energy source for boilers. But during the start-up methane will be generated in limited quantities and will therefore be ignited only.
- Natural gas will be used as fuel in the limestone kiln, so it is expected that the concentration of pollutants will be below the allowable limits, as it is clean fuel. Wet scrubbing of the flue gases will also be conducted to increase the concentration of carbon dioxide, which will be directed to the process of refining the raw juice, and the excess quantity will be released to air. The wastewater from the gas scrubber will be directed to the wastewater treatment unit.
- Proper waste management.

Residual Impact

The above mitigation measures are anticipated to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the operational phase on gas emissions and GHG is deemed **INSIGNIFICANT**.

b. Noise

Noise during operation may result from several sources, including power generation, boilers, drying, centrifuges, air compressors and liquid and syrup pumps. **Annex 11** shows the expected noise levels of the used equipment. Noise during the operational phase is considered *slight, localized, long term* and continuous but periodical (seasonal). The magnitude is therefore deemed SMALL on Low vulnerability surrounding receptors. The significance of this impact is therefore **INSIGNIFICANT**.

Mitigation Measures

The following mitigation measures could be implemented during operation to minimize the potential noise impacts:

- Potential noise generating machines and equipment are designed to meet statutory regulations concerning noise.
- Acoustic enclosures are installed for noise generating equipment, wherever possible such as inverters and transformers
- Workers at noise generating machinery and equipment will be provided with the suitable personal protective equipment (PPEs).
- Periodic maintenance of equipment will reduce the potential impacts of noise.

Residual Impact

Through the implementation of the aforementioned mitigation measures, residual impacts are considered **INSIGNIFICANT**.

c. Soil and Groundwater

The quality of the soil, within the plant site area, can be affected by the improper disposal of the limey clay, which is estimated to be 102 tons/hour. Soil contamination may also occur in the case of untreated sewage leakage. Additionally oil leakage from machines and vehicles may also occur.

Groundwater level in the project area is at a depth of about 100 m as described in chapter 4 of this study. The groundwater in this area is considered deep. Groundwater in the project area is not expected to be affected by the disposal of limey clay.

Hazardous materials stored on site may also result in potential soil and groundwater contamination if not properly managed. Hazardous waste at the site is as follows:

- Spent oils from maintenance operations
- Medical wastes resulting from the clinic
- Sludge from treatment facilities.

The impact is deemed long term, *localized* and *slight* of SMALL magnitude. The vulnerability of soil is Medium prior to the implementation of mitigation measures and the overall significance is deemed **MINOR**.

Mitigation Measures

In addition to the mitigation measures included in the construction phase the following should also be implemented:

- The limey clay will be compressed and transported to a dedicated area within the site where it will be stored. The clay disposal basin will be designed with the following basic features to ensure soil and groundwater protection. The basin will be lined with an insulating layer with slope and provided with a collection system for the leachate water. The leachate water will be collected and re-used in the industrial process.
- Industrial wastewater will be treated while ensuring the full prevention of any leakage **through proper lining** and part of the treated wastewater will be reused in the operations, while the other part is used for irrigation of green areas. This will be in accordance with the requirements of the Egyptian Code No. 501/2015. Chapter 3 provides the treated wastewater specification that can be used for irrigation.
- The spent oils will be collected in **well-insulated** sealed drums and stored in the hazardous wastes storage area until they are transferred to Petrotrade. Medical wastes will be collected periodically and disposed of at the nearest hospital that has incinerator licensed from EEAA.

- Properly ensure that wastewater lagoons are lined and insulated underneath and around, in order to avoid any leakage into soil and/ or groundwater.
- Properly monitor wastewater treatment lagoons and check for any leakage. In case of leakage take an immediate action according to local and international regulations.
- As part of its EMP, the project will develop a waste management system.
- Ensure proper management of soil
- Properly store and label chemicals according to national and international standards in insulated storage areas
- Maintain a hazardous chemical register,
- Provide training for spillage prevention
- Ensure the presence of a spillage prevention kit on site
- Ensure any machineries working with fuel and/or oil is properly stored in an area with insulated layers.

Residual Impact

Through the implementation of the aforementioned mitigation measures, residual impacts are considered **INSIGNIFICANT**.

Groundwater consumption

About 6,000 m³/day will be extracted from a well, treated and used as in the industrial process. The same well will provide 200 m³/day of potable water.

On the other hand, on behalf of Canal Sugar, IRZ Engineering Consultants has carried out a detailed geohydrology and aquifer study in order to assess the aquifer yields and its capability to support a large-scale irrigation project (i.e. the beet sugar farm which is out of scope of the present ESIA). The results of the study indicate that the limestone aquifer is very robust and productive and able to sustain the irrigation project through a total of 60 years of continuous pumping, although the overall static water level will decline. Therefore, the single well that will be utilized for potable and industrial water will not affect groundwater productivity.

On the other hand, the IRZ study does not cover the water needs of the whole project. Therefore, a Phase 2 study is being conducted by Schlumberger on behalf of Canal Sugar to ensure its long-term sustainability for the whole project (facility and land reclamation), as well as neighboring farms. Therefore, Schlumberger is currently performing a study on behalf of Canal Sugar to confirm the aquifer sustainability.

d. Terrestrial Life

As previously mentioned, the area allocated for the sugar beet factory represents a small part of the vast western desert plain and is not considered a critical habitat (refer to the rapid CHA carried out in Chapter 6 – Section 6.3.2 of the ESIA for the Land Reclamation Project). No biodiversity was observed at the factory project site. Additionally there are no protected areas within or biologically important areas nearby. Thus, it

is expected that the above stressors are unlikely to impact the biodiversity. Possible impacts on terrestrial life may also occur as a result of traffic activities (roadkills).

Therefore, impacts of disturbance to wildlife would involve the *study area* and would be *slight* and of low probability of occurrence, but of long term. Therefore, the magnitude of these impacts during the operation phase is SMALL. The importance of these receptors is deemed Low and the overall impacts are **INSIGNIFICANT**.

On the other hand, impacts due to habitat modification as a result of the presence of the project are permanent on the *study area* but *slight*, given the small extension of the project site in comparison to the vast Western Desert. The magnitude is considered MEDIUM on a receptor of Low importance. The significance of this impact is, therefore, **MINOR**.

Mitigation Measures

The following measures will be implemented to mitigate the impact on terrestrial life in addition to the ones stated in the construction phase:

- The project will be provided with a fence to prevent animals from entering the site location.
- All transportation will be carried out on paved roads, and the drivers will be prohibited from driving on unpaved roads.
- The company will comply with all rules and regulations that prevent potential hunting of wild animals.

Residual Impacts

Through the implementation of the aforementioned mitigation measures, residual impacts on biodiversity are considered **INSIGNIFICANT**. However, the impact of habitat modification will remain **MINOR**.

j. Impact on local community

Potential pressures on the available resources and utilities may result due to potential workers influx to the area. However, workers will have their own utilities including housing and cafeteria. The pressure on utilities is considered low and localized during the operational phase as the workers will have their own services located in the desert far away from residential areas. In any case a code of conduct will be integrated in the labor contract.

Additionally, workers influx may have positive socio-economic impacts as results of providing potential services, such as waste management, maintenance, catering supply, etc.

Moreover, Canal Sugar bought the land from The General Authority for Reconstruction and Agricultural Development Projects. In fact, as previously mentioned, the General Authority for Reconstruction and Agricultural Development Projects has signed a contract with Canal Sugar Company to establish a white sugar (produced from beet) factory. The land

handover document indicates that the site has been delivered to Canal Sugar free of any encroachments. Accordingly, the project has not resulted in any land expropriation and no past or present land uses have been impacted by the Project. **Annex 1** includes copies of the sale contract of the project land to Canal Sugar Company and the land handover document to the company (in Arabic), as well as English translations of the two documents.

Another aspect of impacts on the community deals with potential risks pertaining to Gender Based Violence (GBV). This aspect is not anticipated but will be also taken into account through:

- Mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
- Informing workers about national laws that make sexual harassment and gender based violence a punishable offence which is prosecuted;
- Introducing a Worker Code of Conduct as part of the employment contract, and including sanctions for non-compliance (e.g., termination); and
- Contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.

Therefore, the operational phase will have long term impacts of ***no effect***, at the *district* level on the local community. Accordingly, the magnitude is **NEGLIGIBLE** on receptors of Low vulnerability and the overall significance is assessed as **INSIGNIFICANT**.

e. **Traffic**

Traffic impact is not expected during the operational phase, as most of the transported material will be from the Canal Sugar farmland or from nearby farms located next to the facility site. Traffic may arise from transportation of produced sugar and waste. The large and low-traffic Cairo – Assiut Road will be mainly used for transportation. The impact is long term, *regional* and ***slight***. The magnitude is deemed **SMALL** and the vulnerability of the road network to such impact is Medium. Therefore impacts of traffic during the operational phase are assessed as **MINOR**.

Mitigation Measures

- Subcontractors will be required to follow the mitigation measures mentioned below.
- Preparing time schedule appropriate to trucks movement, taking into account actual loads on the road.
- Peak times will be avoided as much as possible in trucks movement
- Traffic legal rules and loads related to off-road transport will be adhered to
- Mitigation measures related to operation air quality will be implemented
- Prepare a schedule for material and waste transport
- Bulk material trucks will be covered, according to traffic rules.

Table 6-4: Proposed Traffic Plan

Materials	Vehicles' Capacity (Tons)	Vehicles' Numbers	Access Roads
Beets	25	1920	Internal paved road between the plant and the beet farm Or Giza - Luxor Road
Waste	25	80	Giza - Luxor Road

Dr. Mohamed Moussa (geology consultant) recommended during the public consultation meeting (held on 9/5/2018) that the project owner shall communicate with the Governorate to request the establishment of U-turn near the project site to facilitate the movement of transport trucks. He also recommended that as the road is currently redesigned, the company should contact the design entity and inform them of the expected traffic loads of the project.

It is worth mentioning that the company will contact the governorate to take the necessary consideration of the anticipated road loads of the project.

Residual Impact

Through the implementation of the aforementioned mitigation measures, residual impacts are considered **INSIGNIFICANT**.

f. Public health

The nearby housing unit for Savola Company workers will be the most likely affected area by air noise and waste emissions. However, the impact of those emissions on Savola workers will be offset by the mitigation measures mentioned previously in the air quality, noise and soil and ground water sections. Residential areas are located far away as previously mentioned and are not expected to be affected by any emissions. The most likely impact on public health may result from accidents which may be caused by traffic from the project. However, transportation of material will not be as frequent as the construction phase. Therefore, impacts on public health will be at the *district* level, long term, but *slight*. The magnitude is deemed SMALL on Medium vulnerability receptors and the overall impact is **MINOR**.

Mitigation measures

Mitigation measures are the same as the ones mentioned in the previous air, noise and traffic sections.

Residual Impacts

Through implementation of the above mitigation measures, the expected residual impact on the workers' health is **INSIGNIFICANT**.

g. Workplace Health and Safety

Workers may be exposed to the following impacts:

- Noise from compressors, pumps, centrifuge equipment, turbines, boilers and evaporators.
- Heat stress from boilers, evaporators, boilers and limestone kiln.

- Fugitive emissions, including potential odors from beet storage, industrial wastewater treatment, suspended particulates and vapors.

These impacts are *severe* and long-term on the study area. Their magnitude is deemed MEDIUM and the vulnerability of workers is also deemed Medium. Therefore, the significance of impacts on workers' health and safety is assessed as **MODERATE**.

Mitigation Measures

In addition to the construction phase mitigation measures, mitigation measures mentioned below will be communicated within the agreements with the subs-contractors. The operational phase will require the following:

- In accordance with Law 12/2003, HS committee will be established in the company as the number of employees is more than 50 workers and the committee will be responsible for protecting and educating employees. The company will also ensure that the exposure to noise is not exceeding the levels specified in Annex 7 of the Executive Regulations of Law 4/1994.
- The Company will take the necessary measures to protect workers from chemical hazards (in accordance with Article 211 of Law 12/2003) or from workplace pollutants such as vapors and dust (Article 34 of Law 211/2003). The company will also ensure that workplace emissions not exceeding the permissible limits stated in Annex 8 of the Executive Regulations of Law 4/1994. The project will ensure that ventilation is appropriate for the size of the workplace and the nature of the activities.
- The Company will also undertake all precautions to protect workers from the heat stress risks as set forth in Article 208 of Law 12/2003 and to comply with the light intensity levels required by Article 208 of Law 12/2003.
- Precautions will be taken to ensure the proper housekeeping of as provided in articles 40 and 41 of Decree 211/2003. The Company is committed to complying with the occupational health requirements detailed in articles 1-6 of Decree 126/2003, as well as the requirements for first aid and health considerations set out in Articles 2012, 219 and 220 of Law 12/2003, and Articles 38 and 39 of Law 21/2003. As well as, compliance with Article 214 of Law 12/2003 regarding Firefighting.
- The company will obey the Worker health and safety requirements
- First aid training shall be provided along with a first aid kit. First aid attendants shall also be present on site along with the suitable required medical equipment prior to transportation to the hospital.
- On site ambulance shall be provided 24/7 with proper tools and equipment
- IFC performance standard of labor and working conditions shall be maintained.

- Security personnel should be selected based on screening process to ensure that those providing security are not involved in any previous abuses and are free of any mental health issues
- Canal Sugar will properly implement the accommodation standards stated in the "Workers' accommodation: processes and standards"¹ document by the IFC and EBRD Such as:
 - Workers housing should avoid crowdedness.
 - Sanitary facilities shall include urinals, toilets, washbasins, and showers
 - Food security shall be maintained and the company shall ensure that the food offered in the cafeteria or provided to the workers and staff is nutritious.
- The client will also implement the health and safety operational safeguard of the AfDB guidelines on workers' health and safety which include for example:
 - Registering and reporting on workers accidents, diseases and incidents
 - Implementing an emergency prevention, preparedness and response plan.
- Child labor² and forced labor shall be avoided.
- A management plan for controlling any forced labor or exploitation will be put in place prior to the start of the project.

Residual Impacts

Through the implementation of the aforementioned mitigation measures, residual impacts are considered **MINOR**.

k. Impacts on archeology

As previously mentioned, no cultural heritage components exist within the project area and there are no registered antiquities within or in close proximity to the proposed project location. Moreover, there will be no excavation works during the operation phase that might lead to unearthing of archeological remains.

In any case, key measures to implement in case of chance find in light of the national prevailing regulations shall be conducted.

6.4 Impacts of the Environment on the Project

6.4.1 Seismic Effects

The project area is located in a medium-risk area with an average earthquake intensity of 4-4.9 on the Richter scale. Seismic effects involve long term, localized, moderately severe risks. The magnitude is **MEDIUM** and the receptors are considered of Medium vulnerability. The significance is, therefore, **MODERATE**.

¹ IFC/EBRD (2009) Workers' accommodation: processes and standards.

²² Potential child labor is more related to agricultural activities and is further assessed in the ESIA for land reclamation.

Residual Impacts

The Egyptian Building Code will be followed to avoid potential risks and residual impacts are considered **MINOR**.

6.4.2 Flashflood Hazards

A flash flood is a rapid flooding of low-lying areas caused by heavy or excessive rainfall in a short period of time. A flood is an overflow of water onto normally dry land. Flooding is a longer term event than flash flooding.

There are no permanent fresh surface water bodies or streams in area. There are, however, dry streams through which occasional precipitation take place. The project site is located within the Middle Limestone Plateau which is an extremely arid part of the Western Desert and practically rainless. the Western Desert area which is generally conceived as a barren plain with apparently internal drainage system (interior basins that are the characteristic depressions and not wadi systems as are characteristic of the Eastern Desert) and extensive sand bodies.

To determine the possibility impact of the flash floods on the project area, a preliminary flood path mapping presented in Figure 6-1 was developed. Accordingly, it is noted that the location of the Beet Sugar Factory is not intersected by any flood streams thus it is not exposed to flash flood risks. Therefore, this potential impact is long term but *slight* on the *study area*. The magnitude of this risk is deemed NEGLIGIBLE being of very low probability on a receptor of High importance (the factory). Potential impacts from flashflood hazards are, therefore, deemed **INSIGNIFICANT**.

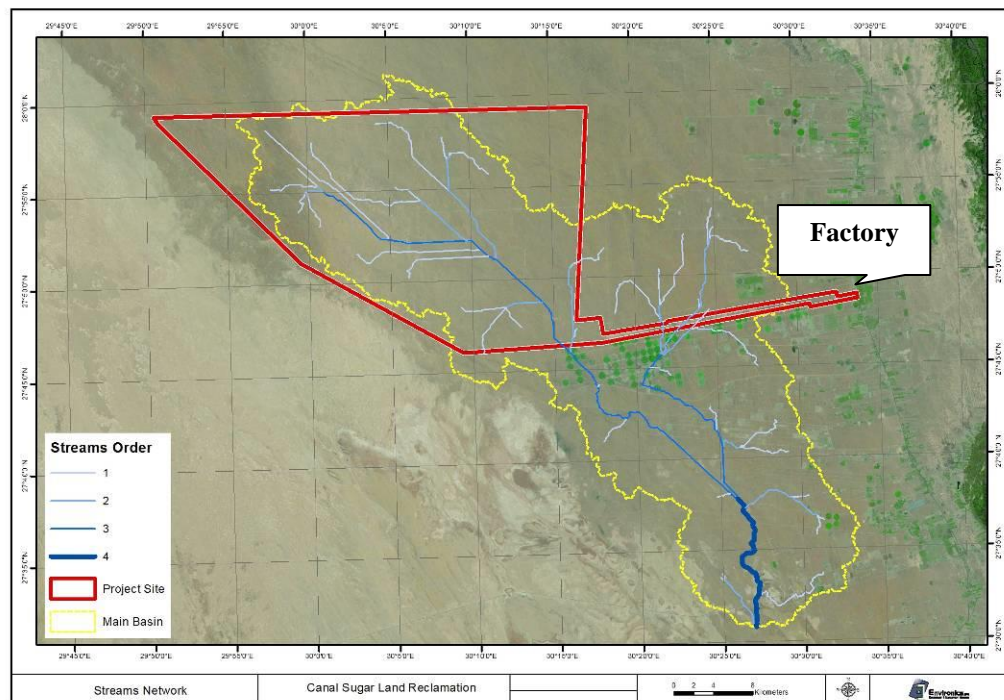


Figure 6-1: Main streams network in Project Area

Source: Extracted from ASTER v2 DEM 1 arc second, 2011

6.4.3 Impact of Sand Storms

Higher wind speeds potentially increases results in the performance losses due to abrasion and/or deposition of aeolian dust on the plant surface. The area experiences sand storms during spring and autumn. Egypt experiences sand storms during spring and autumn. This may pose potential health risk to workers such as eye irritation and dust inhalation. This may occur only during dusty seasons which are temporary. It is a *slight long term* impact at the *study area* level of NEGLIGIBLE magnitude on receptors (the workers) of Medium vulnerability. The assessment of this risk is deemed **INSIGNIFICANT**.

Mitigation measures

In addition to the mitigation measures provided in the worker health and safety sections, the following should be implemented:

- Avoid working during sand storms
- Ensure that workers are wearing PPEs (masks and eye protection equipment)
- Ensure that all materials are stored properly.

Residual impacts

Through implementation of the above mitigation measures, the expected residual impact on the workers' health and safety is deemed **INSIGNIFICANT**.

6.4.4 Impacts of Venomous Species

Venomous species may potentially be present in the desert area and may pose a risk to workers during construction. These include the Horned Viper (*Cerastes cerastes*) and the Sand viper (*Cerastes vipera*). This risk might be present during the construction phase but will considerably decrease during the operation phase when the site will be modified and the potential presence of snakes will be drastically reduced. This is, therefore, a *long term* and *severe* impact on the *study area*, but of very low probability of occurrence throughout the project lifetime. The magnitude is therefore considered SMALL and the workers' vulnerability is Medium, mainly during the construction phase. The significance is therefore assessed as **MINOR**.

Mitigation measures

In addition to the workplace health and safety measures, ensure the presence of anti-venom. Additional measures are provided in the ESIA for Land Reclamation. Moreover, the company HSE plan will provide details on the number, experience and qualifications of required healthcare personnel available at site.

Residual impacts

The expected residual impact is deemed **INSIGNIFICANT**.

Table 6-5: Significance rating summary of the impacts of land reclamation activities during construction and operation

Issue / Impact	Phase	Without Mitigation						With Mitigation
		Temporal	Spatial	Severity	Magnitude	Sensitivity / Vulnerability / Importance of Receptor / Resource	Significance	Significance
PROJECT ON ENVIRONMENT								
Physical Environment								
Air quality	C	Short term	Study area	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
	O	Long term	localized	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
GHG Emissions	C	Short term	Study area	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
	O	Long term	District	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
Noise levels	C	Short term	Localized	Slight	SMALL	Low to Medium	INSIGNIFICANT to MINOR	INSIGNIFICANT to MINOR
	O	Long term	Localized	Slight	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
Soil and Groundwater	C	Short term	Localized	Slight	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
	O	Long term	Localized	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
Biological Environment								
Disturbance to wildlife	C	Short term	Study area	Slight	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
	O	Long term	Study area	slight	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
Habitat modification	C	Permanent	Study area	Slight	MEDIUM	Low	MINOR	MINOR
	O	Permanent	Study area	Slight	MEDIUM	Low	MINOR	MINOR
Socio-economic Environment								
Impacts on local community	C	Short term	District	Slight	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
	O	Long term	District	No effect	Negligible	Low	INSIGNIFICANT	INSIGNIFICANT
Traffic	C	Short term	Regional	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
	O	Long term	Regional	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
Public Health	C	Short term	District	Slight	SMALL	Medium	MINOR	INSIGNIFICANT
	O	Short term	District	Slight	SMALL	Medium	MINOR	INSIGNIFICANT

Issue / Impact	Phase	Without Mitigation						With Mitigation
		Temporal	Spatial	Severity	Magnitude	Sensitivity / Vulnerability / Importance of Receptor / Resource	Significance	Significance
Workplace health and safety	C	<u>Short term</u>	<i>Study area</i>	<i>Moderately severe</i>	MEDIUM	Medium	MODERATE	MINOR
	O	<u>Long term</u>	<i>Study area</i>	<i>Severe</i>	MEDIUM	Medium	MODERATE	MINOR
Impacts on archeology	C	<u>Short term</u>	<i>Localized</i>	<i>Severe</i>	SMALL	High	MODERATE / UNKNOWN	MODERATE / UNKNOWN
ENVIRONMENT ON THE PROJECT								
Seismic effects	C/O	<u>Long term</u>	<i>Localized</i>	<i>Moderately severe</i>	MEDIUM	Medium	MINOR	INSIGNIFICANT
Impacts of flash floods	C/O	<u>Long term</u>	<i>Study area</i>	<i>Slight</i>	NEGLIGIBLE	High	INSIGNIFICANT	INSIGNIFICANT
Impact of sand storms	C/O	<u>Short term</u>	<i>Study area</i>	<i>Slight</i>	NEGLIGIBLE	Medium	INSIGNIFICANT	INSIGNIFICANT
Impacts of venomous species	C/O	<u>Long term</u>	<i>Study area</i>	<i>Severe</i>	SMALL	Medium	MINOR	INSIGNIFICANT

6.5 Cumulative Impacts

The IFC Good Practice Handbook Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets indicates that although the environmental and social impact assessment (ESIA) process is essential to assessing and managing the environmental and social impacts of individual projects, it may be insufficient for identifying and managing incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments at the time the risks and impacts are identified.

The IFC Performance Standard 1 limit cumulative impacts to be addressed to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities. Examples of cumulative impacts include: incremental contribution of gaseous emissions to an airshed; reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed; interference with migratory routes or wildlife movement; or more traffic congestion and accidents due to increases in vehicular traffic on community roadways.

Construction of the Beet Sugar Factory, associated land reclamation project and other nearby farmlands would modify part of the natural desert land into modified built and agricultural lands. However, this desert land is part of the vast Western Desert area and is neither a unique nor an important habitat with low biological richness. Cumulative impacts of land conversion in the area are not considered high as the Western Desert constitutes about two thirds of the total Egyptian land. Moreover, the surrounding agricultural or economic activities are very few and relatively small in land compared to the current project and thus, do not pose serious risks of cumulative impacts.

The Sugar manufacturing plant does not interfere with any wildlife routes, and is not expected to contribute to high congestion and traffic after implementation of the aforementioned mitigation measures. Moreover, the project is not expected to have no high negative impacts on natural resource with the mentioned precautionary approaches in this section.

The main cumulative impacts may arise from high groundwater aquifer abstraction by the land reclamation project and other farmlands (refer to the ESIA for land reclamation), as water abstraction to feed the Beet Sugar factory is limited compared to the farm water requirements. The initial results of the IRZ groundwater study indicate that the aquifer is robust. A second detailed aquifer modeling study is being carried out by Schlumberger to confirm the aquifer sustainability for the whole project as well as surrounding farms.

Additionally, Canal Sugar will generate a positive cumulative impact through obtaining sugar beet from the surrounding agricultural lands, thus supporting income generation for the surrounding farmers.

7. Environmental and Social Management and Monitoring Plan

This chapter describes the environmental management procedures required to mitigate the residual negative impacts for which the mitigation measures do not essentially need to be integrated in the project design. The chapter also includes environmental monitoring plans to ensure compliance and sound environmental performance throughout the project life cycle.

The environmental management plan consists of a set of mitigation and monitoring measures that needs to be taken into account in order to eliminate, offset or reduce negative environmental and social impacts to acceptable levels. The management plan is a practical document that will be updated regularly by the project team to ensure that any potential changes within the facility are taken into consideration.

In general, the environmental management plan consists of the following components:

- **Summary of potential impacts** identified in this ESIA.
- **Summary of the mitigation measures:** to identify appropriate effective measures that will reduce potential adverse environmental impacts to acceptable levels.
- **Environmental management department:** to determine the responsibilities and tasks of the project team.
- **Environmental management plan:** to outline the procedures to implement the environmental management measures for materials, wastes, work environment health and safety, training emergency plans and firefighting measures that are in accordance with the Egyptian regulations as well as the IFC and AfDB guidelines.
- **Self-monitoring plan:** including monitoring methods for the different environmental aspects in accordance with the Environment Law 4/1994 and its amended executive regulations and in accordance with international regulations including the IFC and AfDB guidelines, as well as developing and maintaining the environmental register.
- **Social Management Plan;** dealing with proactive communication with local communities and potential grievances.

7.1 Summary of Impacts

As discussed in Chapter 6, the impacts are classified to three categories as provided in Table 7.1.

Table 7-1: Impacts Classification

Positive Impacts	Potentially Adverse Impacts	Irrelevant impacts
<ul style="list-style-type: none"> - Increase domestic and foreign investment opportunities - Increase in employment opportunities - Decrease in sugar demand 	<ul style="list-style-type: none"> - Impacts on air quality - Impacts from greenhouse gases - Impacts from noise level - Impacts on soil and groundwater quality - Impacts on terrestrial life - Impacts on public health - Community impact - Impacts on workplace health and safety - Impacts on traffic - Impacts on archeology 	<ul style="list-style-type: none"> - Impacts on surface water - Impacts on aquatic life - Impacts from Flashflood

It should be mentioned that for the project in hand, many proactive preventive measures were taken into consideration during an early stage of the design phase. Moreover, residual impacts are mitigated/ addressed through an integrated management plan as described in Section 7-3.

7.2 Summary of Mitigation Measures

This section summarizes the potential negative environmental impacts of the project and mitigation measures. Tables 7-2 and 7-3 present the proposed mitigation measures during the construction and operation phases, as well as related monitoring aspects including location, target/indicator, frequency, responsible and implementation entity and estimated cost.

Table 7-2: Summary of mitigation measures during construction phase

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
Air quality	<ul style="list-style-type: none"> Apply dust suppression method using minimum water technologies Apply dust management through slowing the driving speed of material transportation vehicles Conduct maintenance of equipment and vehicles Regularly inspection of construction equipment Modify timing of construction where possible, to coincide with favorable climate conditions. Prohibit and prevent open burning of any waste and ensure its proper storage and disposal with a certified contractor 	<ul style="list-style-type: none"> Four corners of the facility Point source monitoring (for equipment) 	<p>Compliance of parameters (CO, SO₂, NO₂, TSP /PM₁₀) to air quality standards.</p> <p>Compliance of parameters (CO, HC and Opacity) to air quality standards</p>	Biannual	All contractors and sub-contractors, supervised by Canal Sugar	Third party (research entity or certified lab)	15,000 per monitoring activity
Gas emissions and Greenhouse gases	<ul style="list-style-type: none"> Ensure that technologies and equipment used in the project are new or with a high energy efficiency If possible ensure that equipment and material used in the construction phase are obtained from a nearby area Providing workers with 	<ul style="list-style-type: none"> Four corners of the facility Point source monitoring (for equipment) 	<p>Compliance of parameters (CO, SO₂, NO₂, TSP /PM₁₀) to air quality standards</p> <p>Compliance of parameters (CO, HC and Opacity) to air quality standards</p>	Biannual	All contractors and sub-contractors, supervised by Canal Sugar	Third party (research entity or certified lab)	15,000 per monitoring activity

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	awareness on maintaining good practice for machinery usage <ul style="list-style-type: none"> • Providing workers with awareness on energy efficiency and electricity consumption. • Maintaining good housekeeping practices • Properly store and dispose solid waste and sewage according to the national regulations. If possibly ensure that waste can be recycled is transferred to a certified contractor • Maintaining machinery and vehicles • Ensure that gas emissions are below international and national limits • Prohibit waste burning 						
Ambient noise	<ul style="list-style-type: none"> • Inspection and maintenance of all equipment and vehicles • Provide workers with the suitable PPEs 	At noise generating locations	Compliance to noise levels standards	Biannual	All contractors and sub-contractors, supervised by Canal Sugar	Third party (research entity or certified lab)	5,000 per monitoring activity
Soil and groundwater	<ul style="list-style-type: none"> • Ensure the proper implementation of site housekeeping and general cleaning procedures. 	<ul style="list-style-type: none"> • Visual inspection of site • Groundwater wells 	<ul style="list-style-type: none"> • Proper housekeeping • Compliance to groundwater standards 	<ul style="list-style-type: none"> • Daily • Quarterly 	All contractors and sub-contractors, supervised by Canal Sugar	<ul style="list-style-type: none"> • Contractors & subcontractors • Third party (research entity or 	<ul style="list-style-type: none"> • Included in workforce salary costs • 30,000 per monitoring

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<ul style="list-style-type: none"> • Compliance with spill prevention measures • Inspect all equipment before operation • Ensure periodic inspection of equipment and machinery to minimize spills • Store all materials, equipment and machines properly in designated areas. • Collection of construction wastes at designated collection sites, and store it in appropriate containers, in accordance with the national regulations and international requirements. • Avoid waste accumulation of construction and other wastes at the site. • Collecting the generated wastewater from workers in a closed and sealed insulated collection tank in compliance with the Egyptian regulations and ensure its discharge regularly by a licensed contractor. • The contractor will be 					certified lab	activity

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<p>obliged to transfer the wastewater to a safe discharge location and comply with the legal requirements in this regard.</p> <ul style="list-style-type: none"> Ensure that the diesel generator is well insulated. 						
Terrestrial biodiversity	<ul style="list-style-type: none"> Avoid working at night and avoid using high intensity lights Ensure proper housekeeping practice. Develop, implement and update the environmental management plan during the construction phase and safely disposing waste in accordance with the applicable regulations Comply with all regulations and laws that prohibit the hunting of wild animals. Develop, implement and update a suitable waste management plan Provide awareness to the workers on the negative impacts of hunting any wild fauna. 	Visual inspection within and around the site	Proper housekeeping	Weekly	All contractors and sub-contractors, supervised by Canal Sugar	Contractors & subcontractors	Included in workforce salary costs
Community impact	<ul style="list-style-type: none"> Ensure that workers influx is done gradually 	Offsite inspections (roads, nearby)	<ul style="list-style-type: none"> Regulations are followed 	As necessary	All contractors and sub-	Contractors & subcontractors	Included in workforce

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<ul style="list-style-type: none"> labor influx, will be controlled through a code of conduct integrated in the labor contract, and a specific focus of the community grievance system 	villages, etc)	<ul style="list-style-type: none"> Grievances are minimized 		contractors, supervised by Canal Sugar		salary costs
Traffic	<ul style="list-style-type: none"> Contractors will be required to abide with safety rules and periodic inspections of their Contractors will be required to comply with traffic rules regarding speed limits, driver licenses and training, vehicle maintenance, coverage of bulk materials being transported, etc. Random drug and alcohol analyses will be conducted for drivers. Timing for the transportation of building materials will be set to avoid causing traffic congestion on the roads or at the unloading locations at site. A traffic management plan will be developed during construction to ensure the safety of villages to prevent 	Transport roads	<ul style="list-style-type: none"> Rules are followed Minimized accidents 	As necessary	All contractors and sub-contractors, supervised by Canal Sugar	Contractors & subcontractors	Included in workforce salary costs

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<ul style="list-style-type: none"> potential accidents Properly cover transported material. 						
Public Health	<ul style="list-style-type: none"> Same as traffic mitigation measures 	Offsite inspections	Rules are followed	As necessary	All contractors and sub-contractors, supervised by Canal Sugar	Contractors & subcontractors	Included in workforce salary costs
Workplace Health and Safety	<ul style="list-style-type: none"> Excavated areas during construction will be surrounded with a safety fence The only passage for pedestrian access to the site should be through a gate where security personnel are present The contractor will have a continuous presence on-site for close inspection and management of the construction activities. The contractor will make available to the workers personal protective equipment (PPE) All employees must wear appropriate (PPE) at all times while working at the construction site Ensure workers are properly equipped 	Within the facility site	<ul style="list-style-type: none"> Rules are followed Compliance of air and noise measurements to quality standards Compliance to health standards 	<ul style="list-style-type: none"> Daily (PPEs) Monthly air and noise quality measurements Monthly medical checkups 	All contractors and sub-contractors, supervised by Canal Sugar	<ul style="list-style-type: none"> Contractors & subcontractors Third party (research entity or certified lab) Medical insurance company 	<ul style="list-style-type: none"> Included in workforce salary costs 15,000 / month 4000 / year / worker (cost of medical insurance)

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<p>against heat stress</p> <ul style="list-style-type: none"> Abiding to the instructions and regulations stated on safety signs at all times. The contractor will also properly label stockpiled material, and provide proper access control measures All material should be Transported, Stored and Used according to its safety data sheet Fire extinguishers will be installed in designated places at the site Tools, wood or other building materials should not be left around the workers at any time Materials that are hazardous to workers will be disposed of without delay Removal of pallets and empty wooden boxes from the construction site as soon as they are unloaded. A clinic for simple medical care and follow-up will be established at 						

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<p>the site to respond to minor incidents.</p> <ul style="list-style-type: none"> Prohibition of smoking or eating anywhere in the construction site, except in the allocated facilities Prohibition of open burning operations in any form on site Notify workers prior to the commencement of work of the risks related to the proposed activities on site All equipment will be inspected prior to the start of the work to ensure safety of the workers On-site inspection of the conditions of all equipment will be conducted monthly Only vehicles used for site construction will be allowed to enter the site Prohibit the parking of vehicles in front of fire extinguishers, emergency exits or pedestrian corridors. The movement of cranes and trucks within the construction site will be 						

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<p>regulated through the traffic management plan and the speed limit</p> <ul style="list-style-type: none"> • Ensure that all vehicles used in the construction work, are equipped with visual and audible alarms • Use of construction vehicles on site is allowed for authorized purposes only • Complying with cleanliness and lighting standards • Briefing of employees on safety instructions before entering the site for the first time. • Requiring contractors to take the necessary actions relating to reporting, investigation and taking the corrective actions for any in accordance with the Sugar Canal Company's reporting system • Provide training for fire fighting • Provide first aid training • Provide information sessions on material usage • Provide safety training 						

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<ul style="list-style-type: none"> on equipment usage The contractor should provide TRA for each specific task including hazard identification that might be harmful, risk evaluation and control Measures Canal Sugar should abide by Law 12/2003 Canal Sugar should abide by the international regulations for health and safety including IFC standards and AfDB safeguards 						
Archeology	<ul style="list-style-type: none"> Work should be stopped if any ruins are found during project implementation, Complete the administrative procedure as well as the excavation and dislocation works prior to the project start-up to clear the area from any archeological remains that could delay the project activities. Key measures shall be implemented in case of chance find in light of the national prevailing regulations. 	N/A	N/A	N/A	All contractors and sub-contractors, supervised by Canal Sugar	Contractors, sub-contractors and Canal Sugar	N/A

Table 7-3: Summary of mitigation measures during operational phase

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
Air quality	<ul style="list-style-type: none"> Same mitigation measures as the ones included in the construction phase in addition to the below measures: Exhaust from natural gas burning used to generate steam from boilers will be dispersed to the outside air without treatment through a stack Control odors through ventilation and highly efficient beet storage procedures such as the implementation of the "first-in-first-use" policy Air emissions should be regularly monitored to ensure compliance as indicated in table 6-3 below. Clean roads to ensure the reduction fugitive dust emissions. The air generated from drying, cooling and handling of sugar will be passed through fabric filters to be recycled in the industrial process. 	<ul style="list-style-type: none"> Boilers stack Activated Carbon kiln stack Lime furnace stack 	<ul style="list-style-type: none"> Compliance of parameters (SOx, NOx, CO, TSP) to air quality standards 	<ul style="list-style-type: none"> Biannual 	<ul style="list-style-type: none"> Canal Sugar 	<ul style="list-style-type: none"> Third party (research entity or certified lab) 	<ul style="list-style-type: none"> 10,000 per monitoring activity
Gas emissions and Greenhouse gases	<ul style="list-style-type: none"> Natural gas will be used to generate the heat needed for carbon activation. Emissions from this process are the result of natural gas combustion and carbon emissions. Heating will be carried out at high 	<ul style="list-style-type: none"> Boilers stack Activated Carbon kiln stack Lime furnace stack 	<ul style="list-style-type: none"> Compliance of parameters (SOx, NOx, CO, TSP) to air quality standards 	<ul style="list-style-type: none"> Biannual 	<ul style="list-style-type: none"> Canal Sugar 	<ul style="list-style-type: none"> Third party (research entity or certified lab) 	<ul style="list-style-type: none"> 10,000 per monitoring activity

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<p>temperatures to ensure that the carbon-adsorbed compounds are decomposed into vapor and carbon dioxide.</p> <ul style="list-style-type: none"> • Methane will be used as an energy source for boilers. But during the start-up methane will be generated in limited quantities and will therefore be ignited only. • Natural gas will be used as fuel in the limestone kiln, so it is expected that the concentration of pollutants will be below the allowable limits, as it is clean fuel. Wet scrubbing of the flue gases will also be conducted to increase the concentration of carbon dioxide, which will be directed to the process of refining the raw juice, and the excess quantity will be released to air. The wastewater from the gas scrubber will be directed to the wastewater treatment unit. • Proper waste management. 						
Ambient noise	<ul style="list-style-type: none"> • Potential noise generating machines and equipment are designed to meet statutory regulations concerning noise. • Acoustic enclosures are installed for noise generating equipment, wherever possible 	At noise generating locations (compressors, pumps, turbines, boilers, evaporators, conveyors)	Compliance to noise levels standards	Biannually	Canal Sugar	Third party (research entity or certified lab)	5,000 per monitoring activity

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	such as inverters and transformers <ul style="list-style-type: none"> Workers at noise generating machinery and equipment will be provided with the suitable personal protective equipment (PPEs). Regular inspection and maintenance of equipment. 						
Soil and groundwater	<ul style="list-style-type: none"> In addition to the measures stated in the construction phase, the below measures shall be followed: Compact and transfer the limestone clay to storage area within the site. Proper insulation of the limestone clay disposal area Collect, properly store (insulated layer) and treat and re-use industrial wastewater in the industrial process or for beet irrigation according to the Egyptian Code 501/2015 Collect, properly store (insulated layer) and treat sewage and re-use treated wastewater in irrigating green areas within the project site in accordance with the Egyptian Code 501/2015. The spent oils will be collected in sealed well insulated drums and stored in the hazardous wastes storage area until they 	<ul style="list-style-type: none"> Visual inspection of site Groundwater wells 	<ul style="list-style-type: none"> Proper housekeeping Compliance to groundwater standards 	<ul style="list-style-type: none"> Daily Quarterly 	Canal Sugar	<ul style="list-style-type: none"> Third party (research entity or certified lab) 	<ul style="list-style-type: none"> Included in workforce salary costs 30,000 per monitoring activity
		<ul style="list-style-type: none"> Output of the treated industrial water unit Output of the 	Compliance with the regulations for the following parameters for treated industrial	Biannually	Canal Sugar	<ul style="list-style-type: none"> Third party (research entity or certified lab) 	<ul style="list-style-type: none"> ??

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<p>are transferred to Petrotrade. Medical wastes will be collected periodically and disposed of at the nearest hospital that has incinerator licensed from EEAA.</p> <ul style="list-style-type: none"> • Ensure that wastewater lagoons are well insulated • Properly monitor waste water treatment lagoons and check for any leakage. In case of leakage take an immediate action according to local and international regulations. • As part of its EMP, the project will develop a waste management system. • Ensure proper management of soil • Properly store (in an insulated area) and label chemicals according to national and international standards • Maintain a hazardous chemical register • Offer training for spillage prevention • Ensure the presence of a spillage prevention kit on site • Ensure any machineries working with fuel and/or oil is properly stored in an area with insulated layers. 	treated domestic waste water	<p>water:</p> <ul style="list-style-type: none"> • Temperature • pH • Biological Oxygen Demand (BOD) • Chemical Oxygen Demand (COD) • Total Suspended Solids (TSP) • Oils and grease <p>Compliance with the regulations for the following parameters for treated domestic water:</p> <ul style="list-style-type: none"> • Total suspended solids • Turbidity • Biological Oxygen Demand (BOD) • E-coli • Intestinal 				

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
			nematodes/liter				
Terrestrial biodiversity	<ul style="list-style-type: none"> • Same as construction phase • The project will be provided with a fence to prevent animals from entering the site location • All transportation will be carried out on paved roads, and the drivers will be prohibited from driving on unpaved roads • The company will comply with all rules and regulations that prevent hunting of wild animals 	Visual inspection within and around the site	Proper housekeeping	Weekly	Canal Sugar	Canal Sugar staff	Included in workforce salary costs
Community impact	<ul style="list-style-type: none"> • Code of conduct will be integrated in the labor contract 	Offsite inspections (roads, nearby villages, etc)	<ul style="list-style-type: none"> • Regulations are followed • Grievances are minimized 	As necessary	Contractors and subcontractors supervised by Canal Sugar	Contractors and subcontractors and Canal Sugar staff	Included in workforce salary costs
Traffic	<ul style="list-style-type: none"> • Subcontractors will be required to follow the mitigation measures mentioned below • Prepare a schedule for transport vehicles • Avoid traffic peak times • Comply with to traffic law requirement • Apply air emissions mitigation measures (described above) • Prepare a schedule for material and waste transport • Bulk material trucks will be covered, according to traffic 	Transport roads	<ul style="list-style-type: none"> • Rules are followed • Minimized accidents 	As necessary	Contractors and subcontractors supervised by Canal Sugar	Contractors and subcontractors and Canal Sugar staff	Included in workforce salary costs

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	rules.						
Public health	<ul style="list-style-type: none"> Same as traffic mitigation measures 	Offsite inspections	Rules are followed	As necessary	All contractors and sub-contractors, supervised by Canal Sugar	Contractors and subcontractors and Canal Sugar staff	Included in workforce salary costs
Workplace Health and Safety	<ul style="list-style-type: none"> Same mitigation measures as the ones included in the construction phase Properly insulate sources of heat Ensure that noise is within the limits in the regulations Provide personnel working close to noise sources with ear plugs comply with occupational health and safety standards Ensure that the operating machineries and equipment meet the legal requirements of noise limit First aid training shall be provided along with a first aid kit and first aid attendants On site ambulance shall be provided 24/7 with proper tools and equipment IFC performance standard of labor and working conditions shall be maintained. Security personnel should be selected based on screening process The client will also implement 	Within the facility site	<ul style="list-style-type: none"> Rules are followed Compliance of air and noise measurements to quality standards Compliance to health standards 	<ul style="list-style-type: none"> Daily (PPEs) Monthly air and noise quality measurements Monthly medical checkups 	Canal Sugar	<ul style="list-style-type: none"> Third party (research entity or certified lab) Medical insurance company 	<ul style="list-style-type: none"> Included in workforce salary costs 15,000 / month 4000 / year / worker (cost of medical insurance)

Source of impact / Receptors	Mitigation measures	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
	<p>the health and safety operational safeguard of the AfDB</p> <ul style="list-style-type: none"> Child labor and forced labor shall be avoided A management plan for controlling any forced labor or exploitation will be put in place prior to the start of the project. 						
Archeology	<ul style="list-style-type: none"> Work should be stopped if any ruins are found during project implementation, Key measures shall be implemented in case of chance find in light of the national prevailing regulations. 	N/A	N/A	N/A	All contractors and sub-contractors, supervised by Canal Sugar	Contractors, sub-contractors and Canal Sugar	N/A

7.3 Environmental and Social Responsibilities

7.3.1 Establishment of Health, Safety and Environment Department

The company will establish a Health, Safety and Environment (HSE) Department and will appoint the following staff:

- An occupational health and safety manager
- Two safety engineers
- Three supervisors
- One security supervisor
- One Community Liaison Officer (CLO)
- Few safety watches, and;
- One doctor/nurse

The HSE committee will include the following:

- Director of safety committee: project manager of contractor
- Vice-director of safety committee: safety manager of contractor
- Members: Deputy Project manager, specialty supervisors, safety supervisors of contractors.

7.3.2 Responsibility of HSE Staff

The health and safety management department is responsible for daily safety work in site, for safety walking/inspection, housekeeping, safety protection and control unsafe action/condition.

When construction work poses high risk that threatens the worker/labor's life and health, the health and safety manager has the right to end the activity in order to prevent potential danger, in addition, he has the right to report workers who does not comply with safety regulations on site.

- **Responsibility of Site Manager**
 - Responsible for the health and safety issue relating to contractor's employers;
 - Leads, instructs and supports the work of safety management to implement the HSE plan;
 - Provides help and support for workers;
 - Evaluates the achievement of health and safety work;
 - Ensures sufficient communication among contractual parties;
 - Provides the necessary support and determines any deficiency and disparity in the health and safety procedures;
 - Attends weekly and monthly health and safety meetings;
 - Updates and manages correction plans.
- **Responsibility of HSE Manager**
 - Provides solution to the site management in health and safety and environmental issues;
 - Develops and implements the contractor's HSE plan;
 - Analyzes reports and corrects the HSE issue in site;

- Organizes and completes all relevant HSE introductory training and awareness for workers;
 - Reports any accident/incident in site and investigates the reason of accident/incident;
 - Records and updates health and safety statistics, and submit weekly and monthly reports;
 - Drafts and reviews health and safety assessment reports, method statement and work permit;
 - Prevents and corrects potential safety risk behaviors;
 - Resolves all environmental issues on site;
 - Plans and supervises all environmental monitoring aspects and proposes potential corrective actions.
- **Responsibility of Safety Engineer**
 - Responsible for HSE management for construction;
 - Supervises site personnel;
 - Reviews the safety operation regulation compiled by subcontractor;
 - Provides HSE education and training;
 - Has the right to ask to stop working under dangerous conditions;
 - Has the right to correct any violations against HSE rules.
- **Responsibility of Safety Supervisor**
 - Responsible for interior safety of construction and represents subcontractor to executes safety operation regulation;
 - Reports accident to project manager;
- **Safety Watcher of Contractors**
 - Keeps close contact with safety supervisor;
 - Ensures the interior safety management regulations are met with the requirements of the project manager and safety manager of the contractor;
 - Provides training for workers;
 - Supervises the execution of safety measures;
 - Reports accidents;
 - Supervises the site.
- **CLO Responsibilities**

The Community Liaison Officer (CLO) collects and responds to community concerns and grievances and will require top management approval (Site or HSE Manager) before engaging with the community on any issues that have reputational implications for Canal Sugar. The CLO will provide input into the annual Social Performance Plan and is accountable for delivering the agreed upon actions in this plan. He/she will also submit monthly brief reports to the HSE Manager. This job requires working closely with the HSE staff and management within the company.

Specific tasks include:

 - Planning and implementing the consultation with local communities on issues including impact grievances and negotiation over demands and

- expectations issues;
- Maintain excellent relations with local authorities and key formal and informal leaders in the local communities around the concession;
- Prepare the annual plan for engagement and consultation activities;
- Setting up and managing participatory community meetings and activities;
- Oversee and manage grievance procedures, including follow-up through to closure;
- Participate in the delivery of social impact and risk assessment exercises and follow through the implementation of social risk mitigation measures referred to in the Social Impact Assessment;
- Support the delivery of the Corporate Social Responsibility (CSR) program (see Section 7.5.1) and conduct monitoring and evaluation activities, as assigned the Site/HSE Manager;
- Participate in the regular updates of the stakeholder engagement plan and matrix;
- Write quarterly grievance reports collating and analyzing grievances along with recommendations to top management.

7.4 Environmental Management Procedures

The following is a general outline of the environmental management plan which includes the Canal Sugar health and safety management guidelines of the project. The company will then develop the procedures to be implemented and that are related with this management plan. Additionally, Canal Sugar will ensure that compliance with the national regulations as well as the IFC and AfDB guidelines.

7.4.1 Environmental Management Plan during the Construction Phase

The environmental dimension will be incorporated throughout the construction of the plant. It is worth mentioning that contractor will be responsible for the preparation, and implementation of the environmental management plan. However, Canal Sugar will monitor the performance of the contractor to check his adherence to the plan. Moreover, the contractor will adopt various policies to reduce the hazards and risks to the labor and the facility. The following shows the minimum policies that the contractor will follow.

- ***Solid Waste Management***

Domestic solid waste will be collected from all caravans and facilities. These wastes will be disposed off-site periodically through the approved contractor by Minya city. Solid wastes management will be proceeded in accordance to the requirements of Laws 4/1994 and 37/1967.

On the other hand, the industrial solid wastes will be collected in a designated area for their temporarily storage until they are being sold to the specified contractors.

- **Wastewater Management**

Wastewater will be collected from workers caravans and facilities during construction phase. The generated wastewater from workers will be collected in a closed and sealed collection tank in accordance with article 10 in Decree no 44/2000 and its ER and discharged regularly by a licensed contractor according to the Egyptian regulations. The contractor will be obliged to transfer the wastewater to a safe discharge location and comply with the legal requirements in this regard.

- **Hazardous Wastes (HW) Management**

The following briefs the management plan concerning HW of the proposed facility:

HW Generation

The following hazardous wastes are generated from the proposed project:

- Spent oils
- Contaminated sand
- Empty paint containers used in finishing processes

HW Segregation and On-site Storage

HW will be separated from other types of non-hazardous waste. Proper identification of hazardous waste forms a basis for waste segregation. It is therefore essential that all personnel are familiar with waste identification.

HW will be stored in the HW storage area, which is provided with suitable fire extinguishers. Furthermore, each HW type will have color coding and will be labeled with the containers content and the required precaution instructions.

HW Disposal

HW disposal will be carried out using Fork Lifts to minimize workers exposure due to manual handling. The contaminated soil will be transported to El Nasreya HW landfill in Alexandria, via a certified contractor. Spent oils will be disposed through specialized contractors certified with the collection of oils, to send them to PETROTRADE Company, and under their supervision.

HW Register

A HW register will be established including information about the types and amounts of the generated waste and methods of its disposal.

- **Preventive Maintenance**

Various types of planned activities (preventive, predictive) are undertaken with the basic objective of avoiding the need for emergency maintenance. Preventive and predictive maintenance procedures will be used to maintain vehicles and equipment used in the construction phase.

Inspection programs will be carried out periodically to maintain the equipment and vehicles. Record keeping of equipment and vehicles checks, repairs, cleaning, and equipment failure will be carried out. Maintenance measures include:

- Maintaining equipment history cards at equipment locations.
- Maintaining a master preventive maintenance schedule.
- Keeping vendor maintenance manuals handy.
- Maintaining a manual or computerized repair history file.

Maintenance schedule will be prepared for mechanical work as well as periodic replacement of parts before breakdown occurs.

- ***Antiquities excavation***

The project site does not have any antiquities. However, if the contractor finds any unearthed antiquities, the digging activities will be stopped in the area. The Ministry of State for Antiquities (MSA) will be notified for investigation. The chance find procedure mentioned in the impact assessment chapter will be applied. A detailed procedure will be developed in the Environmental and Social Management System (ESMS) stage prior to the start of the project.

- **Transportation management**

Canal Sugar will prepare a management plan during the construction phase which will include:

- Transportation route of construction materials;
- Transportation schedule of construction materials; and
- Process of transporting construction material and management measures.

- ***Emergency Preparedness and Response Plans***

The contractor will have a written Emergency Response Plan, to respond to and mitigate any accidental release to minimize the impact on employees, community, and environment. Employees will be trained on the implementation of the plan and on response activities that could be required in the event of an emergency.

Canal Sugar will ensure that the contractor has a preparedness program to respond to and mitigate any emergency situation to minimize the impact on employees, community, and environment according to national laws and the IFC and AfDB EHS guidelines.

The contractor is committed to the following:

- A knowledgeable, highly trained, and motivated employee group
- A safety and accident record
- Preparation and training for emergency response and mitigation
- Awareness among the workforce through education and training.

In addition, the written emergency plan will be prepared to address the following phases:

- Preparedness includes the activities which organizations and individuals are communicated for rescuing and minimizing damage.
- Response includes the actions necessary to minimize loss of life and property damage and provide emergency assistance.
- Recovery includes short and long term activities which restore process operation and help return the facility and surroundings to normal state.

- Mitigation includes the activities which eliminate or reduce the probability of disaster.
- ***Employee Training and Awareness***
In order to ensure the competence of the contractor personnel in undertaking the environmental management procedures and plans, training will be conducted for the personnel according to their particular responsibility.

A workers' training program will involve training staff on safe handling of equipment, wastes and on the use of equipment. Moreover, they will be trained on proper safe operation of equipment, and spill clean-up. They will also be trained on the use of fire hose reels and fire extinguishers. The training program will also tend to increase workers' awareness of environmental impacts of various processes.

7.4.2 Environmental Monitoring Plan during Construction

The monitoring plan is an essential element for the environmental management scheme of the project. It provides information for periodic review and adjustment of the environmental management plan as necessary, ensuring that environmental protection is achieved through early detection of negative environmental impacts.

Monitoring results will be fed into the decision making process as a trigger for the implementation of corrective actions, in order to maintain compliance with environmental laws and regulations, ensure environmental protection and workplace safety, as well as to ensure appropriate operation of the mitigation measures and management plans. Moreover, as mentioned in Chapter 2, if different standards for the same parameter are mentioned, Canal Sugar will adopt the most stringent standard.

- ***Ambient Air Quality***
Ambient air quality will be monitored during the project construction phase. Measurements of the main pollutants (CO, SO₂, NO₂ TSP and PM₁₀) will be performed at the four corners of the facility once annually.
- ***Point Source Air Emissions***
Exhaust from construction equipment and motor vehicles will be monitored bi-annually and/or upon visual observation of problematic equipment/vehicle emissions. Monitoring results will be compared with the allowable limits of Law 4/1994 and IFC guidelines for the exhaust generated from motor vehicles. The main air pollutants will be monitored (CO, HC and opacity)
- ***Workplace Monitoring***
Work Place Emissions
Monitoring the emissions inside workplace will be performed by the contractor. Measurement results will be compared to the limits given in Annex (8) of Law 4/1994 and Law 12/ 2003. The following parameters will be monitored: CO, SO₂, NO₂, TSP and PM₁₀.

Noise

During construction, the contractor will ensure that the noise level will not exceed the allowable limit set by Laws 12/ 2003 and 4/1994 for 8 hours duration shift (85 dB). In case the noise levels exceeded this limit, the exposure periods will be proceeded according to those indicated in Laws 12/2003 and 4/1994 and IFC and AfDB guidelines. Noise measurements will be carried out every six months at the locations generating increased noise levels by third party. However, the contractor will take periodic measurements to ensure the compliance of the contractors.

7.4.3 Environmental Management Plan during the Operational Phase

The environmental dimension will be incorporated throughout the operation of the plant. It is worth mentioning that Canal Sugar will be responsible for the preparation, implementation, and monitoring of the environmental management plan during the operation phase. Moreover, Canal Sugar adopts various policies to reduce the hazards and risks to the labor and the facility.

- **Management of Raw Materials**

The company will follow the "first-in, first-out" policy, ie, the use of raw materials based on the priority of their arrival. The raw material will be classified and labeled in an appropriate manner by their names, date of purchase and expiry date. Information on the received materials will be organized through the coordination of both the company stores and the company's occupational health and safety department.

- **Controlling Odors**

Odors will be controlled through the following procedures:

- Provision of adequate ventilation
- Apply the "first in first out" policy to store sugar beet, intermediate products and final products
- Ensure the cleaning of the production site and storage site of sugar beet to prevent fermentation
- Use technologies that eliminate odors at sites with risk of odor emissions

- **Housekeeping**

The project will follow a good housekeeping management as follows:

- Reduce spills during the handling and transport of products.
- Prevent leakage by checking valves and joints along the pipeline.
- Reduce the storage time of the sugar solution and other intermediate products, to reduce potential loss
- Provide guidance for the use of water, chemical detergents and follow good cleaning methods

- **Preventive Maintenance**

The companies will periodically inspect equipment in order to maintain the equipment and vehicles efficiency. Record keeping of equipment and vehicles checks, repairs, cleaning, and equipment failure will be carried out. This will insure the decrease any repetitive equipment failure or breakdown and

emissions.

General maintenance measures include:

- Maintaining equipment history cards at equipment locations.
- Maintaining a master preventive maintenance schedule.
- Keeping vendor maintenance manuals handy.
- Maintaining a manual or computerized repair history file.

Maintenance schedule will be prepared for mechanical work as well as periodic replacement of parts before breakdown occurs. A maintenance schedule will specifically be made for important equipment such as:

- Insulation of boilers and steam lines
 - Smoke detectors
 - Liquid level indicators in liquid tanks
 - Temperature and pressure control devices
 - Compressors
 - Filters
 - Conveyors
 - Steam turbines
 - Sewage and industrial waste water treatment equipment
 - Personal protection devices
- ***Spill Prevention***
Spill prevention is an important mitigation measure in order to avoid pollution and resource loss. The measures shall take into account the following:
 - Storage tanks should be properly closed
 - The containers valves should be in good condition, with spill prevention tools incorporated within the equipment to avoid chemical spillage
 - Storage containers should have labels indicating contents of the container, warnings from health hazards, and emergency spill cleaning procedures.

Detailed plans will be developed by the company to regulate the above-mentioned operational procedures.

- ***Solid Waste Management***
Solid waste generated by manufacturing processes will be properly managed during all stages (production stage, circulation, storage, and final disposal). The project adopts a solid waste reduction approach from the source, including prevention / reduction of solid waste dispersion, reduction of manual handling of materials, and separation of different types of solid waste.
- ***Hazardous Materials and Waste***
Material and hazardous waste management will be managed in accordance with the requirements of Law 4/1994 and its updated Executive Regulations, including:
 - Safe storage according to the type of hazardous materials / waste
 - A special storage area will be designated for hazardous materials taking into considerations the incompatibility of certain substances with each other, staying away from ignition sources for flammable materials,

furthermore the area will be equipped with leak detectors and firefighting means such as fire hydrant system and fire extinguishers of suitable type.

- placing sign labels on stored materials
 - Provide material safety data sheets (MSDS) for hazardous materials used in different departments
 - The provision and use of personal protective equipment (PPE) during the handling of hazardous materials / waste
 - Train workers on safe transfer methods of hazardous materials and waste
 - Prepare a contingency plan for potential emergency incidents caused by hazardous materials or waste
 - Prepare and update a hazardous material and waste register and update it regularly
- **Staff Training and Awareness**
In order to ensure the efficiency of the project personnel and their compliance with the environmental management procedures and plans, staff will be trained according to their professional responsibilities.

Training programs will include several topics, comprising the following:

- Housekeeping of the facility
- Workers health and safety procedures and awareness on the importance of personal protection equipment and how to use it
- Safety procedures for equipment operation
- Safety procedures for handling chemical and hazardous material
- Procedures to prevent and handle spillage
- Emergency and firefighting procedures
- Emergency evacuation procedures from the facility

Additionally, emergency personnel (once appointed) will also conduct periodical training on the rescuing and protection of workers and the facility in case of emergency. Training will include safety, emergency response and first aid procedures. Annual training and awareness for all employees will be provided.

- **Transportation management**

Canal Sugar will prepare a management plan during the operational phase which will include:

- Transportation route of raw sugar beet and other raw materials (in and out);
- Transportation schedule of raw materials; and
- Process of transporting material and management measures.

- **Emergency and Fire Alarm Plans**

First: contingency plans

Identify specific risks

This includes potential risks related to equipment, devices, materials, and buildings at an optimum production capacity during the operation phase and storing procedures in order to identify the type, quantity and the magnitude of risks that could induce ignition, explosion, decomposition,

leaks, and dispersion of hazardous materials or building collapse. These risks include the following:

- Quantities and types of hazardous materials used or stored.
- Negative impacts on human health, environmental health and economic growth inside and outside the facility as well as the necessary procedures.
- Potential failure of the safety measures and procedures, safety valves, supervision devices, sudden cessation of mechanical systems, energy resources and pressure vessels
- Efficiency of the regular maintenance programs

Preparedness

Identify human, administrative and organizational resources as well as devices, equipment and sites needed to combat risks.

- Identify human resources for emergency management
- Identify the required training for staff and implementation schedule
- Identify the essential tools for the protection of individuals and groups and also determine the requirements for rescue
- Prepare maps and detailed plans that include pathways and escape routes, and evacuation plans in case of emergency, and determine the timeline for implementation.
- Identify the affected parties and stakeholders and provide the emergency support and services and determine the type of assistance needed.
- Determine fire prevention and control requirements

Implementation

The plan should include the level of implementation carried out by individuals or groups according to the following steps:

Warning and Alarm plan

The selected warning method should be effective in terms of communicating the warning message to all employees of the site and making sure that they are aware of the nature of the risk and provide them with the opportunity to confront or escape from it. The alarm must be visible and audible to reach all employees on the site.

Response

Responses are carried out according to the type, rate of spread, damages and consequences of the hazard through trained personnel, either directly or manually, using smart devices or through offsite control.

Medical assistance and services

On site clinic and ambulance shall be available for the injured and to provide them with medical care and transfer them immediately to hospitals.

Documentation

A record/report including time, duration of implementation, cost,

expenditure, efficiency, effectiveness, and responsible personnel of each of the above measures shall be maintained .

Keeping records and reporting is an important component of an emergency response plan. The Company will develop a reporting system for accidents, including injuries, damage to property, and environmental damages. The information and records mentioned will be used to improve response procedures and to decrease and control potential hazards. General information to be recorded is as follow:

- Date, place of incident or emergency;
- The affected individual or groups;
- Description of the situation and conditions surrounding the site;
- Identify and assess the magnitude of injury, loss, damage or pollution;
- Actions taken to reduce the severity and degree of the situation;
- Record the treatment or cleaning procedures that have been carried out.

Follow up procedures

Once the hazard was managed, a throughout survey of the affected site must be carried out to ensure that the hazard is completely eliminated and that the situation is restored to its original state. Follow up procedures include the following:

- Identify the causes of emergency;
- Assess the efficiency of emergency response procedures;
- propose corrective action and remedial measures necessary to prevent reoccurrence of such incidents;
- Identify the level of need to implement any treatment and / or monitor procedures to restore the site to its original state;

Update the emergency response plan

The emergency plan will be updated every year or less depending on the needs as a result of changes

Second: Fire Fighting Plans

All plant structures will be provided with firefighting systems such as fire hydrant hose reels, fire monitors and fire extinguishers. In addition to the above, passive smoke detectors and automatic sprinkler systems will be provided in laboratories, control rooms and administration building.

The fire hydrant system will comprise the following:

- A raw water storage tank depending on the guidelines of the Civil Defense Authority
- Fire hose reels
- Automatic sprinkler systems
- A diesel jockey pump to be used in case of fire during an electric shortage

In addition to the fire hydrant system, fire extinguishers will be provided at all locations. Fire extinguishers used will be of the following types

- Dry chemical powder (DCP) type to fight fires of chemicals, oil and electrical
- Foam type to fight oil and electrical fires

Fire extinguishers of suitable type will be provided depending upon the location. The location of the fire extinguishers will be marked by visual indicators. In case of fire, the first response will be the alarm, followed by evacuation and reaching out to the respective authority. Meanwhile the trained personnel will be fighting fire through the use of suitable extinguishers until the specialized authority is reached (if needed).

Additionally, the company will provide a qualified emergency team for emergency response and firefighting. Periodical training for the team will be provided by the company in collaboration with the Civil Defense Authority. The company will provide guidelines for the training which will include firefighting procedures and emergency evacuation procedures.

A firefighting plan will be developed prior to the project operation and will be approved by the Civil Defense Authority.

7.4.4 Environmental Monitoring Plan during Operation

The monitoring plan is an essential element for the environmental management scheme of the project. It provides information for periodic review and adjustment of the environmental management plan as necessary, ensuring that environmental protection is achieved through early detection of negative environmental impacts.

The company will prepare and implement monitoring programs for various environmental aspects. Monitoring results will be fed into the decision making process as a trigger for the implementation of corrective actions, in order to maintain compliance with environmental laws and regulations, ensure environmental protection and workplace safety, as well as to ensure appropriate operation of the mitigation measures and management plans.

According to Law 4/1994, establishments should maintain an environmental register to track the environmental aspects of their activities during operational phase. This register will be updated annually.

The following section shows the proposed monitoring plan for the environmental aspects of the project. It is worth mentioning that environmental monitoring is a dynamic process. Subsequently, regular updates and modifications as needed shall be carried out based on the results of the first monitoring round. Moreover, as mentioned in Chapter 2, if different standards for the same parameter are mentioned, Canal Sugar will adopt the most stringent standard.

Monitoring Aspects

a. Ambient Air Quality Monitoring

Stack emissions monitoring is recommended to be carried out at the

suggested locations and the use indicators shown in Table 7-4. The monitoring results will be compared to the limits of air pollutants listed in Annex 6 of the Executive Regulations (710/2012) and its amendments and IFC guidelines (presented in Chapter 2 of this report). Stacks will have openings for the indicator devices to be added.

Table 7-4: Self-monitoring plan for air emissions

Monitoring location	Parameters / Indicators	Monitoring frequency	Device type	Responsible entity	Estimated Cost (EGP)
Boilers stack (for power generation from natural gas)	Sulfur oxides (SO _x)	Biannual	205A Series Miran Sapphire or IMR 2000/2800	Private licensed lab	300
	Nitrogen oxides (NO _x)				300
	Carbon monoxides (CO)				300
	Total Solid Particles (TSP)				2000
Activated carbon kiln stack	Sulfur Oxides (SO _x)	Biannual	205A Series Miran Sapphire or IMR 2000/2800	Private licensed lab	300
	Nitrogen oxides (NO _x)				300
	carbon monoxides (CO)				300
	Total Solid Particles (TSP)				2000
Lime furnace stack	Sulfur Oxides (SO _x)	Biannual	205A Series Miran Sapphire or IMR 2000/2800	Private licensed lab	300
	Nitrogen oxides (NO _x)				300
	Carbon monoxide (CO)				300
	Total Solid Particles (TSP)				2000

b. Ambient noise monitoring

Noise will be monitored bi-annually specifically at compressors, pumps, turbines, boilers, evaporators, conveyors, loading and unloading units. The measured noise levels will be compared to the levels listed in Annex 7 of the Executive Regulations of Law 4/1994 and IFC guidelines. The Noise Level Meter device will be used to measure noise within the working environment.

c. Heat stress monitoring

The heat stress will be monitored bi-annually at boilers, lime furnace, carbon activation furnace, evaporators and turbines. The results of the measurement shall be compared to the maximum limits set out in Annex 8 to the amended Executive Regulations of Law 4/1994 (Annex 9 of decree 1095//2011). The Heat Stress Meter will be used to measure heat stress

within the work environment.

d. Emissions monitoring in the work environment

The emissions shown in Table 7-5 shall be measured every 6 months. The measurement results will be compared to the limits set out in Annex 8 of the amended Executive Regulations of Law 4/1994. The DATRAM device will be used to measure emissions within the work environment.

Table 7-5: Workplace Emission Monitoring Plan

Monitoring location	Parameter / Indicators	Monitoring frequency	Estimated Cost (EGP)
Lime Furnace	Total suspended particles Particulate matter	Biannual	1000
Carbon Activating Furnace	Total suspended particles Particulate matter	Biannual	1000
Conveyors for bulk materials and packing	Total suspended particles Particulate matter	Biannual	1000

e. Monitoring of treated domestic and industrial wastewater

Bi-annual monitoring of treated industrial and domestic wastewater within the site shall be carried out in accordance using the indicators and frequencies listed in Table 7-6. Monitoring results will be compared with the limits within the Egyptian code 501/2015 prior to reusing it in landscaping irrigation during operational phase.

Table 7-6: Indicators and Frequency for monitoring of industrial wastewater

Monitoring location	Parameters / Indicators	Frequency	Responsible entity
Output of the treated industrial water unit	Temperature	Biannual	Private licensed lab
	pH		
	Biological oxygen demand (BOD)		
	Chemical oxygen demand (COD)		
	Total suspended solids		
	Oils and grease		
Output of the treated domestic waste water	Total Suspended Solids	Biannual	Private licensed lab
	Turbidity		
	Biological Oxygen Demand (BOD)		
	E-Coli		
	Intestinal nematodes/Liter		

Estimated cost of Monitoring

The total cost of measurements for the following; noise, heat stress, emissions from the site and specific source of air emissions was calculated. The cost of wastewater samples was not added since it varies based on the type of samples

obtained and the laboratory performing the analysis. The annual total cost of the results for the environmental measurements (without water samples) is about 30,000 EGP.

Monitoring of Hazardous Materials and Waste

A register for hazardous materials and wastes shall be maintained with records of the type, quantity, storage and handling mechanisms and/or disposal of hazardous waste.

The record will be prepared in accordance with the requirements of Annex 3 of the amended Executive Regulations of Law 4/1994 and it will include the following data:

Hazardous substances

- A catalogue of the hazardous substances used and their types and producers
- Annual consumption of hazardous substances
- Description of storage containers
- Description of storage areas
- Methods of handling hazardous materials.
- Method of disposal of empty containers.

Hazardous waste

- Description of the hazardous waste in each unit and its total quantity
- Type and quantity of waste (ton / year)
- Description of the storage area of the hazardous waste.
- Description of storage containers
- Mechanism of hazardous waste disposal and contracted parties

Emergency Response Plan

- Safety equipment and risk reduction measures
- Fire extinguishing tools and mechanisms for spillage handling
- Transportation and disposal methods
- Monitoring program
- Licenses for safe disposal of hazardous waste

7.4.5 Monitoring Performance and Inspection

Process control is considered one of the basic components in any industry. It ensures efficient operation and minimizes potential upsets. Process control at the proposed project is based on a Programmable Logical Controller (PLC), in which the control elements are not centralized but are rather distributed throughout the process streams. The proposed PLC system depends on automatic and computerized monitoring that avoids human interference. This system ensures accurate and continuous inspection and control.

In addition to the periodic monitoring activities detailed in the above sections, self-auditing and periodical inspection is necessary for ensuring maximum safety and environmental protection. The following activities will be carried out in relevance to inspection and auditing:

Emergency and fire-fighting system

The HSE department of Canal Sugar will periodically train the workers and employees on emergency situations and events. This will be carried out practically through fire drills beside training sessions.

This training will be implemented in coordination with the Civil Defense Authority and through relevant experts, as needed. Training will include first aid, firefighting and evacuation procedures, electrical isolations and mitigation practices.

Inspection of emergency and critical equipment

To ensure safe operation, worker's health and safety and efficient environmental performance, the following will be periodically inspected:

- Emergency equipment and the alarm system as well as the fire and smoke detection and response systems all over the plant to ensure their effectiveness.
- Personal protective equipment to ensure their effectiveness.
- Level indicators for liquid storage tanks will be checked periodically to ensure their effectiveness
- Wastewater treatment unit efficiency will be investigated through sampling and analysis of the inlet and the outlet being discharge to the public sewage system.

In addition, equipment where heat is involved will be inspected to ensure safe and efficient insulation and heat cycle as well as to reduce heat losses.

7.4.6 Environmental Register

The company will prepare an environmental register to record its activities after a reasonable period of the project start date in order to allow for the collection of preliminary information representing the environmental aspects associated with the operation. The Environmental Register will be prepared in accordance with the requirements in Annex 3 of the Executive Regulations of Law No. 4/1994 and its amendments.

The Environmental Register and the Register of Hazardous Substances and Wastes (described above) will be updated on an annual basis and the Company will make both registries available for environmental inspection by the competent authorities.

Contracts for final waste disposal will be attached to the register with details of for the safe disposal of various waste types and monitoring and measurement reports of the different environmental aspects.

In general, the register will include data on the following topics:

- General information
- General description of the establishment
- Inputs
- Laws and regulations related to the project

- Production processes and facilities
- Gaseous emissions and their rates
- Liquid waste
- Solid waste
- Work environment
- Self-monitoring plan

7.5 Social Management Plan

The main purpose of the socio-economic baseline study was to provide an information base against which to monitor and assess the Project's progress and effectiveness during implementation and after the activity is completed.

It is of key importance for Canal Sugar to have a close and proactive communication with the local communities near the project area and to disclose the Project information for transparency and to enhance credibility. A stakeholder engagement and management plan was developed and is detailed in Chapter 8. Main aspects of the plan are summarized in the following.

7.5.1 Labor and Working Conditions

The project is foreseen to have a large number of workers in the construction and operation phase hired by contractors and sub-contractors. Given that employment in Egypt is often informal and seasonal, this may expose employees to exploitation forced or compulsory labor, child labor and discrimination. Therefore, Canal Sugar will appropriately consider this aspect in dealing with contractors and sub-contractors, particularly the importance of having written contracts, appropriate wages and working hours. etc.

7.5.2 Corporate Social Responsibility

A Corporate Social Responsibility (CSR) Plan shall be developed as a part of the Stakeholder Engagement Plan of Canal Sugar as part of the ESMS. The purpose of this CSR Plan is to provide the rationale for future Canal Sugar community projects (i.e. explain the reasons and effective needs of such projects) and ensure they align with the company business objectives and community priorities. The plan would document how CSR projects will be planned and managed including the business case, intended outcomes, how they align with stakeholders' and business priorities, the required resources, how success will be measured as well as communication strategy and exit strategy.

7.5.3 Ongoing Consultation

The Project shall meet with stakeholders, to coincide with the Project disclosure updates; these meetings shall be with regulators and key personnel in nearby communities. Meetings can be in the format of focus groups or key informant interviews to discuss the Project and provide an opportunity to ask questions. It will be important that all identified concerns are discussed in

these meetings and documented and any grievances logged. The Project shall continue to undertake internal quarterly meetings to discuss and schedule engagement activities. Stakeholders will be consulted at least twice a year. A detailed plan for stakeholders' future consultations will be prepared at the ESMS stage.

7.5.4 Information Disclosure

Information regarding the Project shall be publically available on an ongoing basis and updated at a minimum of semi-annually. Information will be at an appropriate level of detail and presented in an accessible manner (e.g., in Arabic with infographics used where beneficial). This information is expected to include, but not be limited to, project progress updates; proposed future engagement and grievance mechanism; information about Project activities that may cause disturbances (e.g., dust, vibration, traffic if any); key contacts for the Project; and other information as needed. More details are provided in Section 8.5.1. of Chapter 8.

7.5.5 Grievance Management

A grievance management plan was developed in Section 8.6 of Chapter 8 and includes an external and an internal grievance mechanism.

Contractors will be contractually required to support the project Grievance Mechanism processes, including reporting of complaints and assistance in developing and implementing mitigation strategies.

Complaints received through contractors or sub-contractors from community members and employees will be reported to Canal Sugar to coordinate their resolution.

Details of grievance management will be developed by the company at the ESMS stage.

7.5.6 Socio-economic Monitoring

The project will monitor the following socio-economic aspects on regular basis:

- Satisfaction of the locals with the project activities;
- Local residents' needs (healthcare, water, etc.);
- Grievance mechanism is fully understood by local residents; and
- Any unsolved grievances or requested compensations for affected stakeholders

8. Public Consultation and Disclosure

8.1 Methodology

Consultation with the community and stakeholders is an important element in the ESIA process. The consultation methodology is addressed in the ESIA Procedures Guidelines, issued by EEAA in January 2009, as follows:

- Identification of the stakeholders at an early stage of the ESIA;
- Consultation during scoping phase of the ESIA. Scoping is generally based on the nature of the project, its components and the relevant environmental components of the project area; and
- Consultation upon issuance of the draft ESIA study. This phase aims at disclosure and discussion of the ESIA results and the proposed mitigation measures.

After consultation is completed, the results are taken into account in the final version of the ESIA study.

The current chapter presents details of the individual and public consultations carried out by Environics.

8.2 Stakeholders Identification

The initial definition of the project's stakeholders was based on an analysis of the administrative and legal environmental framework applicable to the project. The project's site survey that was conducted helped in identifying the potential communities that may be affected by the project. A list of interested stakeholders was then prepared during the scoping phase of the study.

Stakeholders have been identified considering the following factors:

- Project's nature and activities;
- Geographical extension of the project; and
- Environmental aspects of the project.

Table 8-1 shows the main stakeholders concerned and their respective roles in the project, identified during the scoping phase. A detailed list of other potential stakeholders is provided in Table 8-2.

Table 8-1: Main Project stakeholders

Stakeholder	Role / Potential attention
Central Administration for Environmental Impact Assessment, Egyptian Environmental Affairs Agency (EEAA)	EEAA is a comprehensive coordinating agency for monitoring the compliance with relevant laws and regulations; through the development of the ESIA system, inspection and the protection and preservation of the natural environment. Also the management of the use of hazardous substances, in coordination with the competent authorities.
Department of Environmental Affairs, Minya Governorate	Comprehensive coordination, monitoring, enforcement and organization of projects through the development of the EIA system. Protection and Preservation of Natural Environment and management of handling hazardous materials in coordination with the competent authorities.

Stakeholder	Role / Potential attention
Minya Governorate	The governorate in which the project will be located
General Authority for Reconstruction and Agricultural Development Projects, Ministry of Agriculture	Land Allocation Authority for Al Canal Sugar Company to implement the project
Ministry of Investment	The competent administrative authority in accordance with Investment Law No. 72/2017 and its executive regulations
Industrial Development Agency, Ministry of Industry	The administrative authority responsible for licensing industrial projects
Local community	Residents of the project's area, since they are familiar with the project's area and may be positively or negatively affected by the project
Members of the Parliament	Representing the local community and aware with important social issues
National Association and / or community representatives	Protect the environment, influence decision-making, and express a part of the local community.
Academic community	Owns the technical knowledge of the project's area characteristics

8.3 Individual Scoping Meetings

Individual meetings were carried out in the scoping phase of the ESIA with the following stakeholders:

- Central Administration for Environmental Impact Assessment, EEAA.
- Department of Environmental Affairs, Minya Governorate.

The meetings aimed at the following:

- Presentation of the components, resources, and the environmental aspects of the proposed project
- Define the main characteristics of the project's site
- Identify the specific requirements and local concerns to be considered in the ESIA
- Acquire information of the stakeholders suggested for participation in the public consultation session

The following summarizes the main findings of the individual consultation meetings. The minutes of meetings are provided in **Annex 12**.

8.3.1 Meeting with the EEAA

A meeting was held with Mr. Mohamed Abdel Rahman, the Central Administration for Environmental Impact Assessment, on 23/4/2018 at the headquarters of the Egyptian Environmental Affairs Agency (minutes of meeting are included in **Annex 12**).

The main topics discussed during the meeting are:

- Relevance of the project's location for the surrounding activities.
- Groundwater quality and groundwater use rate.
- Geotechnical Report.
- Representation of the Industrial Development Agency in the public

consultation session of the project.

It has been clarified that the project has acquired Ministry of Water Resources and Irrigation approval for the construction of groundwater wells in the area; according to the hydrological study provided to the authority. So far, these wells have not yet been drilled or developed.

On the other hand, the Industrial Development Agency will be invited to public consultation.

Regarding soil and geotechnical investigation, the project's land has recently been allocated, and no sampling work has been conducted so far. But soil investigations will be carried out at a later stage; the results of the geotechnical study were summarized in the chapter 4 of this study.

8.3.2 Environmental Management Unit in Minya Governorate

A meeting was held with Dr. Nada Ashour Abdel Zaher, Director General of the Department of Environmental Affairs in Minya Governorate, on 15/4/2018 at the headquarters of the Directorate of Minya (minutes of meeting are included in **Annex 12**).

The main topics discussed during the meeting are:

- Sources of water and fuel used in the project
- Ground water depth in the project area
- Way of hazardous waste and sewage disposal
- Cooling towers and if they will be used in the project

These issues have been discussed in chapters 3, 4 and 6 of this ESIA.

8.4 Public Consultation Session

The public consultation session was held on 9/5/2018 in the Liberation Hall – Minya for Conferences and Celebrations in Minya City. A summary of the study was sent with an invitation to the stakeholders providing project description and its assessment before the meeting. The session aimed to present the results of the draft ESIA study to stakeholders and to discuss their inquiries and observations.

Twenty-seven stakeholders representing different entities, including Minya Governorate, EEAA, Health Directorate, NGOs, local community, Canal Sugar and Environics, attended the meeting. The meeting agenda and list of attendees are included in **Annex 12**.

The following summarizes the main points discussed through the session:

- Expected employment and quality of required labor. It has been clarified that the direct job opportunities is estimated to be between 600 and 800 workers, while indirect employment is estimated to be about 40,000, represented by farmers, truck drivers and road services. Most of the workers will be from Minya governorate.

- Sewage and industrial wastewater management. It was clarified that the industrial waste water and sewage drainage networks are separate and completely isolated. The treated industrial wastewater will be reused in beet washing operations, other production processes in addition to beet crop irrigation according to the requirements of the Egyptian Code 501/2005. While sewage wastewater will be treated at the nearest water treatment plant to the project's site and will be used to irrigate green areas (irrigation of non-productive or decorative plants) within the project's site and on the side of the internal road leading to the sugar beet farm (outside the scope of the current study).
- Method of management of sewage resulting from the establishment of the project. It has been clarified that the sewage generated from the construction phase will be collected in isolated tanks and periodically flushed and disposed by a licensed contractor.
- Recommendations to communicate with the governorate officials to open a U-turn near the project site to facilitate transport operations and to communicate with the company which is currently renovating the Giza-Luxor road and inform them of the new expected traffic loads.

Annex 12 of this ESIA provides a detailed description of the public consultation session, topics discussed and responses to all raised inquiries.

8.5 Information Disclosure and Stakeholder Engagement

The IFC Performance Standard PS 5 recognizes the importance of an open and transparent engagement between the client, its workers, local communities, and directly or indirectly affected by the Project. Stakeholder engagement is central to building strong, constructive, and responsive relationships which are essential for the successful management of the project's environmental and social impacts and issues. To be effective, it should be initiated at an early stage of the project cycle.

Canal Sugar project site is located in a desert surrounded by other land reclamation projects. No communities or human residential settlements are found within the close proximity of the project. The nearest administrative centers are Markaz Abu Qurqas (at a distance of 32 km) and Markaz Mallawi (30 km). The nearest residential area is located at 15.5 km away from the project site and is concentrated around the edges of Tuna drain. The second nearest residential area is Beni Khaled village located at a distance of 18.5 km. In addition, there is a residential area for employees at Savola Group Company, 1 km south of the project location. In this context, the potential interaction between the project and the communities is expected not to be significant, especially that the workers camp during operation will be constructed on site and will have its independent utilities. Thus, potential adverse pressures are not expected on the communities, resources and utilities

The Public Consultation meeting indicated that the general stakeholders' and communities' interests/concerns are similar for different types of project. Stakeholders are mainly concerned with meeting their socio-economic needs

particularly provision of job opportunities. Stakeholders also expressed their concerns related to sewage and industrial waste water management.

8.5.1 Identification of Stakeholders

Stakeholder identification is a continuous process that is carried on during the different phases of project development. Stakeholders can be categorized as follows:

Primary Stakeholders

In general, those are the ones directly affected by the project, potentially including the project beneficiaries and the local residents/project neighbors.

Secondary Stakeholders

These may include agencies, experts, interested parties and anyone able to influence the outcome of the development, because of their ability to contribute with their knowledge or ideas. Secondary stakeholders would include Central and local Government, active Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs), private sector firms, media, etc. Secondary stakeholders are important as they provide valuable data and information specific to the area; i.e. they are a source of secondary data. Table 8-2 below shows a list of stakeholders and their relevant role/potential interest.

The objectives of stakeholder identification intend to establish which organizations and individuals that may be directly or indirectly affected (positively and negatively), or have an interest in the Project; and understand their needs and expectations for engagement. Stakeholder analysis enables engagement to be tailored appropriately to the needs and interests of different stakeholder groups to ensure their views and concerns are addressed in a suitable manner.

A systematic approach has been adopted to identify Project stakeholder by scoping and identifying stakeholder groups that have an interest in the Project or could be affected (directly or indirectly) by it. In order to ensure that the engagement process is inclusive, it has been important to identify individuals and groups who may find it more difficult to participate and those who may be directly and differentially or disproportionately affected by the Project.

Details of these groups and other key stakeholders have been compiled to enable the Project to readily communicate with those potentially affected or have an interest in the Project. The stakeholder lists created for this Stakeholder Engagement Plan (SEP) will need to be continually reviewed and updated as the Project progresses. Other details (names/contacts, etc.) as well as minutes of consultation meetings with them whether individual or in groups shall be included in the Stakeholder Log which is prepared during the implementation of the SEP. Next table provides an overview of the Project stakeholders and their relationship with the Project. This list shall be updated if, or when, new stakeholders are identified.

Table 8-2: Detailed list of Project stakeholders

Stakeholder	Category	Stakeholder Group Relevance / Importance of the Stakeholder to the Project
Primary stakeholders		
The public	Egyptian society	The entire Egyptian society is affected by the operation of Canal Sugar on the Egyptian lands. The project will contribute to reducing reliance on imports of sugar. The overall project will meet growing domestic demand and is expected to substitute about 75% of sugar imports.
	Minya population	The population of Minya Governorate is estimated in 2017 at 5,497,095. About 82% of the total population of Minya lives in rural areas.
Local people	Markaz level	The population size of Abu Qurqas was 467,716 in 2006, about 11% of the total population of the governorate, and in Mallawi the population size was a bit higher with a total of 562,841 inhabitants in 2006, which is about 13.5% of the total population of the governorate.
	Residents of the project area	The nearest residential area is located at 15.5 km away from the project site and is concentrated around the edges of Tuna drain. The second nearest residential area is Beni Khaled village located at a distance of 18.5 km. Moreover, there is a residential area for employees at Savola Group Company and a sugar beet farmland, 1 km south of the project location. Local residents are familiar with the project's area and may be positively or negatively affected by the project
Civil Society	NGOs	NGOs help in providing environmental and social services and interact with people to reach agreements on environmental and social issues.
Secondary stakeholders		
International Funding Agencies	AfDB, IFC, other funding agencies	Financing the Canal Sugar project
Local authorities: Minya Governorate and Directorates	Department of Environmental Affairs	Comprehensive coordination, monitoring, enforcement and organization of projects through the development of the EIA system. Protection and Preservation of Natural Environment and management of handling hazardous materials in coordination with the competent authorities.
	Directorate / Department of Agriculture	The Directorate/Department is responsible for managing all matters related to agricultural lands.
	Directorate / Department of Water Resources and Irrigation	The Directorate/Department is responsible for managing all matters related to for water wells.
Line ministries	Ministry of Agriculture and Land Reclamation	Official body involved in project permitting and licensing, implementation and follow up of regulations. The General Authority for Reconstruction and Agricultural Development Projects is the land allocation authority for Canal Sugar Company to implement the project.
	Ministry of Water Resources and Irrigation	Responsible for all water resources either surface water, groundwater or rainwater. Involved in project permitting and licensing, implementation and follow up of regulations.
	Ministry of Investment	The competent administrative authority in accordance with Investment Law No. 72/2017 and its executive regulations
	Ministry of Industry	The Industrial Development Agency is the administrative authority responsible for licensing industrial projects
	Ministry of Finance	The Ministry is responsible of reviewing bills and taxes for the project.

Stakeholder	Category	Stakeholder Group Relevance / Importance of the Stakeholder to the Project
	Ministry of State for Environmental Affairs / EEAA	Overall coordinating body of monitoring, enforcement and regulating developments through setting plans and strategies, and managing the protection and preservation of natural environment in coordination with concerned and responsible authorities. Monitoring of any potential environmental pollution resulting from the project and inspection of environmental measures related to solid waste management and waste water disposal for worker camps.
EEAA Departments / Branches	EIA Central Department, Cairo	Review of full ESIA projects and issuance of environmental permits for Category C Projects
	Nature Protection Sector, Cairo	Responsible of planning, management and monitoring of protected areas and preservation of biodiversity
	Assiut RBO, Assiut	Management, monitoring and enforcement of local environmental aspects within Minya Governorate. Review of Form B EIAs and issuance of environmental permits for Category B Projects.
Contractors and service providers	International contractors	International contractors if commissioned by Canal Sugar
	Egyptian contractors	Egyptian contractors commissioned by Canal Sugar to provide services at the site
	Local contractors	Local contractors would provide services at the site, such as leveling and paving of roads, building of workers' camps, provision of laborers, and maintaining security of the site.
Consultancy firms	National and international companies	National and international firms (e.g., Environics; IRZ Consulting / Lindsay International) are undertaking environmental, hydrogeological and social studies and assessments needed for the project.
Academic community	Egyptian universities and research centers	Owens the technical knowledge of the project's area characteristics
Media and journalism	National and international mass media and newspapers	Dissemination of information, publication of data, and responding to rumors or misconceptions about Canal Sugar or about any specific project.

8.5.2 Stakeholder Engagement Strategy

Stakeholder engagement is an ongoing process, and as such, future engagement activities may be adjusted to ensure that information disclosure and consultation activities are effective and meaningful for stakeholders. The SEP will be discussed with key stakeholders as a first stage of engagement and then updated, as required based on feedback received. This section of the SEP provides details of the engagement undertaken to date and activities to be undertaken during the preparation and implementation of the Project.

a. Engagement undertaken to date

Canal Sugar is undertaking various activities to communicate and engage with key stakeholders. In broad terms, activities imply direct communications and ongoing engagement to facilitate the work. Activities can be summarized as follows:

- ***Engagement with stakeholders***

Canal Sugar is in engaging with several key licensing stakeholders including:

- General Authority for Reconstruction and Agricultural Development Projects, Ministry of Agriculture;
- Industrial Development Agency, Ministry of Industry;
- Ministry of Investment;
- Ministry of Water Resources and Irrigation;
- Ministry of State for Environmental Affairs / EEAA.

In addition, individual meetings were carried out during the scoping phase of the ESIA with the following stakeholders:

- Central Administration for Environmental Impact Assessment, EEAA.
- Department of Environmental Affairs, Minya Governorate.

The meetings aimed at the following:

- Presentation of the components, resources, and the environmental aspects of the proposed project
- Define the main characteristics of the project's site
- Identify the specific requirements and local concerns to be considered in the ESIA
- Acquire information of the stakeholders suggested for participation in the public consultation session

- ***Public Consultation Session for the Sugar Refinery Project***

The public consultation session was held on 9/5/2018 in the Liberation Hall for Conferences and Celebrations in Minya City. The session aimed to present the results of the draft ESIA study to stakeholders and to discuss their inquiries and observations.

b. Future engagement activities

Canal Sugar is willing to undertake engagement activities with stakeholders and local residents in the vicinity of the project area. It is of key importance

for Canal Sugar to keep maintaining a close and proactive communication with the local communities around the project area and the broader local community of Minya as well. At the same time, it is important to disseminate information about the Project and also to conduct additional awareness raising activities and campaigns with the public and with vulnerable groups in the local communities.

- ***Engagement with the Local Communities***

Canal Sugar engagement with the local communities will be carried out throughout the present project and will focus on nearby residential area as well as communities from Markaz Abu Qurqas and Markaz Mallawi.

- ***Engagement with the Public***

A public hearing session has been carried out for the beet sugar factory and another one is planned for the land reclamation project (not included in the present ESIA). Moreover, Canal Sugar is willing to undertake a number of engagement activities with some segments of the public such as universities, consultancy firms, academic community and the media.

In broad terms, all above mentioned engagement activities would provide an opportunity to:

- Inform interested groups and individuals about the proposed development, its potential impacts, and measures which will lessen impacts and protect the environment;
- Provide opportunities for timely feedback;
- Identify problems, needs and values;
- Minimize misunderstandings about the scope and impacts of the Project and increase public confidence in the proposed development;
- Contributing to an increased awareness and understanding of Project plans and activities;
- Improve the image of Canal Sugar.

It is also highly recommended to take the following actions:

- Develop a Corporate Social Responsibility (CSR) Plan as a part of the Stakeholder Engagement Plan of Canal Sugar. The purpose of this CSR Plan is to provide the rationale for Canal Sugar community projects and ensure they align with the company business objectives and community priorities. The plan documents how CSR projects will be planned and managed including the business case, intended outcomes, how they align with stakeholders' and business priorities, the required resources, how success will be measured as well as communication strategy and exit strategy. Consultancy firms with assistance of Canal Sugar can develop a CSR plan for the Company in Abu Qurqas and Mallawi local communities based on the general guidelines of Canal Sugar strategy.

- Prepare a rapid need assessment study to design a number of community development projects in the local communities, especially nearby residential areas (e.g. Beni Khaled village).
- The plan should be proposed after consulting the beneficiaries on needed and/or desired developmental interventions and is not in the scope of the present ESIA.

- ***On-going consultation***

The Project shall meet with stakeholders, including Beni Khaled village leaders in the area and local authorities to coincide with the Project disclosure updates; these shall be with regulators and leaders. Meetings can be in the format of focus groups or key informant interviews to discuss the Project and provide an opportunity to ask questions. It will be important that all identified concerns are discussed in these meetings; and all meetings shall be documented and any grievances logged. The Project shall continue to undertake internal quarterly meetings to discuss and schedule engagement activities. It is therefore highly recommended to take the following actions:

- The involvement of the public and concerned entities in the ESIA planning and implementation is mandatory by the Law of Environment 4/2009 for category C projects through the Public Consultation (PC) process with concerned entities. Requirement and methodology of the PC is thoroughly stipulated in the law. Canal Sugar has, therefore, conducted the PC for the Beet Sugar Factory Project with all concerned stakeholders before starting any activities in the field. Envirionics consultancy firm has assisted in arranging, conducting, and documenting the PC process. Moreover, another PC is planned to discuss the outputs of the forthcoming ESIA concerning the land reclamation project.
- Employ a Community Liaison Officer (CLO) to manage community relations, in terms of: consultation activities, information disclosure, and grievance management. The CLO collects and responds to various community concerns identified through consultation with the local community, as well as and grievances related to the project works in the field. The CLO shall work closely with the local communities and the Social Performance Manager (SPM) of Canal Sugar. The CLO shall submit monthly brief reports to the SPM and provide input into an annual Social Performance Plan and is accountable for delivering the agreed upon actions in this plan. He/she will also have responsibilities outlined in the Stakeholder Engagement Plan. The CLO can be appointed from Canal Sugar staff or through a public advertisement throughout the lifetime of the Project.
- Establish a Community Development Committee which includes Canal Sugar, SAVOLA, nearby beet farm, local community leaders in the vicinity of the project, and the CLO. The committee shall meet regularly and upon need to discuss and approve policies adopted by the Company with local settlements in the vicinity of the project area. The main aim of this committee is to ensure that

residents around the project are satisfied and have no grievances related to the project.

- **Information Disclosure**

Information regarding the Project shall be publicly available on an ongoing basis and updated at a minimum of semi-annually. Information will be at an appropriate level of detail and presented in an accessible manner (e.g., in Arabic with infographics used where beneficial). This information is expected to include, but not be limited to, project progress updates; proposed future engagement and grievance mechanism; information about Project activities that may cause disturbances (e.g., dust, noise, traffic if any); key contacts for the Project; and other information as needed.

Project updates will be available on notice/information boards at the project site and at an agreed-upon display area within communities, as well as by distributing leaflets or flyers in public locations. Suitable locations to disseminate information shall be identified by the Project. Additionally, the Project shall notify stakeholders during meetings about project progress on an as-needed basis. Information will also be available on the Canal Sugar Project website (URL to be confirmed and disclosed to stakeholders). All communication activities should be well introduced and branded with key messages around Canal Sugar business and CSR Strategy in Minya Governorate.

8.6 Grievance Management

Canal Sugar aims at minimizing grievances through managing impacts and through pre-emptive community engagement designed to anticipate and address potential issues before they become grievances. A grievance is defined as an issue, concern, problem or claim (perceived or actual) that an individual or community group wants a company or contractor to address and resolve. In alignment with the IFC PS (2012), the Grievance Mechanism (GM) will “seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate and readily accessible, and at no cost and without retribution to the party that originated the issue of concern”¹. The GM shall be developed to address concerns or complaints raised by community members generated throughout Project life time. The process covers all components and activities of the Project, including those activities undertaken by contractors and subcontractors on behalf of the Project. A separate GM shall also be developed to address issues or grievances raised by the Project workforce.

Contractors would be contractually obliged to support the project Grievance Mechanism processes, including reporting of complaints and assistance in developing and implementing mitigation strategies.

¹ IFC PS 2012, para. 35 (Grievance Mechanism for Affected Communities)

8.6.1 External Grievances

a. Current grievance redress actions

Because Canal Sugar is willing to undertake a proactive approach with the communities in the vicinity of the project, a community feedback mechanism for grievances will be developed. It is understood that such a mechanism shall be responsive to stakeholders' concerns related to the Project in a timely manner. For this purpose, the grievance mechanism shall establish a procedure to receive and facilitate resolution of community concerns and grievances.

In addition, Canal Sugar intends to hire a Community Liaison Officer (CLO) for this project. The CLO is responsible for community engagement and relationships management, and will have direct interaction with communities to facilitate information flow and build relationships throughout the life of the Project.

b. Proposed grievance mechanism

An effective outreach process engages all stakeholders to help shape what the grievance resolution mechanism looks like; increase transparency by presenting the company's preliminary thinking about the grievance resolution mechanism (why the company wants to put one in place and ways in which it will benefit local people); and build understanding and support for the initiative among diverse stakeholders. All needed information about the GM shall be accessible to the local community, including the feedback on grievances. All grievances (i.e., verbal or written) shall be registered in a Grievance Log by the CLO within two days of the submission. This log will help the evaluation and monitoring process, and will help improving the system along the project life time. The following steps are proposed for developing an effective GM.

- ***Step 1: Grievance Receipt and Registration***

Community grievances may be submitted to the Project through the following channels:

- Submission of Grievance Form², note or letter to the Project through comment boxes located at Project site, near workforce accommodation, and in public locations in communities in the AOI, such as schools, youth centres, and/or other locations recommended by the community as appropriate locations for comment boxes (signed or anonymous);
- Face-to-face reporting to the CLO and/or to an authority representing the Project (written or verbally);
- Calling the GM hotline (a mobile number managed by CLO); and
- Email, for people who have access to the internet.

- ***Step 2: Acknowledgement***

Upon receiving a grievance, the CLO explain the GM process to the complainant(s) including explaining timelines for the remaining steps

² A proposed Grievance Form is attached in **Annex 13**

and information on how the complaint will be handled and the types of mitigation the Company can, or cannot, provide. He shall also provide a phone number or email that can be used if the complainant has any questions or facilitate a meeting with complainant to discuss any questions. Confidentiality of the complainant from the lodging of a grievance onward shall be assured and that information will be treated confidentially and sensitively by the CLO, and any other authority involved in the resolution of the issue. Acknowledgement shall be communicated in a culturally appropriate manner, either through a letter, telephone call or providing the signed acknowledgment slip attached to the Grievance Form. The complainant will be acknowledged within three days of the Company's receipt of the concern.

- **Step 3: Assess and Assign**

Once registered in the Grievance Log, the CLO shall conduct an assessment to verify the nature of the grievance to ascertain:

- Priority (urgency) of the grievance;
- Whether the grievance is a matter that can be resolved by the Project;
- Recommended way for responding to the grievance; and
- Whether further information is needed in order to respond.

The assessment will allow the CLO to categorize the grievance and categorization shall be recorded in the Grievance Log. When community grievances cannot be resolved solely by the Environment and Social Division, the Project shall assign grievance liaisons to key departments that may be involved in grievance management. The CLO will maintain contact with the respective body to ensure timely management of grievances. The CLO may also engage with the contractors or subcontractors to address grievances; the assignment of these issues shall be aligned and coordinated to the extent possible with the Human Resources Department.

Low-urgency concerns will be assigned and handled directly by the CLO and the Social Management Plan (SMP) who will assess the grievance/claim/suggestions and propose a resolution; while concerns complaints/grievances classified as urgent will be handled by the Site Manager. If the complainant is not satisfied with the proposed resolution, the CLO is not able to provide a quick resolution, or if examination of the grievance requires expertise beyond the mandate of the SMP, the involvement of a third party might be requested.

- **Step 4: Investigation**

The investigation will examine the circumstances of the case, speaking with the parties involved, and conferring with relevant stakeholders. Any options or resolutions proposed by the complainant will be discussed. The CLO will examine the context of the complaint to verify its validity, determine its causes and develop corrective actions to minimize or avoid potential recurrence of the causes of the

complaint. The Company unit associated with the problem will be informed that a grievance has been filed and the CLO may need to collect basic information about the situation from their perspective.

The CLO and SMP will be responsible for communicating with the appropriate unit regarding the grievance. Follow-up site visits and interview with parties involved may be required if further investigation of complaint might be necessary. The complainant has the right to be provided regular progress updates. The updates may be provided verbally and/or in written form. In cases when additional time is needed to complete the investigation, the complainant will be informed of the reason for the delay. If a detailed investigation is needed, it will be conducted in a respectful manner, involving the complainant to the extent needed, possible witnesses and others who can provide insight into the root causes of the issue.

The CLO will issue a written Investigation Report addressed to the SMP and to General Site Manager (if needed) within 48 hours after any meetings are held with the complainant. Once the investigation has been completed, the CLO will document the findings and propose the options for resolving the complaint as appropriate. For low-level concerns, the investigation will take no longer than five (5) days. For complex concerns, the investigation will be undertaken within 15 days.

- ***Step 5: Response***

The CLO and related departments will determine the proposed response to the complaint. In many cases, the response may consist in a clarification of a procedure or commitment to introduce improvements or mitigation measures. Where resolution exceeds the authority level of the CLO, the E&S Unit Director together with the Site Manager will determine the company response or the need to escalate the issue to the General Project Manager. An initial response will be provided within five (5) days. Should additional investigation be required, and/or, the complainant has agreed to the involvement of the third party, the process will be communicated to the stakeholder.

The CLO shall report to relevant stakeholders the outcomes of investigations and subsequent corrective actions. The communication related to grievance aims to provide the complainant with the response, asks for feedback on the Company's response, provide an update on progress of the investigation, and if necessary, explain further next steps that need to be taken and the new target dates.

- ***Step 6: Follow Up and Close-Out***

The proposed resolution shall be based on a dialogue rather than simply announced, and aligned with international human rights standards. Once a resolution has been agreed upon with the stakeholder or a decision made to close out, the Project will close out the resolution and monitor outcomes. Closing out the grievance therefore occurs after the implementation of an agreed resolution has been verified. To close

a grievance, the Project will issue a Grievance Resolution Form. The complainant will be required to sign the Grievance Resolution Form. Therefore, before closing out the grievance, the CLO will verify with the complainant that the resolution has been effectively implemented; suggesting adjustments when necessary to ensure that root causes of complaints are addressed and outcomes are consistent with the spirit of the original agreement. Even when an agreement is not reached, it is important to close the case, document the results and request the parties' evaluation of the process and its outcome. In the case that a grievance is not successfully resolved and the complaint passes to the legal system, the Project will continue to document and track the progress of the complaint. The complainant will be asked to sign when the proposed corrective action is agreed.

- ***Step 7: Reporting and Continuous Improvement***

The CLO will submit a weekly Grievances Report to the SMP. Complaints that threaten the operation of the company shall be reported without delay to the E&S Unit Manager and the Site Manager.

The weekly report will indicate the status of according to the following categories:

- Open: complaint is under examination and the solution has not been communicated to the complainant yet;
- Resolved: complaints where a resolution has been agreed and implemented and the complainant has signed the Grievance Resolution Form;
- Closed: complaints whose implementation of agreed solutions has been verified;
- Unresolved: complaints where it has not been possible to reach an agreed resolution and the case has been authorized for close out by the other means; and
- Abandoned: complaints where the complainant is not contactable after a certain period following receipt of a complaint and efforts to find the person have been unsuccessful.

Grievances will be tracked and numbers of grievances and outcomes will be considered an indicator for community relations activities. The Grievances Register will be used to analyze complaints for frequency and common themes. On a semi-annual basis, a Grievance Report (removing commercially and personally sensitive information) will be generated to summarize the status of grievances. This Grievance Report will be submitted to the Site Manager and will be made publicly available, to demonstrate that the Company is dealing with complaints in a responsive way.

8.6.2 Internal Grievances

a. Current grievance redress actions

It is usually the case in worker camps in the middle of the desert that the common accommodation of the Company staff with their supervisors

creates a friendly environment among them. Although the presence of “friendly environment” is not in itself considered a grievance process, living together day by day does not only include some leisure time, but helps also to resolve any issue even before it becomes a problem or grievance.

b. Proposed grievance mechanism

An internal grievance is generally defined as a claim by an employee or worker that he is adversely affected by the misinterpretation or misapplication of a written company policy or collectively bargained agreement. To address internal grievances, employers typically implement a grievance procedure. The grievance procedure may also be part of a collective bargaining agreement. However, an effective grievance procedure provides employees with a mechanism to resolve issues of concern. The grievance procedure may also help employers in correcting issues before they become serious issues or result in litigation.

A grievance procedure in such cases is a means of internal dispute resolution by which an employee or worker may have his grievances addressed. Most collective bargaining agreements include procedures for filing and resolving grievances. Grievance processes may differ somewhat from employer to employer and under various collective bargaining agreements. However, most will have certain general processes in common. The following procedures are proposed for the internal grievances:

Grievances are brought to the employee’s immediate supervisor. This may be either an informal process or the beginning of the formal process. Generally, there will be a requirement that the grievance be submitted in writing using a Grievance Form³. Usually, the supervisor will review the grievance to determine whether it is valid. Also, most grievance procedures will require that the submission occur within a specified timeframe following the event or incident.

Three possible outcomes may occur at this stage of the process:

- The supervisor may determine that no valid grievance exists.
- The grievance may be resolved.
- The grievance may not be resolved to the employee’s satisfaction, and it will move forward to the next step in the process.

The next step typically involves the next level of supervisor in the company hierarchy. If complaint is not resolved at this step, then a higher level of company management will get involved. Ultimately, the grievance may reach the highest levels as set forth by the contract. If the grievance remains unresolved through the highest levels of management within the company, many procedures include a provision by which a third party or an outside arbitrator may be called in to resolve the issue. Senior leaders are typically involved in the arbitration process.

³ A Proposed Grievance Form is attached in **Annex 13**

However, in the cases where local sub-contractors are engaged in providing workers and laborers to the contractors, resolving internal grievances related to those workers becomes the entire responsibility of the local sub-contractor. It is therefore highly recommended for Canal Sugar to monitor grievances that are delivered to the sub-contractors from the workers and the local communities as well. This monitoring shall involve the main contractor, the field manager, the SMP, and the CLO. Another objective of this monitoring is to ensure the local hiring of laborers to avoid any kind of influx resulting from project in-migration to the local communities. Accordingly, a mechanism to monitor how grievances are resolved by sub-contractors will be developed by Canal Sugar at the ESMS stage.

8.6.3 Consultation and Raising Awareness on the Grievance Mechanism

Before designing and implementing the grievance mechanism, Canal Sugar shall reach out to a broad group of stakeholders (employees, contractors, managers, community leaders, local officials) through public meetings or a series of focus. Outreach meetings are used to receive information and understand people's doubts, objections, expectations, and perceptions related to a grievance mechanism. At the same time, people need to understand why the system is being put in place, what it will look like in broad terms, and how it might benefit local people and those connected to the company. Conversations will also help to gather valuable input about traditional ways that members in the community handle conflict and to identify some of the cultural differences the complaints system will need to address if people are to use it. It is also useful to survey existing dispute resolution capacity in the community and consider how it might play a role in the grievance resolution mechanism.

Main principles of an effective GM shall consider the following issues:

- Involving the community in the design;
- Ensuring accessibility;
- Maintaining a wide scope of issues;
- Developing culturally appropriate procedures;
- Incorporating a variety of grievance resolution approaches;
- Reporting back to the community;
- Using a grievance log to monitor cases and improve the organization; and
- Evaluating and improving the system.

Canal Sugar will further develop the Grievance Management Plan at the ESMS stage to include details of responsibilities and implementation. It will also provide considerations and how complaints received by contractors from community members and employees or through sub-contractors will be reported to Canal Sugar and how resolutions will be coordinated.

9. References

- AfDB (2013) Integrated Safeguards system. Policy Statement and operational Safeguards. Compliance and Safeguards Division
- Ahmad, N., Bibi, Y., Raza, I., Zahara, K., Khalid, N., Bashir, T., & Tabassum, S. (2015). Traditional uses and pharmacological properties of *Alhagi maurorum*: A review. *Asian Pacific Journal of Tropical Disease*, 5(11), 856-861.
- Ahmed, Y.M., and Jureidini, R. (2010) An Exploratory Study on Child Domestic Workers in Egypt. Center for Migration and Refugee Studies, Cairo
- Al-Hussain, A. I., Rathore, H. A., Sattar, M. Z., Chatha, S. A., Sarker, S. D., & Gilani, A. H. (2014). *Citrullus colocynthis* (L.) Schrad (bitter apple fruit): A review of its phytochemistry, pharmacology, traditional uses and nutritional potential. *Journal of ethnopharmacology*, 155(1), 54-66.
- Baha El Din, S. (2006). *A Guide to the Reptiles and Amphibians of Egypt*. Oxford University Press.
- Basuony, M. I., Gilbert, F., & Zalat, S. (2010). Mammals of Egypt. Atlas, Red Data Listing and Conservation. EEAA, Cairo.
- Belmimoun, A., Meddah, B., Side Larbi, K., & Sonnet, P. (2017). Phytochemical study of *Zygophyllum album* Extract. *Journal of Engineering Technologies and Management Research*, 4(5), 1-10.
- Bidak, L. M., Kamal, S. A., Halmy, M. W. A., & Heneidy, S. Z. (2015). Goods and services provided by native plants in desert ecosystems: Examples from the northwestern coastal desert of Egypt. *Global Ecology and Conservation*, 3, 433-447
- CAPMAS (2017) Annual Bulletin for labor force research of 2016
- CAPMAS (2019). Retrieved from <https://www.capmas.gov.eg/>
- EEAA (2003). *Habitat Diversity Egypt*. Publications of the National Biodiversity Unit, 1, EEAA, Cairo: 302 pp.
- EEAA (2007). Environmental description of El-Minya Governorate.
- El Tahir, K. E., & Abdel-Kader, M. S. (2008). Chemical and pharmacological study of *Cymbopogon proximus* volatile oil. *Res. J. Med. Plant*, 2, 53-60.
- General Authority for Educational Buildings (2003). Al Minya Governorate. Geotechnical Encyclopedia of Egypt.
- General Authority for Urban Planning (2010). Environmental Description Report of the northern part of Upper Egypt.
- Hoath, R. (2009). A Field Guide to the Mammals of Egypt. The American University in Cairo Press, Cairo, Egypt
- IFC (2007). Environmental Health and Safety guidelines.

- Information and Decision Support Center, (2010). Description of Egypt Governorates Book
- International Labour Organization (ILO) Conventions and Recommendations
- International Labour Organization (ILO) and CAPMAS (2012) Working Children in Egypt: Results of the 2010 National Child Labour Survey
- IRZ (2019) Canal Sugar project – Phase 1 Development – Geohydrology and Aquifer Report. IRZ Consulting / Lindsay International
- IUCN (2019) IUCN Red List for Threatened Species.
- Kaur, M., & Kalia, A. (2012). *Convolvulus arvensis*: A useful weed. *Int J Pharm Pharm Sci*, 4(1), 38-40
- Ministry of Planning (2018). Minya Governorate.
- Mohamed, A.K.A.; IARIW and CAPMAS (2015) An Analysis of the Gender Pay Gap in the Egyptian Labour Market. Conference Paper, CAPMAS
- Nagori, B. P., & Solanki, R. (2011). *Cynodon dactylon* (L.) Pers.: a valuable medicinal plant. *Res j med plant*, 5, 508-14.
- Research Institute for Groundwater (1999). Hydrogeological Map of Egypt
- Supreme Council of Antiquities (2004). Atlas of Archaeological Sites.
- ThermoGen Power (2019) Advantages and Disadvantages of Gas and Steam Turbines Power Plants
- Wind finder. Minya station
- World Bank (2007). Environmental, Health, and Safety Guidelines for Sugar Manufacturing
- World Health Organization (2007). Distribution of seismic risk zones in Egypt