Canal Sugar

ESIA for Land Reclamation and Cultivation of 180,000 Feddans in West Minya – Minya Governorate

(Final Report)

Prepared by:

Environics, SAE
Environment & Development Advisors

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Executive Summary

1. Background

Canal Sugar Company is implementing an integrated investment project in West Minya that includes a facility for producing 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. Accordingly, an agreement was signed between the company and GARPAD to buy 240 feddans (for the establishment of the sugar factory) and to rent 181,180 feddans for 60 years for sugar beet cultivation.

The current ESIA study addresses the construction and operation phases of the land reclamation of an area of 181,180 feddans for sugar beet cultivation. Part of the area will be planted with sugar beet and other crops while the rest of the area (unsuitable for crop production) may be used for other future activities. The scope of the current study does not include the ESIA for the sugar beet factory which has already been addressed in a previous ESIA which has been reviewed and accepted by the EEAA.

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.

3. Project Description

Sugar beet is biennial plant which is planted between late-August to mid-November and harvest is mid-February through early August. In general, it can be grown in all types of sandy, saline, calcareous soils, as it is very tolerant high pH and salinity conditions.

The project site is located in the Western Desert of Upper Egypt in the south-western part of Minya Governorate. It is located on the Giza - Luxor Desert Road about 255 km from Cairo city and 35 km from Minya city. There are many agricultural reclamation projects in the project area such as El-Hana, El-Shazly and Savola companies.

Following the identification of suitable land, reasonable soils, slopes and availability of to water resources the project involves the following key components:

- Improvement of soil through a variety of tillage practices;
- Implementation of an infrastructural plan;
- Improvement of soil fertility; and
- Production of crops.

The project will contain associated facilities which are the following:

- Accommodation for labor force
- Water treatment unit for potable water
- Domestic wastewater treatment unit
- Fuel Storage Area
- Electricity generation facility and PV solar plant

Canal Sugar has signed agreements with 6 contractors during the construction phase, with an average of 150 worker per contractor, and 7 caravans for their accommodation. The contractors (and potential sub-contractors) will take into account the IFC/EBRD requirements for caravans or workers accommodation, which will be included in their contracts.

The soil needs to be prepared before each planting phase in order to establish a seedbed and to manage weeds in the seedbed. The purpose of land preparation is to provide the necessary soil conditions for seed plantation.

Planting will involve the following crops; sugar beet (the main crop), wheat, chick peas, potato, corn silage and grain corn. Crop rotations every 2 and 3 years will be carried out, depending on soils and isolation distance.

The entire project's water requirement will be abstracted from the aquifer. The expected quantity of water that will be consumed for sugar beet project would not exceed 4000 m^3 /year / feddan. The project will use Centre Pivot System technology for irrigation.

Crop residues can be recycled for their nutrients in through land application or can be sold off-farm to be used as animal fodder

Canal Sugar will employ an estimated number of 900-1000 workers during the construction phase. The operational phase is expected to have around 800 workers (150-180 permanent and the rest seasonal).

4. Description of Environmental Baseline

4.1 Physical Environment

An extremely arid climate prevails in the Nile Valley: high temperature, low relative humidity and negligible rainfall.

The project area is mostly flat with the exception of some relatively elevated hills. Minya Governorate is divided into three geomorphological units as follow:

- The Limestone Plateau;
- The Old Alluvial Plain; and
- The Young Alluvial Plains.

The proposed project is located within the Limestone Plateau. The geological units in project area include Eocene and Oligocene deposits.

Soil profile investigations at the project site indicated two categories for the soil texture, namely sandy and sandy loam. Soil depth at the project site is generally adequate for sugar beet production. Soil sector investigations conducted in the area indicated the following depths:

- 0.5% shallow (25-50 cm) – Not suitable
- 50.5% moderate (50-90 cm) – Good
- 48.9% deep (90-120 cm) – Very good
- 0.1% very deep (<120cm) – Excellent

There are no surface water bodies or streams in the area. The project area is not potentially subject to flash flood hazard as the site location includes drainage runoffs of the 4th flash flood risk level, which do not represent a flash flood risk.

A fractured limestone aquifer covers most of the project area. Groundwater is located at a depth of about 100 meters. Canal Sugar has developed an aquifer assessment study in order to determine the aquifer characteristics underlying the project area. The results indicate that the limestone aquifer is very robust and productive and would support the project's water requirements through 60 years of continuous pumping.

4.2 Biological Environment

The project area is eco-geographically located in the Middle Limestone Plateau of the Western Desert.

The project site is almost totally devoid of vegetation with the exception of very few scattered shrubs. It is not considered as an Important Bird Area (IBA) by BirdLife International and the nearest protected areas are located at about 105 km from the project site. 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 may occur as vagrant species. On the other hand, the presence of water and vegetation in neighboring reclaimed desert farmlands is expected to attract species from the Nile Valley, alien to the area, which would otherwise avoid the desert habitat.

4.3 Socio-economic Environment

The proposed project is administratively located in Minya Governorate and the nearest administrative centers are Markaz Abu Qurqas and Markaz Mallawi.

The village of Balansoura is 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 different types of secondary education schools (general, industrial, business, hotel and agricultural) in Minya governorate reached 258 schools. Technical schools are common but do not provide students with the needed skills for the work market, especially in the technical fields of modern irrigation and agriculture technologies. The number of graduates from

agricultural schools in Minya was 2612 male students in 2015/2016 with no female graduates.

The agricultural sector in Minya Governorate is the main economic activity, as it constitutes around 32% of the workforce in the governorate. The unemployment rate in the governorate was 11.6% in 2016, which is relatively lower than the national level of 12.5%.

There are 49 healthcare services in Minya including 21 private hospitals. Abu Qurqas has a public hospital at about 48 km from the project site, 2 private hospitals and 10 ambulance cars. Mallawi has one general hospital at about 35 km from the project site, which is the nearest hospital to the project area. The project site is connected to other governorates through a group of regional road networks.

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

5. Analysis of Alternatives

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

- No project alternative;
- Site alternative;
- Cultivation alternatives;
- Irrigation source alternatives; and
- Domestic wastewater disposal alternatives.

- The project will induce the transformation of the economically unproductive desert to a productive farm land, which has significant advantages for the national economy and for the local communities. Moreover, if the "no development" alternative is selected, the land proposed for the development would still be used for other agriculture projects as the site is owned by the General Authority for Reconstruction Projects and Agricultural Development (GARPAD) – Ministry of Agriculture and Land Reclamation.

- The proposed land reclamation project is located in the vast and largely unoccupied Western Desert, in an area owned by GARPAD. Therefore this location is considered the most suitable to establish the project and other locations has not been considered.

- Selected cultivation alternatives include:
  - The project will use insoluble fertilizers as it can prevent excess nutrient leakage and over saturation of soil with nutrients;
  - Rotation of sugar beet, wheat, chick peas, potato, corn silage and grain corn will take place and sugar beet will not be cultivated as a solo crop;

- Mono-germ seeds will be used since it has more agro-economic advantages, and reduces the high labor cost arising from seedling crowdedness produced from multi-germ seeds;
- The Center Pivot System will be used for irrigation as it is highly efficient, requires low labor and operates on different topographies;
- The latest technologies will be used for harvesting, including self-propelled sugar beet harvesters that can harvest multiple rows instead of one row.

- The selected irrigation water source would be groundwater abstraction from the limestone aquifer which is very productive and able to sustain the irrigation project through an estimated total of 60 years.

- Treated wastewater will be used for landscaping due to the great value of water resources. Water treatment and reuse options are environmentally preferable than disposal; taking into consideration that the company will comply with the legal requirements

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 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. It will also provide employment opportunities during the construction and operation phases.

6.3 Potential Negative Impacts

The following tables summarize potential negative impacts during the construction and operation phases as well relevant mitigation measures.

6.4 Impacts of the Environment on the Project

- 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	• Apply dust suppression method using minimum water technologies • Apply dust management through slowing the driving speed of material transportation vehicles • Provide workers with awareness on maintaining good practice driving and machinery usage • Maintain machinery and vehicles in good working condition • Carry out the tests stipulated under the current legislation for generator sets • Modify timing of construction where possible, to coincide with favorable climate conditions
Greenhouse gases	• Ensure that technologies and equipment used in the project are new • If possible ensure that equipment and material used in the construction phase are obtained from a nearby area • Provide workers with awareness on maintaining good practice for machinery usage • Maintain machinery and vehicles • Ensure that gas emissions are below international and national limits
Ambient noise	• Inspection and maintenance of all equipment and vehicles • Provide workers with the suitable PPEs
Soil and groundwater	• Implement site management procedures and good housekeeping activities • Ensure proper waste management measures and storage. • Implement measures for spill prevention • Ensure periodic inspection of equipment and machinery • The E&S site personnel will follow up on the contractor's performance and ensure they abide by the contract EHS stipulations. • Ensure waste collection by a licensed contractor for treatment and final disposal through the designated landfill. • Sewage storage tank should be properly insulated for leak prevention. • Ensure the proper management of hazardous waste, treatment and disposal by an accredited contractor • Ensure that the diesel generator is well insulated
Terrestrial biodiversity	• Develop, implement and update a solid waste, hazardous waste and waste water management plan • Provide awareness to the workers on the negative impacts of disturbing any wild fauna. • Ensure proper housekeeping practice. • Avoid working at night and avoid high intensity light that may disturb fauna. • Ensure speed control and the prohibition of off-track driving • Ensure the proper maintenance of construction equipment and any other equipment with high noise and vibration potential. • Ensure that the generator is properly insulated to avoid noise emissions.

Source of impact / Receptors	Mitigation measures
Traffic	• Develop a traffic management plan • Include conditions in contractors' contracts that require them to periodically inspect the safety and efficiency of vehicles and trucks • Require contractors to comply with traffic rules with regard to speed limits, vehicle maintenance and cover of materials to be transported • Drivers and staff shall maintain a good driving conduct and respect speed limits and planned itineraries.
Public Health	• Same as applied for air quality and noise.
Workplace Health and Safety	• Continuous supervision of construction workers • Provision of suitable PPE • Ensuring that workers are always wearing PPEs while working or onsite • Equipment periodic maintenance according to manufacturers' schedule • Ensure that workers obtain a proper first aid training • Ensure the availability of first aid kits. • Provide and install fire extinguishers and ensure that workers are trained to use them • Implement good housekeeping practice and ensure that proper hygiene measures are taken • Ensure the availability of a well-equipped ambulance car within the site • Restrict vehicles speed so that they do not exceed the safety limit (15-20 km/h) • Storage of flammable materials in an isolated and shaded area • Periodic training construction personnel on the safe use of equipment and on environmental issues • Ensure that commitment to safety measures is included in the sub-contractors contracts • Security personnel should be selected based on screening process • Comply with all the executive regulations of Labor Law 12/2003 • Abide by international regulations for health and safety including IFC standards and AfDB safeguards.
Impacts on archeology	• Any unearthed antiquities, activities during construction and operation will be stopped in the area. In case • The Ministry of State for Antiquities (MSA) will be notified for investigation. The chance find procedure mentioned in this chapter will be applied.

Summary of mitigation measures during operational phase

Source of impact / Receptors	Mitigation measures
Air quality	• Apply Dust suppression using minimum water consuming technologies • Apply Dust management through slowing the driving speed of material transportation vehicles • Provide workers with awareness on maintaining good practice driving and machinery usage • Maintain machinery and vehicles in good working conditions • Carry out the tests stipulated under the current legislation for generator sets
and Greenhouse gases	• Apply same mitigation measures as the ones included in the construction phase. • Include good practice for fertilizers and pesticides usage and soil management • Ensure that the added nitrogen is suitable for crop needs, and that fertilizers addition is during the active growth stages • Implement a good practice management plan to prevent nutrient loss • Avoid waste burning and burning of agricultural wastes and more importantly the ones mixed with pesticides • Use/buy fertilizers from a low GHGs manufacture whenever possible. • Enhance soil organic carbon stocks through good land management practices. • Properly store fertilizers and pesticides • Store fertilizer away from machineries and other materials to avoid hazards (e.g., fuels, ignition, or heat sources) • Offer farmers and workers training on nutrient management • Implement a crop rotation program to protect soil • Ensure the selection of efficient pumps
Ambient noise	• 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	• Apply same mitigation measures as the ones included in the construction phase. • Develop a waste management system. • Properly store chemicals • Provide training for workers that are transporting, handling or applying fertilizers and pesticides • Ensure a balanced fertilizer program is applied for each soil management unit. • The Center Pivot System which will be used for irrigation optimizes water use in contrast with the conventional surface irrigation system • Perform period monitoring on ground water quality • Perform monitoring on the aquifer recharge rates and abstraction rates • Each well will need to be scrutinized as part of the final system design and layout to determine the required pump setting, instantaneous flow rate, and required pump head to meet the needs of the system into the future • Perform detailed hydrogeological studies if additional area is developed into irrigation; • Avoid unnecessary abstractions • Implement a water efficiency program • Determine irrigation requirements of crops and workers
Terrestrial biodiversity	• Apply same mitigation measures as construction phase • Properly store fertilizers and pesticides • Minimize the use of pesticides • Use best practice techniques in pesticides application to avoid their consumption by non-targeted species • Seed sourcing should be from reliable suppliers to avoid the introduction of any alien and or invasive species. • Ensure that workers are aware of the hunting impact and ensure that no hunting occurs within and around the site. • Ensure the implementation of rotational crop method to decrease pests and weed • Encourage manual weed control • Ensure that storage areas with pesticides are inaccessible to animals
Community impact	• Perform period monitoring on ground water quality • Perform monitoring on the aquifer recharge rates and abstraction rates • Avoid unnecessary abstractions • Implement a water efficiency program • Determine irrigation requirements of crops and workers. • Maintain soil quality to avoid surface evaporation
Traffic	• Apply mitigation measures same as the traffic measures stated in the construction phase
Public health	• Apply the same mitigation measures for air quality and noise.

Source of impact / Receptors	Mitigation measures
Workplace Health and Safety	• Apply applicable measures stated in the construction phase • Provide tractors, loaders, or harvesting machines with suitable filtration/ventilation. • Provide suitable training to workers on the management and storage of hazardous materials. • 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.
Impacts on archeology	• Any unearthed antiquities, activities during construction and operation will be stopped in the area. In case • The Ministry of State for Antiquities (MSA) will be notified for investigation. The chance find procedure mentioned in this chapter will be applied.

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

- ***Environmental Register***

  The company will prepare an environmental register to record the different environmental management and monitoring 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.

- ***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
  - Emergency Preparedness and Response Plans
  - Employee Training and Awareness

- ***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 Fertilizers
- Management of Pesticides
- Pest Management
- Weed Management
- Controlling Odors
- Housekeeping
- Preventive Maintenance
- Spill Prevention
- Solid Waste Management
- Hazardous Materials and Waste Management
- Staff Training and Awareness
- Emergency and Fire Alarm Plans

7.3 Monitoring

Monitoring provides information for periodic review and adjustment of the environmental management plan, as necessary, to ensure that environmental protection is achieved through early detection of negative impacts.

- ***Monitoring during construction***
  - Ambient Air Quality
  - Point Source Air Emissions
  - Noise levels
  - Workplace Monitoring

- ***Monitoring during operation***
  - Ambient Air and GHGs Quality Monitoring
  - Monitoring of treated domestic wastewater
  - Workplace Monitoring (utilities)

7.4 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:

- Corporate Social Responsibility
- On-going Consultation
- Information Disclosure
- Grievance Management
- Socio-economic Monitoring

8. Consultation and Disclosure

Consultation with the community and stakeholders is an important element in the ESIA process. After consultation is completed, the results are taken into account in the final version of the ESIA study. Accordingly, individual and public consultations have been carried out.

8.1 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 site survey assisted in identifying the potential communities that may be affected by the project. Accordingly, a list of concerned stakeholders was then prepared during the scoping phase of the present study and has been updated throughout the study progression.

8.2 Individual Scoping Meetings

Stakeholder meetings have taken place at the scoping report preparation stage with neighboring farms, and local community in Balansoura village. Data on some socio-economic aspects were obtained. The meetings also indicated that stakeholders are mainly concerned with meeting their socio-economic needs and particularly provision of job opportunities.

8.3 Public Consultation

A public consultation and disclosure meeting has been carried out on the 26th of May 2018 in the Louvre Hall of Triumph Hotel, Fifth Settlement, New Cairo. Transportation of participants from Minya to Cairo and vice-versa has been taken in charge by Canal Sugar.

The main points discussed during the meeting included:

- Wastewater management;
- Emissions and use of natural gas as fuel;
- Potential groundwater depletion after 60 years;
- Groundwater consumption and number of wells;
- Job opportunities; and
- Recommendations to communicate with the governorate officials to open a U-turn near the project site to facilitate transport operations.

1. Introduction

1.1 Background

Canal Sugar has been established as an investment company that aims to cultivate lands with sugar beet and other crops. The company plans to undertake land reclamation of an area of 181,180 feddans for sugar beet production in Minya in addition to establishing a beet sugar factory. Part of the area will be planted with sugar beet and other crops while the rest of the area (unsuitable for row crop production) may be used for other future activities. The project will produce 930,000 tons of white sugar annually from sugar beet as a main product in addition to beet pulp (dry) and final molasses as by-products. Not all beets will be sourced from the farm (due to the dual crop rotation); some will be outsourced from neighboring farms.

According to presidential decrees 31/2015 and 61/2016, two areas of 183,492 feddans and 559,227.45 respectively of the State-owned land in West Minya region have been allocated to the General Authority for Reconstruction Projects and Agricultural Development (GARPAD).

An agreement was signed between the company and GARPAD to buy 240 feddans (for the establishment of the sugar factory) and to rent 181,180 feddans for 60 years for sugar beet production. The agreement is in accordance with the government's plan to achieve sustainable development in various sectors as it aims at increasing agricultural production activities as well as providing direct and indirect employment opportunities. The land rental contract and land handover document are included in **Annex 1**.

According to the project categorization lists developed by the Egyptian Environmental Affairs Agency (EEAA), land reclamation projects with area more than 10,000 feddans fall under Category "C" projects, which includes projects of high environmental impacts requiring a full Environmental and Social Impact Assessment (ESIA).

The project is part of an integrated project which also includes the establishment of beet sugar factory in the same area. Environics has previously conducted an ESIA for the construction and operation of the sugar beet factory and associated facilities in a separate report, which has been reviewed and accepted by the EEAA. The EEAA approval on the sugar beet factory is included in **Annex 2**.

Subsequently, Canal Sugar has requested Environics to conduct an ESIA for the land reclamation to be submitted to the EEAA. The ESIA will be also submitted to AfDB, IFC and/or other International Financing Institutions (IFIs). Therefore, the present report deals with the preparation of a full ESIA prepared according to national and international guidelines.

1.2 Objective of the ESIA

According to the project ESIA categorization issued by the Egyptian Environmental Affairs Agency (EEAA) in 2015, large-scale land reclamation 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 3** includes Environics' Certification).

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.

Furthermore, 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.

1.3 Scope of Work

The different project components and activities addressed in this report include:

- Site preparation and conversion of the project site into an agricultural land;
- Beet and other crops cultivation and harvesting;
- Irrigation and water management;
- Use and management of fertilizers and pesticides;
- Waste management.
- Facilities related to the project including potable water and wastewater treatment facilities and housing.

The scope of work of the present ESIA does not include the beet sugar factory as a separate ESIA for the sugar facility was previously carried out in a separate report. This was submitted to the EEAA in May 2018 and revised to integrate the EEAA comments in September 2018. The ESIA for the beet sugar factory has obtained the EEAA approval on the 3rd of October 2018.

1.4 Structure of the ESIA

The EIA study includes:

- Executive Summary
- Introduction
- Regulatory Framework
- Project Description
- Environmental and Social Baseline
- Analysis of Alternatives
- Impact Assessment and Mitigation Measures
- Environmental and Social Management Plan
- List of References

2. Policy, 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.

2.1 National Legislation

2.1.1 Legislation Pertaining to Environmental Impact Assessment

Law 4/1994 amended by law 9/2009 and its executive regulations ER (Decree 338/1995, modified by Decree 710/2012)

According to Law 4/1994, the project proponent must prepare an Environmental Impact Assessment (EIA) for the approval of the EEAA. Accordingly, environmental requirements are integrated into the existing licensing system.

Proposed developments are classified to four categories according to the severity of potential impacts. They reflect the increasing level of environmental impact assessment. The four categories are:

- 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.

According to law 4/1994, modified by Law 9/2009, and its executive regulations (ER), the EIA report will be submitted to the Competent Administrative Authority (CAA), under which jurisdiction the project falls. . The CAA would send the EIA to EEAA to issue its response within 30 days. If no response is received beyond this period, the assessment shall be deemed approved.

Land reclamation projects with area above 10 000 feddans are classified as Category "C" projects that require preparation of a full EIA study to include construction and operation phases of the facility as well as stakeholders consultation.

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

According to the national environmental law no. 4/1994, projects are required to monitor all emission sources to ensure compliance with the legal stipulations, and record the monitoring results in the project's environmental register. 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). The national limits are only provided for industrial and residential areas. No limits are provided for rural areas.

- 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 (Table 2-2).

- 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 2-3).

- The IFC /WHO ambient air quality[1] was compared to the national limits in Table 2-1 and Table 2-2 from different sources.

Table 2-1: Maximum limits of ambient air pollutants

Pollutant	Average Period	IFC Standards (µg/m^3)	National Requirement (Industrial Areas) (µg /m^3)	National Requirement (Rural Areas) (µg /m^3)
Sulphur dioxide (SO2)	10 minutes	500	-	-
	1 hour	-	350	300
	24 hours	20	150	125
	1 year	-	60	50
Carbon monoxide (CO)	1 hour	-	30 mg/m^3	30 mg/m^3
	8 hours	-	10 mg/m^3	10 mg/m^3
Nitrogen dioxide (NO2)	1 hour	200	300	300
	24 hours	-	150	150

[1]IFC (2007) Environmental Health and Safety guidelines

Pollutant	Average Period	IFC Standards (µg/m^3)	National Requirement (Industrial Areas) (µg /m^3)	National Requirement (Rural Areas) (µg /m^3)
	1 year	40	80	60
Total suspended particles (TSP)	24 hours	-	230	230
	1 year	-	125	125
Respirable particles (PM10)	24 hours	50	150	150
	1 year	20	70	70
Respirable particles (PM2.5)	24 hours	25	80	80
	1 year	10	50	50
Suspended Particles (measured as black smoke)	24 hours	-	150	150
	1 year	-	60	60

Table 2-2: Maximum limits of air pollutants from generator

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	150	250
Sulphur dioxide (SO_2)	NA	3%	100	400
Nitrogen oxides (NOx)	200 (spark ignition)	If bore size diameter [mm] < 400: 1600 If bore size diameter [mm] > or = 400: 1,850	600	600
	400 dual fuel			
	1600 pressure ignition			
Total Particulates	NA	100	50	100

Table 2-3: 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

Potential increase in noise levels during both the construction phase and the operation phase. According to the national environmental law no. 4/1994, projects are required to monitor potential noise sources to ensure compliance with the legal stipulations, and record the monitoring results in the project's environmental register.

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 2-4 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 2-4: 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 that are sensitive to noise (including rural areas)	70	70	50	40

2.1.5 Solid Waste

Solid waste generated during construction and operation phases include food residuals, carton and paper, plastics, glass, metal cans, agricultural waste etc.

Law Number 38 of 1967 on General Public Cleaning and Law No. 106 of 2012 amending a number of articles of Law 38, and its executive regulations (decree 134/1968), is the primary law governing the management of solid waste in Egypt including construction/demolition waste.
In addition, Articles 37 and 39 of the Environmental Law 4/1994 (amended by Laws 9/2009 and 105/2015) and article 38 of its Executive Regulations (amended by decree 964/2015) and articles 39 and 41 of its Executive Regulations (amended by decree 1741/2005) discuss the collection, handling and transfer of solid waste including construction waste.

Annex (11) of the modified Executive Regulations (1095 of 2011) of Law 9/ 2009 are concerned with the collection and transportation of solid wastes.

2.1.6 Hazardous Substances and Waste

Hazardous substances and generation of hazardous waste during construction and operation phases may include pesticides and used pesticides containers, used oil, grease and other lubricating materials.

The farm and facilities 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.

Wastewater disposal shall comply with the Minister of Housing Decree no 44/2000 and its ER during construction phase. 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 Wastewater Usage in Irrigation

The project will use treated wastewater to cultivate the green areas (landscaping) around buildings.

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.

Environics 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 2-5 shows the maximum permissible limits for the reuse of the treated sewage water in in irrigation of food crops and non-food crops according to the Egyptian code.

Table 2-5: Table 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		

Parameter	Maximum limit (mg/L)	
	Long-term Use (1)	Short-term Use (2)
(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 2-6.

Table 2-6: Categorization of the treated sewage water

Requirements \ Category of treatment		A	B	C	D
Maximum physical and chemical limits	Total Suspended Solids-TSS (mg/L)	15	30	50	300
	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 2-7 shows the types of plants authorized to be irrigated with treated water.

Table 2-7: 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

Category of treatment	Sub Group	Agricultural Group	Description
	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
	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 *Ficus Decora*, *Ficus Nitida*, 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

2.1.8 Legislations related to 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.

2.1.9 Potable Water Guidelines

The Decree of the Minister of Health 458/2007 provides the acceptable specifications of potable water. The parameters are categorized under five categories as follows:

1. Physical parameters: such as colour, oudour, turbidity and pH.
2. Inorganic parameters: such as hardness, dissolved salts, sulphates and chlorides and metallic
3. Heavy metals and organic pesticides
4. Microbilogical parameters
5. Radioactive substances

Table 2-8 below shows example parameters relevant to potable water quality for drinking and domestic purposes according to national law.

Table 2-8: Parameters Relevant To Potable Water Quality
Minister of Health Decree 458/2007

Parameter	Maximum allowable limits mg/l
Physical Parameters	
Dissolved salts at 120^0C	1000
Total hardness (as $CaCO_3$)	500
Sulphates (SO_4)	250
Chorides (Cl(	250
Iron (Fe)	0.3
Manganese (Mn)	0.4
Copper (Cu)	2
Zinc (Zn)	3
Sodium (Na)	200
Aluminum (Al)	0.2
Microbiology parameters	
Total bacteria count	– not exceeding 50cell/cm^3 at 37^0C for 24 hrs – not exceeding 50cell/cm^3 at 22^0C for 48 hrs
Total coliform	– 95% of the samples up to 100cm^3 examined /year should be totally free of coliforms – No sample should exceed 2 cell/100 cm^3 provided that this limit does not occur in two sucessive samples form 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 orgnisms

2.1.10 Legislations related to Fertilizers and Pesticides Usage

Agriculture law 53/1966 is concerned with agriculture management, the use of agriculture fertilizers, pest control, tenure cards and penalties. It defines agriculture fertilizers as all types of organic and chemical fertilizers added to the soil or seeds to enhance its fertility.

In addition, the decree of the Minister of Agriculture and Land Reclamation number 974/2017 regulates the manufacturing, registration and utilization of agricultural pesticides.

Law 4/1994 for the protection of the environment states the following:

Article 38 of Law 4/1994 prohibits the use of pesticides or chemicals for agriculture activities without taking into consideration the conditions, regulations and safety measures stated in the ER of this law.

Article 40 in the ER of Law 4/1994 states the regulations to be taken before using pesticides or other chemicals. It states that it is necessary to observe the regulations set by the Ministry of Agriculture, the Ministry of Health and the EEAA. They include the following:

- It is a must to notify the health and veterinary units of the types of pesticides used and their antidotes before spraying;
- Provide first aid facilities;
- Provide PPE (personal protective equipment) for workers involved with pesticide spraying;
- Have trained workers to spray the area.

2.1.11 Legislations related to Labor

- ***Work Environment Health and Safety***
  The Egyptian Labour Law number 12/2003 organizes working conditions and management of worker relationship. The law in its different articles; addresses the individual labour contracts, terms of employment, wages and leaves, collective negotiations and collective labour agreements and litigations as well as vocational training are addressed in sections one to four. The occupational health and safety requirements are addressed in Book five. A number of explanatory notes and ministerial decrees have been issued detailing the different stipulations of the law. The Ministerial Decree 211/2003 of the Ministry of Manpower addresses the requirements to prevent adverse physical, chemical, biological, mechanical hazards and hazard from dynamic electricity including handling and maintenance of electric equipment, wire and cables and those of high voltage in the workplace, as well as keeping medical surveillance records for the employees.

- ***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 2-9 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 2-9: Maximum emission limits in the work environment relevant to the proposed project as stated in the amended Annex 8 of Law 4/1994

Emission	Average concentration in 8 hours (mg/m^3)
Hydrogen sulfide (H_2S)	14
Carbon dioxide (CO_2)	9000
Total particulates	10
Respirable particulates	3

- ***Noise in workplace***

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 2-10 shows these limits and compares them with the IFC limits2.

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 2-10: Maximum permissible noise limits

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 LA_{eq})**
Light industry (decreasing demand for oral communication)	50-65	110	Workplace (workshops and factories) with up to 8 hour shifts	85
Open offices, control rooms, service counters or similar	45 - 50	-	Administrative offices - Work rooms for computers, typewriters and similar equipment	65

[2] IFC (2007) Occupational Health and Safety

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 LA_{eq})**
			Work rooms for activities requiring routine mental concentration - public areas of banks – control rooms in industrial activities - Restaurants and cafeterias	60

- ***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.

- ***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.

2.1.12 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.

2.1.13 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.

2.1.14 Biodiversity Protection

The ecological importance of the project site is insignificant as is devoid of flora and fauna of concern to which the law refers.

Law 4 of 1994 concerning Environmental Protection and its Executive Regulations are concerned with the protection of biodiversity. 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 follows:

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.

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.

2.1.15 Legislation applicable to Cultural Heritage

Law No. 117 of 1983 promulgating the Antiquities' Protection Law, as amended by Law No. 3 of 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 archaeological 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.

2.2 Guidelines of the International Financing Institutions

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 (PSs)3 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

[3] IFC (2012) Performance Standards on Environmental and Social Sustainability

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 Chapter 6.

- ***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 since the State does not recognize the presence of any indigenous communities in Egypt.

- ***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)4.

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 OS 2-OS5 follow:

This OS is fundamental and is applicable to the land reclamation 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 land reclamation 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 rents the land from the General Authority for Construction Projects & Agricultural Development.

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

This OS applies to the land reclamation 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 ***burrowers*** need to follow and the sustainable usage of natural resources. It sets criteria required for pesticide management, waste management and

[4] AFDB (2013) Integrated Safeguards system. Policy Statement and operational Safeguards. Compliance and Safeguards Division

hazardous material, GHG emissions, pollution prevention, health and safety and resource efficiency.

This OS applies to the land reclamation project since the project will produce solid waste including agricultural waste and will also use chemical pesticides and fertilizers, it also addresses to contribution to the GHG, as necessary

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 land reclamation project since the project will recruit and lodge around 800 workers.

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 annual crop production[5] provides best practice to reduce environmental impacts of crop production activities including soil conservation, nutrient management, water management, pesticides handling, usage and storage control, fertilizers usage and storage, energy efficiency and air quality control, Green House Gases emissions control and biodiversity protection practices. 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. The section below presents international conventions to which Egypt is a signatory and that are relevant to the project activities.

a. 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 aims to promote and

[5] World Bank (2016). Environmental, Health and Safety Guidelines for Annual Crop Production

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. It requires all parties 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 the water. In addition, it requires that parties maintain and enhance genetic diversity and floral cover.

b. Climate change

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. Although the agriculture sector is not mentioned explicitly in the agreement, it does mention efforts to adapt to climate change and resilience in a manner that do not hinder food production.

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 agriculture and industry.

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 UNFCC 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 (eg: increase in forests to compensate their emissions). In addition, the protocol requires parties to promote sustainable agriculture practices while taking into consideration the climate change factor.

c. 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.

d. Agriculture

International Sugar Agreement, Geneva, 1992. In Egypt, the agreement is in accession 20 October 1998

The agreement aims to enhance the global cooperation concerning sugar matters and how to improve sugar economy. Members of this agreement shall maintain a good labor standard that promotes the improvement of the living standards of workers in agricultural and industrial sectors including workers in sugar production and growers of both sugar cane and sugar beet.

e. International Labor Standards (ILS)

The International Labor Standards (ILSs) are legal instruments, developed by the ILO constituents (governments, employers and workers). These set the basic principles and rights at work6. 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:

[6] International Labor Organization (ILO) Conventions and Recommendations

- 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.

3. Project Description

3.1 Rationale and Project Background

The main purpose of this project is the cultivation of sugar beet for sugar extraction and refining. The overall project will meet growing domestic demand and is expected to substitute about 75% of sugar imports. Despite the increase in sugar production in Egypt as a result of the increase of sugar crops cultivated area, the local market is suffering from a deficit in the supply of sugar locally, and a substantial quantity of sugar is imported. The quantity of beet sugar imported in 2016/2017 was about 353 thousand tons[1]. The local production of beet sugar decreased from 1,347,283 tons in 2015 to an amount of 1,265,597 thousand tons in 2016[2]. Consequently and along with the local decrease of cane sugar from 1,025,149 tons in 2015 to 93869 tons in 2016, sugar production in general dropped by 7.4% in 2016 from the previous year. However, according to the USDA (2019) forecasts for the years 2019/2020, sugar production is expected to increase by 14% and sugar derived from beet is expected to reach 1.5 million ton whereas sugar derived from cane is expected to reach 1.2 million ton.

The transformation of the economically unproductive desert to productive farm land has significant advantages for the national economy as well as the local communities. The obvious economic spin offs from these activities are long-term and far reaching, and will include:

- income generation for out-growers
- Considerable employment opportunities
- various up and down-stream benefits to suppliers of goods and services
- Reduce reliance on imports of sugar as well as other rotational crops which will be produced locally.

In addition, the process of land reclamation involves considerable technology transfer, from a variety of local and international experts, in all disciplines of engineering, management and crop sciences.

Sugar beet was first commercially grown in Egypt in 1980 and in 2017 was grown in excess of 600,000 feddans[3]. Whilst the cropped area of Sugar cane has remained static at 330,000 or declined the sugar beet production has rapidly increased. This has partially met the national sugar and is both more profitable for the farmers and consumes about 50% less water and land than Sugar Cane[4].

Sugar beet is biennial plant which is planted between late-August to mid-November and harvest is mid-February through early August. In general, it can be grown in all types of sandy, saline, calcareous soils, as it is very

[1] Central Agency for Public Mobilization and Statistics
[2] Annual Report of Council of Sugary Crops, Ministry of Agriculture and Land Reclamation, 2017
[3] 1 feddan = 4,200 m^2
[4] The Product Carbon Footprint of EU Beet Sugar, Sugar Industry Journal, Issue 137 (62) March-April 2012

tolerant high pH and salinity conditions. It is ideally grown in deep soils (+40cm root zone) and is limited in rocky soils having shallow soil depths. Accordingly, about 50- 60% of the allocated land area will be cropped with sugar beet and other crops, whilst the remaining other areas, about 40% of the total land area, is not suitable for crop production mainly due to the elevated topographic features and/or the shallow depths of the soil. These uncultivated areas could be potentially used for other agricultural related activities in the future[5].

Yields are usually high when sugar beet follows corn, potatoes[6] in rotation. In this respect, rotation of wheat, corn and silage will take place for this project.

3.2 Project Location

The project site is located in the Western Desert of Upper Egypt in the south-western part of Minya Governorate. It is located on the Giza - Luxor Desert Road about 255 km from Cairo city and 35 km from Minya city. There are many agricultural reclamation projects in the project area such as El-Hana, El-Shazly and Savola companies. Figure 3-1 shows the location of proposed project in Egypt.

3.3 Project Components

Following the identification of suitable land, reasonable soils, slopes and availability of to water resources the project involves the following key components:

- The improvement of soil through a variety of tillage practices[7];
- The implementation of an infrastructural plan, including irrigation, roads, buildings, utilities supply (gas and electricity);
- The improvement of soil fertility through use of chemical and organic fertilizers (Plant based); and
- The production of crops.

The project will contain associated facilities which are the following:

- Accommodation for labor force
- Water treatment unit for potable water
- Domestic Waste water treatment unit
- Fuel Storage Area
- Electricity generation facility and PV solar plant

[5] Shallow soils unsuitable for sugar beet and other crops are appropriate for trees such as olive and palm trees which may be eventually planted in these areas at a later stage of the project.
[6] Potatoes are not in the current crop plan.
[7] Among the crop production factors, tillage contributes up to 20% and affects the sustainable use of soil resources through its influence on soil properties (Alam et al., 2014).

Figure 3-1: Location of proposed project

3.4 Pre-Construction Phase

Canal Sugar performed different preconstruction-investigations in preparation for the detailed project design and implementation phases. For the purpose of the aquifer assessment study, Canal Sugar drilled testing wells covering the whole site area in order to obtain comprehensive information about the aquifer characteristics and potential yield. In this respect, the company has drilled 56 testing wells until date. The total planned testing wells are 58. Those testing wells will be used as production wells. The aquifer assessment study has been performed by IRZ Consulting / Lindsay International (IRZ, 2019) and its results are presented in **Annex 4**.

3.5 Construction Phase

The overall construction and commissioning of the project would take about 5 years. The main construction activities involve land preparation and levelling. The purpose of land preparation and levelling involves smoothing and shaping the field surface to ensure that that the soil depths variations at over the field are relatively uniform and as result the water distribution in the root zone are also uniform. The construction phase also includes construction of workers accommodation and other project utilities including:

- Potable treatment water plant;
- Sewage treatment plant;
- Road constructions around the reclaimed land area;
- Development wells construction including digging wells and installation of water pumps;
- Installation of infrastructures including irrigation grid and electricity grid; and
- Administrative areas, storage units.

Various types of equipment will be used for construction activities including, but not limited to, bulldozers, trucks, dumpers, forklifts, trailers, scaffolding material, cutting machines and concrete mixers. The amount of fuel that will be utilized for land reclamation will be of 1 million litres / month for 36 months.

Canal Sugar has signed agreements with six contractors during the construction phase, with an average of 150 worker per contractor, and 7 caravans for their accommodation.

The contractors (and potential sub-contractors) will take into account the IFC/EBRD requirements for caravans or workers accommodation, which will be included in their contracts. These requirements include but are not limited to:

- Dormitory should avoid crowdedness;
- Minimum ceiling height of 2.10 meters;
- Standard range of shared rooms: 2-8 workers;
- Sanitary and toilet facilities will always include all of the following: toilets, urinals, washbasins and showers;

- providing safe food, providing nutritious food is important;
- Standard range of hand-wash facility: 1 unit: 6- 15 persons;
- Hygienic means for drying hands;
- Good number of showers and toilets for workers 1 unit: 6- 15 persons;
- Toilet facility should be accessible and easy to reach. 30 – 60 meters from dormitory;
- Provision of first aid kid.

3.6 Operation Phase

3.6.1 Land Preparation

The soil needs to be prepared before each planting phase in order to establish a seedbed and to manage weeds in the seedbed. The purpose of land preparation is to provide the necessary soil conditions for seed plantation. This is important for effective weed control and for enriching the soil. Land preparation typically involves: (i) plowing and overturn of the soil; (ii) harrowing to break the soil clods into smaller mass and preparing the seedbed to promote better root aeration, and (iii) field levelling.

The following activities will be carried out for the land preparation:

- Deep Ripping (50-70 cm)
- Preparation of insoluble fertilizers (slow release) which take time to dissolve and to release nutrients
- Incorporate fertilizers and generate a fine seed bed tilth through plough and harrowing operations

3.6.2 Planting Activity

Planting will involve the following crops; sugar beet (the main crop), wheat, chickpeas, corn silage and grain corn. The sub-sections below describe the planting specifications of those crops.

- **Sugar Beet**
  Seed sowing generally takes place after the land preparation activity to avoid soil erosion. Generally sowing is done via tractor-drawn drills and planters[8], which open a furrow, plant the seeds, and then cover it with soil. Planters can be fitted with fertilizers and pesticides that can be added during planting activity.

  Sugar beet is planted between late-August to mid-November. Sugar beet will be planted in 65% of the land area suitable for planting (about 120,000 feddans). The planting details are as follow:
  - Mono-germ seeds will be used since it has more agro-economic advantages, and reduces the high labour cost arising from seedling crowdedness produced from multi-germ seeds.
  - Seed rate is 0.6 unit (each unit has 100,000 seed) per feddan

[8] These are equipment that are attached to tractors and perform the fully automated planting of the seed and covering with soil

- Planting depth is 1.5-2 cm
- Planting distance between rows is 45 cm
- Planting distance between plants is 14-15 cm

- **Other Crops**

  Other crops would include:
  - Grass (for reclamation)
  - Beans
  - Chickpeas
  - Corn
  - Wheat

  The following tentative table shows the surface area of each crop. Crops, surface area and timing may be subject to changes.

  .

Table 3-1: Crops Surface area

year 2020				year 2021				year 2022				year 2023			
Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter	
area	crop	area	crop	area	crop	area	crop	area	crop	area	crop	area	crop	area	crop
20%	corn	40%	wheat	25%	Reclamation Crop(Beans)	20%	wheat	25%	Reclamation Crop(beans)	20%	wheat			20%	wheat
30%	Reclamation Crop(Grass)	44%	Chickpeas	25%	Beans	5%	Corn seed	25%	Beans	5%	Corn seed	50%	Beans	5%	Corn seed
30%	Reclamation Crop(peans)	10%	Corn seed	25%	corn	50%	Sugar beet	25%	corn	50%	Sugar beet	50%	corn	50%	Sugar beet
20%	Peans	6%	Sugar beet	25%	Reclamation Crop(Grass)	25%	Chickpeas	25%	Reclamation Crop(Grass)	25%	Chickpeas			25%	Chickpeas

3.6.3 Fertilizers Consumption

Fertilizers requirements vary for the different crops in the land reclamation project, as follows:

- **Sugar Beet**
  Sugar beet crop consume approximately the following amounts of fertilizers rate per feddan:
  - 45 kg of phosphate
  - 100 Kg of nitrogen
  - 25-50 Kg of potassium
  - 50 kg of magnesium
  - Micro elements[9] application as foliar on the leaves especially, iron, zinc, manganese and boron.

- **Other Crops**
  The next table shows the fertilizer consumption rate per feddan for each crop.

Table 3-2: Fertilizer Consumption per feddan per Crop

	Purpose	Type of Fertilizer (kg)	Grass	Beans	Wheat	Chickpeas	Corn
1	Soil enhancer	Agricultural sulphur	50	50	50	50	50
2		Humic acid	3	3	3	3	3
3	N-P-K	Phosphate	50	50	50	45	60
4		Potassium	25	30	50	50	50
5		Nitrogen	120	100	110	90	125
6	Micro elements	Magnesium	35	35	35	35	35
7		Manganese	7	7	7	7	7
8		Zinc	7	7	7	7	7
9		Calcium	7	10	10	10	10
10		Boron	0	0.5	0.5	0.5	0.5
11		Micro elements	1	2	1	2	2

3.6.4 Irrigation Method

The type of irrigation system to install is selected based on considering a number of different factors. These include, but are not limited to:

- crop and crop water requirements,
- water supply including quantity and quality of the water source ,
- soil characteristics,
- topography of the field as well as its the size and shape,
- the climate of the area

The project will use Centre Pivot System technology for irrigation. Centre pivot irrigation is an overhead sprinkler irrigation consisting of several segments of pipe with sprinklers positioned along their length, joined together, and mounted on wheeled towers. The machine moves in a circular pattern and is fed with water from the pivot point at the centre of the circle

[9] Used for land enhancement

Most centre pivots are operating by hydraulic systems and electric motor-driven systems. Most systems today are driven by an electric motor mounted at each tower. Such technology is highly automated providing precise control over the application amount – optimising water use and efficient uptake to achieve ideal pasture or crop growth. Due to their design, centre pivots are operating on varying topography.

The major components include:

- Pivot
- Pivot tower
- Control Panel
- Spans of pipe between towers
- Trusses to support the spans
- Tower drive wheels

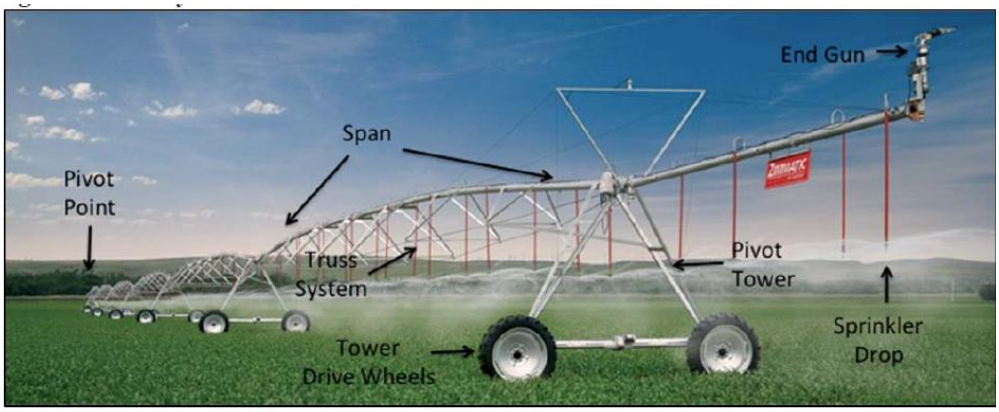


Figure 3-2: Lindsay Center Pivot with End Gun
(Source: Agricultural Irrigation Initiative: Overview of Center Pivot Irrigation Systems, Northwest Energy Efficiency Alliance, 2015)

Generally, centre pivot systems offer many advantages over other irrigation application methods, including:

- Potential for automated operation,
- reducing labour costs
- Simplified and predictable water delivery
- Ability to apply to more shallow depths
- Uniform distribution of water
- Increased ability to plan and schedule irrigation applications
- Easier to apply agri-chemicals (chemigation)
- Little annual setup required, and
- Reliability

On the other hand, potential disadvantages may include:

- Relatively high initial cost
- Circular pattern leaves dry corners and potentially lower yield
- Topographic changes may cause potential operating pressure variations
- Can have operational challenges requiring human interventions
- Potential risk for injury if the operator is not familiar with operation

3.6.5 Irrigation Water Quality

The source of irrigation water for the project will be from the groundwater. It is planned to drill a maximum of 250 wells (including the testing wells) for water abstraction from the underlying aquifer.

Canal Sugar has drilled 56 testing wells to investigate the aquifer water quality and has prepared a detailed aquifer assessment study (IRZ, 2019). Consequently, the detailed project's irrigation plan will be designed. The distribution of testing wells covering the whole area intended for plantation is presented in Chapter 4. Preliminary groundwater quality analysis from two testing wells is presented in Table 3-3 below.

Table 3-3: Preliminary water quality analysis

Well no.	pH	EC dS/m[10]	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO_3^{-}	Cl^{-}
1	8.41	1.58	4.8	1.6	8.7	0.8	3.8	10.5
2	8.39	1.86	5.2	2.0	10.5	1.1	3.4	12.5

In this respect, Table 3-4 below presents FAO guidelines for evaluation of water quality for irrigation. The values in the table emphasize the potential long-term influence of water quality on crop production, soil conditions and farm management. This table has been developed as management tools that would help users to generally understand better the effect of water quality on soil conditions and crop production. Generally, no soil or cropping problems are experienced or recognized when using water with values less than those shown for 'no restriction on use.

Table 3-4: Irrigation Water Evaluation guidelines

Potential Irrigation aspect	Units	Degree of Restriction on Use		
		None	Slight to Moderate	Severe
Salinity				
EC_w	dS/m	< 0.7	0.7 – 3.0	> 3.0
(or)				
TDS	mg/l	< 450	450 – 2000	> 2000
Specific Ion Toxicity				
Sodium (Na)				
surface irrigation	SAR	< 3	3 – 9	> 9
sprinkler irrigation	me/l	< 3	> 3	
Chloride (Cl)				
surface irrigation	me/l	< 4	4 – 10	> 10
sprinkler irrigation	me/l*	< 3	> 3	
Bicarbonate (HCO3)				
(overhead sprinkling only)	me/l	< 1.5	1.5 – 8.5	> 8.5
pH		Normal Range 6.5 – 8.4		

Source: adapted from Water quality for agriculture http://www.fao.org/docrep/003/T0234E/T0234E01.htm#ch1.4
*me/l = milliequivalent per litre

[10] TDS (mg/L or ppm) = EC (dS/m) × 640 (EC from 0.1 to 5 dS/m); TDS (mg/L or ppm) = EC (dS/m) × 800 (EC > 5 dS/m)

3.6.6 Irrigation Water Consumption

The entire project's water requirement will be abstracted from the aquifer. The expected quantity of water that will be consumed by the proposed sugar beet project would not exceed 4000 m^3 /annually/feddan, as per the conditions set by the Ministry of Water Resources and Irrigation[11].

Table 3-5: Water requirement per type of crop

Crop	m^3/feddan / season
Sugar beet	4000
Wheat	3500
Check peas	3250
Potato	3500
Corn silage	3200
Grain corn	3600

Source: Canal Sugar

3.6.7 Pest Management

Pest control is an important factor affecting agricultural production. Canal Sugar considers the policy and strategy of the Ministry of Agriculture and Land Reclamation, using integrated pest management[12], as the policy for pest management.

Integrated Pest Management (IPM) is based on prevention, monitoring, and control which offers the opportunity to eliminate or drastically reduce the use of pesticides. The integrated pest management is a combination of techniques that relies on maximizing the use of natural pest management schemes through an environmental, economic and social perspective. This system is based on limiting intervention with chemical pesticides to only necessary cases and, using soft chemicals (short half-life), in a targeted way, to limit costs and negative effects on beneficial insect populations.

For integrated pest prevention, cultural options can be very efficient and cost-effective and present little risk to people and to the environment. Such options may include:

- Rotating between different crops;
- Selecting pest-resistant varieties; and
- Planting pest-free rootstock.

[11] For an area not less than 70% of the total reclaimed area, Annex 1 of the Land Leasing Contract – Irrigation Conditions, of the Ministry of Water Resources and Irrigation.

[12] Minister of Agriculture and Land Reclamation Decree 974/2017 regulating the manufacturing and utilization of agricultural pesticides

3.6.8 Weed Control

Integrated control of weeds is intended to be in accordance with the recommendations of the Ministry of Agriculture, and include both chemical and mechanical controls.

An integrated weed management approach to land management combines the use of complementary weed control methods such as grazing, herbicide application, land fallowing, and biological control and management plans to include several control strategies divided into five categories, as follows:

- **Prevention:** includes using certified weed-free seeds, cleaning vehicles and equipment to prevent the spread of weed seed and weed plant parts from one area to another. Prevention also includes removing weeds before they can form seed heads or spread by other methods.
- **Cultural controls:** involves management practices that reduce the incidence of weed infestations. Cultural controls include using proper planting times and planting rates, planting companion crops, mulching, managing fertilization and irrigation to favour desired plants rather than weeds, rotating crops and planting cover crops
- **Mechanical/Physical controls:** include physically disrupt the weed, including hand-pulling, hoeing, mowing, tilling, etc.
- **Biological controls:** the use of a living organism to manage pests. The most common biological controls for weed management include livestock and insects. Success depends upon selectivity, reproduction, adaptation, and ability of the organism to reach a high level of effectiveness.
- **Chemical controls**: involves the use of herbicides to manage weeds.

3.6.9 Crop Rotation

It is important to minimize pest, disease incidents on the crop as well as soil exhaustion through the crop rotation method. Crop rotations every 2 and 3 years will be carried out, depending on soils and isolation distance.

3.6.10 Harvesting Activity

Harvesting of sugar beet crop is in February through early August. These plant harvest windows are extended outside of optimal times to extend factory usage every year. Canal Sugar will use latest technologies for harvesting including self-propelled sugar beet harvesters that can harvest multiple rows instead of one row having predominantly 6-row harvesting units. The beets are lifted from the ground by lifting shares. Through cleaning rollers, the transfer web and the discharge elevator, the beets are separated from the adhering soil and transported into the holding tank of the machine. The leaves of the beets are removed and will mostly remain in the field to be used as green manure for additional source of nutrients or can be used off site as animal feed for cattle, the leaves can be fed fresh or as silage.

In this respect, it is expected that the utilization of harvesting waste as source of nutrients will contribute to reducing the utilization of chemical fertilizers. The beets are placed on the edge of the field in storage clamps or loaded on a transport vehicle during harvesting.

Figure 3-3: Sugar beet harvester

Harvesting for all types of crops is expected to take place mechanically thus minimizing the reliance on labour but is expected to increase investment and energy consumption.

3.7 Employment

Canal Sugar will employ an estimated number of 900-1000 workers during the construction phase. The operational phase is expected to have around 800 workers (of which 150-180 permanent and the rest seasonal), 49% of the employees will be sought nationally; whereas about 50% will be locally engaged from Minya area, whilst 1 % will be foreigners. About 150 workers will be residing in the farm housing units and 350 workers will be daily employed from the surrounding areas.

3.8 Utilities

3.8.1 Workers Accommodation

Canal Sugar Company will construct a workers camp which consists of a housing area, a cafeteria, a police station at the factory entrance, medical facility with resident doctor providing 24 hours medical service, a mosque, a gym, a fire unit and a playground area. The total area of the residential complex is about 300,000 square meters. The housing area consists of 3 buildings, with 2 floors each of them containing 32 rooms. Figure 3-4 shows the facility units including the housing layout and associated components, as follows:

- Housing
- Laundry

- Restaurant
- Mosque
- Potable water treatment plant (WTP)
- Sewage treatment plant (STP)

3.8.2 Potable Water Supply

A groundwater well will be specified for potable water to be used by workers. A 200 m^3/day treatment plant will be constructed to provide potable water for the accommodation camp through groundwater treatment. Following are the main process selection and the design considerations for the proposed potable water treatment plant:

- 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 unit described in the section below.

3.8.3 Wastewater Treatment Unit

Wastewater from the accommodation camp, administrative facility and associated buildings will be treated in a wastewater treatment unit. The expected waste treatment unit capacity is approximately 180 m^3/day.

Wastes from kitchen and laundry will be collected prior to 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 wastewater:

- 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 wastewater 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 manually and sent for disposal through a third party licensed by the EEAA as per contract, or will be used as a fertilizer at the farm.

The concentration limits of treated sewage wastewater to be used in green area irrigation, compared to the limits of the ministerial decree 44/2000 and the Egyptian Code No. 501/2015 are shown in Chapter 2 (Section 2.1.8, Table 2-5).

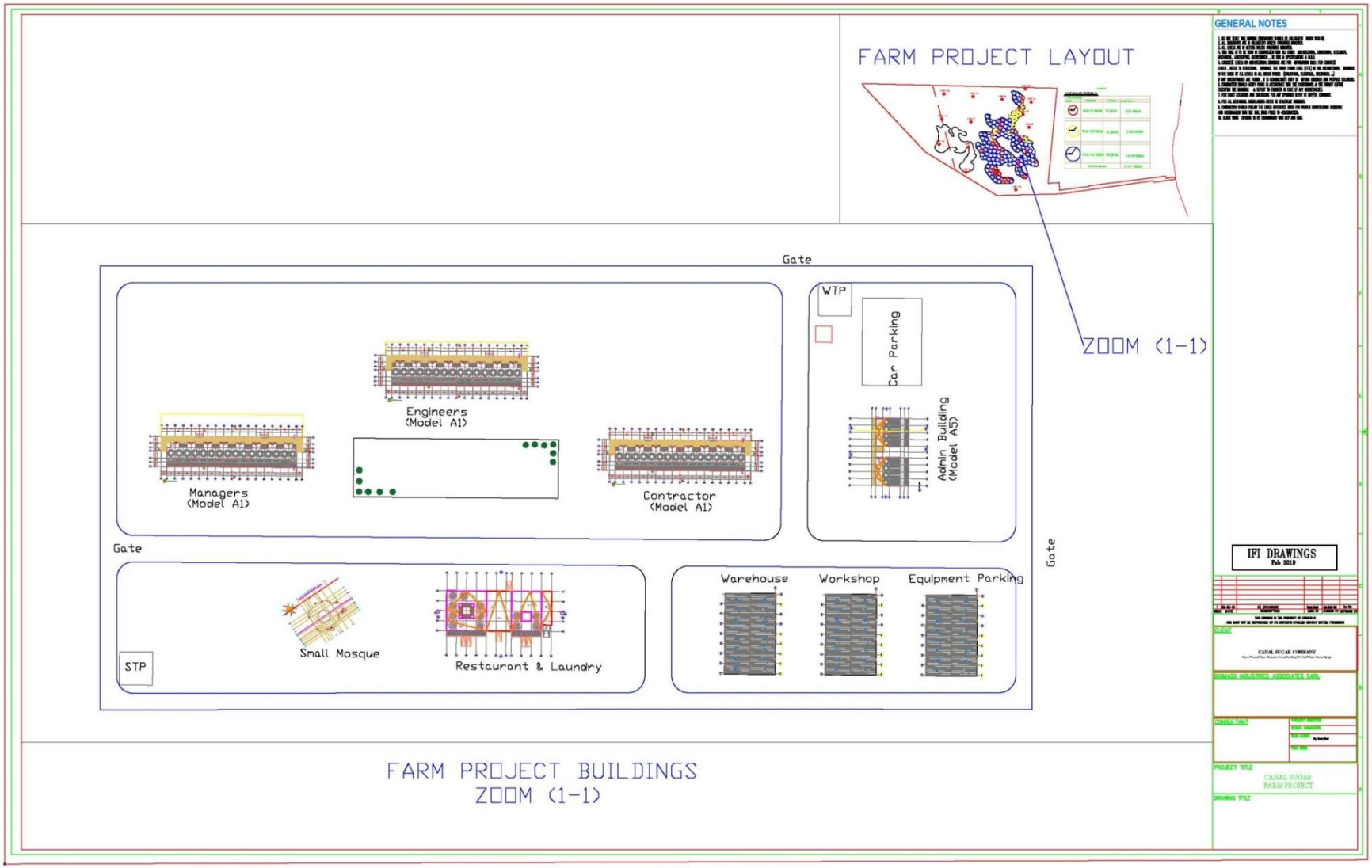


Figure 3-4: Facilities and accommodation complex layout

3.8.4 Electricity

Reportedly, the electricity source in the area is not reliable and experience serious fluctuations which could damage the electricity driven equipment and appliances. Accordingly standby diesel generators will be used at the project site. In this respect, Canal Sugar has communicated with the Egyptian Electricity Transmission Company (EETC) regarding the construction of transmission lines to connect the Canal Sugar integrated project (the farm and the factory) to 220 kv West Malawi Substation to secure the electricity needs of the project.

Accordingly, Canal Sugar 220/33kV substation will be interconnected with the nearest point of National Grid "West Malawi 220/66/11kV Substation" through 220kV double circuit overhead transmission line (52 km route length). 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 (out of the scope of the present ESIA) will be supplied power 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 (32 km route length).

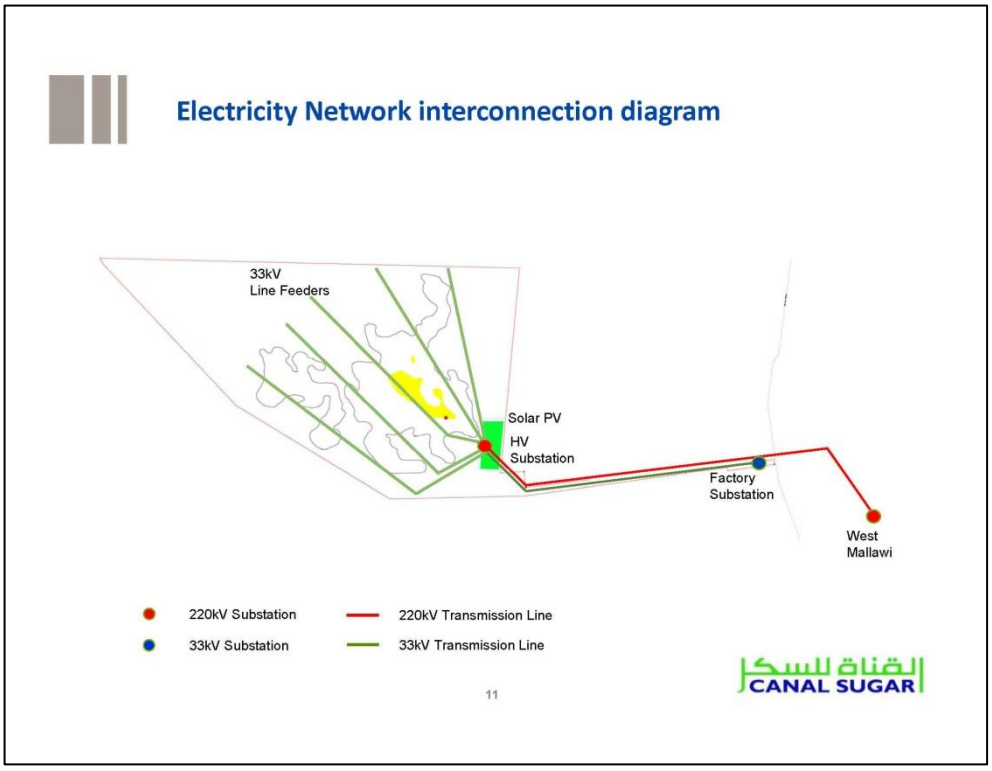


Figure 3-5: Electricity network interconnection diagram

Upon final agreement with EETC, Canal Sugar will develop the ESIA document for the intended transmission line (associated facility) on behalf of EETC (Figure 3-6).

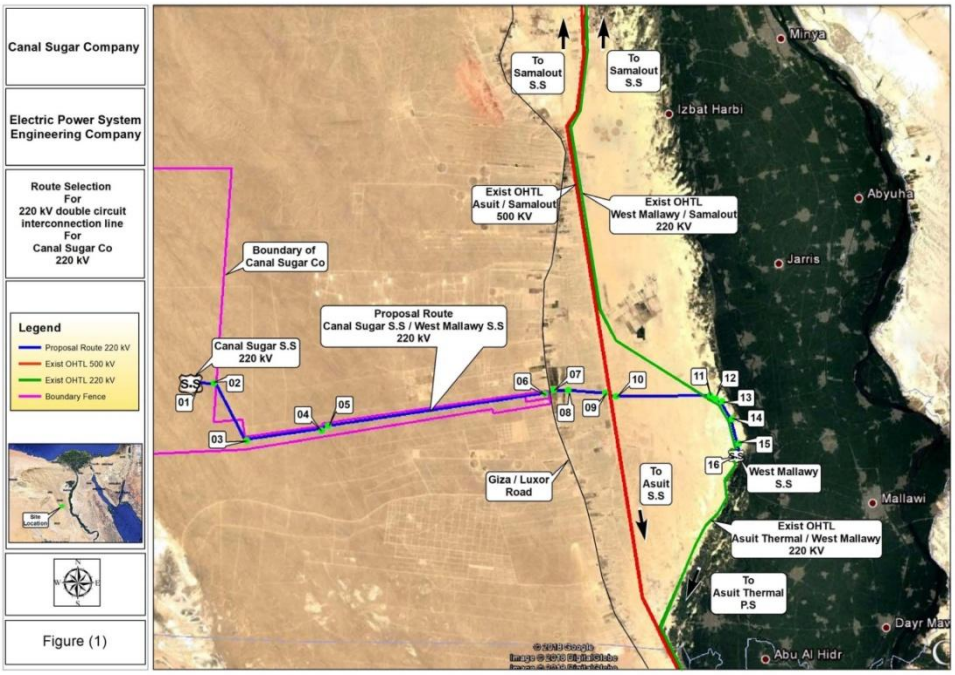


Figure 3-6: Proposed electricity grid layout

Annex 5 of this ESIA presents the results of preliminary site visit of EETC and Canal Sugar representatives to the substation location. The project will rely on the diesel generator during the first year.

3.8.5 Security

Security cameras will be installed at randomly selected areas of the project site to ensure the safety of the workers and the project.

3.9 Waste

3.9.1 Non-hazardous waste

These include agriculture waste such as crop residues other waste such as wood pallets or iron scrap. Crop residues can be recycled for their nutrients through land application or they can be sold off-farm to be used as animal fodder as they have high fiber content and are low in protein, starch and fat. Wood and scrap waste are economically valuable and are sold off-farm.

3.9.2 Hazardous waste

Include waste pesticides and chemicals and containers and waste oils from farm machinery. Hazardous waste will be properly managed on site to avoid any leakage according to the legal requirements and disposed via a certified contractor. The storage areas / containers will be regularly emptied through a licensed contractor for safe disposal as per the national regulations.

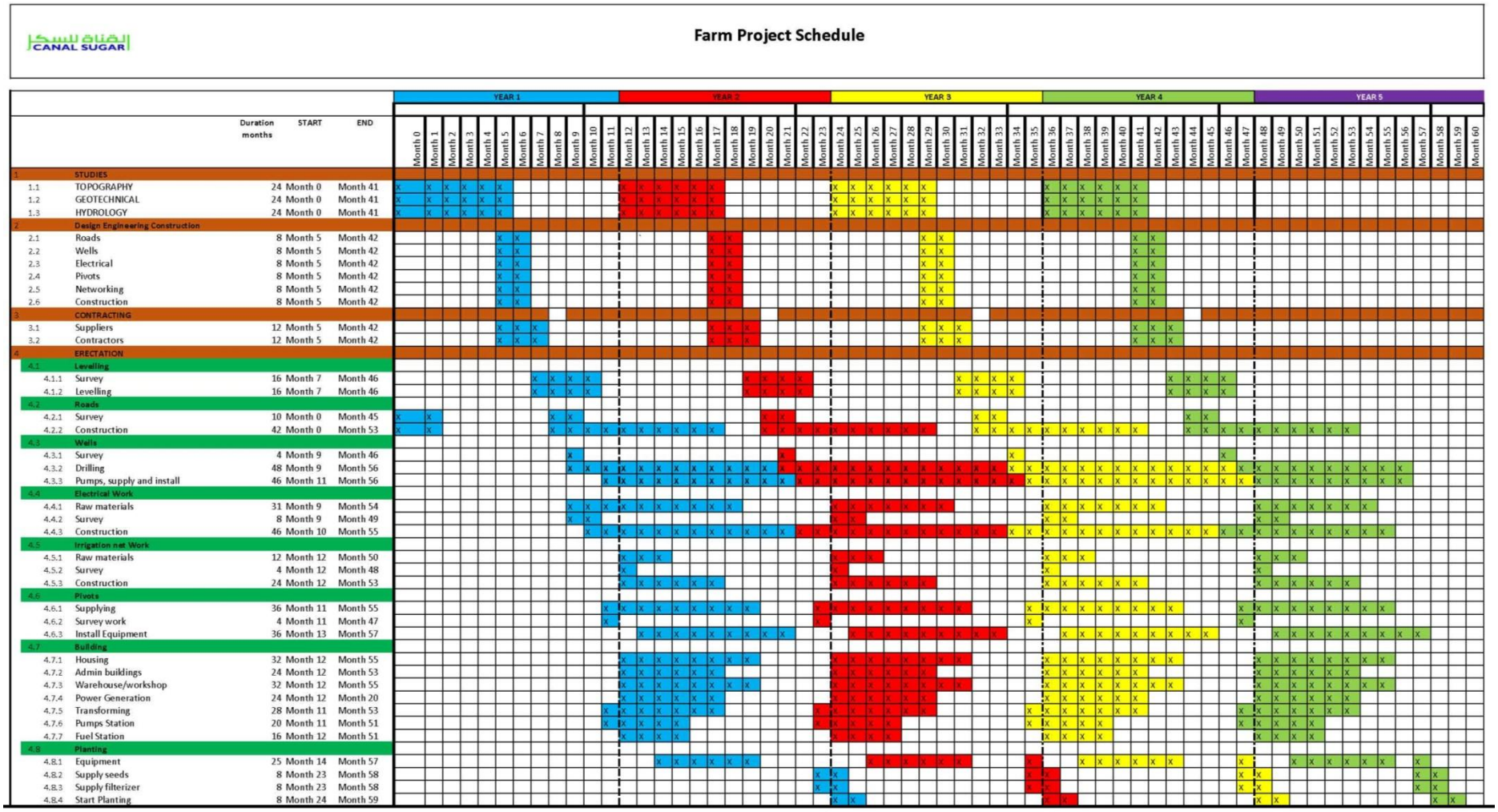
3.10 Project Time Schedule

The project timetable is shown in the following figure taking into account that all project phases will start after the completion and approval of the ESIA.

The project will be implemented in stages, estimated at a total of 4 years after obtaining the necessary approvals and certifications.

Table 3-6 below presents the preliminary time schedule for the different project phases.

Table 3-6: Project Time Schedule



4. Environmental and Social Baseline

4.1 Physical Environment

4.1.1 Climate

An extremely arid climate prevails in the Nile Valley: high temperature, low relative humidity and negligible rainfall. Climatic aridity gradually increases westwards. There is, however, no access to meterological stations in the desert, and therefore the information in this section relies on a Nile Valley station, keeping in mind the previous fact.

According to the Meteorological data collected from Minya Station in 2010, the climatic features of the project area are characterized as follows:

a. Temperature

The average monthly temperature reaches its maximum value in June (37°C Max, 19.6°C Min) and its minimum value in January (19.8°C Max, 6.9°C Min), as shown in Table 4-1 and Figure 4-1. The annual average is (20.3°C Max and 4.3°C Min).

Table 4-1: Temperature in the Area

Air Temp.	Month												Annual Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Min °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
Max °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
Mean °C	11.8	13.4	16.8	21.9	26.2	28.6	28.6	28.2	26.5	22.2	17.6	13	22

Source: Environmental Perspective for El-Minya Urban Development Strategy, GOPP, 2010

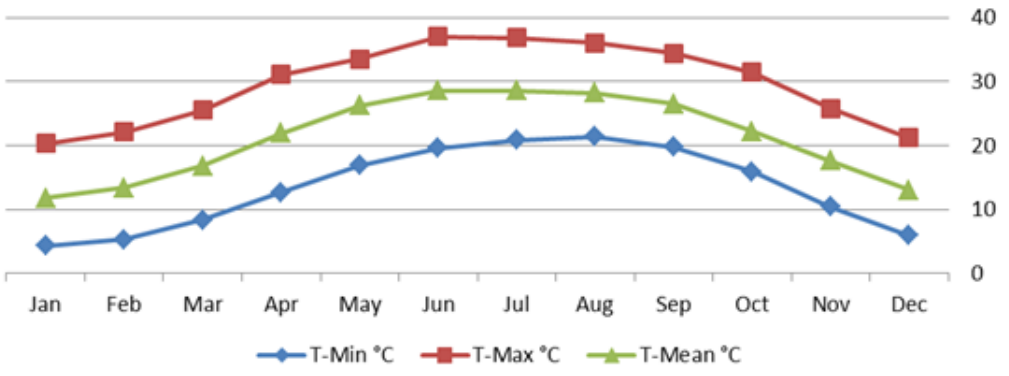


Figure 4-1: Temperature in the Area

b. Rainfall

Rainfall is very limited. The distribution of rainfall in Egypt shows a maximum over the Mediterranean coast with a rapid decrease towards the south. The average monthly rainfall is about 0.35 mm and the annual

rainfall is about 4.4 mm. The rainfall reaches its maximum value in March (1.6 mm) and its minimum value in May and December (0.3 mm), and rarely occurred over the summer months.

Table 4-2: Rainfall data

Rainfall	Month												Annual Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(mm/ month)	0.4	1.1	1.6	0	0.3	0	0	0	0	0	0.7	0.3	4.4

Source: Environmental Perspective for El-Minya Urban Development Strategy, GOPP, 2010

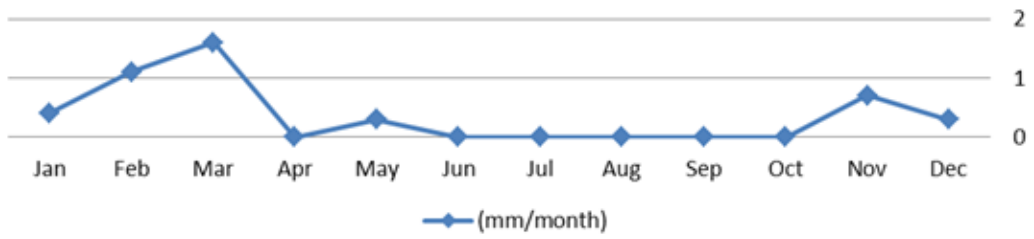


Figure 4-2: Rainfall data in the Area

c. Relative humidity

The average annual relative humidity is about (53%), and the average monthly relative humidity reaches its maximum value in December (68%) and its minimum value in May (38%), as shown in table (10).

Table 4-3: Relative Humidity

Relative humidity	Month												Annual Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(%)	65	57	53	44	38	41	48	52	53	56	63	68	53

Source: Environmental Perspective for El-Minya Urban Development Strategy, GOPP, 2010

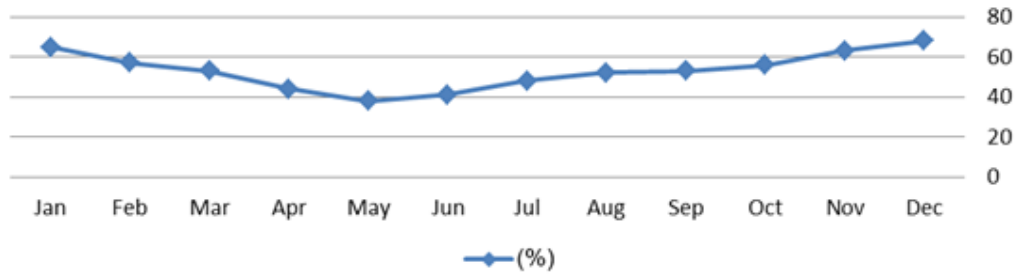


Figure 4-3: Relative Humidity

d. Wind speed

The average of wind speed is between 2.5 m/sec in December and 3.8 m/sec in June with annual average of 3.15 m/sec. Dry hot dust-laden winds from the southwest known as Khamasin blow occasionally for about 50 days during spring and early summer. The direction of winds prevailing is the North about 65% of the year as shown in Figure 4-4.

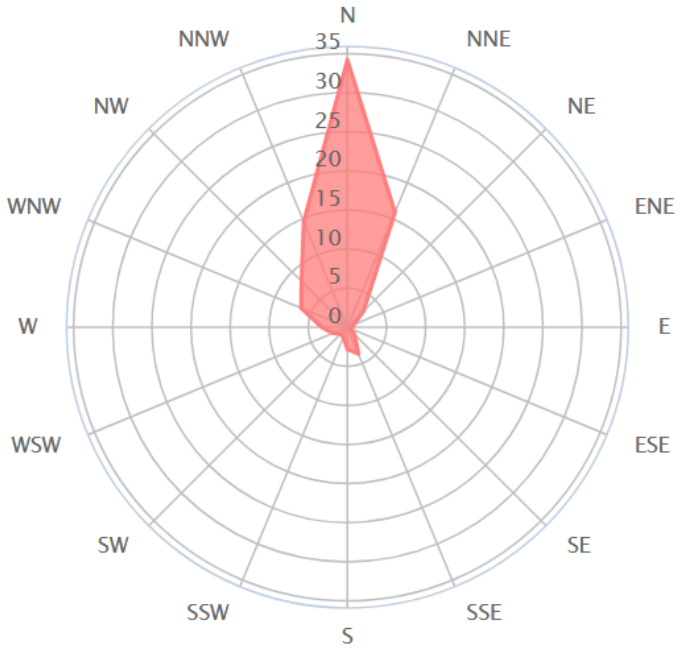


Figure 4-4: Wind directions in the Project Area

Deterioration of air quality would take place during windy days, which are quite frequent in the desert area. Due to the desert nature of the area, the level of dust and fine sand contents in the air is quite high in case of high wind speeds

4.1.2 Topography

The site visit carried out during the period 3-4 September 2018 indicated that the area is mostly flat with the exception of some relatively elevated hills. The following figure shows the surface elevation at the project site and surroundings.

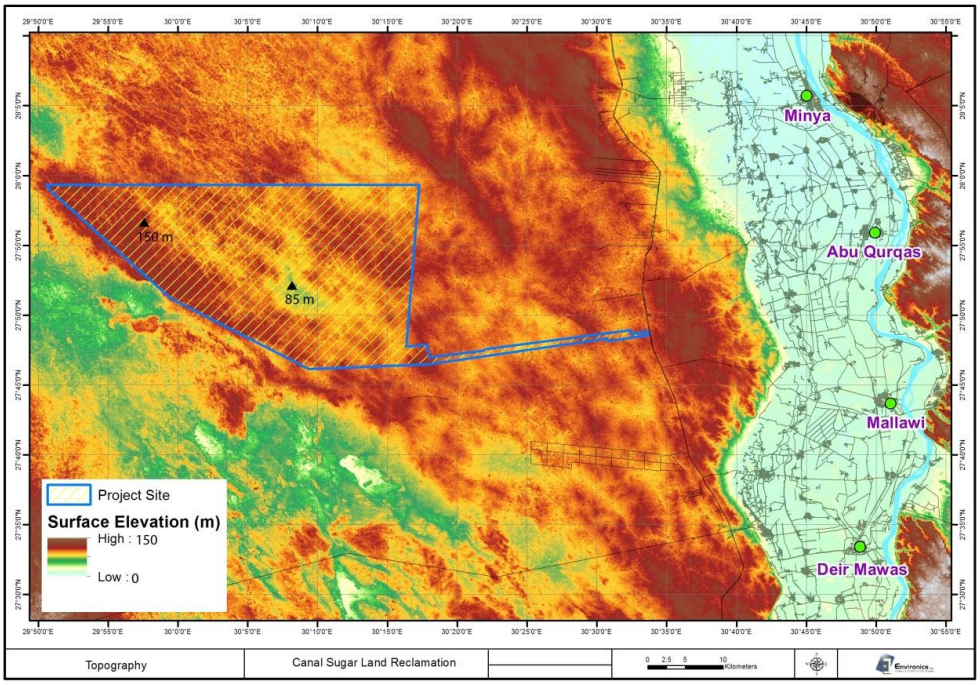


Figure 4-5: Relative Surface elevation at the project site and surroundings
Source: ASTER v2 Global Digital Elevation Map 1 arc second, NASA, 2011

4.1.3 Geomorphology

There are three geomorphologic units dominating the study area (Figure 4-6); these are from west to east:

- The limestone plateau;
- The old alluvial plain; and
- The young alluvial plain.

e. The Limestone Plateau

It is structurally formed, composed mainly of limestone covered with alluvial deposits of sands and gravels and bounds the Nile Valley from the east and west. The project site is located within this geomorphologic unit.

f. The Old Alluvial Plain

It is adjacent to the cliff of plateau and it includes new desert reclamation lands as well as scattered urbanized areas in the western side of the valley and it is irrigated by groundwater.

g. The Young Alluvial Plain

It occupies the area adjacent to the Nile bank between the River Nile and the old alluvial plain. It represents the old agricultural areas irrigated with surface water diverted from the Nile and from main canals such as Bahr Youssef.

Generally, the land surface drops gently in a longitudinal direction (northwards), while the lateral slope towards the Nile (eastwards) is very high.

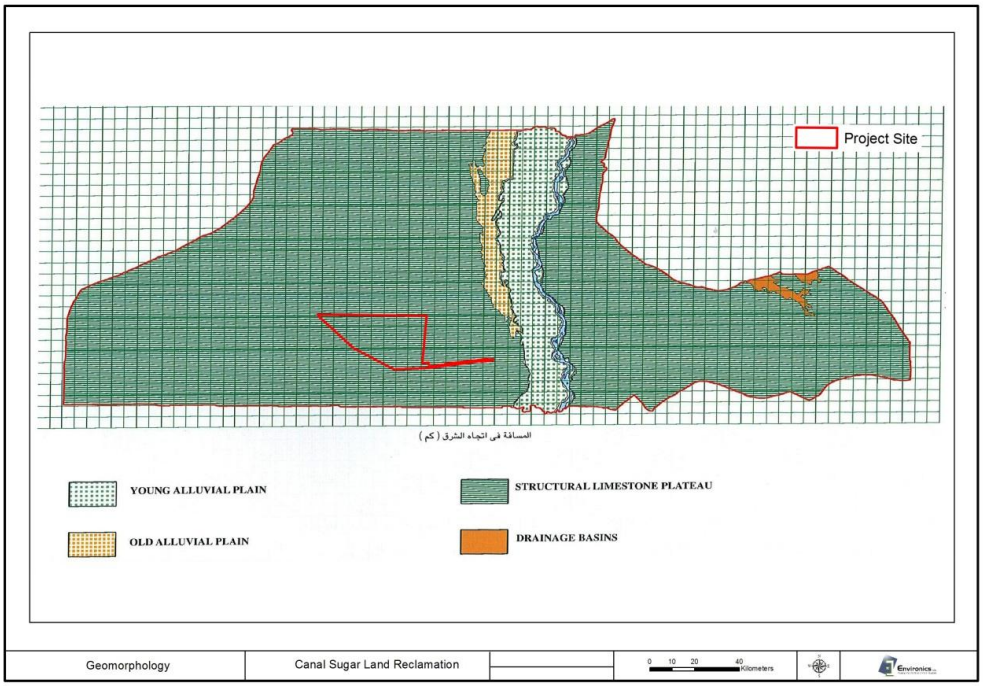


Figure 4-6: Geomorphological structure of the project area
Source: Geotechnical Study of El-Minya Governorate, Soil Mechanics and Foundations Research Laboratory in Cairo University, 2003

4.1.4 Surface Water Conditions and Flash Floods

There are no permanent fresh surface water bodies or streams in the 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 4-7 was developed. Accordingly, it is noted that the project site is mainly intersected by low risk drainage runoffs and all flowing water aggregates from low risk level streams. Moreover, the project site is located at the beginning of the basin at a higher elevation than the catchment area, thus the project area is not potentially subject to flash flood hazard.

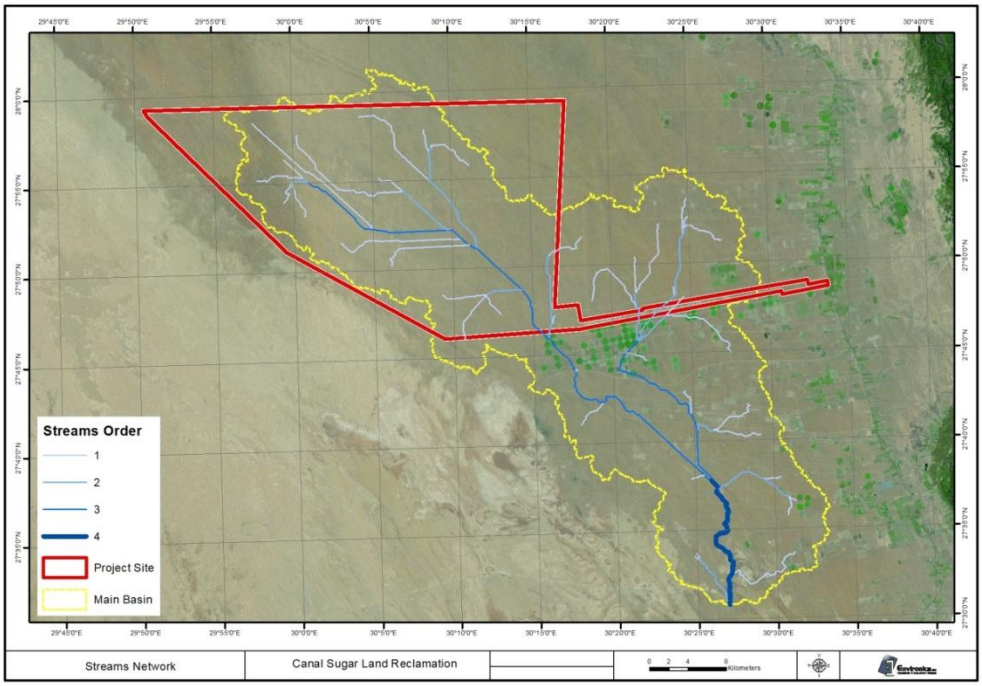


Figure 4-7: Main Streams Network in Project Area
Source: Extracted from ASTER v2 DEM 1 arc second, 2011

4.1.5 Geology

The geological units in project area include Eocene and Oligocene deposits.

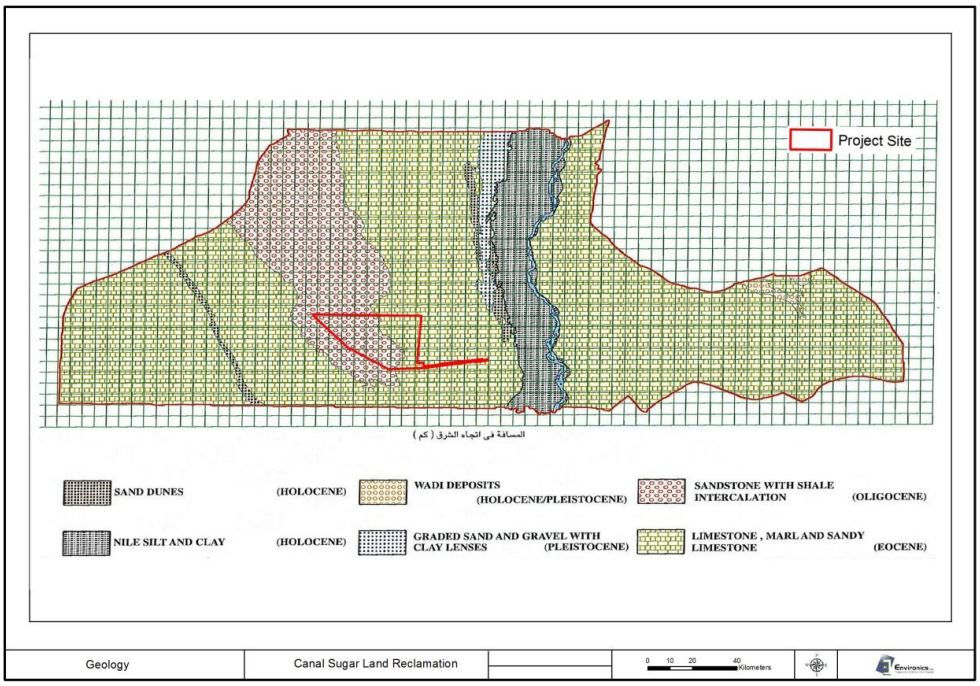


Figure 4-8: Geological Map for Project Area
Source: Geotechnical Study of El-Minya Governorate, Soil Mechanics and Foundations Research Laboratory in Cairo University, 2003

a. Eocene deposits

They are composed mainly of limestone, sand limestone, and marl. Its thickness ranges between 200 m to more than 500m.

b. *Oligocene deposits*

They cover a wide area and composed mainly of gravel, sand and limestone fragments varying in size with dark brown colour, its maximum thickness reaches 200 m in the western portion. It is considered as a good local aquifer in the desert fringes. Figure 4-8 shows the geological characteristic of the wider project area

4.1.6 Soil Characteristics

Although some plants may be found to grow under different soils and extreme agro-ecological conditions, each plant species requires definite soil and site conditions for its optimum growth, and not all plants can grow on the same soil and under the same environment.

The site visit indicated that the soil surface is mainly composed of sand, coarse pebble and gravel. Soil profile investigations at the project site indicated two categories for the soil texture, namely sandy and sandy loam. Soluble salts are generally spread in the soil profiles. Soil chemical analyses indicate that soil samples collected from this location have a high percentage of $CaCO_3$. The pH values are within the normal range with a tendency towards being weak alkaline. Soil depth at the project site is generally adequate for sugar beet production (ECAP, 2013). Preliminary soil sectors investigation results conducted in the area indicated the following depths:

- 0.5% shallow (25-50 cm) – Bad
- 50.5% moderate (50-90 cm) – Good
- 48.9% deep (90-120 cm) – Very good
- 0.1% very deep (<120cm) – Excellent

Figure 4-9 below shows the soil profile within the project site.

Figure 4-9: Picture taken at the project site showing a section of soil profile

4.1.7 Hydrology

a. Groundwater

Groundwater is considered as a part of the regional Nile valley aquifer systems (Moneim *et al*., 2016)[1]. The ground water depth at the project area is about 100 meters and the static water level ranges between 21 m and 37.4 m above mean sea level. There are two recognized aquifers, the Quaternary and the Eocene aquifers (Figure 4-10). A fractured limestone aquifer covers a large area around the western desert area and most of the reclaimed land and composed of fractured limestone sediments.

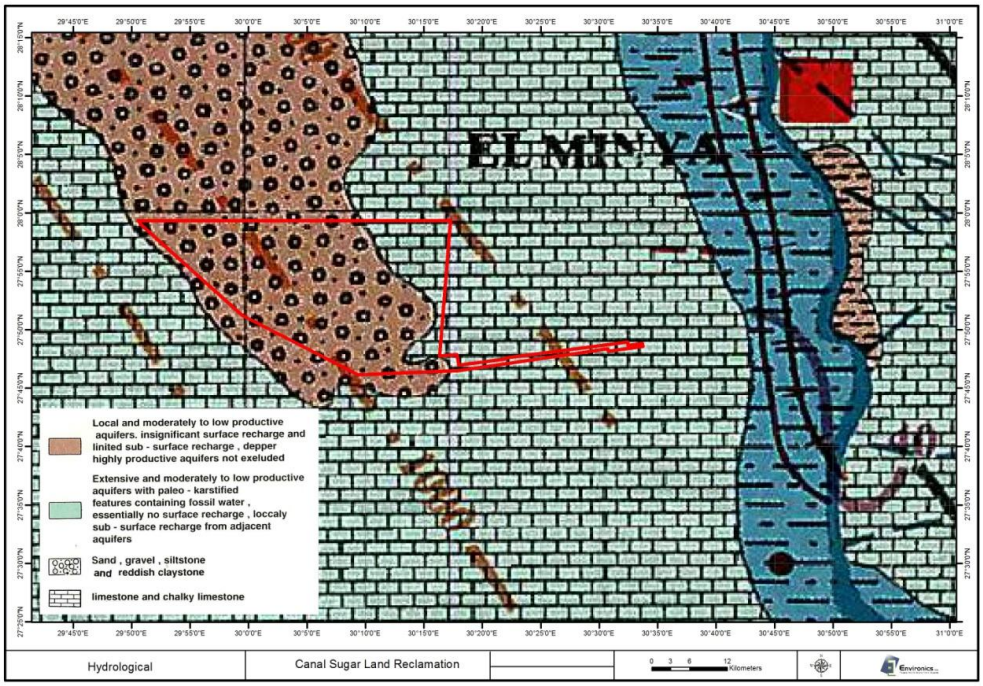


Figure 4-10: Location of the project site in relation to the main aquifers
Source: Inferred from the hydrogeological map of Egypt

The Quaternary aquifer has a wide area of extension, especially on the western side of the Nile Valley. The aquifer is formed of a relatively thick formation of Quaternary alluvial deposits composed of sands and gravels intercalated with clay lenses. The aquifer is overlain by Holocene Nile silt and sandy clay extending into a semi-permeable to impermeable layer. The thickness of the Holocene silt and sandy clay layer varies from zero (at the fringes) and 16 meter (near the Nile) with an average thickness of 9 – 10 meter. The top layer receives water from both the infiltration of return flow after irrigation of the agricultural lands and from subsurface seepage through banks and beds of the irrigation canals and conduits.

[1] Moneim, A. A. A., Fernández-Álvarez, J. P., El Ella, E. M. A., & Masoud, A. M. (2016). Groundwater management at West El-Minia Desert Area, Egypt using numerical modeling. *Journal of Geoscience and Environment Protection*, *4*(07), 66.

The Quaternary aquifer has a large extension in the north-south direction. It is found on an impermeable bed, the bottom of which is formed of Pliocene clays. It is limited from the east and west and rests on Middle Eocene Limestone. The thickness of the aquifer decreases from 200 m below the Nile to a few meters towards the west and east.

The Middle Eocene limestone water bearing formation underlies the Quaternary aquifer and overlies the Nubian sandstone water bearing formation. The Eocene aquifer occupies the extreme eastern and western sides of the study area.

The Eocene aquifer is represented by Samalut formation and is made up of hard, white, highly fossiliferous limestone with shale and marl intercalations. Eocene limestone is fractured and is probably affected by a network of faulting system.

Canal Sugar has developed an aquifer assessment study in order to determine the aquifer characteristics underlying the project area (IRZ, 2019 – provided in **Annex 4**).

For this purpose, the company has drilled 56 testing wells to date covering the whole site area in order to obtain comprehensive information about the aquifer characteristics and potential yield. Figure 4-11 below presents the distribution of the testing wells covering the whole land area.

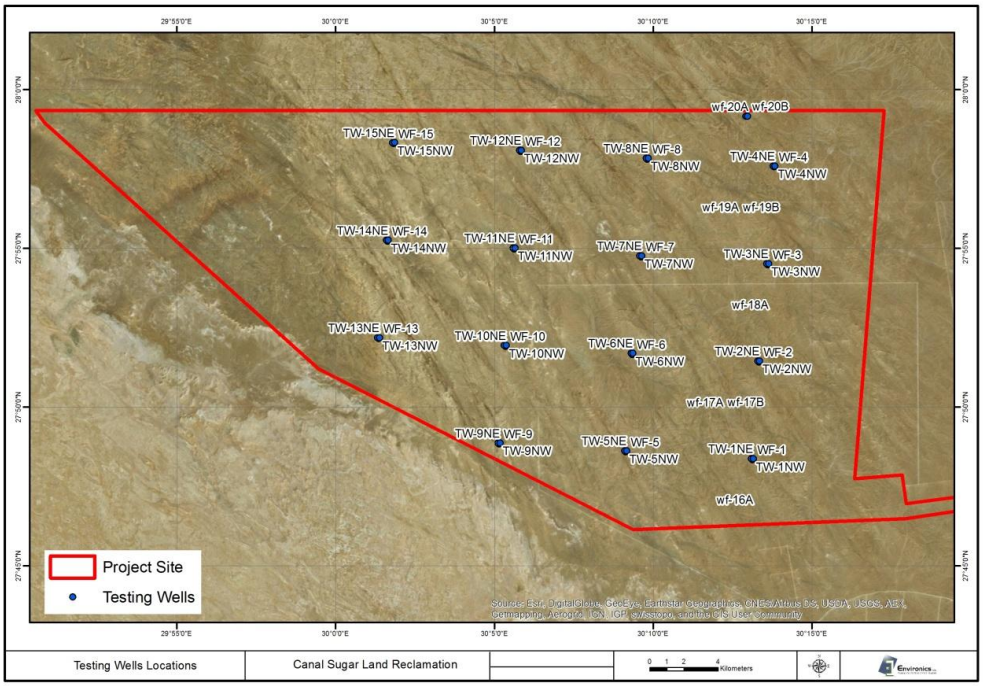


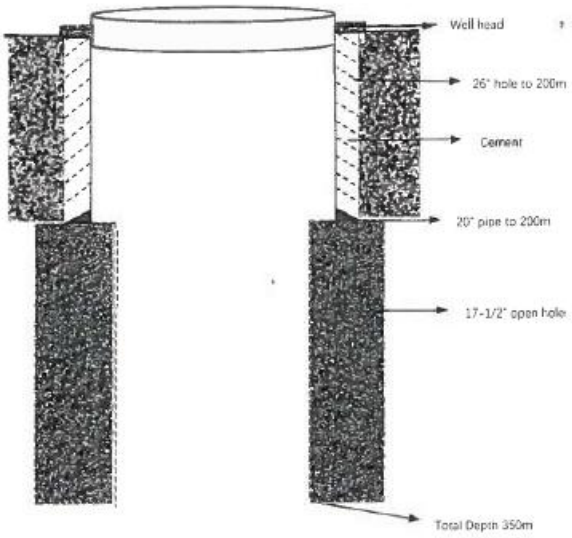
Figure 4-11: Distribution of testing wells

The test wells have been sized and drilled to have the ability to be future production wells. These wells have been drilled utilizing the mud rotary method through the unconsolidated overburden down to limestone.

Casing has been set and sealed into limestone in order to provide a cased pump chamber along with isolating the limestone and overburden aquifers from each other. The borehole penetrating the limestone aquifer has then been drilled utilizing the air-foam rotary method. This methodology has provided effective cleaning of the cuttings out of the well, along with indicating the presence of water bearing zones in the wells

In this context, Figure 4-12 below schematically presents the testing wells design.

Well Design For Canal Sugar Project In West Minia



#	Item	Description
1	General Information	
1.1	Project location	West Minya
1.2	Owner	Canal sugar
1.3	Contractor	ZPEC EGYPT
1.4	Number of wells	Total 300 wells
2	Wells Data	
2.1	Well Type	Vertical Well
2.2	Completion Type	Open hole
2.3	Well Design	26" hole drill to 200m, run 20" pipe (not confirm the type) and cement job. Drill 17-1/2"hole to TD 350m,open hole completion.

Figure 4-12: Testing wells description

No bentonite drilling muds are used in well drilling. This approach would avoid later need for bentonite removal from the walls of the wells, potentially using chemicals, and thus will prevent potential groundwater pollution. Figure 4-13 shows testing well drilling at the project site.

Figure 4-13: Testing well drilling at the project site

The results of the analysis clearly note that the limestone aquifer that has been penetrated is very robust and productive. It has been estimated that the overall static water level will decline approximately 12 meters over the first 10 years and then an additional 2 meters through a total of 60 years of continuous pumping. With the very high yields of most of the wells tested to date, this would provide the project's water requirements over that time period given the pump chambers that are available.

Each well will need to be scrutinized as part of the final system design and layout to determine the required pump setting, instantaneous flow rate, and required pump head to meet the needs of the system into the future. The anticipated 14 meter decline will need to be incorporated into that design. This decline is well within reason when considering the density and intensity of pumping that is anticipated. The system design can easily anticipate this type of decline over the years. If additional area is developed into irrigation the assumptions of this analysis will change and there will be potential impacts to the estimated aquifer decline.

The study also states that given the intensity of pumping that is anticipated for this project, the underlying aquifer certainly appears to be one of the most productive aquifers IRZ has been associated with. All indications are that the development can be irrigated long into the future.

b. Surface Water

There are no surface water bodies in the project site and surroundings. The nearest major sources of surface water are Bahr Youssef, Ibrahimya Canal, and the Nile River located respectively about 17, 23 km, and 26 km east of the project site as shown in Figure 4-14.

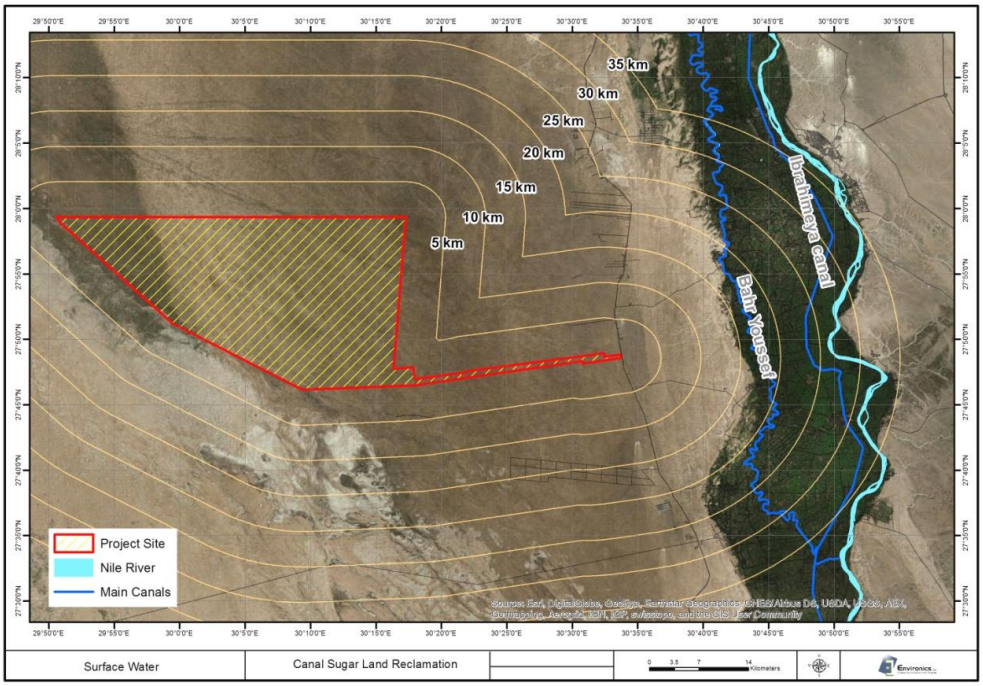


Figure 4-14: Location of the project site in relation to major surface waters

4.2 Biological Environment

The project is located in the wide Western Desert which covers about two thirds of the total area of Egypt. This desert extends from the Mediterranean coast in the north to the Sudan – Egypt border in the south and from the Nile Valley and Delta in the east to the Egypt – Libya border in the west.

The Western Desert can be divided from south to north into three principal physiographic regions as shown in Figure 4-15 (EEAA, 1993):

- The Nubian Sandstone Plateau sloping gradually toward the north from Gebel Uweinat and the Gilf Plateau to the fringe of the oases depressions.
- The Middle Limestone Plateau extending from about latitude 25° N to about 29° N. this plateau embraces a number of oases depressions including the inhabited Kharga, Dakhla, Farafra, Bahariya and Fayoum. The latter is connected with the Nile by Bahr Youssef irrigation canal; the other oases depend on groundwater resources from the Nubia Sandstone aquifers. The project site is located within this region of the Western Desert.
- The Miocene Northern Plateau that slopes towards the Mediterranean coast. This plateau embraces the inhabited Siwa oasis and the Qattara Depression.

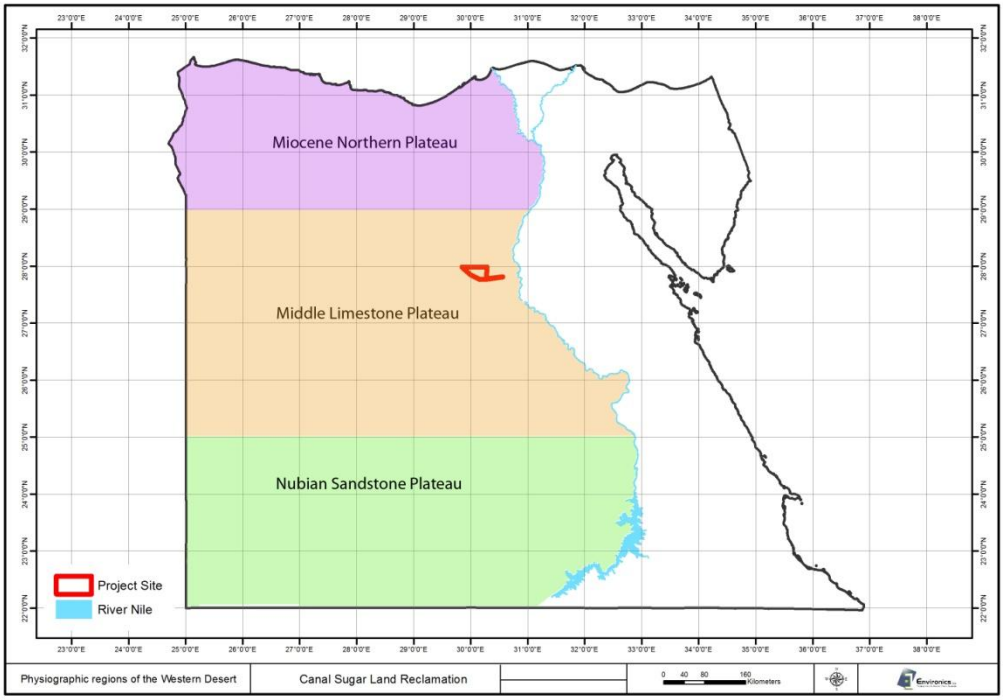


Figure 4-15: Principal physiographic regions of the Western Desert and location of the Project site

The Western Desert 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.

4.2.1 Project Wider Area

The project wider area is eco-geographically located in the Middle Limestone Plateau of the Western Desert while it is administratively located in Minya Governorate, which includes several types of habitats. Biodiversity is adapted to the different habitat types found within the project wider area. The wider area includes three main types of habitats:

a. ***Nile Valley:*** The farmlands of the Nile Valley provide habitat for a variety of weeds and ruderal plants in the fields, canal and drain banks. Some of these are exotic species that were inadvertently introduced but have now become naturalized. Also, a large variety of cultivated field and economic crops are of foreign origin. The Nile suffers from multiple anthropogenic stressors including pesticides and chemical fertilizers used in agriculture. It is expected that with agricultural expansion, many of the species of the Nile Valley would reach the project site, including several species of birds such as the Cattle Egret (*Bubulcus ibis*), the Red Fox (*Vulpes vulpes*) and pests including the African Grass Rat (*Arvicanthis niloticus*) and Black Rat (*Rattus rattus*).

b. ***Urban areas:*** consist of residential areas, schools, and other facilities normally found in cities and towns. These areas have mainly exotic

plants and trees introduced for ornamental purposes as well as a biodiversity associated with human activities such as the House Mouse (*Mus musculus*).

c. Middle Limestone Plateau Desert: Minya Governorate encompasses a large area of the Middle Limestone Plateau of the Western Desert characterized by a substantially dry sand plateau with very little or no precipitation (EEAA, 2003). The project is located within this area. The presence of water and vegetation in neighboring reclaimed desert farmlands (Figure 4-16) is expected to attract species from the Nile Valley that would otherwise avoid the desert habitat.

Figure 4-16: Neighboring farmland using drip irrigation

Figure 4-17 shows the wider area and its three main habitat types.

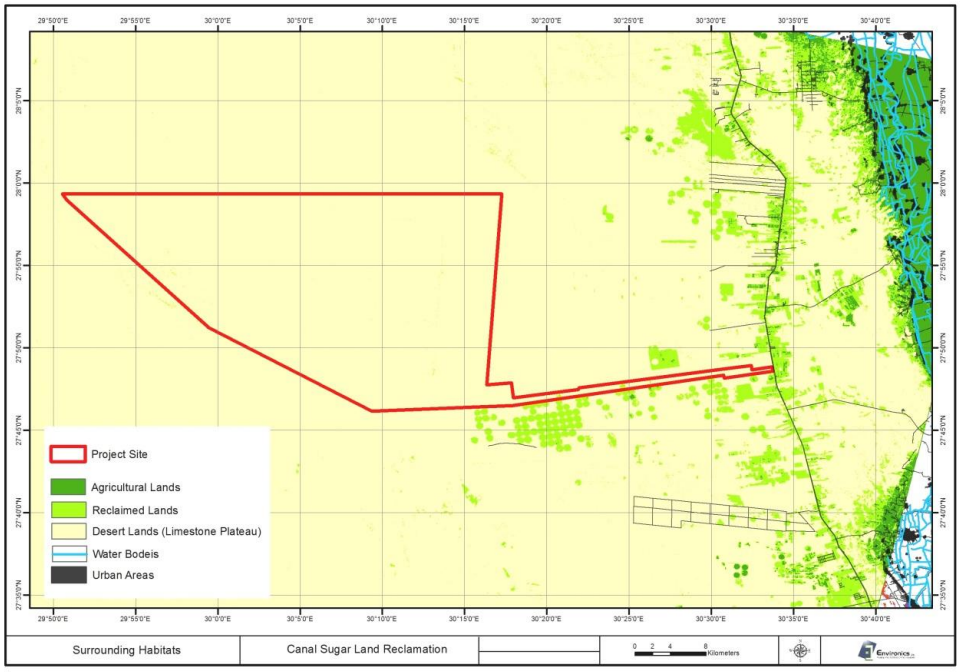


Figure 4-17: Surrounding Habitat Types

Some threatened species might be present in the wider area, as reported in literature. However, they are not expected to occur in the project area, except as vagrant species. The following table shows some species of concern reported from the wider area.

Table 4-4: Threatened and/ or protected fauna possibly occurring in the wider area

Scientific name	Common name	National classification	International classification
Gazella dorcas	Dorcas Gazelle	VU	VU
Vulpes zerda	Fennec Fox	EN	LC
Hyaena hyaena	Striped Hyaena	LC	NT
Gerbillus andersoni	Anderson's Gerbil	VU	LC
Canis anthus	Golden Wolf	DD	NE
Felis silvestris	Wild Cat	NE	LC
Varanus griseus	Desert Monitor	NT	NE
Eryx colubrinus	Theban Sand Boa	VU	NE
Naja nubiae	Nubian Spitting Cobra	NT	NE

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

4.2.2 Project Area

The project site is located within the Middle Limestone Plateau which is an extremely arid part of the Western Desert and practically rainless.

A site visit to the land reclamation project area took place on the 3rd of September 2018. The site visit indicated that the project area is mainly composed of a barren flat desert land with some elevated hills (Figure 4-18, Figure 4-19 and Figure 4-20). The site is almost totally devoid of vegetation with the exception of very few scattered shrubs.

Figure 4-18: View of the project site showing the absence of vegetation cover

Figure 4-19: Scattered desert shrubs recorded from the project site

As described earlier, there are various reclaimed farmlands neighboring the project site, mainly cultivated with fruit trees. The area has been altered by human activities including extensive land reclamation activities. Interviews with local communities indicated the presence of the Red Fox (*Vulpes vulpes*) as well as rodents associated with agricultural activities.

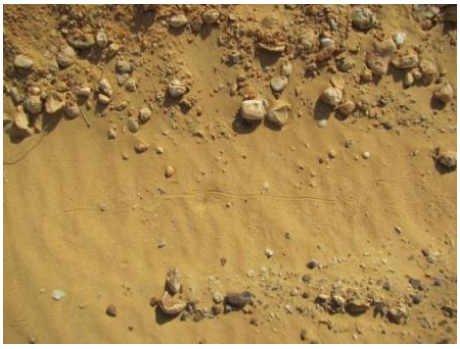
A previous site visit was conducted on the 8th of March 2018 at the sugar factory site where signs of foxes, lizards and small mammals were observed. As the factory location is closer to the existing land reclamation activities as well as to the Nile Valley agricultural areas, the observation of some species confirms their expansion coming from the Nile Valley as result of introduced agricultural and human activities, but these species are currently absent in the proposed land reclamation project site due to its aridity and the absence of vegetation cover.

Fox tracks

Car wheel tracks

Small mammal burrow

Scat of a carnivore



Lizard track

Lizard burrow

Figure 4-20: Signs and tracks of different fauna and human activities

Additionally, the Greater Hoopoe Lark (*Alaemon alaudipes*) was seen in the area (Figure 4-21). It is a breeding resident of arid, desert and semi-desert regions.

Figure 4-21: Greater Hoopoe Lark (*Alaemon alaudipes*) recorded next to the project area

On the other hand, as the reclamation land is further to the east within the site, vegetation cover is mainly absent with the exception of few scattered desert shrubs and no biodiversity was observed at the project site during the site visit of September 2018.

4.2.3 Natural Protectorates

Natural Protectorate areas are located far away from the project site, more than 100 km away, as shown in Figure 4-22. Accordingly, those areas have been scoped out from the ESIA as it will be highly unlikely that they will be affected from the project's activities. The nearest protected areas are:

- Wadi El-Rayan Protected Area and Important Bird Area (IBA), located about 105 km north of the project site;
- The White Desert Protected Area, located about 105 km southwest of the project site;
- Wadi Sannur Cave and Wadi El Assiuti protected areas, located at more than 105 km away northeast and northwest of the project site respectively.

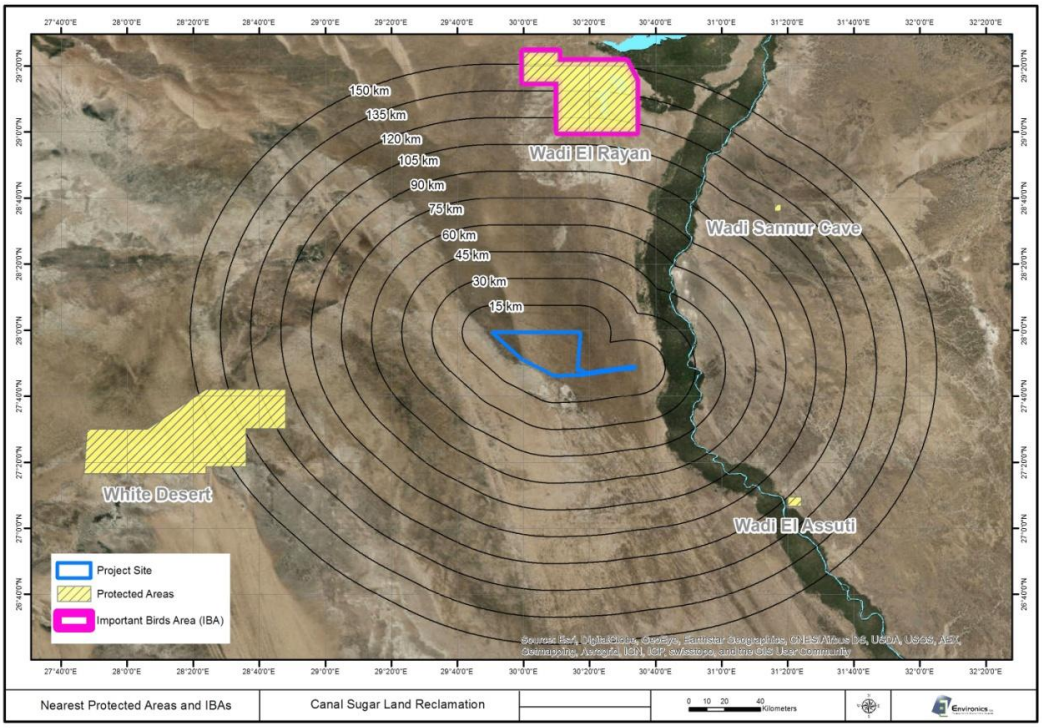


Figure 4-22: Map showing distances of sensitive areas from the project site

4.3 Socio-Economic Environment

4.3.1 General Background

The proposed project is located in the Western Desert of Minya Governorate. The total area of Minya governorate covers 56587 km2, representing about 5.3% of the Egypt's area. The populated area is around 5293.88 km^2, representing 7.5% of the total governorate's area. The governorate is divided administratively and encompasses 9 *Markaz*, 9 cities, 61 rural local units, 360 villages and 1715 Kafrs and Nagaas (hamlets and settlements).

Although the project is within the administrative borders of Minya Governorate; however, it is not affiliated to a certain administrative *Markaz* in Minya (Figure 4-23). The legal jurisdiction of the land lies within the scope of the General Authority for Reconstruction Projects and Agricultural Development – Ministry of Agriculture and Land Reclamation. In this respect, the socio-economic baseline information will be mainly provided on the governorate level and where available on two administrative centers of Abu Qurqas and Mallawi as they are the nearest administrative centers to the project's location.

The socio-economic data provided mainly rely secondary data sources and on publicly available and accessible information such as those of the Central Agency for Public Mobilization and Statistics (CAPMAS), documents and reports covering the same area, as well as satellite images. In many cases available CAPMAS data are not the most updated data; however, it has been used for this document to provide an indication of the key features and

characteristics of the project area. More updated and comprehensive data not available within the public domain would be sought or purchased at the ESIA stage, as needed. Findings of the field visits were also used, as relevant, to refine and supplement information on the project site and nearby sensitivities. The figure below shows the boundaries of the project within the governorate and the boundaries of the administrative centers.

The nine administrative centers (*Markaz*) of Minya Governorate are:

1. Al Adwah
2. Maghagha
3. Bani Mazar
4. Matay
5. Samalot
6. Al-Minya
7. Abu Qurqas
8. Mallawi
9. Deir Mawas

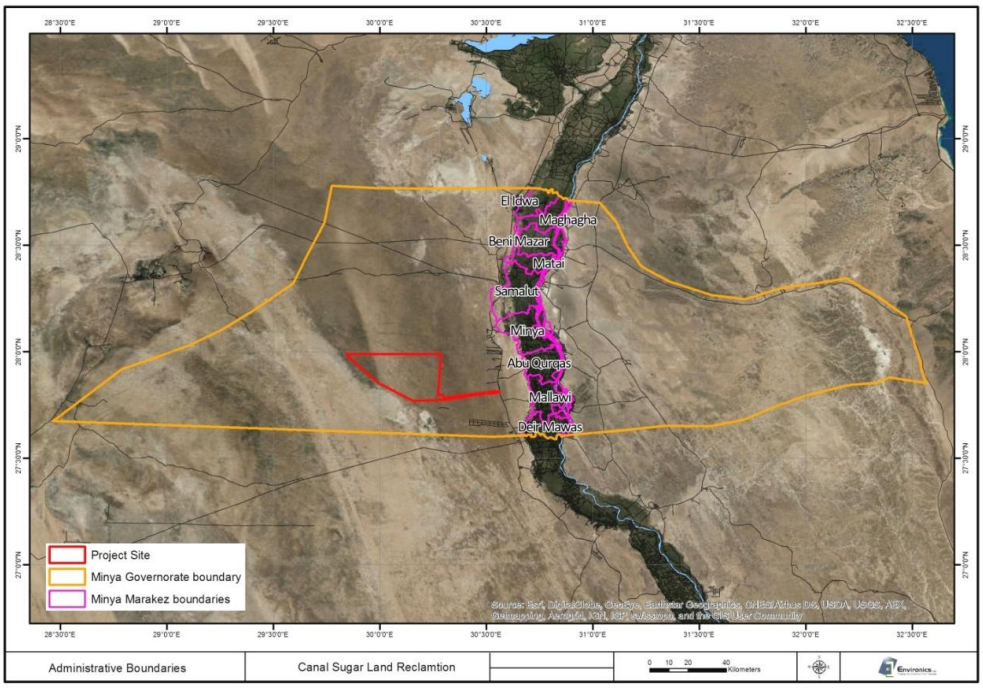


Figure 4-23: Minya borders in relation to the project site

The project is located on the Giza - Luxor Desert Road about 35 km from Minya city. The villages of Balansoura (*Markaz* Abu Qurqas) and Beni Khaled (*Markaz* Mallawi) are the closest settlements to the project, located at a distance of about 15.5 and 18.5 km respectively. There are some agricultural reclamation projects in the project area and Savola Company is located about 1 km south of the project site. Figure 4-24 shows the location of proposed project in Egypt.

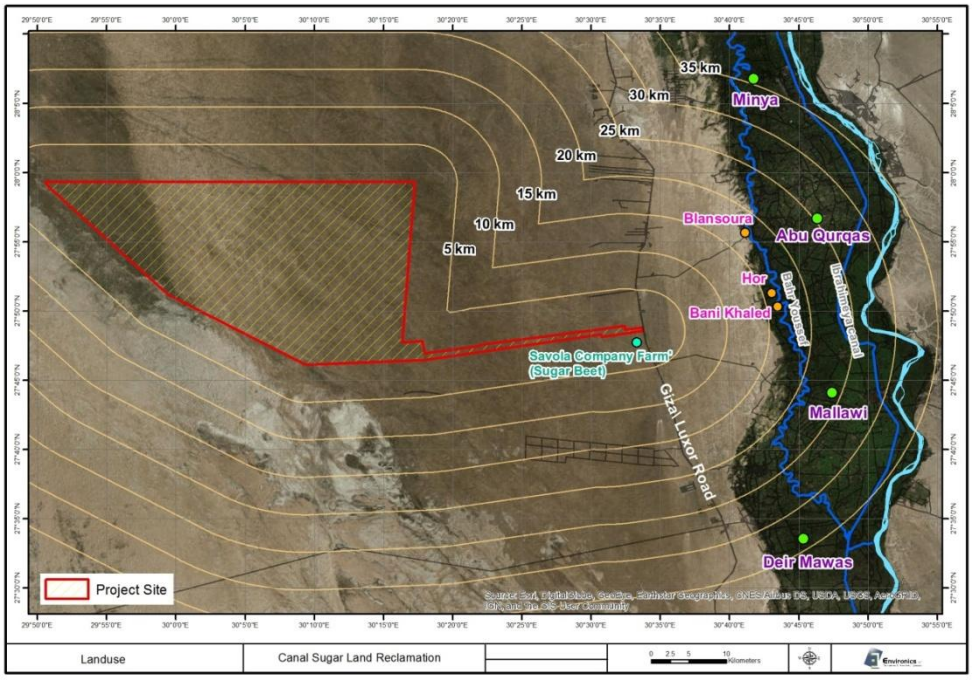


Figure 4-24: Map showing the location of the project site in relation to the nearest settlements

4.3.2 Demographic Profile

a. Population size

The population of the governorate reached 5,497,095 in 2017 (CAPMAS, 2017) and the majority of the population of about 82% of the total population lives in rural areas which is higher than the national average of 57%[2]. The highest residential density is concentrated by the Nile Valley. The total population of Balansoura in 2006 was 13,379 people and about 2,973 households, representing an average family size of 4.5 members, while the population of Beni Khaled was 12,069 people.

b. Gender ratio and distribution across the administrative centers

Table **4-5** shows the males to females' ratio across the governorate and the administrative centers of Abu Qurqas and Mallawi by sex and on levels of urban and rural areas.

Table 4-5: Distribution of the population by sex in Minya governorate on the level of urban and rural in 2012

Administrative Center	Urban			Rural			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Abu Qurqas	33545	33050	66595	244328	227110	471438	277873	260160	538033
Ratio Male to Female	1.014977307			1.075813482			1.068085025		
Mallawi	82271	78695	160966	333032	314427	647459	415303	393122	808425
Ratio Male to Female	1.045441261			1.059171127			1.056422688		

[2] CAPMAS, Annual Bulletin of Births & Deaths of 2016.

Administrative Center	Urban			Rural			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Minya Governorate	455722	446105	901827	1990959	1899884	3890843	2446681	2345989	4792670
Ratio Male to Female	1.021557705			1.047937137			1.042920917		

Source: El-Bayoumi & Ali, 2015[3]

The nearest residential communities to the project area is Balansoura village affiliated to *Markaz* Abu Qurqas located about at 15.5 km and then the village of Beni Khalid (*Markaz* Mallawi) at about 18.5 km. In addition, there is a residential area for Savola employees south of the Canal Sugar factory about 1 km southwards.

c. Age structure

The age distribution for the whole governorate is shown in Table 4-6 below for the year 2017.

Table 4-6: Age distribution of the population in Minya, 2006

Gender	0-5	5-14	15-44	45-59	60+
Males	12.1	25.4	46.1	5.7	10.9
Females	12	24.1	46.9	6.1	10.8
Total	12.1	24.7	46.5	5.9	10.9

Source: CAPMAS, 2017 [4]

d. Households

The average household size and number of households for the whole governorate as well as in Abu Qurqas and Mallawi are presented below in Table **4-7**.

Table 4-7: Population by sex, number of households & the average household size by administrative centres in Minya, 2011

Administrative Center	Status	No. of Households	Average Household size
Abu Qurqas	Urban	14414	5
	Rural	102019	5
Mallawi	Urban	34824	5
	Rural	140085	5
Minya Governorate	Urban	196224	5
	Rural	840583	5

Source: Source: Al-Minya Governorate: Information and Decision Support Center.

e. Religious composition

Minya governorate has the fourth largest proportion as well as the fourth highest number of Christians from all governorates. About 12% of the governorates population is Christians while the rest of the population is Muslims[5]

[3] El-Bayoumi and Ali (2015). Assessment of Urban Sprawl on El Minya Archeological Sites, Egypt, *Journal of Applied Sciences*

[4] CAPMAS Statistical Yearbook for 2017

[5] Characterizing the Copts in Egypt: Demographic, socioeconomic and health indicators, 2013

f. Education and literacy rates

Illiteracy rate among those over 10 years reached 37% in Minya in 2017 which is higher than the national average of 25%,. Illiteracy rate among females is (45%) higher than males (29%) in the governorate[6]. The percentage of illiterates in Abu Qurqas is 45.4% of the total population older than 10 years whereas in Mallawi, the illiteracy is 48.5%, both higher than the illiteracy rate at the governorate level.

Some children drop out of schools as sometimes low income families encourage their children to work for extra income. Table 4-8 shows the number and percentage of the labor force in Minya Governorate

Table 4-8: Number and percentage of the labor force (10 years & above) by education status and gender in Minya Governorate, 2016

Gender	Illiterate	Read & Write	below intermediate	intermediate	above intermediate	university degree	above university degree	Total
Males	2938	1458	1534	141	4398	468	1343	12218
Females	1576	333	412	45	1321	86	715	4489
total	4554	1792	1947	186	5718	553	6958	16707
Total (%)	27.3	10.7	11.6	1.1	34.2	3.3	11.7	

Source: CAPMAS, 2017[7]

Table **4-9** below shows the number of different secondary education schools. There are two primary schools, one preparatory and one secondary school in Balansoura.

Table 4-9: Secondary education types across the governorate by number and sex of students for 2015/2016

#		General Secondary education	Industrial secondary education	Business Secondary education	Hotel secondary education	Agricultural secondary education
Number of schools		105	45	16	2	90
Number of Students	Males	29235	39441	9173	401	2612
	Females	22662	27159	27890	128	0

Source: CAPMAS, 2018[8]

As illustrated, the number of graduates from agricultural schools in Minya was 2612 male students in the year 2015/2016 and no female graduates.

Technical schools are most common in the governorate. Reportedly, technical schools do not provide students with the needed skills for the work market, especially in the technical fields of modern irrigation and agriculture technologies[9] [10].

[6] CAPMAS, 2017
[7] CAPMAS, Annual Bulletin for labor force research of 2016
[8] CAPMAS, 2018: Bulletin of pre-university education 2015/2016
[9] IOM & TNS (2014), Minya Labor Market Analysis
[10] interviews with local communities in Balansoura

There are schools in primary, preparatory and secondary education in Minya. There is also on public and one private university in Minya[11]. It also includes a school for the deaf and dumb. The number schools in the governorate reached 3005 including up to 28250 classes, in 2016/2017[12].

g. Vocational training centers

There are 25 vocational training centers in Minya governorate as of the year 2012/2013[13]. There is one in Mallawi and one in Abu Qurqas. These training centers offer crafts training and vocational development[14].

4.3.3 Public Health

a. Public health status

Hepatitis diseases as well as respiratory system diseases are highly common in Minya. Total number of viral infection cases reached about 3,411,276 cases (including Virus C) from 1-1-2004 till 30-6-2005. During the same period, the number of cases infected by parasitic diseases was 11,304 cases, renal failure cases was 3,324, liver diseases cases was 20,057, and respiratory system diseases cases was 17,284. Out of examinations carried out on 1,442,385 people in the same period, 11% of people examined were reported to have Bilharzia and about 8% had Esporosest.

b. Health centers and hospitals

There are only one health unit in Balansoura village. Reportedly, it does not have the capacity to provide adequate health services. On the governorate level, there are 49 health care services in Minya including 21 private hospitals. Abu Qurqas has a public hospital at about 48 km from the project site, 2 private hospitals and 10 ambulance cars. As reported by local communities within the project area, Mallawi has one General hospital at about 35 km from the project site, which is the nearest hospital to the project area. Reportedly, it does not have intensive care facility. There is also one private hospital, EL Nil Hospital, which has better capacities than Mallawi general hospital and provides 24 hrs services. There are also two ambulance cars one at Mallawi checkpoint and another at Abu Qurqas checkpoint.

There are 3 specialized hospitals on the governorate level and 12 ambulance cars. There is one blood bank per each administrative center of Abu Qurqas and Mallawi[15].

There are about 50 private local clinics in the governorate distributed in different localities of the governorate, mostly belonging to Muslim and Christian NGOs. They concentrate in Minya and Beni Mazar localities

[11] Public Minya University and Deraya private university
[12] Ministry of Education
[13] Information & Decision Support Center, Minya Governorate Description, 2014
[14] IOM & TNS (2014), Minya Labor Market Analysis
[15] EEAA (2007) Environmental description of El-Minya Governorate

(20 clinics in each of them respectively). These clinics depend on individuals and the NGO to which they belong as a main source of financial support in addition to their service fees. These clinics have an important role in providing health care for people. In addition to their low fees, the level of the service is better than that of the governmental healthcare facilities.[16].

4.3.4 Economic Profile

Although Minya is mainly an agriculture oriented governorate, however, various industrial activities have been established particularly in food processing, spinning and textile and chemicals industries.

a. Agricultural sector

Agriculture is considered the main economic activity in the governorate of Minya. It is known for cultivating cotton, onions, wheat, maize, clover and sugar cane. Clover and wheat are the most important crops representing 80% of the total winter crops. Summer crops are mainly maize presenting 67% of the area of summer crops[17]. Moreover, Minya represents one of the top four major producers of sugar cane[18]. In 2016, the agriculture sector employed about 32% of the labor force in the governorate.[19]

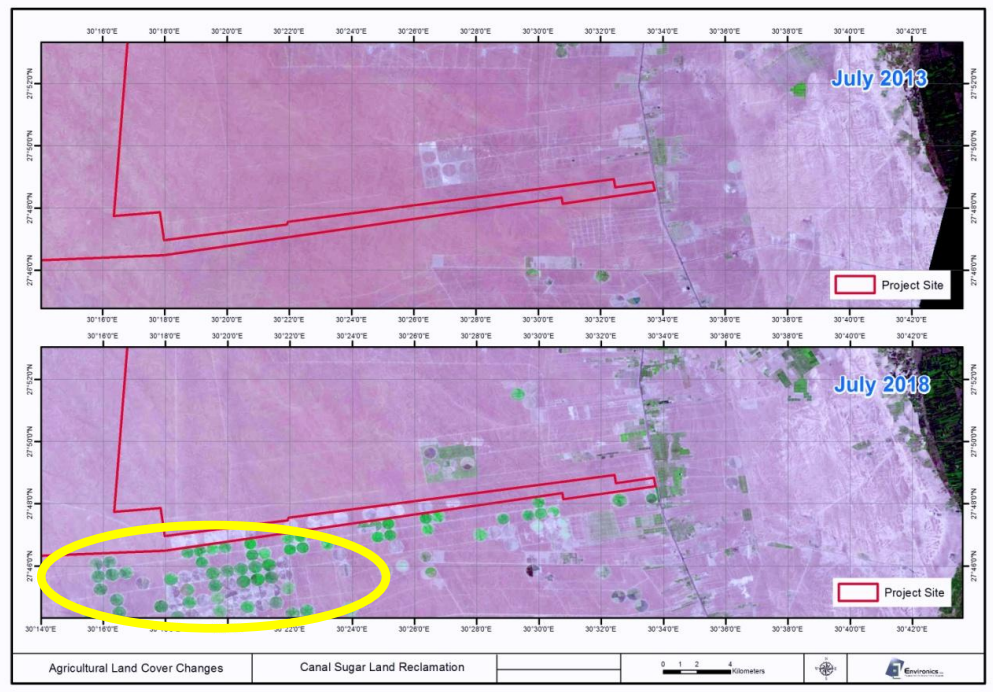


Figure 4-25: Expansion of agriculture during the period 2013 – 2018

[16] Ibid
[17] Information & Decision Support Center, Minya Governorate description, 2014
18 El-Sharif et al., (2009). *Economic Potentialities Achieve Self-Sufficiency from Egyptian Sugar under the International Variables*
[19] CAPMAS, Annual Bulletin for labor force research of 2016

Currently, parts of desert land around the project site have been reclaimed for agriculture, relying on groundwater sources. The previous figure shows agricultural expansion around the eastern part of the project site during the period 2013 – 2018.

During the site visit, there were indications that some previous agricultural activities have been taking place on the track to the land reclamation area. It was clarified that such tracks are result of previous non-authorized attempts to utilize the area before it was acquired by Canal Sugar.

The table below shows the amount of cultivated lands and reclaimed lands and their sources of irrigation in the neighboring administrative centers.

Table 4-10: Survey of cultivated and reclaimed lands in Minya by Administrative Centre (Feddans)

Administrative Center	Cultivated land		Reclaimed lands	Land under process of reclamation	Lands taken away from agricultural plot	Irrigation System		
	Within boundary	Outside boundary				Flood Irrigation	Drip	Sprinkler
Abu Qurqas	51862	1100	940	40240	1703	Lands inside the boundary	Lands outside the boundary and the desert strips	
Mallawi	63986	1356	1715	46546	1447			
Minya Governorate	427225	53401	59621	216092	10792			

Source: Source: Al-Minya Governorate: Information and Decision Support Center. 2011

b. Poverty rates

Minya is one of Egypt poorest governorates and ranked last among all Egyptian Governorates in the Human Development Index rank[20]. That combined with a population growth of 28% increasing by approximately one million in 6 years to reach 5 million in 2015, poverty rates are increasing; people living under poverty line in Minya have doubled from 15% to 30.9% from 2004 to 2009[21]. Communities living in the urban part of the governorate enjoy higher access to utilities, higher education status, higher job stability and productivity than the rural areas[22].

4.3.5 Labor Market

a. Employment

As of 2016, the total labor force is 1,670,700 while those employed are 1,475,800 leaving 194,900 unemployed[23]. This unemployment rate of 11.6% is relatively lower than the national rate of 12.5% according to CAPMAS (2016). 44.54% is the rate of unemployed males from the total unemployed persons in Minya[24].

[20] General Authority for Urban Planning, Future vision and supporting projects for the development of Minia Governorate, 2017
[21] UNESCWA, Population and Development Report. Issue 7: Overcoming Population Vulnerability to Water Scarcity in the Arab Region
[22] General Authority for Urban Planning, Future vision and supporting projects for the development of Minia Governorate, 2017
[23] CAPMAS 2016
[24] CAPMAS, Annual Bulletin for labor force research of 2016

Table 4-11 below shows the age structure of the unemployed persons in Minya.

Table 4-11: Age structure of the unemployed persons (10 years & above) in Minya Governorate (hundreds) in 2016

Gender	Up to -15	-20-24	-25-29	-30-34	-40-44	-50-54	60-64	Total
Males	154	509	98	65	28	12	2	868
Females	215	371	212	242	33	6	0	1081
Total	369	881	310	308	61	18	2	1949
Total (%)	18.9	45.2	15.9	15.8	3.1	0.9	0.1	100

Source: CAPMAS, 2017[25]

Table 4-12 shows the education level of unemployed persons across the governorate. It shows that more than half of the unemployed persons are of intermediate technical education and 20% are university graduates implying a negative relationship between level of education and employment. This might be because the governorate is mostly rural relying on agricultural activities which may not be providing opportunities to people with other types of higher education.

Table 4-12: Education level of unemployed persons (10 years & above) in Minya Governorate (hundreds) in 2016

Gender	Illiterate	Read & Write	Below intermediate	Intermediate	Intermediate technical	Above intermediate (technical but precollege)	University degree & above	Total
Males	66	20	88	40	441	21	194	868
Males (%)	3.386352	1.0261673	4.515136	2.0523345	22.626988	1.0774756	9.9538225	
Females	182	37	25	4	595	22	215	1081
Females (%)	9.3381221	1.8984094	1.2827091	0.2052335	30.528476	1.128784	11.031298	
Total	247	57	114	44	1036	43	409	1949
Total (%)	12.7	2.9	5.8	2.3	53.2	2.2	21	100

Source: CAPMAS, 2017[26]

Table 4-13 below presents the major characteristics of Minya's labor market.

Table 4-13: Facts on unemployment in Minya in 2016

Item	Value
Total labor force (thousand persons)	16707
No. of employed persons (thousand persons)	14759
No. of unemployed persons (thousand persons)	1949
Labor force (% of population)	30
Rate of unemployment (%)	11.6
Females (% of work force)	29
Unemployment rate of higher education graduates (%)	21
Unemployment rate of intermediate and above intermediate education graduates (%)	57.7

Source: CAPMAS, 2017[27]

[25] CAPMAS, Annual Bulletin for labor force research of 2016
[26] CAPMAS, Annual Bulletin for labor force research of 2016

b. Child labor

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[28].

c. Rate of internal migration to the governorate

In 2006, Minya had approximately 30,000 migrants from other governorates, with 5,000 (approx.) moving to the governorate for work reasons while the highest percentages were for marriage reasons[29].

Minya is considered to be repellent with its people migrating north to Cairo which accommodates for 78% of the total migrants from the governorate, followed by the canal governorates and Alexandria[30].

d. Labor force engagement in economic activities and women participation in the workforce

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 4-14 below presents the distribution of those employed in Minya across different economic activities.

Table 4-14: 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[31]

[27] CAPMAS, Annual Bulletin for labor force research of 2016
[28] 2008 laws, Mohamed Sekeeker. An Exploratory Study on Child Domestic Workers in Egypt
[29] Central Agency for Public Mobilization and Statistics (CAPMAS); Statistical Yearbook. 2009
[30] General Authority for Urban Planning, Future vision and supporting projects for the development of Minya Governorate, 2017
[31] Annual Bulletin for labor force research of 2016

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[32].

4.3.6 Infrastructure, Utilities and Services

a. Potable water

Table 4-15 shows the production and consumption rates of potable water across the governorate as well as the number of water stations.

Table 4-15: Total potable water stations, sources, production and consumption in Minya (1000 m^3/day) 2015/2016

Number of stations		Total quantity of water produced (million $m^{3)}$		Total water produced	Total water consumed
Surface water	Groundwater	Surface water	Groundwater		
80	119	228.5	59.2	287.7	186.7

Source: CAPMAS, 2015/2016[33]

Table **4-16** below shows the amount of potable water quantities for the cities of Abu Qurqas and Mallawi.

Table 4-16: Potable water quantity in Abu Qurqas & Mallawi (1000 m^3/day)

Administrative Center	Amount of water produced	Amount of water consumed
Abu Qurqas	40.4	33.76
Mallawi	53.3	43.51

Source: Information and Decision Support Center, 2010

b. Sewage systems

There are 12 sewage stations in Minya as of the year 2015/2016 and an actual capacity of 132,000m3/day as shown in Table 4-17.

Table 4-17: Sewage systems in Minya and treatment and sanitation capacity in 2015/2016

Component	#
No. of Sewage stations	22
No. of Sewage treatment stations	12
Capacity of sanitation (thousand m^3/day)	132
Quantity of treated wastewater (million m^3)	48.3

Source: CAPMAS 2015/2016[34]

As per 2007, sewage services were limited to four cities only (Minya city – Abu Qurqas – Adwah – Deir Mowas). Sewage service in the villages were not available expect for Bahnasha village. There are two plants under construction for two villages (Belga in Deir Mowas – Beni Ebeid in Abu Qurqas). Table **4-18** shows the sewage systems available in Abu Qirqas and Mallawi as of the year 2007.

[32] IARIW & CAPMAS (2015), An Analysis of the Gender Pay Gap in the Egyptian Labour Market
[33] CAPMAS, Bulletin: Drinking water and drainage statistics 2015/2016
[34] CAPMAS, Bulletin: Drinking water and drainage statistics 2015/2016

Table 4-18: Sewage systems in Abu Qurqas and Mallawi (1000m^3/day) in 2007

Administrative Center	No. of sewage treatment stations	Amount of Sewage
Abu Qurqas	1	40
Mallawi	0	--

Source: EEAA, 2007[35]

Treated sewage from each of Minya and Abu Qurqas station is discharged into to Mohit drain, then to the Nile. The rest of the stations drain in sub drains that end up in Mohit then to the Nile.. Currently there are no methods for reusing treated or untreated sewage.

25% of the population living in Minya has access to sewage systems while 13% have no access to any kind of sanitation. The rest of the governorate mainly depends on open-bottom tanks or septic tanks to dispose of sanitary waste[36].

c. Police stations

There are 15 police stations distributed across *Markaz* and cities of Minya[37]. The closest police station from the project's location is in Mallawi.

d. Religious services

Table 4-19 below shows the number of mosques and churches in the governorate in 2010.

Table 4-19: Number of mosques and churches in Minya in 2010

Total number of Mosques			Total number of churches		
Urban	Rural	Total	Urban	Rural	Total
324	3416	3740	85	321	406

Source: Minya Governorate[38]

e. Roads and transportation

The transportation network available within Minya Governorate includes 1,828 km main paved roads and 565 km unpaved ones[39]. The project location in other governorates relates to a group of regional road network, Giza / Luxor road (Western Desert), Aswan agricultural road, and Cairo / Assiut road. The project is about 95 km north of Assiut International Airport.

f. Agricultural waste management

There are two waste recycling plants and the production of organic fertilizers (in Mallawi and Minya) that use agricultural waste, There are also currently three factories that produce animal feed using agro-

[35] EEAA (2007) Environmental description of El-Minya Governorate
[36] General Authority for Urban Planning, Future vision and supporting projects for the development of Minia Governorate, 2017
[37] Minya Governorate Description, 2014
[38] About Minya Governorate, Minya Governorate website, 2010
[39] Ministry of Transportation; Ministry of Interior; General Authority for Roads and Bridges. 1/1/2007

industrial residues. However, daily generated agricultural residues are usually burned by farmers[40].

g. Social affairs and Non-Governmental Organizations (NGOs):

Table 4-20 below shows the level of social services including all the following.

Table 4-20: Social affairs and services in Minya as of 2013

Item	#
No. of social services units	130 units
No. of persons per social services unit	3,743 persons
No. of insured persons in social insurance system	290,040
No. of beneficiaries of social security	114,640 cases
Disbursed amounts of social security fund	289.83 million L.E
Amount of disbursed funds per beneficiary	2528.19 L.E per case
No. of productive family projects	84,140 families
No. of community associations	1513 associations
No. of persons per community association	3,220 persons
No. of children day care homes	755 day care homes
No. of children in day care homes	50,850 children
Avg. no. of children per day care homes	67 children

4.3.7 Vulnerable Groups

a. Children

As illustrated in the labor structure earlier that child 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. Also children are expected and pushed by their families to work due to poverty rates which make them even more vulnerable[41].

b. Gender issues

Women are considered to be vulnerable in Upper Egypt with high rate of traditional patriarchy. Moreover, in the labor market, 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[42].

4.3.8 Archeological Sites

Minya is rich in historical heritage, with 39 archaeological sites (Ministry of Culture, 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 the Tuna El Gabal, 17 km southeast of the site and Alashmonin 25 km east of the site in the center of

[40] Minya Environmental Profile, EEAA
[41] International Labour Organization and CAPMAS (2012).Working Children in Egypt: Results of the 2010 National Child Labour Survey
[42] IARIW & CAPMAS (2015) An Analysis of the Gender Pay Gap in the Egyptian Labour Market

Mallawi. Balansoura is located 17.5 km northeast of the site at Abu Qurqas as illustrated in Figure 4-26.

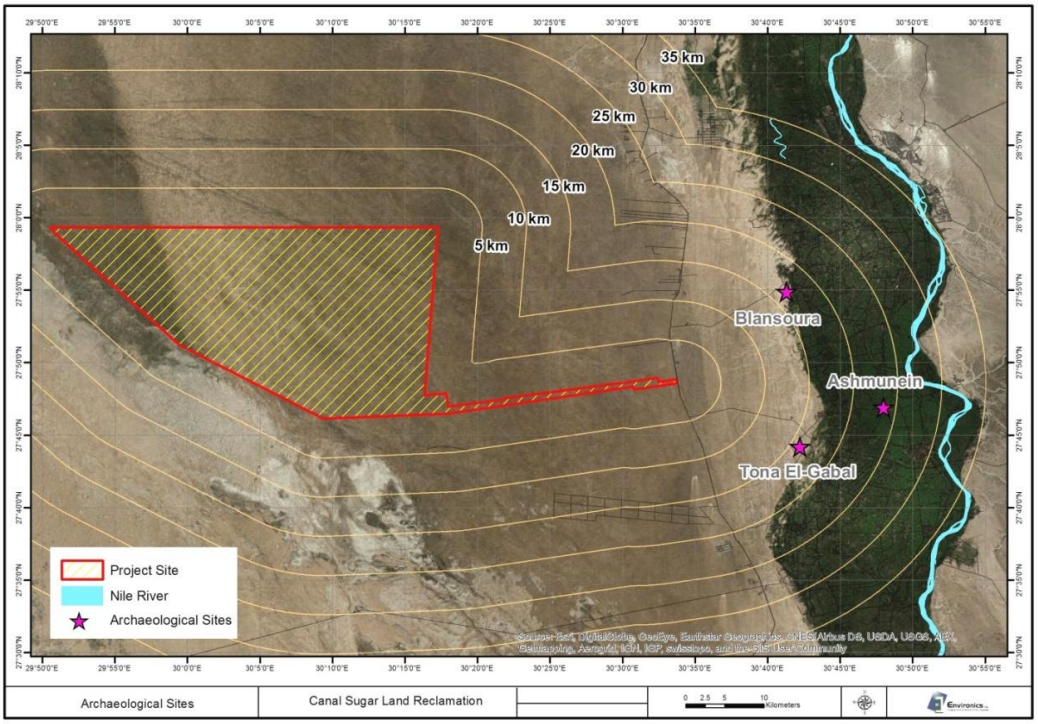


Figure 4-26: Nearest archaeological sites to the project area

a. Tuna El Gabal

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 (Minya Governorate, 2013; Information Centre 2018). The area is a destination for many visitors and is overseen by the Supreme Council of Antiquities.

b. Alashmonin

The region includes temples of all ages, such as the Pharaonic Temple of Ramses II, the Agrique Temple of Philippe Arheidos and the Temple of Ptolemy 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 (Minya Governorate, 2013; Mohammad Tharwat, 2017).

c. Balansoura

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

5. Analysis of Alternatives

The analysis of alternatives is based on the evaluation of numerous project alternatives during the conceptual and pre-feasibility design phases.

When evaluating alternatives, particular emphasis was placed on the environmental and social implications of the alternatives to ensure that the option selected is environmentally sound and meets the Egyptian regulations as well as the international regulations.

5.1 No Project Alternative

As previously mentioned the main purpose of this project is the cultivation of sugar beet for sugar extraction and refining. The overall project will meet growing domestic demand and is expected to substitute about 75% of sugar imports. Despite the increase in sugar production in Egypt as a result of the increase of sugar crops cultivated area, the local market is suffering from a deficit in the supply of sugar locally, and a substantial quantity of sugar is imported. The quantity of beet sugar imported in 2016/2017 was about 353 thousand tons[1]. The local production of beet sugar decreased from 1,347,283 tons in 2015 to an amount of 1,265,597 thousand tons in 2016[2]. Consequently and along with the local decrease of cane sugar from 1,025,149 tons in 2015 to 93869 tons in 2016, sugar production in general dropped by 7.4% in 2016 from the previous year.

Therefore, the project will induce the transformation of the economically unproductive desert to a productive farm land, which has significant advantages for the national economy as well as the local communities. The obvious economic spin offs from these activities are long-term and far reaching, and will include the following benefits:

- Income generation for out-growers
- Significant work opportunities
- Various up and down-stream benefits to suppliers of goods and services
- Reduce reliance on imports of sugar as well as other rotational crops which will be produced locally.

In addition, the process of land reclamation involves considerable technology transfer, from a variety of local and international experts, in all disciplines of engineering, management and crop sciences.

Sugar beet was first commercially grown in Egypt in 1980 and in 2017 was grown in excess of 600,000 feddans. Whilst the cropped area of Sugar cane has remained static at 330,000 or declined, the sugar beet production has rapidly increased. This has partially met the national sugar demand and is both

[1] Central Agency for Public Mobilization and Statistics (CAPMAS)
[2] Annual Report of Council of Sugary Crops - Ministry of Agriculture, 2017

more profitable for the farmers and consumes about 50% less water and land than Sugar Cane[3].

It is worth mentioning that if the "no development" alternative is selected, the land proposed for the development would still be used for other agriculture projects as the site is owned by the General Authority for Reconstruction Projects and Agricultural Development (GARPAD) – Ministry of Agriculture and Land Reclamation, and has been designated for such projects.

Due to the beneficial type and nature of the project, the No Project Alternative was not considered as it does not embrace such profits.

5.2 Site Location Alternative

Sugar beet can be grown in all types of sandy, saline, calcareous soils, as it is very tolerant in high pH and salinity conditions. It is ideally grown in deep soils (+40cm root zone) and is limited in rocky soils having shallow soil depths. Therefore the nature of the soil in the Minya desert is suitable for growing sugar beet. Accordingly, about 60% of the allocated land area will be cropped with sugar beet and other crops, whilst the remaining other areas, about 40% of the total land area, is not suitable for crop production mainly due to the elevated topographic features and/or the shallow depths of the soil. These uncultivated areas could be potentially used for other agricultural related activities in the future.

Additionally the site is owned by GARPAD and is designated for such projects. Furthermore the project is located in an unoccupied desert land devoid of vegetation away from any protected area or important bird areas.

In this context, the proposed land reclamation project is located within the site area, in the vast and largely unoccupied Western Desert, in an area owned by GARPAD. Therefore this location is considered the most suitable to establish the project and other locations has not been considered.

5.3 Cultivation Alternatives

5.3.1 Fertilizers Alternative

Fertilizers solubility can be classified into two types: soluble and insoluble.

- ***Soluble fertilizers***
  Soluble fertilizers have a higher nutrient release rate and will need to be applied more frequently. Farmers or operators can adjust the application rate and concentrations. Additionally, nutrients can reach the crops rapidly. However, it may lead to over saturation of soil with nutrients or nutrient leakage.

[3] The Product Carbon Footprint of EU Beet Sugar, Sugar Industry Journal, Issue 137 (62) March-April 2012

- ***Insoluble fertilizers***
  Insoluble fertilizers on the other hand have a slower nutrient release rate and do not need to be applied on a continuous basis which would reduce the application costs. However, rate of release cannot be adjusted after application. The project will use insoluble fertilizers as it can prevent excess nutrient leakage and over saturation of soil with nutrients[4,5].

5.3.2 Crop Rotation Alternative

- ***Planting Sugar Beet as a solo crop***
  Planting the same crop for several years within the same area will deplete the soil from any nutrients, additionally; it may cause the buildup of weed populations and will help pest populations to establish. However, no planning for crop rotation is required[6].

- ***Crop rotation***
  Crop rotation requires careful planning of crops replacements schedules. This technique prevents soil exhaustion and deterioration and minimizes pest and disease incidents on the crop. Additionally, it is an economic way to manage soil nutrients and controlling weeds and pests as well as preventing soil erosion (Alhameid et al., 2017)[7].

  Therefore, rotation of sugar beet, wheat, chick peas, potato, corn silage and grain corn will take place for this project.

5.3.3 Seed Type Alternative

- ***Multigerm seeds***
  In terms of agroeconomic assessment, multigerm seeds produce seedling crowdedness that may require high labour activity (i.e thinning activity) (Springer Science + Business Media, 2008) [8].

- ***Monogerm seeds***
  In previous studies, monogerm seeds established higher seed plants with higher numbers of shoots than multigerm seeds (Jagosz, 2015)[9].

  Mono-germ seeds will be used since it has more agro-economic advantages, and reduces the high labor cost arising from seedling crowdedness produced from multi-germ seeds (Springer Science+Business Media , 2008).

[4] University of California Agriculture and Natural Resources (2019) Water insoluble nitrogen (WIN)
[5] Premier Tech Horticulture (PROMIX), (2019) Pros and Cons of Using Controlled-Release Fertilizers in the Greenhouse.
[6] Integrated Water Resources Management (IWRM). Crop rotation.
[7] Alhameid, A., Tobin, C., Maiga, A., Kumar, S., Osborne, S., & Schumacher, T. (2017) Intensified Agroecosystems and Changes in Soil Carbon Dynamics. *In*: Soil Health and Intensification of Agroecosytems (pp. 195-214). Academic Press
[8] Springer Science+Business Media (2008) Monogerm Seed. In: Encyclopedia of Genetics, Genomics, Proteomics and Informatics. Springer, Dordrecht
[9] Jagosz, B. (2015) Seed plant characteristics of monogerm and multigerm red beet. *Infrastruktura I Ekologia Terenów Wiejskich*, (IV/3).

5.3.4 Irrigation Method Alternative

- ***Surface Irrigation Technology***
  Surface irrigation requires the application of water near the ground and letting gravity control its distribution. This method has a low initial and maintenance cost, low energy cost, can be adapted to different types of soils and crops, does not require much mechanical equipment and soil leakage can be managed. This technique however, has a low efficiency, requires large water supply, high labor needs, the method is not practical on soils with high penetration rates as it is not easy to obtain evenly distributed water and requires high and intensive land preparation ensuring little to no steeped land (Evans, 2010)[10] .

- ***Micro-irrigation Technologies***
  Drip irrigation encompasses small micro-sprinklers. The technology is based on a localized irrigation which slowly but regularly releases water directly to the roots of the crops. This technique reduces any water diversion and losses, does not moist the entire surface, flexible technology, can be adapted to different crops and climatic conditions, can be used in different soil types with very low or high penetration rates, can be installed above or below surface, does not require high energy usage, water management can be adjusted, can incorporate fertilizers, requires low labor cos tand has a high efficiency rate. Meanwhile, the water emitters are prone to being plugged, maintenance needs are high, may cause weed growth in wet areas, initial costs and maintenance are high and the system may be vulnerable to rodent or mechanical damage.

- ***Sprinkle Irrigation Technology***
  Sprinkle irrigation imitates natural rainfall. Water is sprayed into the air and falls into the ground in small water droplets[11]. There are different technologies used in sprinkle irrigation and they are as follows:

  - Hand move systems
    Hand move sprinklers technologies are one type of a sprinkler technology. They are very popular, relatively cheap compared to the rest of the sprinkle technologies and are very flexible in different topographies. However, they require high labor, can be physically demanding on some types of soils, slight winds can affect its water distribution and may have high energy requirements (Evans, 2010).

  - Center Pivot systems
    A center pivot is composed of a pipeline attached on tower like structures with wheels for movement. A center pivot device revolves around a "pivot" point in the middle of the field whereas a travel machine moves in a straight pattern and has a different guidance device. Center pivots are adaptable to heterogeneous topography, extremely efficient, have a uniform water distribution, requires less workers as they are automated technologies, can irrigate large areas, can incorporate fertilizers, can easily manage water levels and could be combined with other devices such as

[10] Evans, R. G., & Engineer, S. A. (2010) Irrigation Technologies Comparisons
[11] FAO, Chapter 5: Sprinkler Irrigation

Global Positioning Systems (GPS). On the other hand it has a high initial cost, energy and maintenance costs, water distribution can be affected by wind, and machine movement can be disturbed by the soil additionally it may cause injury to the operator (Evans, 2010).

Canal Sugar will use the Center Pivot System due to several factors which include, but are not limited to the following:

- Crop type and crop water requirements;
- Water supply including quantity and quality of the water source;
- Soil characteristics;
- Topography of the field as well as its the size and shape; and
- The climate of the area.

This system is highly efficient, requires low labor, and operates on different topographies. Such technology is highly automated providing precise control over the application amount and optimizing water use and efficient uptake to achieve ideal crop growth.

5.3.5 Sugar Beet Harvesting Alternative

- ***Manual harvesting***
  Manual harvesting would require a big number of workers, would take plenty of time and is a physically demanding activity. However it may help in excluding any infected crops[12].

- ***Topper and trailer systems***
  The topper and trailer are two different machines that are used for cutting and collecting the sugar beet. Both of them can be combined on the same trailer. They are cheaper than the combined harvester, but slower and less efficient[13].

- ***Self-propelled Sugar beet harvesters (combined harvester)***
  This is a single machine that can perform the harvesting activity of cutting and collecting simultaneously. Mechanical systems minimize the reliance on labor requirements. However, the machine is very expensive, requires high energy consumption, high maintenance costs and can only be used for harvesting sugar beet crops. Nonetheless it is the most efficient system to harvest sugar beets.

  Canal Sugar will use latest technologies for harvesting including self-propelled sugar beet harvesters that can harvest multiple rows instead of one row having predominantly 6-row harvesting units.

5.4 Irrigation Source Alternatives

Water resources are a central component for the project operation. The site is not connected to any water source thus the potential options would include:

[12] Science direct: Manual harvesting
[13] Sugar Beet Combine Harvesters (Farming Simulator 17)

- ***Construction of water pipeline from the Nile***
  The Nile River is at distance of about 26km to the east of the project area. The closest surface water body is Tuna drain located at a distance of 16 km east of the proposed project followed by Bahr Youssef and Ibrahimya Canal, located at 17, 23 km respectively. Construction of a water pipeline is to consider the distance, Giza-Luxor road crossing as well as settlements and other agricultural areas crossing in addition to pumping to the project site. Additionally this option is likely to include water pre-treatment to remove potentially floating debris and/or oil or other immiscible liquids and minimize excessive turbidity. This option is considered economically inefficient and could cause social issues and thus is not to be considered for this project.

- ***Water trucking***
  The land reclamation project will require a large amount of water since the proposed cropping area is relatively large. Thus, it will require a high number of trucks and a high amount of water transfer. This technique will be very costly as it will depend on continuous water trucking. Additionally, it may potentially impact traffic. Therefore, this technique is not considered feasible.

Groundwater abstraction

The groundwater depth at the project area is about 100 meters. IRZ Engineering Consultants has carried out, on behalf of Canal Sugar, a detailed geohydrology and aquifer study in order to assess the aquifer yields and its capability to support a large-scale irrigation project (IRZ, 2019). The results of the study indicate that the limestone aquifer is very robust and productive and able to sustain the irrigation project through an estimated total of 60 years of continuous pumping.

Accordingly, the selected irrigation water source would be groundwater abstraction.

5.5 Domestic Wastewater Disposal Alternatives

The company 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 wastewater.

- ***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.

- ***Use of treated wastewater for landscaping***
  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).

This alternative will enable the company to save quantities of water drawn from underground wells (used 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.

6. Environmental and Social Impacts Assessment and Mitigation

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 impacts of the proposed project are identified based on a modification of the Leopold matrix (Table 1). The 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 "rows" of the matrix consist 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 "columns" consist of the resources and receptors susceptible to impacts categorized as physical, biological and socio-economic environment. Identified resources and/or receptors were:

    - Air quality
    - Atmospheric greenhouse gases
    - Ambient Noise level
    - Soil
    - Groundwater quality
    - Terrestrial Biodiversity
    - Workplace health and safety
    - Public health
    - Traffic and road safety
    - Employment
    - Socio-economic
    - Archeology

6.1.2 Evaluation and Assessment of Impacts

Interaction between the different activities and the environmental receptors, identified through the baseline information, was carried out. Such interactions may result in negative or positive impacts. The different types of impacts were identified.

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"

Potential relevant impacts were subject to a process of impact evaluation, based on the analysis of the proposed project components and activities, in order to determine the significance of the different impacts. The evaluation process takes into account the information collected in the field, available in the literature and/or based on the professional judgment of the consulting team and public consultation

Impact evaluation is based on pre-set criteria including, impact magnitude, duration, planned mitigation measures, regulatory standards and sensitivity of environmental receptors.

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 in this chapter after the implementation of all mitigation measures.

6.2 Impact Identification

6.2.1 Scoped out Impacts

Potential impacts in the Leopold matrix were identified in relation to their effects on potential receptors. 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 settings of the area and the construction and operational processes has shown that the following impacts are irrelevant.

- ***Impacts on "surface water quality" and "aquatic life"***
  The project activities will have no contact with surface waters (Nile River, lakes, irrigation canals, etc.) or aquatic life. The closest surface water body is Tuna drain located at a distance of 16 km east of the proposed project. Thus impacts on aquatic species and on surface water quality are irrelevant.

- ***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. However, as Egypt is rich in archeological ruins, there is a remote possibility of unearthing archeological remains during construction and/or operation activities. Therefore, an assessment of potential impacts on archeology has been conducted in Section 6.2.3.

- ***Impact of flash floods***
  The project site is not intersected by any flood streams thus not potentially subject to flash flood hazards.

6.2.2 Positive Impacts

- ***Economic growth***
  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 transformation of the economically unproductive desert to productive farm land has significant advantages for the national economy as well as the local communities. The obvious economic spin offs from these activities are long-term and far reaching, and will include:
  - income generation for out-growers
  - Considerable employment opportunities
  - various up and down-stream benefits to suppliers of goods and services
  - Reduce reliance on imports of sugar as well as other rotational crops which will be produced locally.

- ***Employment opportunities***
  The project will provide employment during construction and operation phases. Construction activities involves mainly infrastructure building. Construction activities will include an estimated workforce of about 900-1000 workers, including:
  - 200 workers in well drilling
  - 250 – 300 in workers in construction including road construction
  - 250 – 300 for power lines

- 160 for land development machines
- Other indirect job opportunities

Priority will be given to the local workforce. In this context, it is envisaged that local medium sized businesses will be able to supply the majority of auxiliary components such as maintenance services. During operation, the project is expected to provide about 800 job opportunities for skilled and semi-skilled workers. This will be in addition to the indirect employment they project would provide. Work opportunities would also be created for other potential service contractors such as catering, waste management and security services.

About 49% of the employees will be sought nationally, whereas about 50% will be locally engaged from Minya area, whilst 1 % will be foreigners. This will be in addition to the indirect employment they project would provide.

6.2.3 Current Negative Impacts

6.2.4 Potential Negative Impacts

After exclusion of the irrelevant impacts and identifying the positive impacts, the remaining "potential negative impacts" were assessed based on the following criteria:

- Magnitude of the impact.
- Duration: period of time that impact lasts.
- Mitigation measures; its availability whether integrated in the project design or implemented as management measures.
- Adherence to regulatory standards according to Egyptian legal and regulatory framework and international standards including AfDB and IFC requirements.
- Public concern and perception

. Using the impact identification matrix (Table 6-1), the different types of impacts were identified. The table presents the different types of potentially negative impacts during the construction and operation phases. For each potential negative impact the significance before and after implementing the design integrated measures and/or applying management and monitoring practices is determined.

Table 6-1: Potential / Residual Impacts Matrix

Activities (Sources of impacts)	Aspects	Environmental Attributes[1]											
		Physical Environment					Biological Environment	Socio-economic Environment					Cultural Heritage
		Air Quality	Greenhouse gases	Noise level	Soil	Groundwater Quality	Terrestrial life	Public Health	Employment	Work place H & S	Traffic	Community impact	Archeology
Construction Phase													
Site leveling Civil Works Construction equipment Testing wells transport vehicles Electricity generators	• Labor demand	NA	NA	NA	NA	NA	NA	NA	+	NA	NA	+	-/I_m
	• Dust Emissions	-/I_m	NA	NA	NA	NA	-/I_m	-/I_m	NA	-/I_m	NA	NA	
	• Gas emissions (vehicles & equipment)	-/I_m	-/I_m	NA	NA	NA	-/I_m	-/I_m	NA	-/I_m	NA	NA	
	• Noise (vehicles & equipment)	NA	NA	-/I_m	NA	NA	-/I_m	-/I_m	NA	-/I_m	NA	NA	
	• Construction Waste	NA	NA	NA	-/I_m	-/I_m	NA	NA	NA	-/I_m	NA	NA	
	• Accidents (vehicles & equipment)	NA	NA	NA	NA	NA	NA	-/I_m	NA	-/I_m	-/I_m	NA	
	• Spills (vehicles & equipment)	NA	NA	NA	-/I_m	-/I_m	NA	NA	NA	NA	NA	NA	
Construction workers	• Sewage and solid waste from workers	NA	NA	NA	-/I_m	-/I_m	-/I_m	NA	NA	-/I_m	NA	NA	NA
	• Workers influx	NA	NA	NA	NA	NA	NA	NA	NA	NA	-/I_m	-/I_m	NA
	• Physical stress	NA	NA	NA	NA	NA	NA	NA	NA	-/I_m	NA	NA	NA
Operation Phase													
Labor	Labor demand	NA	NA	NA	NA	NA	NA	NA	+	NA	NA	+	NA
Agricultural operational activities (land ripping	Dust Emissions	-/I_m	NA	NA	NA	NA	-/I_m	-/I_m	NA	-/I_m	NA	NA	-/I_m

[1](-): Negative impact(+): positive impact
I_m: minor residual impacts acceptable after mitigation through management
I_d: minor residual impacts acceptable after design integrated mitigation
NA: Not applicable

Activities (Sources of impacts)	Aspects	Environmental Attributes[(1)]											
		Physical Environment					Biological Environment	Socio-economic Environment					Cultural Heritage
		Air Quality	Greenhouse gases	Noise level	Soil	Groundwater Quality	Terrestrial life	Public Health	Employment	Work place H & S	Traffic	Community impact	Archeology
etc.) and associated activities such as electricity generators, housing, machine usage, fertilizers and pesticides application, transport vehicles	Gas emissions (vehicles & equipment and fertilizers application)	-/I_m	-/I_m	NA	NA	NA	-/I_m	-/I_m	NA	-/I_m	NA	NA	
	Noise (equipment & vehicles and workers)	NA	NA	-/I_m	NA	NA	-/I_m	-/I_m	NA	-/I_m	NA	NA	
	Spills (vehicles & equipment)	NA	NA	NA	-/I_m	-/I_m	NA	NA	NA	NA	NA	NA	
	Accidents (vehicles & equipment)	NA	NA	NA	NA	NA	NA	-/I_m	NA	-/I_m	-/I_m	NA	
Ground water abstraction	Ground water contamination and decrease in level	NA	NA	NA	NA	-/I_m	NA	-/I_m	NA	NA	NA	/I_m	NA
Operational waste	Waste generation such as agricultural waste	NA	NA	NA	-/I_m	-/I_m	-/I_m	-/I_m	NA	-/I_m	NA	NA	NA
Activities related to Workforce	Municipal solid waste generation and sewage generation	-/I_m	-/I_m	NA	-/I_m	-/I_m	-/I_m	-/I_m	NA	-/I_m	NA	NA	NA
	Physical stress (heat stress etc)	NA	NA	NA	NA	NA	NA	NA	NA	-/I_m	NA	NA	NA
	Chemical stress (pesticides and fertilizers application)	NA	NA	NA	NA	NA	NA	NA	NA	-/I_m	NA	NA	NA

6.3 Assessment of Potentially Negative Impacts

6.3.1 Impact on the Physical Environment

a. Air Quality

Construction Phase

Construction activities include construction of infrastructure as well as site preparation and leveling. They may result in moderate, localized, mid-duration (5 years), air quality impacts in the form of dust and particulate matter from soil leveling and emissions from construction equipment and transport vehicles.

A diesel generator will be used for electricity supply during the 5 years construction period. Accordingly, air emissions during construction may include particulate matter from the diesel generator. However, the construction activities are split into phases, which lower the stress on the area.

Such impacts will occur for relatively a mid-duration period and are expected to affect mainly the site location and potentially neighboring farms and desert fauna. On the other hand, the project is located in the desert away from residential areas.

The allocated land area covers 181,180 feddans. However, about 65% of the allocated land (i.e. about 120,000 feddans) will be cropped with sugar beet and other crops, whilst the remaining other areas, about 40% of the total land area, is not suitable for crop production.

Since the construction phase will be carried out on an area of 108, 700 feddans and for a total of 5 years, which is a relatively large area and not of short duration, the impact is considerate a **moderate** impact.

Mitigation Measures

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

- Dust suppression using water and chemical controls such as calcium chloride in areas free from agricultural crops, whenever possible
- Dust management through slowing the driving speed of material transportation vehicles
- Providing workers with awareness on maintaining good practice driving and machinery usage
- Maintaining machinery and vehicles in good working conditions to minimize fugitive emissions
- Carry out monitoring tests for generators and ensure their compliance with the national laws
- Modify timing of construction where possible, to coincide with favorable climate conditions.

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 **low**.

Operation Phase
Operational phase may result in minor, localized, long-term but seasonal impacts.

During the operational phase, agricultural activities such as land ripping and the use of machinery /vehicles and the stand by diesel generator may result in a combination of dust and particulate matter. However, the main source of electricity will be obtained from the national grid. Since the land reclamation is mainly done on a large area and is a long term project but with specific planting period and with a total of around 800 workers, the emissions from the operational phase are assessed to be of **low** impact.

Mitigation Measures
- 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
- Maintaining machinery and vehicles in good working conditions to minimize fugitive emissions
- Carry out the tests stipulated under the current legislation for generator sets

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

Green House Gases Emissions

Construction Phase
The emissions during this phase are moderate, general, and of mid-duration (5 years).

Vehicles and machinery used during the construction phase will result in gas emissions including GHG emissions resulting 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 (CO_2) and nitrous oxide (N_2O).

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 assessment on GHGs emissions during construction phase is deemed **insignificant** (EBRD, 2017)[2]

Mitigation Measures

Although potential impacts are assessed as insignificant, mitigation measures will still be applied to reduce GHGs emissions, as follows:

- Ensure that technologies and equipment used in the project are new
- 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
- Maintaining machinery and vehicles in good working and ensure regular maintenance
- Ensure that gas emissions are below international and national limits

Residual Impacts

The above mitigation measures are anticipated to be efficient for minimizing GHG generation during construction activities.

Operation Phase

The emissions during this phase are moderate, general, and of long duration.

Agricultural activities, crop and livestock production for food, contribute to emissions and can lead to increased availability of nitrogen in the soil and result in emissions of N_2O. Generally, activities that contribute to N_2O emissions from agricultural lands include:

- **Land Use Change (LUC)** or conversion[3] of lands into agricultural lands. This could be a source in cases of clearance of forests, grasslands and trees, who act as Carbon storage systems, for agricultural activities and production.
- The **application of synthetic and organic fertilizers**, activities, the growth of nitrogen-fixing crops and irrigation practices.
- The **tillage or ploughing** of soil may release CO_2 stored in the soil.
- **Livestock**, especially ruminants such as cattle, produce CH4 as part of their normal digestive processes.

Management of agricultural soils can account for over half of the emissions from the agriculture economic sector[4]. Smaller sources of agricultural emissions include CO_2 from liming and urea application, and burning crop residues

Regarding Canal Sugar project, the area does not include any vegetation cover and is located in a very arid desert. Therefore, carbon sequestration would be insignificant in this area. Consequently, land conversion or Land Use Change (LUC) from an arid desert devoid of vegetation to an agricultural desert is not expected to be a source of GHGs in this project. Moreover, the project will not

[2] EBRD (2017). EBRD protocol for greenhouse gases.
[3] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 (February 2013)
[4] EPA (n,d.). Sources of Greenhouse Gas Emissions

rely on external soil in the crop production. In addition, the project does not include livestock production, manure usage and fertilizers production on site.

However, the project will use chemical pesticides and fertilizers who play a role in GHG emissions such as N_2O. In addition to agriculture specific activities, fuel combustion from equipment and transport vehicles and energy usage may result in the release of CO_2 and NOx, another source of GHG. An assessment study for the estimation of the total amount of greenhouse gases (GHGs) in kilotons of carbon dioxide equivalent (kt CO_2 eq) for the Canal Sugar farm during the operation phase is provided in **Annex 6**. The GHG assessment for the total CO_2 equivalent is 530.332 (kt CO_2 eq/ Y) from the farming activities (Table 6-2).

On the other hand, emissions that might be potentially generated from the farm operation are above 25 kt CO_2 eq. Therefore, Canal Sugar will report the necessary data related to GHG assessment of their project in line with the EBRD (2017) protocol.

Table 6-2: Total CO_2 equivalent from the farming activities (calculated by Environics; Annex 6)

Components	Total CO_2 equivalent (kt CO_2 eq/ Y)
Agriculture emissions	84.29
Electricity	401.625
Agriculture machinery	42.84
Workers transportation	0.277
Workers accommodation	1.3
TOTAL	**530.332**

Mitigation Measures

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

- Include good practice for fertilizers and pesticides usage and soil management
- Ensure that the added nitrogen is suitable for crop needs, and that fertilizers addition is during the active growth stages
- Implement a good practice management plan to prevent nutrient loss
- Ensure proper time for the application of nutrients according to the type of crops to optimize their uptake by the crops and minimize nutrient loss
- Avoid waste burning and burning of agricultural wastes and more importantly the ones mixed with pesticides
- Use / buy fertilizers from a low GHGs manufacture whenever possible.
- Enhance soil organic carbon stocks through good land management practices
- Properly store fertilizers and pesticides
- Store fertilizer away from machineries and other materials to avoid fire hazards (e.g., fuels, ignition, or heat sources)
- Offer farmers and workers training on nutrient management
- Implement a crop rotation program to protect soil
- Ensure the selection of efficient pumps

Residual Impacts

The above mitigation measures are anticipated to be efficient for minimizing the potential impacts.

b. Noise levels

Construction Phase

The use of construction equipment may result in minor, localized, mid-term, increase in noise levels. Table 6-3 shows typical noise levels, in decibels, expected at various distances from construction machinery. It is not expected that noise from the construction activities would pose impacts on the neighboring areas (roads or nearby communities) as they are located at significant distances.

Table 6-3: Average Noise Levels from Construction Equipment

Equipment Type	Distance from Noise Source (dBA)		
	10m	**50m**	**100m**
Crane	72	58	52
Bulldozer	74	60	54
Generator	76	62	56
Backhoe	79	65	59

*Doubling the distance drops the intensity by about 6 dB and that 10 times the distance drops the intensity by 20 dB[5].

Thus, assessment of noise emission prior to mitigation measures is deemed **low**.

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 (such as 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

Noise resulting during construction activities is unlikely to have an impact on the general public. However, the impact of construction activities on workplace can be potentially significant. But with implementing the above mitigations measures and health and safety procedures, residual impacts are considered **negligible**.

Operation Phase

Noise during the operational phase is considered minor, localized, continuous but periodical, increase in noise levels. Noise during operation can result

[5] The Inverse Square Law is an idealization because it assumes exactly equal sound propagation in all directions. If there are reflective surfaces in the sound field, then reflected sounds will add to the directed sound and you will get more sound at a field location than the inverse square law predicts. If there are barriers between the source and the point of measurement, the propagated noise intensity may get less than the inverse square law predicts. Nevertheless, the inverse square law is a logical first estimate of the sound at a distant point in a reasonably open area.

mainly from workers, machines and vehicles and used in during the operational phase of the project. However the agricultural activities are seasonal and are not expected to have high noise impact as the nearest community (Balansoura Village) is located at about 15.5 km from the project area.

Regarding the noise levels within the workplace, implementing the mentioned mitigation measures and implementation of effective occupational health and safety measures including providing the workers with the necessary PPEs and limiting the exposure period, the residual impacts in workplace and ambient noise are considered **low**.

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).
- Regular inspection and maintenance of equipment.

Residual Impacts

Potential noise during operation activities is unlikely to have an impact on the local communities. By implementing the above mitigations measures and health and safety procedures, impacts of noise on the workplace will be **negligible**.

c. Soil

Construction Phase

Generally, the construction activities are unlikely 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.

Impacts of the construction phase on soil are thus deemed **low**.

Mitigation Measures

- Implement site management procedures and good housekeeping activities
- Ensure proper waste management measures and storage.
- Implement measures for spill prevention that will contribute to controlling and minimizing any potential impacts.
- Ensure periodic inspection of equipment and machinery which will contribute to minimizing spills and leaks.

- The E&S site personnel will follow up on the contractor's performance and ensure they abide by the contract EHS stipulations.
- Ensure waste collection by a licensed contractor for treatment and final disposal through the designated landfill. Other construction wastes will be safely and temporarily stored on site and periodically disposed through selling to contractors.
- Sewage storage tank should be properly insulated for leak prevention. Contents should be emptied regularly for disposal at the nearest wastewater treatment plant at adequate intervals through a licensed contractor.
- Ensure the proper management of hazardous waste, treatment and disposal by an accredited contractor
- Ensure that the diesel generator is well insulated

Residual Impacts

Impact on soil during construction activities will be **negligible** if proper housekeeping and management measures are implemented.

Operation Phase

The soil characteristics of the area will be modified through the use of fertilizers and continuous irrigation, turning from an unproductive desert soil to a productive agricultural soil. This could be considered a positive impact from an economic perspective, while it is a negative aspect from the ecological perception, as the area will be transformed from a natural desert environment into a modified agricultural area. Due to the agricultural nature of the project, this aspect cannot be modified but can be slightly mitigated through a rational use of nutrients and fertilizers.

During the project operation, potential soil impacts may arise from contamination caused by improper management of chemicals and materials (such as oil leaks during maintenance activities), domestic wastewater, municipal solid waste and agricultural waste improper management as well as improper storage of fertilizers and pesticides. Additionally, accidental leaks from machines and vehicles may also arise. Most of the leaks are considered to be accidental.

The impact is deemed **moderate** prior to the implementation of mitigation measures

Mitigation Measures

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

- As part of its EMP, the project will develop a waste management system.
- Properly store chemicals
- Provide training for workers that are transporting, handling or applying fertilizers and pesticides to ensure sustainable usage and handling are met.
- Ensure a balanced fertilizer program is applied for each soil management unit.

Residual Impacts

With the implementation of the mitigation measures, potential impacts of the project operation on the soil are considered to be **moderate-low**.

d. Groundwater

Construction Phase

During construction phase ground water contamination may result from the same sources described in the (soil section above). Potential contaminations may result from spillage during well drillings. Additionally contamination may result from improper management of domestic wastewater management as well as improper solid and hazardous waste management. As spillage is not a continuous impact and is not expected to happen frequently and since the groundwater is deep (about 100 meters below surface), potential impacts are deemed **low**.

Mitigation Measures

Mitigation measures are similar to the ones stated in the soil section above.

Residual Impacts

With the proper implementation of the mitigation measures, the impact on groundwater contamination during construction phase is deemed **negligible**.

Operation Phase

Groundwater quantity may face a potential significant long-term impact as the project would require substantial groundwater abstraction. One well will provide water to the potable water treatment plant while the rest of the wells will be used for irrigation.

On the other hand, based on a detailed geohydrology and aquifer study conducted by IRZ Engineering Consultants (IRZ, 2019), on behalf of Canal Sugar in order to assess the aquifer yields and its capability to support a large-scale irrigation project, it indicated that the aquifer would be able to sustain the project. The results of the study indicate that the limestone aquifer is very robust and productive and able to sustain the irrigation project (see Chapter 4, Section 4.1.7). The projected decrease in the groundwater level after 60 years of continuous pumping is estimated at 14 meters which is a relatively small amount for this long period.

Nevertheless, the study indicates that if additional area is developed into irrigation the assumptions of this analysis will change and there will be potential impacts to the estimated aquifer decline. Therefore, abstraction may potentially impact groundwater availability to other potential users. As Canal Sugar has obtained all the required permits, this aspect should be managed the Ministry of Water Resources and Irrigation.

Although the groundwater aquifer is able to sustain the project and potential impacts on groundwater quality are deemed insignificant, impacts on groundwater during the operational phase are deemed **high to moderate** due to the long-term duration of the project.

Mitigation Measures

In addition to implementing the mitigation measures stated in the soil section above, mitigation measures for groundwater abstraction shall also be implemented:

- The Center Pivot System which will be used for irrigation optimizes water use in contrast with the conventional surface irrigation system utilized in most agricultural areas in Egypt which consumes large amounts of unrequired water;
- Perform periodic monitoring on ground water quality;
- Perform monitoring on the aquifer recharge rates and abstraction rates;
- Each well will need to be scrutinized as part of the final system design and layout to determine the required pump setting, instantaneous flow rate, and required pump head to meet the needs of the system into the future;
- Perform detailed hydrogeological studies if additional area is developed into irrigation;
- Avoid unnecessary abstractions;
- Implement a water efficiency program;
- Determine irrigation requirements of crops and workers.

Residual Impacts

Upon implementation of the mitigation measures potential impacts of the project operation on the groundwater are **moderate to low**.

6.3.2 Impacts on the Biological Environment

The project 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 project area represents a small part of the vast Western Desert (which covers two thirds of the surface of Egypt) and while several species are reported from literature in the wider area, no biodiversity was observed at the project site, although vagrant species may occur. On the other hand, few signs (tracks and burrows) indicating the presence of a modest biodiversity were recorded at the adjacent factory site. Additionally, there are no protected areas, Important Bird Areas (IBAs), or other sensitive areas within or in the vicinity of the project area.

According to IFC Performance Standard 6, identification of a Critical Habitat is mainly based on five criteria as follows:

- Critically Endangered (CR) and/or Endangered (EN) species
- Endemic and/or restricted-range species
- Migratory and/or congregatory species
- Highly threatened and/or unique ecosystems
- Key evolutionary processes

None of the above-mentioned criteria apply to the biodiversity and/or features of the project area and surroundings and therefore, the project area is not considered a critical habitat.

Construction Phase

Impacts on biodiversity during the construction phase include the following:

a. Disturbance to wildlife

Air emissions, noise and vibrations, light emissions as well as human presence may affect local wildlife during construction phase. These stressors may drive fauna away from the site. Heavy machinery may lead to soil compaction and destroy dens and burrows, thus affecting fossorial species. Increased traffic may increment animal roadkills.

b. Habitat modification

During the construction of facilities and soil leveling, the soil nature and topographic structure of the area will change leading to a modification of the desert habitat due to construction and soil leveling activities. This impact is deemed irreversible (unless the project is terminated) and of **moderate** magnitude given the extension of the Western Desert.

c. Growth of marginal vegetation

Sewage mismanagement during the construction phase may result in the presence of water and marginal vegetation which may in turn attracts pests.

d. Attraction of pests

Solid waste and sewage waste water mismanagement may result in the attraction of pests (such as insects and rodents) and alien species to the area (such as feral dogs and cats). Pests may be disease vectors while feral dogs and cats may compete with native fauna for food resources.

The construction phase has duration of 5 years. Thus, it is expected that the impact on biodiversity would be minor, and of mid duration impact. Therefore, impacts on biodiversity during the construction phase are deemed to be of a **low** level, while habitat modification is considered as a **moderate** impact.

Mitigation Measures

- Develop, implement and update a solid waste, hazardous waste and waste water management plan to include waste collection, storage, transport and disposal in an environmentally sustainable manner to avoid attraction of vermin and the potential consumption of waste from desert species.
- Provide awareness to the workers on the negative impacts of disturbing any wild fauna.
- Ensure proper housekeeping practice.
- Avoid working at night and avoid high intensity light that may disturb fauna.
- Ensure speed control and the prohibition of off-track driving
- Ensure the proper maintenance of construction equipment and any other equipment with high noise and vibration potential.
- Ensure that the generator is properly insulated to avoid noise emissions.

Residual Impacts

Residual impacts would be **insignificant** with the proper implementation of the above mitigation measures, with the exception of habitat modification which will remain **moderate**.

Operation Phase

Impacts on biodiversity during the operational phase include the following:

a. Disturbance to wildlife

Air emissions, noise and vibrations, light emissions arising from facilities and machineries (such as transport vehicles, tractor-drawn drills, self-propelled sugar beet harvesters, central pivot system and emergency diesel generator) as well as human presence may affect the few local wildlife during operation phase. Heavy machinery may destroy dens and burrows and increased traffic may increment animal casualties. These stressors may disturb fauna within the site and surroundings. Moreover, the use of pesticides during operational phase may affect non-targeted species.

b. Habitat modification

During the operational phase, agricultural activities (i.e. irrigation and planting) will result in the transformation of the natural desert habitat into a modified (man-made) agricultural habitat similar to the Nile Valley agricultural habitats. This impact is irreversible and deemed of **moderate** magnitude (unless the project is terminated) given the extension of the Western Desert in which the farm is located.

c. Changes in species composition

The operation phase would contribute to the expansion of opportunistic species (such as Nile Valley birds and Red Fox) coming from the Nile Valley and surrounding agricultural lands as result of the introduced agricultural and human activities. This is expected to result in an increase in agro-biodiversity, while true desert fauna will move and relocate in adjacent desert areas. Nonetheless, although the project area is relatively large, it is still very small when compared to the vast Western Desert.

d. Growth of marginal vegetation

Wastewater leakage during the operation may result in the presence of water and marginal vegetation which may in turn attracts pests.

e. Attraction of pests

The presence of crops and irrigation water would definitely attract rodents and insects to the farmland. Solid waste and sewage wastewater mismanagement may result in the attraction of pests and alien species to the housing and utilities areas.

Impacts on the area desert habitat and related biodiversity are of long-term duration and considered to be of **moderate** magnitude.

Mitigation Measures

In addition to the implementation of the mitigation measures stated in the construction phase, the following measures shall be implemented to ensure the proper protection of biodiversity:

- Properly store fertilizers and pesticides
- Minimize the use of pesticides
- Use best practice techniques in pesticides application to avoid their consumption by non-targeted species
- Seed sourcing should be from reliable suppliers to avoid the introduction of any alien and or invasive species
- Ensure that workers do not disturb native fauna within and around the site.
- Ensure the implementation of rotational crop method to decrease pests and weed
- Encourage manual weed control
- Ensure that storage areas with pesticides are inaccessible to animals.

Residual Impacts

With the proper implementation of the mitigation measures and management plan the impacts on biodiversity are deemed to be **low** while impacts concerning habitat modification will remain **moderate**.

6.3.3 Socio-economic Impacts

a. Public health

Construction and operation phases

Impacts on public health from dust, gas, noise emissions, and health hazards from waste mismanaged are deemed unlikely as residential areas are located far away from the project site and only Savola and a small farmland is located in the project vicinity, about 1 km south of the project site. Since the noise and gas emissions impacts during the construction and operation phases are deemed low, it is not expected that they will affect the neighboring areas. Impacts on ambient air are however, moderate during construction phase and may impact the neighboring farm through the emission of dust and particulate matter emissions, however the impact is minor. Therefore, impacts on public health during construction and operation are deemed **low**.

Mitigation Measures

- Same as applied for air quality and noise.

Residual Impact

Residual impacts after applying the above mitigation measures are **negligible**.

b. Impacts on local community

Construction Phase

Potential pressures on the available resources and utilities before the workers accommodation is established may result due to potential workers influx to the area. However, the area is located in the western desert of El-Minya and far away from facilities and utilities. Additionally, Canal Sugar planned to recruit 49% national workers, 50% locals from Minya area and 1% foreigners.

Additionally, workers influx may have positive socio-economic impacts as results of providing potential services, such as waste management, maintenance, catering supply, etc. Therefore it is expected that negative impacts of the construction phase is **insignificant**.

Operation Phase

It is planned that the workers housing during the operational phase will be on-site having its independent utilities and will not be located within the existing local settlements. In this context, potential adverse pressure is not expected on the available resources and utilities. On the other hand, the project is expected to require high amount of groundwater abstraction which may potentially impact groundwater availability to other users. The project may also impact the potential establishment of other farmlands in the area. Although the project has obtained the required permits from the Ministry of Water Resource and Irrigation, this long-term impact is deemed **moderate to high**.

Mitigation Measures

- Perform periodic monitoring on ground water quality
- Perform monitoring on the aquifer recharge rates and abstraction rates
- Avoid unnecessary abstractions
- Implement a water efficiency program
- Determine irrigation requirements of crops and workers.
- Maintain soil quality to avoid surface evaporation

Residual Impacts

Residual impacts after applying the above mitigation measures are deemed to be **moderate**.

c. Traffic and road safety

Construction Phase

The construction phase may potentially increase traffic caused by transport vehicles for construction material, etc. In addition, although accidents are not an ongoing event and happen randomly, potential safety impacts may arise from potential traffic accidents during transportation of materials. The impacts of this phase are minor and of mid duration and are therefore deemed **low**.

Mitigation Measures

- Develop a traffic management plan Include conditions in contractors' contracts that require them to periodically inspect the safety and efficiency of vehicles and trucks
- Require contractors to comply with traffic rules with regard to speed limits, vehicle maintenance and cover of materials to be transported
- Drivers and staff shall maintain a good driving conduct and respect speed limits and planned itineraries
- The Canal Sugar project will install lightings on the main road, 2 km to the north and 2 km to the south of the project site.

Residual Impacts

Residual impacts are expected to be **negligible** if the above mitigation measures are implemented.

Operation Phase

The operational phase may potentially increase traffic caused by transport vehicles of required materials for operation. Potential safety impacts may also arise from potential traffic accidents during transportation. The impacts of the operational phase on traffic are deemed **low**.

Mitigation Measures

Similar to the ones stated in the construction phase above.

Residual Impacts

Residual impacts are expected to be **negligible** if the above mitigation measures are implemented.

d. Workplace health and safety

Construction Phase

Potential impacts on workers' health and safety during construction could arise from dust and air emissions, increased noise levels from machines and vehicles, accidental slipping of workers and chemical hazards from material handling. Moreover, solid waste and sewage mismanagement may pose health concerns as they play a role in the increase of pest and disease. Additionally, physical stress may arise from heat and mechanical accidents. These impacts are localized and of mid period impacts (5 years construction phase). Therefore, impacts on workers prior to mitigation measures are deemed **moderate**.

Mitigation Measures

- The contractors (and potential sub-contractors) will take into account the IFC/EBRD requirements for caravans or workers accommodation, which will be included in their contracts
- Continuous supervision of construction workers
- Provision of suitable PPE (including earplugs and respiratory protective equipment and chemical protection equipment)
- Ensuring that workers are always wearing PPEs while working or onsite
- Equipment periodic maintenance according to manufacturers' schedule
- Ensure that workers obtain a proper first aid training
- Ensure the availability of first aid kits.
- Provide and install fire extinguishers and ensure that workers are trained to use them
- Implement good housekeeping practice and ensure that proper hygiene measures are taken
- Ensure the availability of a well-equipped ambulance car within the site to drive the injured worker to the closest hospital located at 35 km away from the project site.
- Restrict vehicles speed so that they do not exceed the safety limit (15-20 km/h)
- Storage of flammable materials in an isolated and shaded area
- Periodic training construction personnel on the safe use of equipment and on environmental issues related to construction
- Ensure that commitment to safety measures is included in the sub-contractors contracts.

- Security personnel should be selected based on screening process
- Comply with all the executive regulations of Labor Law 12/2003 and specifically the ones related to operation of equipment and machinery (for example bulldozers and excavators), welding, working on elevated ground or closed areas etc.
- Abide by 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 is low.

Operation Phase

Impacts during operation phase on workers' health and safety may arise from physical or mechanical stress, in addition to their exposure to pesticides and fertilizers. These impacts are considered high and long-term (seasonal) impacts. Therefore, the assessment of the impacts on workers prior to mitigation measure is deemed **moderate**.

Mitigation Measures

In addition to the mitigation measures provided in the construction phase the following shall also be included as part of the health and safety plan:

- Field work should be divided into shifts and should be stopped if temperature is too high.
- Provide tractors, loaders, or harvesting machines with suitable ventilation for workers.
- Provide suitable training to workers on the management and storage of hazardous materials. The training should provide workers with knowledge on how to read Material Safety Data Sheets (MSDS). Training shall include management for pesticides and fertilizers handling and storage as well.
- On site ambulance shall be provided 24/7 with proper tools and equipment
- IFC performance standard of labor and working conditions shall be maintained.

Residual Impacts

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

- ***Impacts on archeology***

Construction and operation phases

Vibrations and digging during construction and operation phases might impact archeological remains if present on site. On the other hand, no known 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 (Chance Find Procedures are detailed in Chapter 7). Impacts on potential archeological remains are **unknown**.

Mitigation measures
- In case of any unearthed antiquities, activities during construction and operation will be stopped in the area.
- The Ministry of State for Antiquities (MSA) will be notified for investigation. The chance find procedure mentioned in Chapter 7 will be applied.

Residual Impacts
Through implementation of the above mitigation measures, the expected residual impact on archeology is deemed **insignificant**.

6.3.4 Impact of the Environment on the project

a. Impact of sand storms

Construction Phase
Higher wind speeds potentially increases results in the performance losses due to abrasion and/or deposition of aeolian dust. The area experiences sand storms during spring and autumn. This may pose potential health risk to construction workers such as eye irritation and dust inhalation. This may occur only during dusty seasons which are temporary. The assessment of this risk is deemed **low**.

Mitigation Measures
In addition to the mitigation measures provided in the worker health and safety section, 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 **negligible**.

Operation Phase
Adverse impacts as a result of sandstorms may also cause the loss of plant tissue and reduced photosynthetic activity as a result of sandblasting, burial of seedlings under sand deposits and delayed plant development. Additionally sand storm may also impact workers through physical irritation (eye irritation) and dust inhalation. This may occur only during dusty season which is temporary. The assessment of this risk is deemed **low**.

Mitigation Measures
In addition to the mitigation measures stated in the construction phase and workers health and safety the following shall be implemented:
- Ensure the addition of proper windbreaks using natural vegetative barrier or shelterbelts.
- Use crop residues to protecting loose soil particles.

Residual Impacts
The expected residual impact on the project is deemed **negligible**.

b. Impacts of venomous species

Construction and Operation Phases
Venomous species may potentially be present in the desert area and may pose a health risk to workers. These include scorpions and at least two desert snakes; the Horned Viper (*Cerastes cerastes*) and the Sand viper (*Cerastes vipera*). Moreover, the Egyptian Cobra (*Naja haje*) is common in the agricultural areas of Minya Governorate and can be found in the reclaimed agricultural project area. The assessment of this risk is deemed **moderate**.

Mitigation Measures
The following measures should be adopted to avoid envenoming accidents or to deal with potential envenoming cases:

- Project staff should not turn over a stone with bare hands or put a hand or foot into a crevasse or hole where snakes or scorpions may hide;
- Avoid walking barefoot in areas where there is tall crops such as corn crops;
- Make workers camps and housing in areas where snakes are less likely to be present;
- Training and awareness of workers to learn which snakes may be present in the area and familiarize with their habits;
- Purchase species-specific venom antidotes before starting project activities to be available at the site during construction and operation activities;
- A person trained on how to deal with snake and/or scorpion bites should be present at the project site during field activities;
- An ambulance should be available to transport potential bite victims to the nearest hospital at 35 km away from the project site.

Residual Impacts
The expected residual impact is deemed **low**.

7. Environmental and Social Management 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 farm and associated facilities 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
- Increase in employment opportunities - Decrease in sugar demand	- 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 - Impacts on local community - Impacts on traffic - Impacts on workplace health and safety - Impacts on archeology - Impacts on archeology	- Impacts on surface water - Impacts on aquatic life - Impacts from Flashflood

The 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. Table 7-2 and Table 7-3 present the proposed mitigation measures during the construction and operation phases.

Table 7-2: Summary of mitigation measures during construction phase

Source of impact / Receptors	Mitigation measures
Air quality	• Apply dust suppression method using minimum water technologies • Apply dust management through slowing the driving speed of material transportation vehicles • Provide workers with awareness on maintaining good practice driving and machinery usage • Maintain machinery and vehicles in good working condition • Carry out the tests stipulated under the current legislation for generator sets • Modify timing of construction where possible, to coincide with favorable climate conditions
Greenhouse gases	• Ensure that technologies and equipment used in the project are new • If possible ensure that equipment and material used in the construction phase are obtained from a nearby area • Provide workers with awareness on maintaining good practice for machinery usage • Maintain machinery and vehicles • Ensure that gas emissions are below international and national limits
Ambient noise	• Inspection and maintenance of all equipment and vehicles • Provide workers with the suitable PPEs
Soil and groundwater	• Implement site management procedures and good housekeeping activities • Ensure proper waste management measures and storage. • Implement measures for spill prevention • Ensure periodic inspection of equipment and machinery • The E&S site personnel will follow up on the contractor's performance and ensure they abide by the contract EHS stipulations. • Ensure waste collection by a licensed contractor for treatment and final disposal through the designated landfill. • Sewage storage tank should be properly insulated for leak prevention. • Ensure the proper management of hazardous waste, treatment and disposal by an accredited contractor • Ensure that the diesel generator is well insulated
Terrestrial biodiversity	• Develop, implement and update a solid waste, hazardous waste and waste water management plan • Provide awareness to the workers on the negative impacts of disturbing any wild fauna. • Ensure proper housekeeping practice. • Avoid working at night and avoid high intensity light that may disturb fauna. • Ensure speed control and the prohibition of off-track driving • Ensure the proper maintenance of construction equipment and any other equipment with high noise and vibration potential. • Ensure that the generator is properly insulated to avoid noise emissions.

Source of impact / Receptors	Mitigation measures
Traffic	• Develop a traffic management plan • Include conditions in contractors' contracts that require them to periodically inspect the safety and efficiency of vehicles and trucks • Require contractors to comply with traffic rules with regard to speed limits, vehicle maintenance and cover of materials to be transported • Drivers and staff shall maintain a good driving conduct and respect speed limits and planned itineraries.
Public Health	• Same as applied for air quality and noise.
Workplace Health and Safety	• Continuous supervision of construction workers • Provision of suitable PPE • Ensuring that workers are always wearing PPEs while working or onsite • Equipment periodic maintenance according to manufacturers' schedule • Ensure that workers obtain a proper first aid training • Ensure the availability of first aid kits. • Provide and install fire extinguishers and ensure that workers are trained to use them • Implement good housekeeping practice and ensure that proper hygiene measures are taken • Ensure the availability of a well-equipped ambulance car within the site • Restrict vehicles speed so that they do not exceed the safety limit (15-20 km/h) • Storage of flammable materials in an isolated and shaded area • Periodic training construction personnel on the safe use of equipment and on environmental issues • Ensure that commitment to safety measures is included in the sub-contractors contracts • Security personnel should be selected based on screening process • Comply with all the executive regulations of Labor Law 12/2003 • Abide by international regulations for health and safety including IFC standards and AfDB safeguards.
Impacts on archeology	• Any unearthed antiquities, activities during construction and operation will be stopped in the area. In case • The Ministry of State for Antiquities (MSA) will be notified for investigation. The chance find procedure mentioned in this chapter will be applied.

Table 7-3: Summary of mitigation measures during operational phase

Source of impact / Receptors	Mitigation measures
Air quality	• Apply Dust suppression using minimum water consuming technologies • Apply Dust management through slowing the driving speed of material transportation vehicles • Provide workers with awareness on maintaining good practice driving and machinery usage • Maintain machinery and vehicles in good working conditions • Carry out the tests stipulated under the current legislation for generator sets
and Greenhouse gases	• Apply same mitigation measures as the ones included in the construction phase. • Include good practice for fertilizers and pesticides usage and soil management • Ensure that the added nitrogen is suitable for crop needs, and that fertilizers addition is during the active growth stages • Implement a good practice management plan to prevent nutrient loss • Avoid waste burning and burning of agricultural wastes and more importantly the ones mixed with pesticides • Use/buy fertilizers from a low GHGs manufacture whenever possible. • Enhance soil organic carbon stocks through good land management practices. • Properly store fertilizers and pesticides • Store fertilizer away from machineries and other materials to avoid hazards (e.g., fuels, ignition, or heat sources) • Offer farmers and workers training on nutrient management • Implement a crop rotation program to protect soil • Ensure the selection of efficient pumps
Ambient noise	• 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	• Apply same mitigation measures as the ones included in the construction phase. • Develop a waste management system. • Properly store chemicals • Provide training for workers that are transporting, handling or applying fertilizers and pesticides • Ensure a balanced fertilizer program is applied for each soil management unit. • The Center Pivot System which will be used for irrigation optimizes water use in contrast with the conventional surface irrigation system • Perform period monitoring on ground water quality • Perform monitoring on the aquifer recharge rates and abstraction rates • Each well will need to be scrutinized as part of the final system design and layout to determine the required pump setting, instantaneous flow rate, and required pump head to meet the needs of the system into the future • Perform detailed hydrogeological studies if additional area is developed into irrigation; • Avoid unnecessary abstractions • Implement a water efficiency program • Determine irrigation requirements of crops and workers
Terrestrial biodiversity	• Apply same mitigation measures as construction phase • Properly store fertilizers and pesticides • Minimize the use of pesticides • Use best practice techniques in pesticides application to avoid their consumption by non-targeted species • Seed sourcing should be from reliable suppliers to avoid the introduction of any alien and or invasive species. • Ensure that workers are aware of the hunting impact and ensure that no hunting occurs within and around the site. • Ensure the implementation of rotational crop method to decrease pests and weed • Encourage manual weed control • Ensure that storage areas with pesticides are inaccessible to animals
Community impact	• Perform period monitoring on ground water quality • Perform monitoring on the aquifer recharge rates and abstraction rates • Avoid unnecessary abstractions • Implement a water efficiency program • Determine irrigation requirements of crops and workers. • Maintain soil quality to avoid surface evaporation
Traffic	• Apply mitigation measures same as the traffic measures stated in the construction phase
Public health	• Apply the same mitigation measures for air quality and noise.

Source of impact / Receptors	Mitigation measures
Workplace Health and Safety	• Apply applicable measures stated in the construction phase • Provide tractors, loaders, or harvesting machines with suitable filtration/ventilation. • Provide suitable training to workers on the management and storage of hazardous materials. • 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.
Impacts on archeology	• Any unearthed antiquities, activities during construction and operation will be stopped in the area. In case • The Ministry of State for Antiquities (MSA) will be notified for investigation. The chance find procedure mentioned in this chapter will be applied.

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 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

7.4.2 Environmental Management during Construction Phase

The environmental dimension will be incorporated throughout the construction phase. 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, farmland and facilities. The following shows the minimum policies that the contractor will follow.

- ***Solid Waste Management***

  Domestic solid waste will be collected from all accommodation and facilities. Waste shall be properly stored according to the national regulations and disposed with a certified waste contractor. If possible wastes that can be recycled shall be transferred to a certified contractor

  Waste will be disposed off-site periodically through a contractor certified by Minya Governorate. 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 accommodation and facilities. 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. Wastewater transfer and disposal will be carried out regularly by a licensed contractor according to the Egyptian regulations. The contractor will be committed to transfer the wastewater to a safe discharge location indicated by the National Authority for Potable Water and Sewage in compliance with the legal requirements in this regard.

- ***Hazardous Wastes (HW) Management***

  The following briefs the management plan concerning HW of the proposed farmland and facilities:

  <u>HW Generation</u>

  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 Nassreya 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 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.

- ***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 farmland, facilities and surroundings to normal state.
- Mitigation includes the activities which eliminate or reduce the probability of disaster.

- ***Staff 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.

7.4.3 Environmental Management Plan during Operational Phase

The environmental dimension will be incorporated throughout the operation of the farm and its associated utilities. 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, farmland and the facility. The management plan will also comply with the project specific guidelines of the IFC "Environmental, Health and Safety Guidelines for Annual Crop Production".

- ***Management of Fertilizers***

  Fertilizers will be properly handled and managed through the following procedures:
  - Fertilizers will be obtained from a low GHG manufacturer whenever possible
  - Fertilizers will be classified and labeled in an appropriate manner by their names, date of purchase and expiry date.
  - Information on the received fertilizers will be organized through the coordination of both the company stores and the company's occupational health and safety department.
  - Fertilizers should be properly stored in a closed area away from machineries, pesticides and other materials.
  - Training on handling, applying and storing fertilizers and nutrient management shall be provided to personnel
  - Fertilizers application should be carried out by a trained personnel
  - Fertilizers should be added when the soil is sufficiently wet in order to avoid any run-offs and should be added during active growth stages of the crops to maximize its uptake by the crops.
  - Amount of fertilizers added must be consistent with crop needs only
  - A balanced fertilizer program shall be applied for each soil management unit.

- ***Management of Pesticides***
  Pesticides will be properly handled and managed through the following procedures (Derived from FAO (2001) [1] and IFC guidelines for annual crop production):
  - Pesticides will be obtained from a low GHG manufacturer whenever possible
  - Follow the guidelines provided on the label for both pesticides and herbicides
  - Pesticides including herbicides will be classified and labeled in an appropriate manner by their names, date of purchase and expiry date.
  - Pesticides will be stored away from any equipment and materials including flammable ones. Additionally their storage area will be inaccessible to animals.
  - Training on handling, applying and storing pesticides shall be provided to personnel
  - Pesticides application should be carried out by a trained personnel
  - Pesticides usage will be minimized whenever possible
  - Follow the product label including its recommended dose rate and number of treatments.
  - Proper treatment intervals will be followed prior to re-entry to avoid the exposure of workers to pesticide residues in production sites.
  - Agricultural wastes mixed with pesticides will be controlled to avoid its burning
  - Pesticides containers will be handled as a hazardous waste material and must never be re-used under any circumstances
  - Whenever possible containers may be returned to suppliers
  - Machines and containers transporting pesticides will be cleaned from spillage.

  For the application of rodenticides the following procedures will be followed (Derived from (EBPF, n.d)[2]):
  - Best practice techniques in pesticides application will be followed to avoid their consumption by non-targeted species
  - Bait points for rodents will be carefully selected to ensure the higher probability of being consumed by rats and mice.
  - Bait should be added on trays and not directly to the ground to prevent its spillage and facilitate its removal at the end of the treatment
  - Use of closed trays that are accessible only to the targeted rodents
  - Baits can be added directly into the rodent's burrow
  - Sites with treatment will be inspected frequently and dead bodies shall be removed instantly to prevent secondary poisoning by non-targeted species.
  - Dead rodents may be disposed as hazardous waste with a certified waste contractor
  - Ultrasonic rodent repellent devices can be added to reduce the use of

[1] FAO (2001). Guidelines on Good Practice for Ground Application of Pesticides
[2] EBPF (n.d). Guideline on Best Practice in the Use of Rodenticide Baits as Biocides in the European Union

pesticides (Tobin, 2005)[3].

Additionally the management of pesticides will comply with the regulations of Law 4/1994 to be taken before using pesticides or other chemicals (stated in Chapter 2, Section 2.1.11). Mitigation measures in Chapter 6 concerning pesticides and fertilizers in accordance with IFC guidelines will be applied.

- ***Pest management***

  Pest control is an important factor affecting agricultural production. Canal Sugar considers the policy and strategy of the Ministry of Agriculture and Land Reclamation, using integrated pest management[4], as the policy for pest management.

  Integrated Pest Management (IPM) is based on prevention, monitoring, and control which offers the opportunity to eliminate or drastically reduce the use of pesticides. The integrated pest management is a combination of techniques that relies on maximizing the use of natural pest management schemes through an environmental, economic and social perspective. This system is based on limiting intervention with chemical pesticides to only necessary cases and, using soft chemicals (short half-life), in a targeted way, to limit costs and negative effects on beneficial insect populations.

  An integrated pest management approach will be used to minimize the use of pesticides whenever possible. The following management scheme shall be followed (adapted from Pretty & Bharucha 2015)[5]:
  - The use of crop rotation to prevent the building of any pathogens and also the establishment of weed populations
  - Select pest-resistant varieties of crops
  - Prepare seeds and seedbeds
  - Plant pest-free rootstock
  - Substitute highly toxic pesticides with low toxicity
  - Use of bio pesticides (from natural plant repellents)
  - Use target spraying
  - Deliberate release of natural predator to control pest if possible
  - Apply sticky and pheromone traps for pest trapping
  - Add stakes in the fields for bird perching

  For indoor areas (EBPF, n.d):
  - Store food properly to prevent its accessibility by rodents
  - Prevent rodents from entering vulnerable buildings
  - Ensure the tight fitting of doors and windows to prevent rodents entrance

- ***Weed management***

  Integrated control of weeds is intended to be in accordance with the

[3] Tobin, M. E., & Fall, M. W. (2004). Pest control: rodents.

[4]Minister of Agriculture and Land Reclamation Decree 974/2017 regarding regulating the manufacturing and utilization of agricultural pesticides

[5] Pretty, J., & Bharucha, Z. (2015). Integrated pest management for sustainable intensification of agriculture in Asia and Africa. *Insects*, *6*(1), 152-182.

recommendations of the Ministry of Agriculture, and include both chemical and mechanical controls. Through the application of several practices to control weeds and reduce their adaptation in the area[6].

An integrated weed management (IWM) approach aims to remove the weed seed stock in the area. The management plan of the IWM will include the following:

- **Prevention**

- Use certified weed-free seeds
- Clean vehicles and equipment before entering the site to prevent the spread of weed seed and weed plant parts from one area to another.
- Decrease machine and vehicles on side during periods when seeds are likely to spread.
- Create tracks for machines and vehicles
- Remove weeds before they can form seed heads or spread by other methods.

- **Cultural controls**

- Use proper planting times and planting rates
- Use locally native plants if possible
- Manage fertilizers and irrigation in order to target desired plants rather than weeds
- Use of crop rotation and plant cover crops
-

- **Mechanical/Physical controls**

- Mowing may restrict the establishment of weeds and its spreading
- Mulch[7] soil through adding a ground cover consisting of organic material which will prevent the weed from receiving sunlight
- Apply tilling or turning the soil which will bury the weed underneath the and therefore killing it

- **Biological controls**

- Carefully select natural insect predators to control attacks on the plants and their fruits

- **Chemical controls**

- Read herbicides labels and guidelines prior to application
- Use of herbicides to manage weeds

- ***Controlling Odors***

  Odors will be controlled through the following procedures:
  - Provision of adequate ventilation in closed areas and buildings
  - Ensure good housekeeping practices around the farm and avoid any waste accumulations.
  - Use technologies that eliminate odors at sites with risk of odor emissions

[6] Australian Government. Integrated Weed Management
[7] Mulching is the addition of residual organic matter such as leaves

- ***Housekeeping***
  The project will follow a good housekeeping management as follows:
  - Reduce any accidental spills from machines and vehicles
  - Reduce the storage time of any wastes including agricultural wastes
  - 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:

  - Tractor-drawn drills
  - Self-propelled sugar beet harvesters
  - Center Pivot System
  - Potable water treatment equipment
  - Sewage waste water treatment equipment
  - Personal protection devices
  - Diesel generator

- ***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***
  Domestic solid waste will be collected from all accommodation and facilities. Waste shall be properly stored according to the national regulations and disposed with a certified waste contractor. If possible wastes that can be recycled shall be transferred to a certified contractor

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 Management***
  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.
  - Place 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

- ***Antiquities excavation***
  In case of finding any ruins during land ripping and seasonal preparations or during any activities of the operational phase, it is necessary to implement the management plan for antiquities stated previously in the construction phase management plan in this chapter

- ***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 farm and facilities
  - 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 facilities

Additionally, emergency personnel (once appointed) will also conduct periodical training on the rescuing and protection of workers farm and associated facilities in case of emergency. Training will include safety, emergency response and first aid procedures. Annual training and awareness for all employees will be provided.

- ***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 as well as the necessary procedures.
- Potential failure of the safety measures and procedures and supervision devices
- 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 though 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 buildings and 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 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.

7.5 Environmental Monitoring Plan

Although most potential impacts can be mitigated through management measures, the monitoring program is an essential element of 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 during construction operation. 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.

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.

7.5.1 Environmental Monitoring Plan during Construction

Proposed monitoring during the construction phase includes the following aspects.

- ***Ambient Air Quality***
  Ambient air quality will be monitored during the project construction phase. Measurements of the main pollutants (CO, SO_2, NO_2 TSP and PM_{10})
  Air emissions will be monitored bi-annually to check its compliance with:
  - Annex 5 of the Executive Regulations for Law No. 4 of 1994 (as amended by decree 710 of 2012) limits and IFC limits for ambient air
  - Annex 6 of the Executive Regulations for Law No. 4 of 1994 (amended by decree 964 of 2015) and IFC limits, for air pollutants from power generation units
  - Annex 6 of the Executive Regulations of Law No. 4 of 1994 (amended by decree 964 of 2015) for vehicle exhausts

  More details on these limits are provided in Chapter 2, Section 2.1.3.

- ***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). Section 2.1.3 in Chapter 2 provides more details on these limits.

- ***Noise levels***
  Ambient noise will be monitored during the project construction phase for the equipment used to ensure that the regulatory limits and IFC limits are not surpassed. (Section 2.1.4 in Chapter 2 provides more details on noise limits). 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.

- ***Workplace Monitoring***
  Air 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 (stated in Chapter 2, Section 2.1.12). The following parameters will be monitored: total particulates and respirable particulates.

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) (stated in section 2.1.12 in Chapter 2). 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.

7.5.2 Environmental Monitoring Plan during the Operational Phase

Proposed monitoring during the operation phase includes the following aspects.

- ***Ambient Air and GHGs Quality Monitoring***

  Air emissions will be monitored bi-annually to check its compliance with:
  - Annex 5 of the Executive Regulations for Law No. 4 of 1994 (as amended by decree 710 of 2012) limits for ambient air
  - Annex 6 of the Executive Regulations for Law No. 4 of 1994 (amended by decree 964 of 2015) and IFC guidelines, for air pollutants from power generation units
  - Annex 6 of the Executive Regulations of Law No. 4 of 1994 (amended by decree 964 of 2015) for vehicle exhausts

  Section 2.1.3 in Chapter 2 provides more details on these limits.

- ***Pest monitoring***

  Invertebrate pest monitoring[8] during operational activities depends on the following factors:
  - Crop and or insect development stage
  - Species of insect and type of crop

  Monitoring procedures shall be performed as follow:
  - Sweep netting
  - Shaking the plant and collecting insects in a bag
  - Using pit trapping for nocturnal insects
  - Close examination of insects with magnifying glass

  Results analysis shall be performed as follow:
  - Assess the level of predators/parasites present
  - Compare with threshold level of pests per crop type
  - Assess biological conditions that play a role in pest survival

[8] Department of primary industries and regional development (2015). Monitoring insects and other crop pests. Government of Western Australia

Rodent pest monitoring was extracted from (Meerburg *et al*., 2004)[9] can be done as follow:

- Estimate the abundance of rodents using traps, or tracking plates or electronic devices

Results analysis shall be performed as follow

- Check which rodents are the major pests
- Check if abundance is above threshold

- ***Monitoring of treated domestic wastewater***

Bi-annual monitoring of treated domestic wastewater within the site shall be carried out in accordance using the indicators and frequencies listed in Table 7-4. Monitoring results will be compared with the limits within the Egyptian code 501/2015 prior to reusing it in irrigation.

Table 7-4: Indicators and Frequency for monitoring of industrial wastewater

Monitoring location	Indicators	Frequency	Responsible entity
Output of the treated domestic waste water	Total Suspended Solids	Biannual	Private licensed lab
	Turbidity		
	Biological Oxygen Demand (BOD)		
	E-Coli		
	Intestinal nematodes/Liter		

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.

[9] Meerburg, B. G., Bonde, M., Brom, F. W. A., Endepols, S., Jensen, A. N., Leirs, H., & Kijlstra, A. (2004) Towards sustainable management of rodents in organic animal husbandry. *NJAS-Wageningen Journal of Life Sciences*, *52*(2), 195-205

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

- ***Workplace Monitoring***

Air emissions

Monitoring the emissions inside utilities workplace will be performed. Measurement results will be compared to the limits given in Annex (8) of Law 4/1994 and Law 12/ 2003 (stated in section 2.1.12 in Chapter 2). The following parameters will be monitored: CO_2 and H_2S.

Noise

During operation of utilities, Canal Sugar 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) (stated in section 2.1.12 in Chapter 2). 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.

7.5.3 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 Firefighting 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 utilities 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.

7.6 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.

7.6.1 Corporate Social Responsibility

A Corporate Social Responsibility (CSR) Plan shall be developed as a part of the Stakeholder Engagement Plan of Canal Sugar. The purpose of this CSR Plan is to provide the rationale for future 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.

7.6.2 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.

7.6.3 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 Chapter 8, Section 8.5.1.

7.6.4 Grievance Management

A grievance management plan was developed in Section 8.6 of Chapter 8 and includes an external and an internal grievance mechanism.

7.6.5 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.

7.7 Management Plan Review

The Project Manager is authorized to change and re-issue the ESMP. The Site Supervisor should be informed of any changes made by the Project Manager and is authorized to change and re-issue procedures for environmental control. Moreover, each procedure would be regularly reviewed by the Site Supervisor. He is also responsible for ensuring that the workforce is complying with procedures, informing the staff of any changes and ensuring that the staff is aware of changes before starting any works.

8. 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 assisted in identifying the potential communities that may be affected by the project. A list of involved 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.
- Environmental aspects of the project.

Table 8-1 shows the main concerned stakeholders and their respective roles in the project, identified during the scoping phase. The list has been updated throughout the study progression and a detailed list of 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
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 Projects and Agricultural Development (GARPAD) is the land allocation authority for Canal Sugar Company to implement the project.
Ministry of Irrigation and Water Resources	Official body 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
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

The land reclamation project is part of an integrated project which also includes the establishment of a beet sugar factory. Therefore, scoping meetings with relevant stakeholders were carried for both the sugar factory and land reclamation projects. 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; and
- Acquire information of the stakeholders suggested for participation in the public consultation session.

8.3.1 Scoping Meetings for the Sugar Factory

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

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

- ***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.

  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

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.

Regarding soil and geotechnical investigations, the project's land has recently been allocated, and no sampling work had been conducted so far. As soil investigations have been carried out at a later stage; the results of the geotechnical study were summarized in Chapter 4 of this study.

- ***Environment Management Unit in Minya Governorate***
  A meeting was held with Dr. Nada Ashour Abdel Zaher, General Director of the Department of Environmental Affairs in Minya Governorate, on 15/4/2018 at the headquarters of the Directorate of Minya.

  The main topics discussed during the meeting are:
  - Sources of water and fuel used in the project
  - Groundwater depth in the project area
  - Way of hazardous waste and sewage disposal

8.3.2 Scoping Meetings for the Land Reclamation Project

Stakeholder meetings have taken place at the scoping report preparation stage with neighboring farms, and local community in Balansoura village. During these meeting data on some socio-economic aspects were obtained from the interviewees and integrated in Chapter 4, Section 4.3.

The meetings also 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 and particularly provision of job opportunities. Stakeholders also expressed their concerns related to lack of key services, particularly the health services.

8.4 Public Consultation

Two public consultation sessions have been planned, for the sugar factory and the land reclamation project.

8.4.1 Public Consultation for the Sugar Factory

The public consultation and disclosure meeting 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 meeting aimed at presenting the results of the draft ESIA study to stakeholders and to discuss their inquiries and observations.

The following summarizes the main points discussed during the meeting:

- 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.

8.4.2 Public Consultation for the Land Reclamation Project

As for the beet sugar factory, a public consultation and disclosure meeting for the present land reclamation project has been carried out on the 26th of May 2018 in the Louvre Hall of Triumph Hotel, Fifth Settlement, New Cairo. Transportation of participants from Minya to Cairo and vice-versa has been taken in charge by Canal Sugar. The meeting aimed at presenting the results of the draft ESIA study to stakeholders and to obtain their feedback and discuss their concerns and observations.

The following summarizes the main points discussed during the meeting:

- Wastewater management: wastewater will be reused and will be properly managed according to the legal requirements. Sewage tanks will be monitored in case of any leakage and will be provided with devices to detect any changes in the rate of wastewater flow.
- Recommendations to communicate with the governorate officials to open a U-turn near the project site to facilitate transport operations. Additionally, the project will install lightings on the main road, 2 km to the north and 2 km to the south of the project site.
- Emissions and use of natural gas as fuel: Canal Sugar will use natural gas, which does not generate dark emissions. The produced steam by the factory for 1 ton sugar is less than the national average by 30%. Canal Sugar uses new technologies that decrease the energy requirements.
- Potential groundwater depletion after 60 years: the groundwater study did not mention that the reservoir will be depleted after 60 years and cannot provide projections for more than 60 years. After 60 years a new study

must be conducted on the aquifer. The study states that after 60 years, the groundwater in the reservoir will decrease by 14 meters which is relatively a small amount in a 60 years period. The amount of water that is pumped for the project is very small compared to the capacity of the reservoir.

- Groundwater consumption and number of wells: All the wells will be monitored using SCADA systems and supervised by the ministry of irrigation and water resources. The project will not pump more water than the agreed amount with the authorities. The cost of energy required for pumping is high; therefore, the project will not pump unnecessary water. The project will not use 800 wells but 800 pivots which require a maximum of 250 wells.
- Job opportunities: Canal Sugar has contracted Sinoma International Engineering, and will provide their details in case someone is looking to work in the construction phase. During the operation phase, most of the workers will be from Minya.

A detailed report of the PC meeting is provided in **Annex 7**.

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 about 32 km) and Markaz Mallawi (about 30 km). The nearest residential area is the village of Balansoura at about 15.5 km from the project area. The second nearest residential area is Beni Khaled village located at a distance of about 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

Stakeholders meetings carried out at the scoping report preparation stage with neighboring farms and Balansoura village residents 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 lack of key services particularly the health services.

5.1.1 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 the village of Balansoura at about 15 km from the project area. The second nearest residential area is Beni Khaled village located at a distance of about 19 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 Projects and Agricultural Development 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	Owns 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.

8.5.1 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 Projects and Agricultural Development, Ministry of Agriculture and Land Reclamation;
  - 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.

- ***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. 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. Balansoura and Beni Khaled villages).
  - 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 Balansoura and 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. Environics 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.

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.

[1] IFC PS 2012, para. 35 (Grievance Mechanism for Affected Communities)

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 Form[2], 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 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

[2] A proposed Grievance Form is attached in **Annex 8**

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 compliant 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. 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.

In case where the local sub-contractors is providing workers and laborers to the main contractors, resolving internal grievances related to those workers becomes the entire responsibility of that local sub-contractor.

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 Form. 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.

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 that 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.

8.6.3 Consultation and Raising Awareness about 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.

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