National Solid Waste Management Program

Lot B: Governorate of Kafr El-Sheikh and Governorate of Gharbia

Scoped ESIA for Upgrading the Waste Transfer Station in Bassioun, Gharbia Governorate

March 2021

Lot B implemented by:

COWI A/S

Chemonics Egypt

in association with
BC Berlin and Environics Egypt

Table of Contents

List of Tables ..... **vi**

List of Figures ..... **viii**

Glossary of Abbreviations ..... **ix**

Executive Summary ..... **xi**

1. Introduction **1-1**
- 1.1 Background 1-1
- 1.2 Objective of the ESIA 1-2
- 1.3 Scope of Work 1-2
- 1.4 Structure of the ESIA Report 1-3

2. Regulatory Framework **2-1**
- 2.1 National Laws and Regulations 2-1
  - 2.1.1 Environmental and Social Assessment Procedures in Egypt 2-1
  - 2.1.2 The Egyptian Environmental Impact Assessment Guidelines 2-3
  - 2.1.3 Legal and Regulatory Framework for Municipal Waste Management 2-4
  - 2.1.4 Egyptian Permits for Transfer Stations 2-5
  - 2.1.5 Legal and Regulatory Framework for Emissions to Air 2-6
  - 2.1.6 Legal and Regulatory Framework for Noise Nuisance 2-7
  - 2.1.7 Legal and Regulatory Framework for Wastewater Disposal to Sewers 2-7
  - 2.1.8 Legal and Regulatory Framework for Potable Water Quality 2-8
  - 2.1.9 Legal and Regulatory Framework for Protection of Biodiversity 2-9
  - 2.1.10 Legal and Regulatory Framework for Environmental and Other Registers 2-10
  - 2.1.11 Legal and Regulatory Framework for Work Environment 2-10
  - 2.1.12 Legal and Regulatory Framework for Social and Labour Aspects 2-11
  - 2.1.13 Legislation applicable to Cultural Heritage 2-13
- 2.2 Regional and International Conventions 2-13
- 2.3 International Standards 2-15
  - 2.3.1 Environmental and Social Standards of KfW 2-15
  - 2.3.2 World Bank Environmental and Social Framework 2-16
  - 2.3.3 World Bank EHS Guidelines 2-18
  - 2.3.4 IFC Performance Standards 2-19
  - 2.3.5 International Labour Standards 2-19

3. Project Description **3-1**
- 3.1 Background 3-1
- 3.2 Project Location 3-5
- 3.3 Waste Characteristics 3-6
- 3.4 Existing Infrastructure 3-7
- 3.5 Current Existing TS 3-7
- 3.6 Proposed Project Components 3-7
  - 3.6.1 Weighbridge 3-7
  - 3.6.2 Loading area 3-8
  - 3.6.3 Reception Area ..... **Error! Bookmark not defined.**

3.6.4 Entrance Area ..... **Error! Bookmark not defined.**
3.6.5 Administration Building 3-8
3.7 Construction Phase 3-10
3.7.1 Pre-construction and Construction Activities 3-10
3.7.2 Utilities 3-10
3.7.3 Construction Equipment 3-11
3.7.4 Inputs during Construction Phase 3-11
3.7.5 Emissions and Wastes during Construction Phase 3-12
3.7.6 Labour Force and Work Shifts 3-14
3.7.7 Schedule of Construction Phase 3-14
3.8 Operation and Maintenance Phase 3-14
3.8.1 Weighbridge O&M 3-14
3.8.2 Loading area O&M 3-14
3.8.3 O&M of Equipment and Vehicles 3-15
3.8.4 Access roads and ramp during O&M phase 3-15
3.8.5 Traffic management onsite/offsite during O&M phase 3-15
3.8.6 Utilities during O&M phase 3-15
3.8.7 Inputs during O&M phase 3-16
3.8.8 Emissions and Wastes during O&M Phase 3-16
3.8.9 Maintenance Procedures and Frequency 3-18
3.8.10 Labour Force and Work Shifts 3-18
3.8.11 Site Security 3-18
3.8.12 Site Tidiness 3-18
3.8.13 Vector and Wildlife Management 3-18
3.9 Time Schedule for Project Implementation 3-18
3.10 Decommissioning Phase 3-18
3.11 Emergency Procedure 3-19

4. Baseline Environmental and Social Conditions 4-1
4.1 Methodology 4-1
4.1.1 Physical Environment 4-1
4.1.2 Biological Environment 4-1
4.1.3 Socio-economic Environment 4-2
4.2 Physical Environment 4-2
4.2.1 Project Location 4-2
4.2.2 Climate 4-4
4.2.3 Topography 4-7
4.2.4 Geomorphology 4-7
4.2.5 Geology 4-9
4.2.6 Hydrogeology 4-10
4.3 Biological Environment 4-14
4.3.1 Ecology of the Wider Area 4-14
4.3.2 Ecology of the Project Site 4-18
4.3.3 Ecological Value 4-18
4.4 Socio-Economic Environment 4-20
4.4.1 General Background 4-20
4.4.2 Demographic Profile 4-20
4.4.3 Public Health 4-22
4.4.4 Economic Profile 4-23
4.4.5 Employment 4-23
4.4.6 Infrastructure, Utilities and Services 4-24

4.4.7 Archaeological Sites 4-24

5. Project Alternatives 5-1
5.1 No-Project Alternative 5-1
5.2 Alternative Project Location 5-2
5.3 Alternative Loading Technologies 5-2
5.3.1 Option with Direct Dumping into Transfer Vehicle 5-2
5.3.2 Option with Storage and Disposal of Waste 5-3
5.3.3 Option with Baler System 5-4
5.3.4 Option with Loading using Surge Pit 5-4
5.3.5 The Option Selected for Bassioun TS 5-4

6. Environmental and Social Impacts Assessment and Mitigation Measures . 6-6
6.1 Methodology 6-6
6.1.1 Identification of Potential Environmental Impacts 6-6
6.1.2 Evaluation and Assessment of Impacts 6-6
6.1.3 Mitigation Measures 6-9
6.1.4 Residual impacts 6-9
6.2 Impact Identification 6-9
6.2.1 Scoped out Impacts 6-9
6.2.2 Positive Impacts 6-10
6.2.3 Potential Negative Impacts 6-12
6.3 Assessment of Potentially Negative Impacts and Proposed Mitigation Measures 6-14
6.4 Cumulative Impacts 6-43

7. Environmental and Social Management Plan 7-1
7.1 Summary of Impacts 7-1
7.2 Summary of Mitigation Measures and Residual Impacts 7-2
7.3 Environmental and Social Responsibilities 7-7
7.3.1 Establishment of Health, Safety and Environment Department ... 7-7
7.3.2 Responsibility of HSE Staff 7-7
7.4 Environmental Management Procedures 7-8
7.4.1 Environmental Management during the Construction Phase 7-8
7.4.2 Environmental Management during the Operational Phase 7-11
7.5 Environmental Monitoring Plan 7-16
7.5.1 Environmental Monitoring during the Construction Phase 7-16
7.5.2 Environmental Monitoring during the Operational Phase 7-20
7.5.3 Monitoring Performance and Inspection 7-21
7.6 Social Management Plan 7-24
7.6.1 Labour and Working Conditions 7-24
7.6.2 Ongoing Consultation 7-24
7.6.3 Information Disclosure 7-24
7.6.4 Grievance Management 7-24
7.6.5 Socio-economic Monitoring 7-25
7.7 Management Plan Review 7-25

8. Consultation and Engagement 8-1
8.1 Methodology 8-1
8.2 Stakeholders Identification 8-1
8.3 Individual Scoping Meetings 8-2
8.3.1 Meeting at the Gharbia Governorate Headquarter 8-2

8.3.2 Meetings in Zefta 8-3
8.3.3 Meetings in Samanoud 8-3
8.4 Information Disclosure and Stakeholder Engagement 8-4
8.4.1 Stakeholders Identification 8-4
8.4.2 Public Consultation and Disclosure 8-7
8.4.3 Stakeholder Engagement Strategy 8-9
8.5 Grievance Management 8-10
8.5.1 External Grievances 8-10
8.5.2 Internal Grievances 8-14
8.5.3 Consultation and Raising Awareness on the Grievance Mechanism 8-15

9. References i

Annexes

Annex 1: Land Allocation Letter

List of Tables

Table 2-1: Key permits needed for construction and operation of new TS 2-5
Table 2-2: Maximum Limits of Ambient Air Pollutants 2-6
Table 2-3: Maximum Emission Limits in Vehicles using Gasoline Fuel 2-7
Table 2-4: Maximum Emission Limits in Vehicles using Diesel Fuel 2-7
Table 2-5: Maximum Limit Permissible for Noise Level in the Different Zones According to Annex 7 of the Modified ERs of Law 4/1994.....2-7
Table 2-6: Standards and specifications of wastewater to be discharged to sewer systems 2-8
Table 2-7: Parameters Relevant for Potable Water Quality.....2-9
Table 2-8: Law 4/1994: Period of Workplace Exposure to noise in dB (A) 2-11
Table 2-9: Labour Law: Decree 211/2003 – Workers exposure to noise in workplace 2-11
Table 2-10: Relevant regional and international conventions related to the project 2-13
Table 3-1: Waste quantities and composition 3-6
Table 3-2: List of main construction equipment.....3-11
Table 3-3: Raw materials used during construction phase 3-11
Table 3-4: Hazardous wastes generated during construction phase 3-13
Table 3-5: List of main equipment for O&M of the proposed TS 3-15
Table 3-6: Hazardous wastes generated during operation phase 3-17
Table 4-1: Average monthly temperature in the Project Area (based on 30 years of data).....4-4
Table 4-2: Average rainfall data in the Project Area (based on 30 years of data) 4-5
Table 4-3: Average monthly wind speed in the Project Area (based on 30 years of data).....4-6
Table 4-4: Distribution of the population by sex in both of Gharbia Governorate and Markaz Bassioun in 2017.....4-21
Table 4-5: Distribution of infection cases and common diseases. 4-22
Table 4-6: Total hospitals categorized by sector 4-22
Table 4-7: Distribution of labour force between economic activities in Gharbia.....4-23
Table 6-1: Temporal scale category description 6-7
Table 6-2: Spatial scale category description 6-7
Table 6-3: Severity scale category description 6-7
Table 6-4: Significance Matrix 6-8
Table 6-5: Potential / Residual Impacts Matrix 6-13
Table 6-6: Potential impacts on air quality during construction and operation and proposed mitigation measures.....6-17
Table 6-7: Potential impacts on GHGs emissions during construction and operation and proposed mitigation measures 6-19
Table 6-8: Potential impacts on noise levels during construction and operation and proposed mitigation measures.....6-21
Table 6-9: Potential impacts on soil and groundwater during construction and operation and proposed mitigation measures.....6-23
Table 6-10: Potential impacts on biological environment during construction and operation and proposed mitigation measures.....6-26
Table 6-11: Potential impacts on public health and amenity during construction and operation and proposed mitigation measures.....6-29
Table 6-12: Potential impacts on traffic and road safety during construction and operation and proposed mitigation measures.....6-31

Table 6-13: Potential impacts on workplace health and safety during construction and operation and proposed mitigation measures....6-33
Table 6-14: Potential impacts on local community during construction and operation and proposed mitigation measures....6-35
Table 6-15: Potential impacts on archaeology during construction and operation and proposed mitigation measures....6-37
Table 6-16: Potential impacts from flash floods during construction and operation and proposed mitigation measures....6-37
Table 6-17: Potential impacts from sandstorms during construction and operation and proposed mitigation measures....6-38
Table 6-18: Potential impacts from venomous species during construction and operation and proposed mitigation measures....6-40
Table 6-19: Significance rating summary of the impacts of the transfer station activities during construction and operation....6-41
Table 7-1: Impacts classification....7-2
Table 7-2: Impact assessment and mitigation measures summary during construction phase....7-1
Table 7-3: Impact assessment and mitigation measures summary during operation phase....7-5
Table 7-4: Parameters for Monitoring of Surface water and groundwater....7-17
Table 7-5: Monitoring activities during the construction phase....7-19
Table 7-6: Monitoring activities during the operational phase....7-22
Table 8-1: Main Project stakeholders....8-2
Table 8-2: Stakeholders interviewed in Gharbia Governorate....8-6
Table 8-3: Public consultation meeting attendees....8-8

List of Figures

Figure 4-16: Birds noticed in the site.....xiii
Figure 2-1: Specific Procedure for ESIAs for MSW under the NSWMP 2-2
Figure 3-1: Waste accumulation at the current TS location 3-2
Figure 3-2: Current MSW management in the governorate 3-3
Figure 3-3: Planned MSW management in the governorate.....3-4
Figure 3-4: Location of the proposed Bassioun Transfer Station 3-5
Figure 3-5: Surrounding land use in the project area.....3-6
Figure 3-8: Layout for the proposed Bassioun TS.....3-9
Figure 4-1: Location of the project site (in red) and administrative boundaries (yellow: Governorate and blue: Markaz).....4-3
Figure 4-2: The distance of settlements from the project site and surrounding environment 4-4
Figure 4-3: Average monthly temperature in the Project Area (based on 30 years of data).....4-5
Figure 4-4: Average rainfall data in the Project Area (based on 30 years of data).....4-5
Figure 4-5: Average monthly wind speed in the Project Area (based on 30 years of data).....4-6
Figure 4-6: Wind directions in the Project Area (based on 30 years of data).....4-6
Figure 4-7: Digitized contour lines (left) from the topographic maps of the Delta region 4-7
Figure 4-8: Project site within the geomorphologic units of the Nile Delta region....4-8
Figure 4-9: Geological Map of the Project Area 4-9
Figure 4-10: Contour map of the base of the Quaternary aquifer relative to the mean sea level.....4-11
Figure 4-11: Diagram of recharge and discharge elements of the aquifer.....4-12
Figure 4-12: Salinity distribution for shallow groundwater in Nile Delta aquifer (up to 125m) 4-13
Figure 4-13: Canals and drains at the Project Area 4-13
Figure 4-14: Habitats of Gharbia Governorate 4-14
Figure 4-15: Habitats surrounding the project site 4-15
Figure 4-16: Birds noticed in the site..... **Error! Bookmark not defined.**
Figure 4-17: Education levels in Gharbia Governorate 4-21
Figure 4-18: Education levels in Markaz Bassioun 4-22
Figure 5-1: Direct Dumping into Transfer Vehicle (EPA, 2002) 5-3
Figure 5-2: Storage and Disposal of Waste (EPA, 2002) 5-3
Figure 5-3: Baler System (EPA, 2002) 5-4
Figure 5-4: Surge Pit (EPA, 2002).....5-4

Glossary of Abbreviations

AEWA	Conservation of African-Eurasian Migratory Water birds
AMC	Accompanying Measures Consultant
BOD	Biological Oxygen Demand
CAA	Civil Aviation Authority
CAPMAS	Central Agency for Public Mobilization and Statistics (Egypt)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CMS	Conservation of Migratory Species
CRC	Convention on the Rights of the Child
COD	Chemical Oxygen Demand
CPI	Consultants for Project Implementation
DCP	Dry Chemical Powder
EBRD	European Bank for Reconstruction and Development
EEAA	Egyptian Environmental Affairs Agency
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
ERs	Executive Regulations
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
EU	European Union
FIs	Financial Intermediaries
GHGs	greenhouse gases
GIIP	International Industry Practice
GM	Grievance Mechanism
IFC	International Finance Corporation
ILO	International Labour Organization
ILS	International Labour Standards
IUCN	International Union for the Conservation of Nature
KfW	Kreditanstalt für Wiederaufbau
MBT	Mechanical Biological Treatment
MSA	Ministry of State for Antiquities
MSDS	material safety data sheets
MSW	Municipal Solid Waste
NCHR	National Council for Human Rights
NGOs	Non-governmental organizations
NO	No objection
NSWMP	National Solid Waste Management Program
OECD	Organization for Economic Co-operation and Development
OSH	Occupational Safety and Health
PMU	Project Management Unit
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan

SECO	State Secretariat for Economic Affairs
SEP	Stakeholder Engagement Plan
SWMU	Solid Waste Management Unit
TS	Transfer Station
TSP	Total Suspended Particles
TSS	Total Suspended Solids
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity
UNFCCC	UN Framework Convention on Climate Change
WB	World Bank
WHO	World Health Organization
WMRA	Waste Management Regulatory Authority

Executive Summary

1. Background

The National Solid Waste Management Program (NSWMP) includes the construction and operation of three Solid Waste Transfer Stations (TS) on the territory of Gharbia Governorate. The three TS facilities are planned in Bassioun, Zefta and Samanoud.

In Bassioun, a TS already exists that aims at Municipal Solid Waste (MSW) consolidation and its transfer to Sadat landfill. However, the TS is badly managed leading to MSW accumulation in the site, and the blockage of the TS exit. The Bassioun TS project aims at upgrading the existing TS to increase its efficiency in handling MSW. It is worth mentioning that the transported waste will not be segregated and will be disposed of without treatment in the Sadat landfill. This situation will not be permanent as it is planned to transfer the waste to Kafr El Zayat Mechanical and Biological Treatment (MBT) facility (upon construction however low on funds) for segregation and treatment. This treatment facility will allow for the separation and recycling some of the waste fractions, while non-recyclable waste and residual waste from the treatment facilities will be sent for disposal to the Sadat landfill. The present report is a *Scoped environmental and social impact assessment* (ESIA) for the Bassioun Transfer Station only.

According to Law 4/1994 modified by Laws 9/2009 and 105/2015, any new project or modification will require an environmental approval from the Egyptian Environment Affairs Authority (EEAA). The Transfer Stations for solid waste are not mentioned in the national project categorization lists issued by the EEAA in 2016. On the other hand, Mechanical Biological Treatment (MBT) facilities are included in the project categorization list of Category B-Scoped projects, which requires the preparation of a Scoped ESIA for each proposed MBT facility and does not require organizing a public consultation meeting. As TS facilities are expected to generate less environmental impacts than MBT facilities, a Scoped ESIA is also deemed appropriate for the construction and operation of a Transfer Station.

As a loan from the KfW/EU/SECO is considered by the NSWMP in order to finance the project, the ESIA should comply with the KfW requirements. In this respect, the ESIA follows the latest version of the ESIA Guidelines for Municipal Solid Waste Management Projects developed for NSWMP in 2019 including the Appendix A – Supplement for Transfer Stations.

2. Legal and Administrative Framework

This section of the ESIA report provides a summary of environmental legislations relevant to the project. The summary includes national legislations and regulations, International Financing Institutions requirements including Environmental and Social Standards of KfW, World Bank Environmental and

Social Framework, World Bank EHS Guidelines, and international conventions to which Egypt is party.

3. Project Description

The Bassioun TS is part of an integrated solid waste management (ISWM) system for Gharbia Governorate that includes waste transportation via Bassioun, Samanoud and Zefta TS facilities, recycling in different MBTs facilities located in the governorate and final disposal outside the governorate in El Sadat Landfill (Menoufya Governorate).

The site of the proposed project is currently used as TS facility and has an area of approximately 5,650 m^2. The site of the existing TS is located in an agricultural area, to the southeast of Bassioun City. The project area is accessible from Bassioun\ Kom El Naggar Road. The current TS structures include a fence, a small wooden guard room, and a small shaded parking area. The TS site is currently not divided into waste reception, unloading, and loading areas. Collection trucks delivering waste unload it in any area, leading to waste accumulation in different parts of the TS territory.

The activities of the TS facility upon the proposed upgrading will include waste daily storage and transfer from collection trucks (small trucks) to bigger trucks (transfer trucks). The local unit or private sector will operate the TS. Collection trucks will enter the facility and will be inspected visually for any unaccepted waste such as hazardous waste. Then, trucks will be weighted and enter the unloading area equipped as an elevated platform. The small trucks will via a ramp enter the unloading area established in a building (hangar). The small trucks will unload/tip waste into the hopper directing the waste into a large transfer truck placed under the hopper to receive that waste. The small trucks could also unload within the area next to the top of ramp in case of transfer truck delay or in case of waste deliveries by small trucks without tipping mechanism. The small trucks will be also weighed before leaving the TS site to determine the amount of waste delivered.

The proposed TS facility will include the following key elements:

- Entrance Area
- Weighbridge
- Waste Reception Area
- Loading Area
- Security\ Guard Room
- Administration/Staff Building

The estimated labour force required for the project construction is approximately 20 employees (20 males and 0 females) hired through direct jobs. The project will be implemented through one work shift (of 8 hours) per day. The governorate will encourage contractors to hire most workers from Gharbia and gender equality will be considered in this phase of the project. The construction phase of the station will last for 6 months according to NSWMP plans.

The estimated labour force required for the project operation is approximately 15 employees (including males and females) hired through direct jobs. The labour is recommended to be hired from Markaz Bassioun, and gender equality shall be considered in this phase of the project.

4. Baseline Environmental Conditions

4.1. Physical Environment

The monthly average for the maximum temperature reaches its peak value in July and August (36 °C), and its minimum value in January and February (20 °C) whereas the monthly average of minimum temperature reaches its highest in August (21 °C) and its lowest in February (6 °C). The mean annual precipitation in the last thirty years at the project area is 31 mm. The prevailing winds at the project area blow from North and North West directions.

The ground surface elevation within the project area ranges from 1.4 to 5 meters. The geomorphologic features of the project area (located in the Nile delta) includes three main geomorphologic units namely; the Offshore Submerged Plain, the Foreshore Plain and the Young Fluvial Plains.

The stratigraphic column for the soil in Bassioun Markaz is as follows:

- Consolidated silt with a thickness (1 m) from 0 ground level to -1 m.
- Consolidated silt and trace fine sand with a thickness (1.5 m) from -1 m ground level to -2.5 m.
- Consolidated brown clay and trace fine & coarse sand with a thickness (5.5 m) from -2.5 m ground level to -7 m.
- Brown clay, trace coarse sand, and fine gravel with a thickness (4 m) from -7 m ground level to -11 m.
- Yellow gravel and coarse sand with a thickness (4 m) from -11 m ground level to -15 m.

The groundwater can be found at depths approximately 2 meters in the project area. There are a few canals and drains surrounding the project site. The closest canal (unnamed canal) to Bassioun TS is adjacent to the western border of the site. Furthermore, Tirat Al Batanuniah canal lies approximately 1,1 km to the east project site. The closest drain is located about 140 m at the east next to the sewage treatment plant.

4.2. Biological Environment

Chemonics conducted a site visit in February 2021. The transfer station site is currently a transfer station with accumulated waste surrounded by agricultural lands and a wastewater treatment facility. No threatened species were observed within the area. Only stray dogs and some common birds including Hooded Crow (*Corvus corone*) and Cattle Egret (*Bubulcus ibis*) were observed Pests such as flies and rodents were also present within the area. An unnamed canal is located east of the project site. The canal may include amphibians; however, they were not observed during the site visit.

4.3. Socio-Economic Environment

The project's location is within the administrative borders of Bassioun Markaz which occupies approximately 160 km^2 and represents 8.2% of the governorate's total area. The project area is located near the southern border of Markaz Bassioun. Scattered houses are located about 450 to 475 m north and east the project site and they are deemed to be the nearest residential houses to the site. The project site is surrounded by agricultural lands from three sides; south, west and north, at the eastern side sewage treatment plant is present followed by minor paved road and unnamed drain. The surrounding land use of project site can be summarized as follow:

- North: Agricultural lands;
- West: Narrow unpaved road, canal, and agricultural lands;
- East: Sewage treatment plant, minor paved road, and drain;
- South: Agricultural lands.

The population of the governorate reached 4,999,633 in 2017. Most of the population (71.8%) lives in rural areas, which is higher than the national average (57%). The total population of Markaz Bassioun reached 296,355 inhabitants and its approximately 80,247 households represent an average family size of 3.7 members. Most of the population in Markaz Bassioun (77.8%) lives in rural areas.

The illiteracy rate in Markaz Bassioun (26%) is higher than the governorate's rate (21%) and lower than the national average rate in total (30%). About 30% of total population (+10 years) have received pre intermediate education, 32% intermediate, 3% post intermediate, and about 10% have a university degree or higher.

Typhoid is a highly common disease in Gharbia. Additionally, the total number of infection (including Typhoid and Hepatitis A, B and C) cases reached about 1669 cases in 2017. Moreover, Gharbia Governorate includes 33 public hospitals and 58 private hospitals with a total number of 7163 beds. A central public hospital is located in Bassioun city about 3.5 km from the project site.

Industrial activities such as weaving and dyes production, oil and soap and fertilizers productions, as well as agriculture, are the main activities of Gharbia residents.

Like in other regions of Egypt, activities of informal waste pickers and recyclers, Zabbaleen (GIZ, 2015) are observed in Bassioun. They are mainly associated with collection points in residential areas, where Zabbaleen have access to the incoming new waste and can extract the recyclables. The site proposed for TS in Bassioun contains accumulated waste with estimated amount 15,000 tons of waste, which is accessible for informal waste pickers. Part of the accumulated waste is currently being cleaned-up. Upon construction and operation of the project, the site will be of no further interest for the informal waste pickers.

The project area does not include any archaeological sites. The nearest archaeological site is located about 9 km northwest the project site at Markaz Bassioun.

5. Project Alternatives

The alternatives are proposed from baseline investigations, stakeholders, and site visit. The suitable alternatives are identified according to one or more of the following:

- Stakeholders' meetings;
- Solid waste management manuals; and
- Project designer meeting.

The following alternatives were investigated:

- No-project alternative;
- Alternative project location; and
- Alternative loading technology.

The current land use of the location is TS with accumulated waste. Solid waste from Bassioun Markaz is collected, and consolidated in this site, then it is transferred to Sadat landfill. However, the bad management of the TS led to waste accumulation (15,000 tons) at the site. It is reported that the site have negative environmental impact on the surroundings (gaseous and odour emissions, waste spontaneous combustion, generation of leachate and thus impacts on public health).

The "no-project" alternative will result in the continuous bad management of the TS and waste accumulation and the related negative impacts of the current condition of the TS will continue.

The proposed project is the upgrading of the existing Bassioun TS without increasing the area of the current TS. Therefore, no other project alternative was studied.

Unloading/loading technologies that are discussed are the following:

- Direct Dump into Transfer Vehicle
- Storage and Disposal of Waste
- Baler System
- Loading using Surge Pit

The selected loading technology is direct dumping into transfer vehicle.

6. Environmental and Social Impacts Assessment and Mitigation Measures

6.1. Environmental Impacts and Mitigation Measures scoped out

- Impacts on archaeology
- Land acquisition, compensation and involuntary resettlement
- Impacts on vulnerable groups

- Impacts on indigenous people

6.2. Positive Impacts

- Improved working conditions
- Increase in employment opportunities
- Reduced negative impacts of the accumulated waste on environment and human health
- Reduction of Greenhouse Gas Emissions
- Improved visual impact

6.3. Negative Impacts

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

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Air Quality	Construction	• Movement of heavy equipment and vehicles in the location and unpaved roads; • Levelling, excavation and backfilling activities in the construction site; and • Mixing of building aggregates.	MINOR	• Dust suppression using water and chemical controls such as calcium chloride; • 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; • Modify timing of construction where possible, to coincide with favourable climate conditions.	INSIGNIFICANT
	Operation	• Vehicle and generator emissions which contains NOx, SOx, CO, and PM; • Odour from the municipal waste; and • Dust and bio-aerosols	MINOR	• Misting system (if required); • Building orientation with respect to predominant wind direction; • Implement good housekeeping procedures; • Sweep waste management areas; • Providing workers with good practice driving and machinery usage; • Carry out monitoring tests for the generator and ensure their compliance with the national laws; • Inspection and Maintenance of machinery and vehicles to keep them in good working conditions to minimize fugitive emissions; and • Clean vehicles and equipment routinely; and • Establish and implement odour management plan/routines with staff training.	INSIGNIFICANT

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Greenhouse gases (GHGs) Emissions	Construction	• GHGs emitted from vehicles and machinery used during construction phase	INSIGNIFICANT	• 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; • Provide workers with awareness on maintaining good practice for machinery usage; • Maintain machinery and vehicles in good working conditions and ensure regular maintenance; and • Ensure that gas emissions are below international and national limits.	INSIGNIFICANT
	Operation	• Fuel combustion from equipment, transport vehicles, and diesel generator may result in the release of CO_2, NOx, CO, black carbon and non-absorbing aerosols. • Waste accumulation may result in CH_4 emissions. However, it is unlikely to happen	MINOR	• Ensure that technologies and equipment used in the project are new; • Provide workers with awareness on maintaining good practice for machinery usage; • Maintain machinery and vehicles in good working conditions and ensure regular maintenance; • Ensure that gas emissions are below international and national limits, and • Waste should not be left to accumulate within the site	INSIGNIFICANT

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Noise Levels	Construction	• The predominant noise generation during construction will result from the operation of heavy equipment, and vehicle movement.	MINOR to MODERATE	• Maintain machinery and vehicles in good working conditions to minimize noise generation and ensure that they do not exceed permissible limits; • Maintain site roads in good condition to reduce noise and vibration from vehicle movements; • Select equipment that has low noise emission levels; • Use buildings to contain inherently noisy plant equipment; • Follow the manufacturers' recommended maintenance schedule for engine and mechanical parts, including proper tire pressure; and • Construction should be carried out at proper times during daytime.	MINOR
	Operation	• Noise during operation can result mainly from workers, machines and vehicles used during the operational phase of the project.	MINOR to MODERATE	• Potential noise generating machines and equipment are designed to meet statutory regulations concerning noise; • Acoustic enclosures are installed for noise generating equipment, wherever possible; • Regular inspection and maintenance of equipment; and • Waste transfer should be conducted during daytime.	MINOR
Soil and Groundwater	Construction	• Domestic wastewater, material and waste improper management; • Accidental spills from machinery.	MINOR to MODERATE	• 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;	MINOR

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
				• Ensure periodic inspection of equipment and machinery which will contribute to minimizing spills and leaks; • 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 adjacent wastewater treatment plant at adequate intervals through a licensed contractor • Ensure the proper management of hazardous waste, treatment and disposal by an accredited contractor	
	Operation	• Domestic wastewater, material and waste improper management; • Accidental spills from machinery, vehicles, and diesel generator; • • In case the transported waste is humid, some leachate could come with the trucks. • Wastewater generated during cleaning of the loading area.	MINOR to MODERATE	• Use impermeable materials for roads, waste handling areas, and vehicle washing areas, and install curbs to prevent runoff to permeable areas; • Ensure that the diesel generator is well insulated; • Collect runoffs from areas used for waste handling, and treat runoff to meet applicable environmental standards before discharge to surface water or the municipal sewage system (e.g., screen to remove large material, install silt traps to remove particulates, and remove separate-phase liquids with an oil/water separator); • Discharge of runoff to the municipal sewage system (via pipe or tanker truck) as agreed	MINOR

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
				with the Holding Company of Water and Wastewater; • The wastewater will be monitored periodically to be sure that it is within the law limits before being discharged into the sewage network. In case wastewater parameters exceed the limits of the law, NSWMP will communicate with the Holding Company of Water and Wastewater to agree on the requirements for wastewater disposal; • Waste collection and transfer trucks could be equipped with leachate tanks that will be emptied at designated facilities; • Waste will not be left to accumulate for more than 1 day through applying the operational plan. • Continuous staff training on operation activities should be implemented.	
Biological Environment	Construction	• Air emissions, noise and vibrations as well as human presence may affect local wildlife; • Increased traffic may increment animal road kills; • Any spillage from vehicles and sewage mismanagement may affect aquatic wildlife in nearby canals and drains; and • Solid waste and sewage wastewater mismanagement may result in the attraction of pests and alien species to the area.	MINOR to INSIGNIFICANT	• Same mitigation measures aiming at reducing air emissions and noise; and • Provide awareness to the workers on the negative impacts of disturbing any wild fauna; • Avoid working at night and avoid high intensity light that may disturb fauna; and • Ensure speed control and the prohibition of off-track driving • Develop, implement and update a solid waste, hazardous waste and wastewater 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 by animals; and	INSIGNIFICANT

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
				• Ensure proper housekeeping practices.	
	Operation	• Domestic wastewater, material and waste improper management; • Accidental spills from machinery, vehicles, and diesel generator; • Leachate generation and leaks. However, it is unlikely to happen; • In case the transported waste is humid, some leachate could come with the trucks; • Wastewater will be generated during cleaning of the loading area.	MINOR	• Use impermeable materials for roads, waste handling areas, and vehicle washing areas, and install curbs to prevent runoff to permeable areas; • Ensure that the diesel generator is well insulated; • Collect runoffs from areas used for waste handling, and treat runoff to meet applicable environmental standards before discharge to surface water or the municipal sewage system (e.g., screen to remove large material, install silt traps to remove particulates, and remove separate-phase liquids with an oil/water separator); • Discharge of runoff to the municipal sewage system (via pipe or tanker truck) will be arranged on agreement with the Holding Company of Water and Wastewater ; • The wastewater will be monitored periodically to be sure that it is within the law limits before being discharged into the sewage network. In case wastewater parameters exceed the limits of the law, NSWMP will communicate with the Holding Company of Water and Wastewater to agree on the requirements for wastewater disposal; • Waste collection and transfer trucks could be	MINOR to INSIGNIFICANT

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
				equipped with leachate tanks that will be emptied at designated facilities; • Waste will not be left to accumulate for more than 1 day.	
Public Health	Construction	• Dust, gas emissions, noise, and health hazards from waste mismanagement, that may impact close by residential areas; • Accidents from transport vehicles may arise.	MINOR	• Choose routes for construction trucks that avoid passing by the local communities; • Monitor air pollution regularly to take corrective actions timely, if needed; • Engage effectively with local residents and farmers who live or make their living in the close vicinity of the project site; • Include a community grievance mechanism explaining the objective of the mechanism, channels of complaints and comments boxes, and a clear complaint form that ensures the feedback on the concern or grievance; • Traffic and road safety measures shall be followed; and • Develop of non-technical material to be disclosed and disseminated to the public to explain the Project, positive and negative impacts, the grievance mechanism, and hotlines to reach project staff in case of inquiries or emergencies.	MINOR to INSIGNIFICANT
	Operation	• Disturbances may arise from noise, dust and litter caused by onsite waste transfer operations and offsite waste transportation; • The presence of the transfer station may also cause aesthetic concerns.	MINOR	• Choose routes for waste transfer trucks that avoid passing by the local communities, if possible; • Maintain the trucks and assure that the solid waste is covered during transportation; • Build a high fence of 3 meters around the site to isolate it completely from residential areas, to avoid offsite dispersion and facilitate	MINOR to INSIGNIFICANT

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
				collection of litter; • Collect litter as soon as possible before it becomes scattered offsite; • Plant with a green belt the whole site perimeter to improve aesthetics; • Monitor air pollution regularly to take corrective actions timely, if needed • Undertake periodical community engagement activities and implement a grievance mechanism; and • Implement traffic and road safety mitigation measures shall be followed.	
Traffic and road safety	Construction	• The traffic volume for transporting the collected waste is not known as it is not decided till now how the project will handle the collected waste in the construction phase; • A potentially increase in traffic may be caused by transport vehicles for construction material transportation; • Potential accidents during transportation of material might have potential safety impacts.	MINOR	• 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 • Install lightings on the roads if lacking • Add signs, signals, and pavement markings. • Require adequate queuing distance. • Require an onsite traffic pattern design. • Schedule operating hours and delivery.	INSIGNIFICANT

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
	Operation	• A potentially increase in traffic might be caused by transport vehicles of solid waste. • Potential safety impacts may also arise from potential traffic accidents during waste transportation.	MINOR	• Same mitigation measures mentioned in the construction phase • Equip all collection and transfer trucks with a simple GPS tracking system to monitor, manage, and control their speed limits, routes, and fuel consumption if feasible.	INSIGNIFICANT
Workplace Health and Safety	Construction	• Dust and air emissions, increased noise levels from machines and vehicles, and accidental slipping of workers may have potential negative impacts on the workers; • Solid waste and sewage mismanagement may pose health concerns • Physical stress may arise from heat and mechanical accidents.	MODERATE	• The 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; • 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 fire kit and ensure that workers are trained to use them; • Implement good housekeeping practice and ensure that proper hygiene measures are taken; • 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 of the construction personnel on the safe use of equipment and on environmental issues related to construction;	MINOR

Aspect	Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
				• Security personnel should be selected based on screening process; • Comply with all the executive regulations of Labour Law 12/2003 and specifically the ones related to operation of equipment and machinery (for example bulldozers and excavators), welding, working on elevated ground, etc.	
	Operation	• Waste exposure and handling, noise emitted from equipment, and accidents may have negative impacts on the health and safety of workers; • Fire may arise from badly stored waste. However, no accumulated waste is expected to be kept in the TS • The presence of insects and pests within the wastes may cause health issues to waste handlers.	MODERATE	• IFC performance standard of labour and working conditions shall be maintained; • Add sprinkler systems; • Add fire extinguishers and fire kit; and • Use fire resistant /retardant material in building construction.	MINOR
Local Community	Construction and Operation	• The Bassioun TS project will impact the livelihoods and income generation of scavengers (Zabbaleen). The Zabbaleen are not expected to be prevented from collecting and sorting waste within the Markaz territory. However, the scavengers will not have access to waste at the TS after the operation of the project.	MODERATE	• Engage with scavengers in to better understand their concerns about the Project. It is also important to communicate with them the positive impacts on community health and on their health, and to discuss with them how would be the best way to integrate them in the Project's activities while protecting their livelihoods and benefits. • Engagement should continue throughout the project until an agreement is reached. • Develop a full Grievance Mechanism (GM) explaining the objective of the mechanism, channels of complaints and comments boxes, and a clear complaint form that ensures the feedback on the concern or grievance.	MINOR

6.4. Cumulative Impacts

With the mitigation measures provided, the project is not expected to have cumulative impacts of particular concern. On the other hand, the project along with the rest of the solid waste management components in Gharbia Governorate will help in improving both public and environmental health.

7. Environmental and Social Management 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 governorate/operator will establish a Health, Safety and Environment (HSE) Department and will appoint the following staff:

- An occupational health and safety officer
- One security supervisor
- One Community Liaison Officer (CLO)
- One doctor/nurse

7.2 Environmental Management Procedures

- *Construction Phase*

  The environmental dimension will be incorporated throughout the construction phase. It is worth mentioning that the contractor will be responsible for the preparation, and implementation of the environmental management plan. However, Governorate 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 workers. The following list shows the minimum set of environmental management procedures that the contractor will establish and follow:

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

- *Operation Phase*

  The governorate/operator will be responsible for the preparation, implementation, and monitoring of the environmental management plan during the operation phase. The management plan will also comply with the

project specific sections of the IFC Environmental, Health, and Safety Guidelines for Waste Management Facilities.

The following list shows the minimum set of environmental management procedures that the facility operator will establish and follow:

- Environmental Register
- Pest management
- Controlling Odours
- Housekeeping
- Preventive Maintenance
- Solid Waste Management
- Hazardous Waste Management
- Staff Training and Awareness
- Emergency and Fire Alarm Plans
- Transportation management

7.3 Environmental 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
  - Noise levels
  - Workers' Health and Safety

- *Monitoring during operation*
  - Ambient Air and GHGs Quality Monitoring
  - Pest monitoring
  - Workplace Monitoring

In addition to the periodic monitoring activities, self-auditing and periodical inspection is necessary for ensuring maximum safety and environmental protection.

7.4 Social Management Plan

It is of key importance for NSWMP/governorate 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:

- Labour and Working Conditions
- 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 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 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 preparation of the study.

8.2 Individual Scoping Meetings

Stakeholder meetings have taken place at the report preparation stage with governorate, Zefta and Samanoud officials. The meetings aimed at the following:

- Define the main characteristics of the project's site and the surrounding land use;
- Identify the specific requirements and local concerns to be considered in the ESIA; and
- The expected positive and negative impacts of the project.

8.3 Public Consultation and Disclosure

A public consultation was carried out by Chemonics for engaging the relevant stakeholders and the public. The public consultation meeting regarding proposed Transfer Stations in Samanoud and Zefta was held in the meeting hall of the General Diwan of Gharbia governorate in the 8th of September, 2020. The farmers neighbouring the project location reported that their livelihood improved due to removal of the waste accumulation from the project locations.

It is expected that during the public disclosure of the present ESIA for the planned upgrading of the Bassioun TS and the stakeholder consultation the participants will support the proposed project focused on improving the site operation.

8.4 Information Disclosure and Stakeholder Engagement

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

Stakeholder Engagement Strategy

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

Grievance Management

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

1. Introduction

1.1 Background

The National Solid Waste Management Program (NSWMP) lot B includes the construction and operation of three Solid Waste Transfer Stations (TS) on the territory of Gharbia Governorate. Three TS facilities are planned in Bassioun, Samanoud, and Zefta.

In Bassioun, a TS already exists that aims at Municipal Solid Waste (MSW) consolidation and its transfer to Sadat landfill. However, the TS is badly managed leading to MSW accumulation in the site, and the blockage of the TS exit. The Bassioun TS project aims at upgrading the existing TS to increase its efficiency in handling MSW. It is worth mentioning that the transported waste will not be segregated and will be disposed of without treatment in the Sadat landfill. This situation will not be permanent as it is planned to transfer the waste to Kafr El Zayat Mechanical and Biological Treatment (MBT) facility (upon construction however low on funds) for segregation and treatment. This treatment facility will allow for the separation and recycling some of the waste fractions, while non-recyclable waste and residual waste from the treatment facilities will be sent for disposal to the Sadat landfill.

According to Law 4/1994 modified by Laws 9/2009 and 105/2015, any new project or modification will require an environmental approval from the Egyptian Environment Affairs Authority (EEAA). The Transfer Stations for solid waste are not mentioned in the national project categorization lists issued by the EEAA in 2016. On the other hand, Mechanical Biological Treatment (MBT) facilities are included in the project categorization list of Category B-Scoped projects, which requires the preparation of a Scoped ESIA for each proposed MBT facility and does not require organizing a public consultation meeting. As TS facilities are expected to generate less environmental impacts than MBT facilities, a Scoped ESIA is also deemed appropriate for the construction and operation of a Transfer Station.

As a loan from the KfW/EU/SECO is considered by NSWMP in order to finance the project, the ESIA should comply with their requirements. In general, KfW bases the project assessment on the regulations of the country in which the project is to be implemented. However, these regulations must be consistent with the international standards set by the European Union (EU), the leading Organization for Economic Co-operation and Development (OECD) countries, as well as the International Finance Cooperation (IFC) Performance Standards and Environmental, Health, and Safety (EHS) Guidelines, the Environmental and Social Standards (ESS) of the World Bank (WB). In this respect, EEAA's Category B-Scoped projects correspond to the IFC and WB Category "B" projects[1].

[1] Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures

The present report is a Scoped ESIA for the Bassioun Transfer Station only. A separate ESIA were developed for the Samanoud and Zefta Transfer Stations, which both received the NO from KfW on the 27th of October, 2020.

1.2 Objective of the ESIA

The objective of the Scoped ESIA is to ensure that the project is environmentally sound and sustainable, and that any potential negative environmental consequences are recognized early in the project cycle and are taken into account during the project preparation for they could be avoided, mitigated or compensated. On the other hand, the ESIA should highlight the benefits and positive impacts of the project on the environment and social conditions of the surrounding communities and underline the potential contribution of the project to the community development.

Furthermore, this ESIA study is intended to satisfy the environmental legal requirements of the Egyptian Environmental Law 4/1994, modified by Law 9/2009 and Law 105/2015, and its Executive Regulations (ERs), as well as the international conventions and to ensure that KfW requirements are met, thus contributing to secure funding to the project. In this respect, the ESIA follows the latest version of the ESIA Guidelines for Municipal Solid Waste Management Projects developed for NSWMP in 2019 including the Appendix A – Supplement for Transfer Stations.

1.3 Scope of Work

This Scoped ESIA is related to the construction works for upgrading the existing Bassioun Transfer Station and its further operation, taking into account the requirements set by KfW/EU/SECO. No other facilities are included in the considered scope of work. Moreover, landfilling, transportation, treatment and other peripheral activities are not covered by the scope of this ESIA.

In this respect, the scope of work includes the following activities/tasks:

- Prepare a project description based on the data provided by Chemonics (the Project Designer);
- Collect desktop baseline data covering the regulatory framework as well as physical, biological and socio-economic environment;
- Undertake a site visit to the project area to refine and update baseline data;
- Identify potential impacts during construction and operation as well as the required actions needed to mitigate negative environmental and social impacts;
- Prepare an Environmental and Social Management Plan framework, including the required monitoring measures;
- Undertake individual scoping meetings with relevant stakeholders; and
- Prepare the ESIA Report in English for submission to KfW.

The Scope of Work does not cover the following aspects:

- Land acquisition, resettlement and compensation plans[2];
- Carrying out air, noise and groundwater measurements;
- Traffic assessment; and
- Offsite waste management, treatment or disposal.

1.4 Structure of the ESIA Report

The ESIA Report includes the following main parts:

- Executive Summary;
- Legal and Regulatory Framework;
- Project Description;
- Environmental and Socio-economic Baseline;
- Analysis of Alternatives;
- Assessment of Environmental and Social Impacts;
- Mitigation Measures;
- Management Plan and Monitoring Plan;
- Consultation and Engagement;
- List of References;
- Annexes

[2] The project will be carried out on land owned by the State, specifically allocated for the Bassioun TS (as mentioned in Section 3.2) and in the Land Allocation Document (Annex 1). Moreover, the land is currently used as a transfer station and does not include settlements or livelihood activities. Accordingly, no resettlement and compensation are expected to be needed.

2. Regulatory Framework

This section summarizes the national environmental and social legislation and regulations of relevance to the project. They were identified according to the type of the proposed activity, geographic location and the expected impacts. Moreover, as project is implemented under the NSWMP and co-funded by KfW, the EU and the Swiss State Secretariat for Economic Affairs (SECO), the project must not only meet all relevant Egyptian requirements but must also follow the international standards of the funding institutions as reflected in the ESIA guidelines approved by KfW.

2.1 National Laws and Regulations

Solid waste management is regulated by several national environmental laws and ministerial decrees, including the following:

1. Law No. 38 of 1967 concerning cleanliness and its Executive Regulation issued by the Minister of Housing, Utilities and Urban Communities' Decree No.134 of 1968.
2. Law 202/2020 concerning waste management
3. Law No. 43 of 1979 (Local Administration Law) concerning responsibilities related to infrastructure to City Councils.
4. Law No. 137, 1981 concerning occupational safety.
5. Law No. 12 of 2003 (Labour Law) and its executive regulations.
6. Law No. 4 of 1994 promulgating the Law concerning the Environment and its Executive Regulation issued by Prime Minister's Decree No. 338 of 1995.
7. Law No. 9 of 2009 amends Law No. 4/1994 for the protection of the environment.
8. Law No. 10 of 2005 amending certain Provisions of Law No. 38 of 1967 concerning the Public Cleanliness.

Main aspects of the laws are presented below.

2.1.1 Environmental and Social Assessment Procedures in Egypt

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

Proposed developments are classified as four categories according to the severity of potential impacts. The categories reflect the level of environmental impact assessment detail. The four categories[3] are as follows:

- Category A: projects with minor environmental impacts;
- Category B: projects with substantial impacts;

[3] The IFC categorization is in the reverse order as it considers Category A projects to have the most significant impacts and Category C projects having the least significant impacts.

- Category B Scoped: projects with substantial impacts with specific focus on specific project activities/components;
- Category C: projects with high potential impacts requiring full EIA.

Solid Waste Transfer Stations are not included in the national project categorization lists issued by the EEAA in 2016. On the other hand, projects assuming the construction and operation of Mechanical Biological Treatment (MBT) facilities are included within Category B-Scoped projects, which requires the preparation of a Scoped Environmental and Social Impact Assessment (ESIA) and does not require organizing a public consultation meeting. As TS facilities are expected to generate less environmental impacts than MBTs, a Scoped ESIA is also deemed appropriate for the projects assuming construction and operation of the TS.

The administrative process for review and approvals of ESIAs for MSW projects under the NSWMP is slightly different than for projects outside of the Program because of the supporting roles of the Accompanying Measures Consultant (AMC) and the Consultants for Project Implementation (CPIs). Whilst the main procedural steps and most entities are generally similar to other projects in Egypt, for the NSWMP projects the Solid Waste Management Unit (SWMU) of a Governorate acts as the Project Proponent and the CPIs act as the Design/EIA contractors. Also, after review of the ESIA by the Waste Management Regulatory Authority (WMRA)/ Project Management Unit (PMU) with support from AMC, a final No-Objection (NO) must be obtained from the KfW. The key steps for review and approvals of ESIAs under the NSWMP are shown in Figure 2-1.

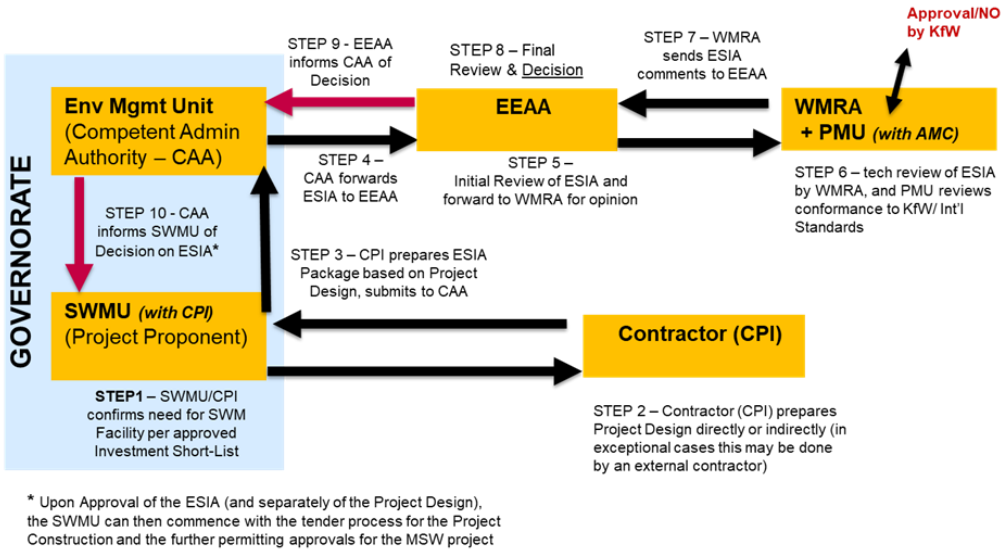


Figure 2-1: Specific Procedure for ESIAs for MSW under the NSWMP
Source: NSWMP, 2019b

The steps shown in the above figure are further elaborated below.

Step 1: The SWMU at Governorate level acts as the Project Proponent. Confirmation of the go-ahead for Project Design and ESIA of a MSW project is based on the approved Investment Short-List for Work-Package #3 for each Governorate.

Step 2: The Contractor (CPI) prepares the Project Design directly or indirectly. In some special cases, part of the design works may be completed by an external design firm on behalf of the CPI.
Step 3: The CPI prepares the ESIA package based on Project Design and submits to the Governorate-level CAA (usually the Environmental Management Unit).
Step 4: CAA forwards ESIA to EEAA.
Step 5: EEAA conducts an initial review of the ESIA and forwards to WMRA for further opinion.
Step 6: Technical review of ESIA by WMRA, and PMU (with support of AMC) reviews conformance of the ESIA to KfW/International Standards. Once deemed to be in conformance, PMU sends the ESIA to KfW with request for No Objection.
Step 7: WMRA sends ESIA comments to EEAA.
Step 8: EEAA conducts final review and decision.
Step 9: EEAA informs CAA of decision.
Step 10: CAA informs SWMU of decision on ESIA.

Upon final approval of the ESIA by EEAA (and separately the WMRA approval of the Project Design) and provided that KfW has issued the No-Objection, the SWMU can commence the tender for construction of the proposed project facility. When preparing the tender documents the ESIA/ESMP and the KfW's Standard Tender Documents should be consulted for addressing the ESHS risk level of each specific contract.

2.1.2 The Egyptian Environmental Impact Assessment Guidelines

The EEAA issued EIA guideline in 2010 that describes the contents of "B scoped" and "C" Categories EIAs. Furthermore, NSWMP developed specific guideline for ESIAs of municipal solid waste management projects. The guideline developed by NSWMP focuses more on the social aspects from the guideline developed by EEAA. The contents of the ESIA are the following:

- Non-technical summary;
- Introduction and background of the project;
- Outline of important characteristics of the proposed project;
- Description of the proposed project;
    - Objective;
    - Location;
    - Description of surrounding activities, near ecological hotspots, and land use plan;
    - Project layout including associated facilities;
    - Construction phase activities including construction activities, resources expected to be consumed, pollutants expected to be emitted, etc.;
    - Operation and maintenance phase including equipment description resources expected to be consumed, pollutants expected to be emitted, pollution control; and
    - Description of planned closure activities including equipment description and expected activities.

- Applicable legislative framework and the regional and international conventions;

- Baseline Environmental Conditions:
  - Physical (Climate, Hydrology, Geology);
  - Ecology and Biological Description (habitats, fauna and flora);
  - Land Use;
  - Air Quality;
  - Water Quality;
  - Noise;
  - Socioeconomic Issues; and
  - Traffic.
- Project alternatives taken into consideration including the no-project alternative, location alternative, technical alternatives, etc.;
- Prediction and evaluation of Impacts and mitigation measures
  - Waste water management and quality.
  - Air emissions and noise.
  - Solid Waste
  - Hazardous Materials
  - Socioeconomic
- Environmental and Social Management Plan (ESMP)
- Monitoring plan
- Description of consultation activities undertaken with local public/stakeholders

2.1.3 Legal and Regulatory Framework for Municipal Waste Management

Public Cleanliness Law No. 38 of 1967 and its Executive Regulations

The main legislation relating to solid waste management is Law 38/1967 as amended by Law 31/1976. The law regulates the collection and disposal of solid waste from residential areas, commercial and industrial establishments, and public places. It imposes a cleanliness tax on all housing units equivalent to 2% of the rental value. Moreover, the law requests a license to be issued by the local council for all workers employed as waste collectors.

Law No. 137 of 1981

Law No. 137/1981 deals with occupational safety. It only has peripheral relevance here but includes (Article 117) the requirement that an employer should inform his workers of the hazards associated with his non-compliance with safety measures and that personal safety equipment, together with training on its use, should be provided to the worker.

Environment Law No. 4 of 1994 and its Executive Regulations

Article 37 of the law prohibits the burning, disposal or treatment of solid waste except in designated areas far away from housing or industrial or agricultural areas as well as from waterways. (Article 38 of the Executive Regulations for the Law permits the incineration of infectious waste generated by medical care in hospitals and health centres, with certain provisions). Article 38 of the executive regulation states that the location of the landfill and

recycling facilities shall be 1.5 km away from nearest residential area. However, no specific distance is mentioned for the transfer stations.

Prime Minister Decree 3005/2015 – Solid Waste Management
This decree created the Waste management Regulatory Authority (WMRA) and it defined its responsibilities and roles. The decree replaces the EEAA in the enforcement of articles (25,26,27,28,29,30,31,32,33,38,39,41,54,55,56) of the Executive regulations of law 4/1994 by WMRA

Law 202/2020 for Solid Waste management
The law created a new WMRA that replaces the one created by decree 3005/2015 and it defined its responsibilities and roles. One of the responsibilities of the WMRA is to supervise the management and planning of the MSW projects. Article 34 introduced a monthly fee that will be collected form the households for the MSW management. Article 20 bans the open burning of the waste. Article 38 bans the disposal, sorting, and treatment of MSW in unauthorized places and criminalized such activity. Article 40 obliges competent authorities to shut-down uncontrolled dumpsites in duration of two years starting from the law issuing date.

According to the PMU of the NSWMP, a national plan is currently under development for informal sector integration requested by the President of Egypt. A ToR for the study of the economic, social, and environmental aspects is underway. Integration of the informal sector hence waste pickers are a part of a bigger scheme that will include but not limited to (i) work under the formal sector umbrella when operational budget is in place; (ii) new law considering the informal waste picking as criminal and requiring anyone working in waste management to be licensed.

2.1.4 Egyptian Permits for Transfer Stations

According to the ESIA Guideline for NSWMP, the key environmental-related permits needed for construction and operation of new TS in Egypt are listed in Table 2-1.

Table 2-1: Key permits needed for construction and operation of new TS

Permit Name	Purpose	Issuing Body	Comment
Approval for Civil Defence and Fire Fighting System	Approve the system initially for 6 months, then renew again after periodical inspection.	Civil Defence Authority - Firefighting department	All facilities
Approval for Natural Gas connection	Approve connection of natural gas to the facility	Egyptian Natural Gas Holding Company (E-gas)	Only if facility is using Natural Gas.
Approval for the height of the buildings	Approve the height of all the buildings during design stage	Egyptian Civil Aviation Authority	Depends on facility location. Likely that most MSW facilities will not require this, but needs to be checked per each project.

Permit Name	Purpose	Issuing Body	Comment
Construction Permit	Approve starting of construction phase. It defines all the project structures and components.	Permits department under local authority	
Environmental Approval	Approve the ESIA study before the facility construction.	EEAA	
Land Acquisition and Hand-Over Report	Transfer ownership of the land from the governorate to the investor. It describes exactly the area of the land and the borders.	Local authority	This would apply in case a private firm takes ownership of a facility/property; in many cases, the properties used for MSW facilities may remain in ownership of the Governorate.

Source: NSWMP, 2019b

2.1.5 Legal and Regulatory Framework for Emissions to Air

Article 35 of law 4/1994 and Annex 5 of its ER (710/2012) define the maximum allowable limits for the air emissions to the ambient air (Table 2-2).

According to the IFC guidelines, projects with significant sources of air emissions and potential for significant impacts to the ambient air quality should strive to prevent/ minimize their impacts by ensuring that emissions do not result in pollutant concentrations that reach or exceed ambient quality standards stated by the national standards, the current World Health Organization (WHO) Air Quality Guidelines, or other internationally recognized sources. The following emissions levels are normally acceptable to the World Bank Group in making decisions regarding provision of World Bank Group assistance. The emissions levels given here can be consistently achieved by well-designed, well-operated, and well-maintained pollution control systems.

Table 2-2: Maximum Limits of Ambient Air Pollutants

Pollutant	Area	Maximum Allowable limits			
		1 hr	8 hrs	24 hrs	1 year
Sulfur Dioxide (µg/m^3)	Urban Areas	300	-	125	50
	Industrial Areas	350	-	150	60
International guidelines (IFC)		-	-	*20*	-
Carbon Monoxide (mg/m^3)	Urban Areas	30	10	-	-
	Industrial Areas	30	10	-	-
International guidelines (IFC)		-	-	-	-
Nitrogen Dioxide (µg/m^3)	Urban Areas	300	-	150	60
	Industrial Areas	300	-	150	80
International guidelines (IFC)		*400*	-	*150*	-
Total Suspended Particles (µg/m^3)	Urban Areas	-	-	230	125
	Industrial Areas	-	-	230	125
International guidelines (IFC)		-	-	-	-
PM_{10} (µg/m^3)	Urban Areas	-	-	150	70

	Industrial Areas	-	-	150	70
International guidelines (IFC)		-	-	*150*	*70*

Article 36 of the same law, and article 37 and Annex 6 of the ER (Executive Regulatory) provides the maximum allowable limits of vehicles exhaust gas emissions. Table 2-3 and Table 2-4 show the limits for different types of vehicles.

Table 2-3: Maximum Emission Limits in Vehicles using Gasoline Fuel

Annex 6 (Table 23) Executive Regulations of Law 4, 1994 (as amended by Decree No. 710 of 2012) regarding Vehicles using Gasoline Fuel (Measured at Idle speed 900 cycle/minute)						
	Before 2003		From 2003 – 2009		From 2010 till present	
Pollutants	HC ppm	%CO	HC ppm	%CO	HC ppm	%CO
Maximum limits	600	4	300	1.5	200	1.2

Table 2-4: Maximum Emission Limits in Vehicles using Diesel Fuel

Annex 6 (Table 24) Executive Regulations of Law 4, 1994 (as amended by Decree No. 710 of 2012) regarding Vehicles using Diesel Fuel (Measurements are done according to International Standard Specifications (ISO – 11614))		
Year of manufacture (Model)	Before 2003	From 2003 till present
Smoke density Coefficient K (m^{-1})	2.8	2.65

2.1.6 Legal and Regulatory Framework for Noise Nuisance

Article 42 of Law 4/1994 and article 44 of its modified ER (710/2012) present the maximum allowable limits for sound intensity. Table 2-5 presents the maximum limits of ambient noise levels in different areas.

Table 2-5: Maximum Limit Permissible for Noise Level in the Different Zones According to Annex 7 of the Modified ERs of Law 4/1994

Type of zone	Permissible limit for noise level, dB (A)	
	Day time 7 am – 10 pm	Night 10 pm – 7 am
Areas on roads whose width is 12 m or more, or industrial areas which comprise light industries and other activities	70	60
International guidelines	*70*	*70*

2.1.7 Legal and Regulatory Framework for Wastewater Disposal to Sewers

The waste is not expected to be accumulated at the TS for more than one day. Therefore, practically no significant amount of leachate is expected to be generated at the TS, provided that the waste is not very humid due to rain or flood. However, the waste has high organic content potentially generating some leachate during collection and transfer of the waste. Trucks for waste collection and transfer will be equipped with containers for leachate accumulation. These containers will be emptied at designated facilities.

The wastewater generated during the TS operation is expected to include sanitary wastewater from staff rest rooms and wastewater from cleaning of the loading area, which could contain some leachate generated during collection and transportation of waste. Pre-treatment requirements for wastewater discharge into the sewage system will be taken into consideration. The oil/water separators, traps for solids, other treatment systems will be established and operated, if necessary.

Decree 44/2000 of the Ministry of Housing modifying the executive regulations of Law 93/1962 addresses the conditions and maximum allowable limits for discharge of wastewater to the public sewer network. Article 14 of the Decree sets the specifications for the quality of wastewater to be drained in public sewerage networks, which are illustrated in the following Table 2-6.

Table 2-6: Standards and specifications of wastewater to be discharged to sewer systems

Parameter	Maximum allowable limits (mg/l unless otherwise noted)
pH	5-6.9
BOD	600 ppm
COD (Dichromate)	1100 ppm
Temperature (°C)	43 °C
Total Suspended Solids (TSS)	800 ppm
Settled Solids (after 10 and 15 min)	8 cm^3 /15 cm^3
Oil & Grease	100 ppm
Total Nitrogen	100 ppm
Total Phosphorus	25 ppm
Phenol	0.05 ppm
Sulphide	10 ppm
Ammonium	100
Cyanide	0.2 ppm
The total of the following heavy metals shall not exceed 5mg/l	
Arsenic	2
Boron	1
Cadmium	0.2
Copper	1.5
Chromium 6	0.5
Lead	1
Mercury	0.2
Nickel	1
Silver	0.5
Tin	2

2.1.8 Legal and Regulatory Framework for Potable Water Quality

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:

i. Physical parameters: such as colour, odour, turbidity and pH.

ii. Inorganic parameters: such as hardness, dissolved salts, sulphates and chlorides and metallic
iii. Heavy metals and organic pesticides
iv. Microbiological parameter
v. Radioactive substances

Table 2-7 below presents example parameters relevant to potable water quality for drinking and domestic purposes according to national law.

Table 2-7: Parameters Relevant for Potable Water Quality

Parameter	Maximum allowable limits (mg/l)
Physical Parameters	
Dissolved salts at 120^0C	1000
Total hardness (as $CaCO_3$)	500
Sulphates (SO_4)	250
Chlorides (Cl)	250
Iron (Fe)	0.3
Manganese (Mn)	0.4
Copper (Cu)	2
Zinc (Zn)	3
Sodium (Na)	200
Aluminium (Al)	0.2
Microbiology parameters	
Total bacteria count	- Not exceeding 50cell/cm^3 at 37^0C for 24 hours - Not exceeding 50cell/cm^3 at 22^0C for 48 hours
Total coliform	- 95% of the samples up to 100 cm^3 examined a 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 successive samples form one sampling source.
Streptococcus pyogenes	- None
Algae	- Microcystins should not exceed 1µg/l in case of blue green algal bloom
Microscopic examination	- Totally free of living protozoa and pathogenic organisms

2.1.9 Legal and Regulatory Framework for Protection of Biodiversity

a) Law 4 of 1994 concerning Environmental Protection

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.

The ecological importance of the project site is insignificant as it is currently used as a TS with accumulated waste and is devoid of flora and fauna of concern to which the law refers.

b) *Law 53 of 1966 (known as "The Law of Agriculture")*
Article 117 prohibits the hunting for birds and other wild animals valuable for agriculture. It also bans the trading and killing of these birds as well as the destruction of their nests.

Article 118 of the same law prohibits the cultivation of plants harmful to these birds and wild animals, bans the importation of material used in their hunting and prevents the use of all forms of traps.

Minister of Agriculture Decree 28 of 1967 (amended by Decree 1227 of 1988) specifies the species of birds and other wild animals under protection covered by Article 117 of Law 53/1966.

2.1.10 Legal and Regulatory Framework for Environmental and Other Registers

Article 22 of Law 4/1994 and article 17 of its modified executive regulations stipulates that establishments should maintain an environmental register for their activities. Article 17 and Annex 3 of the ER provide the content of the environmental register and state that the owner of the facility must inform EEAA with any non-compliance.

Furthermore, Articles 26, 28 and 29 of the modified ERs are concerned with the rules and procedures of hazardous substances and waste management. Accordingly, a register for the hazardous waste should be maintained as well as record for the hazardous substances used.

In addition, Article 211 of the Labour Law 12/2003 and Article 34 of the Decree of the Minister of Labour and Manpower no. 211/2003 regarding requirements to prevent adverse physical, chemical, biological and mechanical hazards in the workplace, stipulates that companies should prepare, records/ reports/register for chemical safety.

2.1.11 Legal and Regulatory Framework for Work Environment

The Egyptian Labour Law number 12/2003 organizes working conditions and management of worker relationship. The national labour 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. A number of explanatory notes and ministerial decrees have been issued detailing the different stipulations of the law. Part 3 of Book 5 of the labour law number 12/2003, articles 208 through 215, address the responsibility of companies to protect workers against risks resulting from handling of gaseous, liquid and solid chemical substances.

The Ministerial Decree 134/2003 requires that organizations hiring more than 50 employees establish an occupational health and safety department to be responsible for the workplace and employees' safety and provide the necessary equipment for measuring and monitoring pollution in the work environment. Besides, Ministerial Decree 211/2003 of the Ministry of Manpower also addresses the requirements to prevent adverse physical, chemical, biological, mechanical hazards and the dynamic electricity hazard in the workplace as well as keeping medical surveillance records for the employees

According to articles 43 and 45 of Law 4/1994 and articles 44, 45, 46 and 47 of its executive regulations, the facility owner must provide the protective equipment and all necessary safety measures for the workers against noise, heat stress and gaseous emissions inside the work place. In addition, it is the responsibility of the facility's owner to provide all closed and semi-closed places with efficient ventilation system.

According to Law 4/1994, Maximum Permissible Noise Levels inside the Workplace (dB (LAeq)) are presented in Annex 7 of the Executive Regulations of Law 4, 1994 (as amended by Decree No. 710 of 2012). Table 2-7 shows the limits of the noise exposure in workplace, and Table 2-8 shows the exposure duration to noise in workplace.

Table 2-8: Law 4/1994: Period of Workplace Exposure to noise in dB (A)

Type of Place and Activity	Maximum Permissible Noise Level	Exposure time*
Workplace (workshops and factories) with up to 8-hour shifts (licensed starting from 2011)	85	8
Administrative offices - Work rooms for computers, typewriters and similar equipment	65	-
Work rooms for activities requiring routine mental concentration - banks public squares – industrial activities control rooms – restaurants	60	-

* Exposure duration to be reduced by 50% with each 3 dBA increase in noise intensity

Table 2-9: Labour Law: Decree 211/2003 – Workers exposure to noise in workplace

Maximum Noise intensity level dB (A)	90	95	100	105	110	115
Exposure duration (hours)	8	4	2	1	0.5	0.25

2.1.12 Legal and Regulatory Framework for Social and Labour Aspects

a) Grievance

Law 4/1994

Every citizen and organization concerned with the protection of the environment shall have the right to report any violation of the provisions of this Law.

Article 85 of The Constitution

Everyone has the right to address public authorities in writing and signed, but should not address it on behalf of groups, only as juridical persons.

b) *Inclusivity/vulnerable groups*

Article 9 of the Egyptian Constitution

The state is committed to achieving equality of opportunity for all citizens, without discrimination.

Article 11 of the Egyptian Constitution

The State guarantees equality between women and men in all civil, political, economic, social and cultural rights in accordance with the provisions of the Constitution. The State shall endeavour to take measures to ensure appropriate representation of women represented in parliaments, as prescribed by law, and guarantee women the right to hold public office and functions of senior management in the state and the appointment of competent judicial bodies, without discrimination against them. The state is committed to protecting women against all forms of violence, and to ensure the empowerment of women to reconcile their family duties and work requirements. It is also committed to providing care and protection of motherhood and childhood and women breadwinners and elderly and women most in need.

c) *Governance and Human Rights*

Law no. 94/2003 on establishing the National Council for Human Rights (NCHR)

It aims to promote, ensure respect, set values, raise awareness and ensure observance of human rights. At the forefront of these rights and freedoms are the right to life and security of individuals, freedom of belief and expression, the right to private property, the right to resort to courts of law, and the right to fair investigation and trial when charged with an offence.

d) *Labour working conditions*

The Egyptian Labour Law number 12/2003 organizes working conditions and management of worker relationship in chapters one to four of Book 5 of the Labour Law. The national labour law in its different articles; addresses the following aspects:

- The individual labour contracts,
- Terms of employment,
- Wages and leaves,
- Collective negotiations and collective labour agreements and litigations, and
- Vocational training

e) *Child Labour*

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 Labour Law 12/2003 (amended by law 90/2005) address working conditions for children and obligations on the owner who has child labour working in their project. Minister of Labour decree 118/2003 concerning child labour describes terms and conditions

for recruiting a child such as providing periodical medical examinations, first aid, good working environment, personal protective equipment (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.

The below articles of the ministerial labour decree 118/ 2003 concerning child labour indicate the following:

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

2.1.13 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 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).

2.2 Regional and International Conventions

The regional and international conventions relevant to the project are shown in Table 2-10.

Table 2-10: Relevant regional and international conventions related to the project

Convention & Relevance to the Project	Date of Signature	Date of Ratification	Date of Entry into Force
Climate Change: The current use of the project location is a TS with accumulated waste. The proposed project is expected to reduce greenhouse gases (GHGs). Egypt is signatory to a number of relevant international conventions on climate change, as follows:			
UN Framework Convention on Climate Change (UNFCCC): Article 4 of the convention states "Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors"	6/9/1992	12/5/1994	3/5/1995

Convention & Relevance to the Project	Date of Signature	Date of Ratification	Date of Entry into Force
Kyoto Protocol Calls for Implementing and/or further elaborating policies and measures that result in limitation and/or reduction of GHGs emissions.	3/15/1999	1/12/2005	4/12/2005
Vienna Convention on the protection of the ozone layer The objectives of the Convention were for Parties to promote cooperation by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer.	3/22/1985	5/9/1988	
Montreal Protocol on substances that deplete the ozone layer This Protocol was designed to reduce the production and consumption of ozone depleting substances in order to reduce their abundance in the atmosphere, and thereby protect the earth's fragile ozone Layer, which is not directly related to the activities of the current project.	9/16/1987	8/2/1988	
Paris Agreement The Agreement enhances the implementation of the Convention, including its objective, and aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including: 1. Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change; 2. Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and 3. Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.	4/22/2016		
Nature Conservation: Gharbia Governorate includes agrobiodiversity, which should be taken into consideration while developing the solid waste management project.			
United Nations Convention on Biological Diversity (UNCBD) Recognizes the importance of biological diversity in offering ecosystem services such as re-creational, ecological, economic, educational services etc. and its importance in maintaining life. The convention emphasizes that countries and states are responsible to preserve their biological diversity and that specific human activities negatively affects their presence. Parties are expected to sustainably manage the surroundings of protected areas. Municipal solid waste management can help reduce pollution in the project area.	6/9/1992	6/2/1994	8/31/1994
Convention on the Conservation of Migratory		02/11/1982	11/1/1983

Convention & Relevance to the Project	Date of Signature	Date of Ratification	Date of Entry into Force
Species of Wild Animals (CMS), Bonn convention Globally conserve aquatic, terrestrial and avian migratory animals and it recognizes their crucial role in the stability of the ecosystem It also recognizes that all boundaries where the species occur or pass through need to be managed.			
Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA). The convention emphasizes on the importance of migratory birds on the global biological diversity and that they highly depend on wetlands. Parties of this convention are expected to minimize disturbances as much as possible that can negatively impact migratory water birds when planning and constructing.	8/20/1997	11/1/1999	11/1/1983
Child Labour			
Convention on the Rights of the Child (CRC) The convention recognizes that all family members should have equal rights, freedom and justice. It recognizes that everyone should have rights and freedom with no discrimination by race, gender, culture, language, ethnicity, religion, social status and income. It states that a healthy family environment and a healthy society are crucial for the development of the child. It also states that a child needs to have legal rights to protect its needs and mental maturity prior and after birth. It recognizes the importance of global cooperation in improving the lives of children in different regions. Furthermore, it also gives attention to children in challenging environments and circumstances and recognizes their need for special attention.	05/02/1990	06/07/1990	

Source: This table was adapted from the EEAA and was further edited by Environics.

2.3 International Standards

The project will be implemented under the NSWMP and co-funded by the KfW. The project will be aligned with KfW requirements. ESIAs are an integral part of every appraisal of the projects funded by the KfW. The ESIAs must follow the KfW Sustainability Guideline, the World Bank Group Environmental and Social Standards, the IFC Performance Standards, and World Bank Group/IFC EHS Guidelines.

2.3.1 Environmental and Social Standards of KfW

KfW Standards provide an overview of its ESIA process for foreign investment projects on its website. Projects are first screened into three (four) categories: A, B (B+) and C. The projects are categorised in accordance with their potential environmental and social impacts and risk. “A” category projects are those with highest impact and require the highest scope and depth of the assessment. “B” category projects are less severe and are normally mitigated through state-of-the-art measures or standard solutions. “C” category projects are those with least impacts or risks.

The ESHS risk level of a specific contract (for a subproject) is not necessarily identical with the environmental and social risk level of the whole project. During preparation of tender documents for the contract for Bassioun TS the ESIA and the KfW's Standard Tender Documents should be consulted for adequately addressing the ESHS risk level of each specific contract/subproject.

Once a project is screened against a certain category, a comprehensive ESIA is prepared. Necessary technical studies are also carried out (ex. Resettlement, economic displacement, biodiversity offset requirements, etc.). Stakeholder engagement is a necessary component to be carried out and documented, particularly to include those potentially impacted by the project. Public disclosure is another necessary component, and the involvement of the affected local population and the management of grievances to be undertaken and documented in accordance with international standards. The ESIA must include a management plan that identifies mitigations to prevent, or reduce undesirable impacts, to acceptable levels, or to offset them. A resettlement action plan (RAP) is required in case a project may result in loss of livelihood opportunities and/or resettlement.

Moreover, the KfW has been requesting relevant projects, to carry out systematic climate assessments, to estimate the GHG emissions of the projects and potential climate change impacts.

2.3.2 World Bank Environmental and Social Framework

The World Bank Environmental and Social Framework (ESF) enable the World Bank and the Borrowers to have a better management of environmental and social risks of projects, to decrease the negative impacts of these projects, and to improve development outcomes. It was launched on October 1, 2018. The ESF covers the environmental and social risks broadly and systematically. The ESF covers areas as transparency, non-discrimination, public participation, and accountability. The ESF consists of 10 Environmental and Social Standards (ESS) which set out the requirements applied to borrowers.

- *ESS1 Assessment and Management of Environmental and Social Risks and Impacts*
  It sets out the Borrower's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each phase of any project funded by the Bank, in order to reach environmental and social performance consistent with the Environmental and Social Standards (ESSs).

  This standard is applicable on the construction and operation phases of the project

- *ESS2 Labour and Working Conditions*
  It recognizes the importance of creation of job opportunities, economic growth, and income generation. It states the requirements for safe and healthy working conditions, and labour protection.

This standard is applicable on the construction and operation phases of the project

- *ESS3 Resource Efficiency and Pollution Prevention and Management*
  It recognizes that economic activities may lead to pollution of the environment, and consume finite resources that may threaten people, ecosystem services, and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life-cycle.

  This standard is applicable on the construction and operation phases of the project.

- *ESS4 Community Health and Safety*
  It addresses the health, safety, and security risks and impacts on project-affected communities, and the responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to vulnerable groups.

  This standard is applicable on the construction and operation phases of the project.

- *ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement*
  It addresses the appropriate measures to mitigate adverse impacts on displaced persons and host communities receiving displaced persons due to involuntary resettlement.

  This standard is scoped out as the project land is on a state-owned land already used as a transfer station.

- *ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources*
  It recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development and it recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support. ESS6 also addresses sustainable management of primary production and harvesting of living natural resources and recognizes the need to consider the livelihood of project-affected parties, including Indigenous Peoples, whose access to, or use of, biodiversity or living natural resources may be affected by a project.

  This standard is applicable to the construction and operation phases of the project.

- *ESS7 Indigenous Peoples/Sub-Saharan African*
  It means to avoid adverse impacts of projects on Indigenous Peoples/Sub-

Saharan African Historically Underserved Traditional Local Communities, or when avoidance is not possible, to minimize, mitigate and/or compensate for such impacts.

The State does not recognize the presence of any indigenous communities in Egypt. While any national acknowledgement of indigenous groups is valid to help determine the potential presence of indigenous people, it is understood that it is not the sole determinant that is used for assessing the applicability of ESS7. On the other hand, local communities are composed of Nile Delta populations (Egyptians) and no populations to whom Indigenous People Criteria could apply are present in the area. Therefore, this standard is scoped out from the present project.

- *ESS8 Cultural Heritage*
  It sets out measures designed to protect cultural heritage throughout the project life cycle.

  This standard is scoped out as there is no sensitive cultural heritage near the project site

- *ESS9 Financial Intermediaries (FIs)*
  It recognizes that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction. FIs are required to monitor and manage the environmental and social risks and impacts of their portfolio and FI subprojects, and monitor portfolio risk, as appropriate to the nature of intermediated financing.

  This standard is not applicable.

- *ESS10 Stakeholder Engagement and Information Disclosure*
  It recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

  This standard is applicable on the construction and operation phases of the project.

2.3.3 World Bank EHS Guidelines

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors.

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account.

2.3.4 IFC Performance Standards

The eight IFC Performance Standards have been adopted as the World Bank Performance Standards for Projects Supported by the Private Sector ("WB Performance Standards") for application to projects (or components thereof) that are designed, owned, constructed and/or operated by a Private Entity, in lieu of the World Bank's safeguard policies ("WB Safeguard Policies"). As the project within the Egyptian NSWMP is the state-owned, the IFC Performance Standards do not apply. On the other hand, the IFC Performance Standards are acknowledged by KfW, WB and European Investment Bank Standards and are taken into account whenever relevant to the project.

2.3.5 International Labour Standards

As stated in the International Labour Standard (ILS) website, ILSs are legal instruments, developed by the International Labor Organization (ILO) constituents (governments, employers and workers). These set the basic principles and rights at work. 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[4] are:

1. Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87), ratified by Egypt in 1957;
2. Right to Organise and Collective Bargaining Convention, 1949 (No. 98), ratified in 1954;
3. Forced Labour Convention, 1930 (No. 29), ratified in 1955;
4. Abolition of Forced Labour Convention, 1957 (No. 105), ratified in 1958;
5. Minimum Age Convention, 1973 (No. 138), ratified in 1999;
6. Worst Forms of Child Labour Convention, 1999 (No. 182), ratified in 2002;
7. Equal Remuneration Convention, 1951 (No. 100); ratified in 1960; and
8. Discrimination (Employment and Occupation) Convention, 1958 (No. 111), ratified in 1960.

[4] The ratification date is obtained from the International Labor Organization official website.

3. Project Description

This chapter presents a description of the key features of the construction and operation of the proposed upgraded TS facility located in Markaz Bassioun in Gharbia Governorate.

3.1 Background

The Bassioun TS is part of an integrated waste management system for Gharbia Governorate that includes waste transportation via Bassioun, Samanoud and Zefta transfer stations, recycling in different MBTs located in the governorate and final disposal outside the governorate in El Sadat Landfill[5] (Menoufya Governorate). However, the MBT facility (Kafr El Zayat MBT) allocated for receiving the waste from Bassioun TS is not constructed yet, and no resources have been allocated for its construction yet. Therefore, until the construction of Kafr El Zayat MBT facility the collected waste coming to the Bassioun TS will be transferred directly for disposal at the Sadat landfill.

The activities of the TS facility will include receiving of collected waste, its daily storage and transfer from collection trucks (having small volume) to bigger trucks taking the waste to the Sadat landfill. The governorate or private sector will operate the TS.

Currently, the location of the proposed Bassioun TS upgrading site is used as a TS. MSW is collected from collection points in Bassioun city, consolidated in Bassioun TS, and transferred to Sadat landfill for disposal. However, the current TS is badly managed leading to the accumulation of MSW as shown in Figure 3-1. Sometimes, this accumulated solid waste is exposed to spontaneous combustion due to high temperatures. This negatively affects the crops of the surrounding farmland as well as the quality of the surrounding air. The current TS on daily basis receives approximately 150 tons of MSW collected by the Bassioun local unit.

The current amount of waste accumulated within the site is estimated to be 15,000 tons. The Bassioun local unit has received financial support (500,000 EGP) from the governorate to transfer 5,000 tons of the accumulated waste to Sadat landfill starting from the 7th of February 2021. The proposed upgrading of the Bassioun TS should improve the facility operation as an element of the MSW management system in Gharbia governorate.

[5] The Sadat landfill is part of the integrated waste management system and will be upgraded as part of the NSWMP. A separate ESIA has been developed for the Sadat landfill extension project. The full study report can be found via the following links to websites of NSWMP and Chemonics:
https://nswmp.net/publications/sadat-landfill-esia-inquiry-questions/
https://www.chemonicsegypt.com/news/5513/sadat-landfill-esia-inquiry-questions-2/

Figure 3-1: Waste currently accumulated within the existing Bassioun TS territory

The current system of MSW management in the governorate (Figure 3-2) is as follows:

- MSW from Markaz Santah is sent to an uncontrolled dumpsite;
- MSW from Markaz Samanoud is sent to an uncontrolled dumpsite;
- MSW from Markaz Zefta is sent to an uncontrolled dumpsite;
- MSW from Markaz Basssioun is sent to Bassioun TS, then it is sent to Sadat landfill;
- MSW from Markaz Tanta is sent directly to Defra MBT, then the reject is sent to Sadat landfill;
- MSW from Markaz El-Mahalla El-Kobra is sent directly to El-Mahalla El-Kobrah MBT, then the reject is sent to Sadat landfill;
- MSW from Qtoor is sent directly to a private sorting and treatment facility, then the reject is sent to Sadat landfill;
- MSW from Kafr El-Zayat is either sent to Sadat landfill or used in backfilling of a canal.

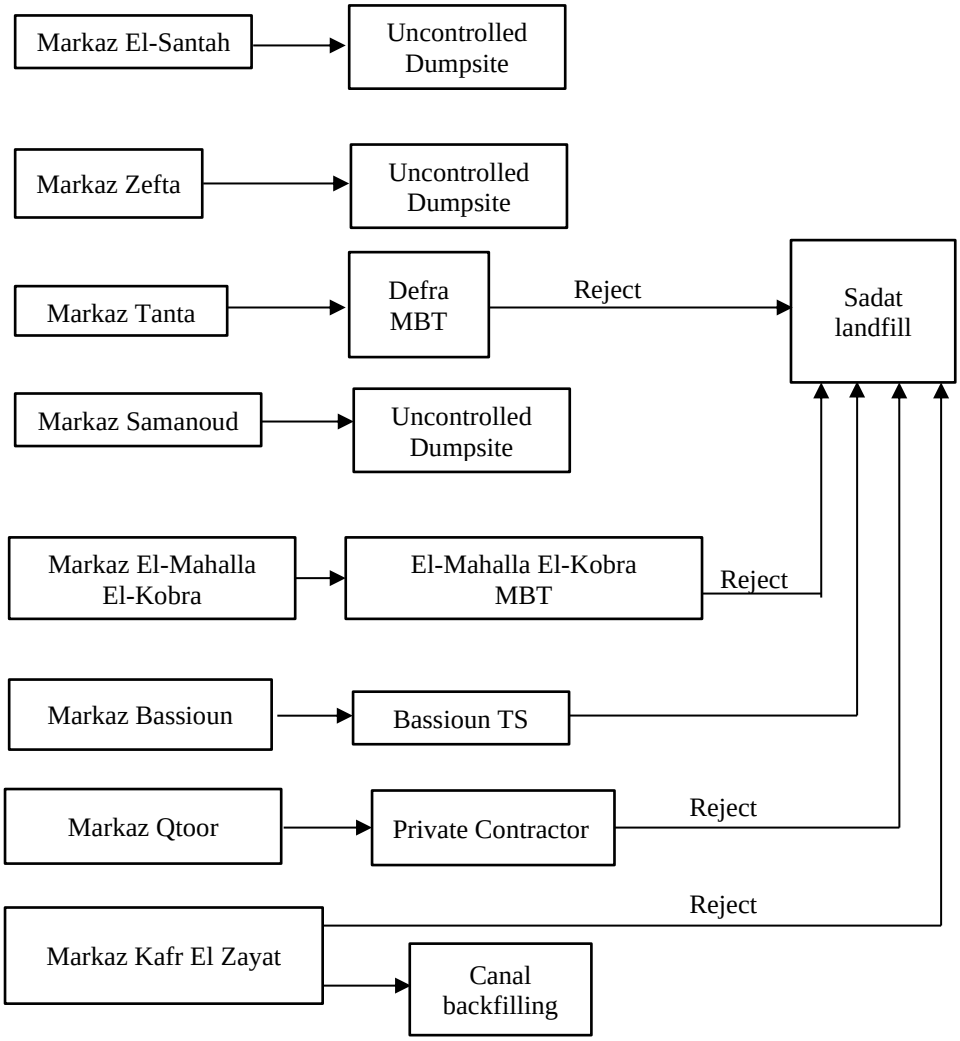


Figure 3-2: Current MSW management in the governorate

The current system of collection and transfer of MSW in Bassioun Markaz is based on the available working collection vehicles (5-ton trucks, 10-ton trucks, 2 wheeled tractors, and compactor trucks of capacity 18 m^3), and transfer trucks (20-ton trucks, 40-ton trucks, and 40-ton compactor trucks).
The proposed management plan for the MSW in the governorate is shown in Figure 3-3.

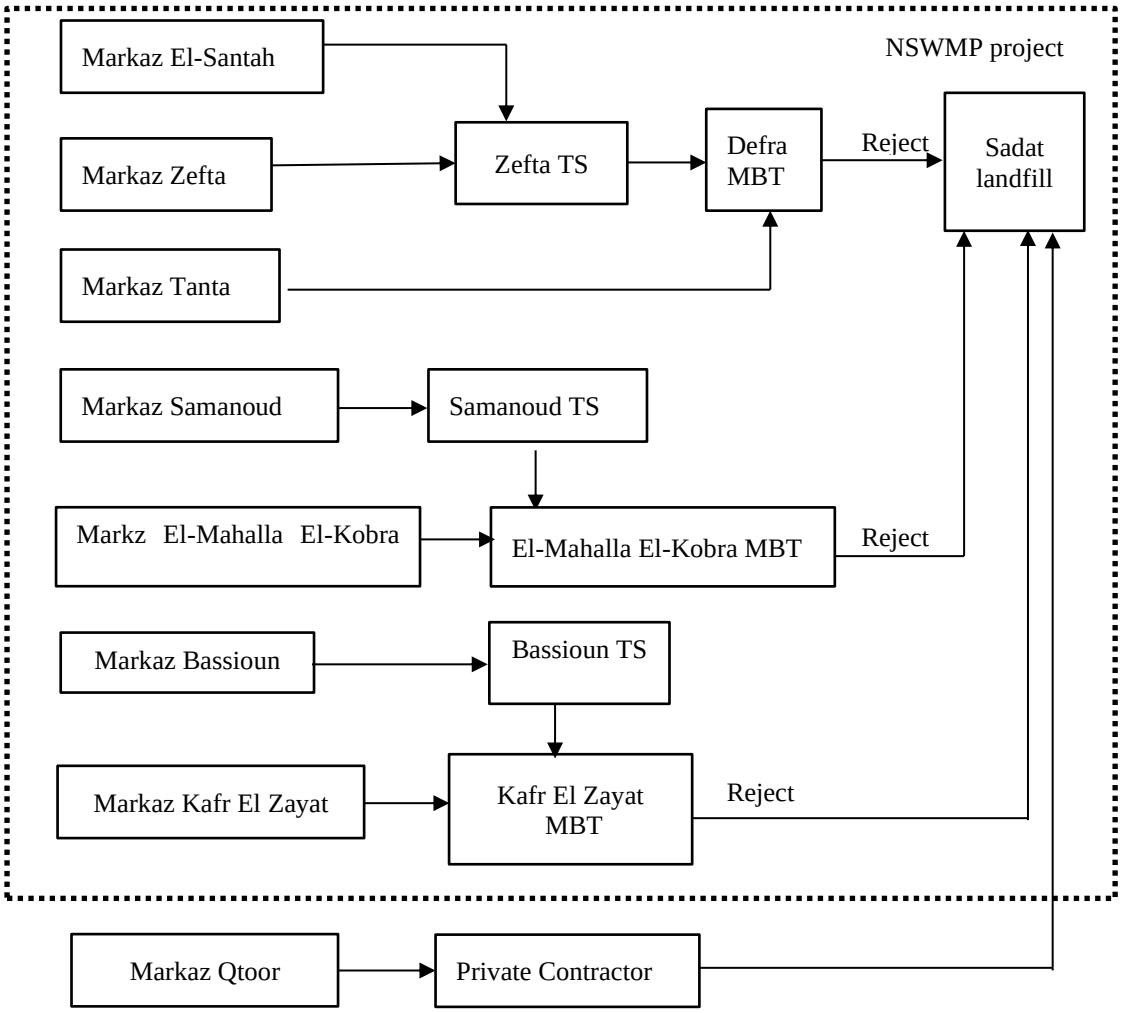


Figure 3-3: Planned MSW management in the governorate

As per Figure 3-3, the proposed MSW management is planned to be as follows:

- MSW from Markaz Santah will be sent to Zefta TS then to Defra MBT. The reject of the MBT will be sent to Sadat landfill. Defra MBT will be upgraded, and its increased capacity would take Markaz Santah's waste;
- MSW from Markaz Zefta will be sent to Zefta TS then to Defra MBT. The reject of the MBT will be sent to Sadat landfill. Defra MBT will be upgraded, and its increased capacity would take Markaz Zefta's waste;
- MSW from Markaz Tanta will be sent directly to Defra MBT. Defra MBT will be upgraded, and its increased capacity would take Markaz Zefta's and Santah's waste;
- MSW from Markaz Samanoud will be sent to Samanoud TS then to El-Mahla El-Kobra MBT. The reject of the MBT will be sent to Sadat landfill. El-Mahalla El-Kobra MBT will be upgraded and its increased capacity would take Markaz Samanoud's waste;
- MSW from Markaz El-Mahalla El-Kobra will be sent directly to El-Mahalla El-Kobra MBT. El-Mahalla El-Kobra MBT will be upgraded and its increased capacity would recycle Markaz Samanoud's waste;

- MSW from Markaz Basssioun will be sent to Basssioun TS then to Kafr El Zayat MBT. The reject of the MBT will be sent to Sadat landfill.
- MSW from Markaz Kafr El Zayat will be sent to Kafr El Zayat MBT. The reject will be sent to Sadat landfill
- MSW from Qtoor will remain as the current situation.

The reject (residual waste) generated at the MBTs will be sent to Sadat landfill for final disposal.

3.2 Project Location

The proposed project site belongs administratively to Markaz Bassioun, located in the middle part of the Nile Delta, in Gharbia Governorate. It is located close to the southern border of Markaz (approximately 3 km from the border) and approximately 2.5 km east of Bassioun city. The project's site location extends between latitudes 30°56'3.32"and 30°56'1.56"north, and longitudes 30°51'10.13" and 30°51'5.96" east as shown in Figure 3-4.

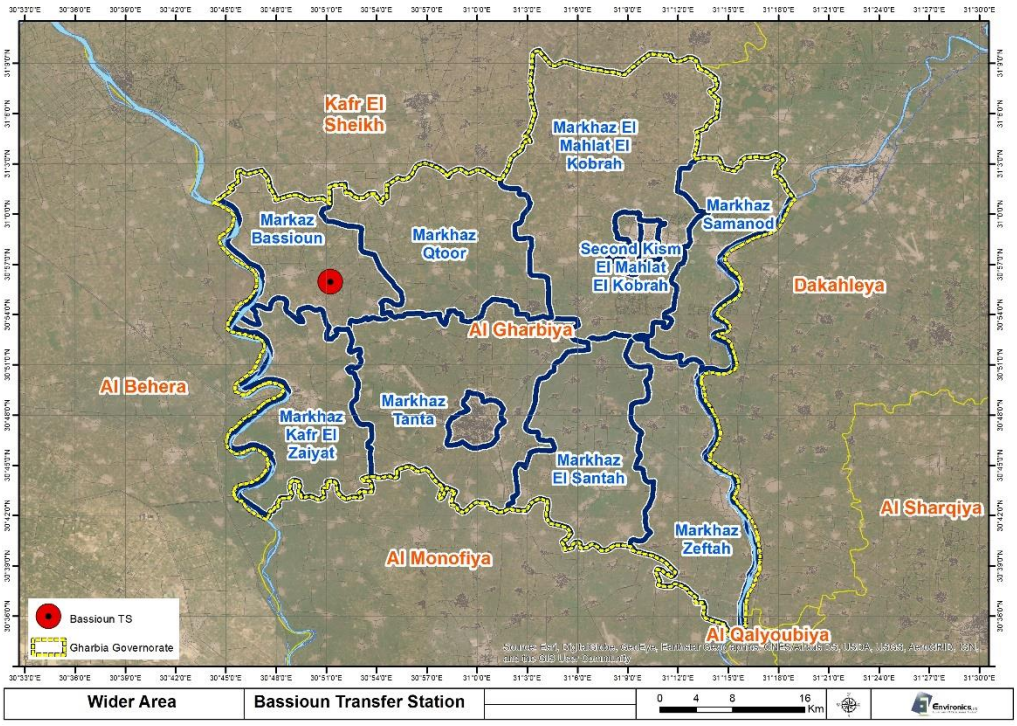


Figure 3-4: Location of the proposed Bassioun Transfer Station

The site of the existing Bassioun TS facility has the area of approximately 5,650 m^2 and is located in agricultural area, to the east of Bassioun City. The official land allocation letter for establishment of the TS is attached in Annex 1. The project area is accessible by Bassioun\ Kom El Naggar Road. The land use pattern in surroundings of the site proposed for the existing TS facility upgrading, as shown in the following Figure 3-5, is as follows:

- North: Agricultural lands;
- West: Narrow unpaved road, canal, and agricultural lands;
- East: Sewage treatment plant, minor paved road, and drain;

- South: Agricultural lands.

There are no residential buildings adjacent to the project site. Scattered houses are located approximately 450 to 475 m north and east of the project site. Mashal village is the nearest settlement area is approximately 480 m northeast of the site.

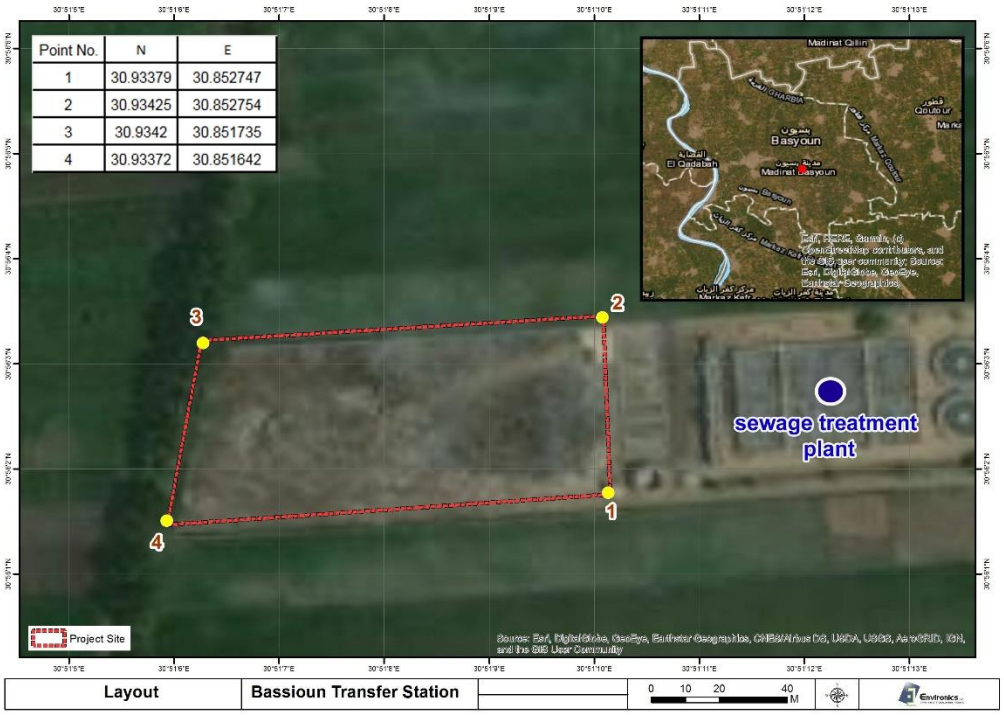


Figure 3-5: Surrounding land use in the project area

3.3 Waste Characteristics

Table 3-1 presents the results of a waste characterization survey carried out in urban and rural areas of Gharbia in March 2017. The purpose of this survey was the estimation of waste generation rates and waste composition in urban and rural areas of the Governorate. MSW consist of street sweeping, residential, and commercial wastes. The major components of the MSW are organic and animal waste (67.65%), plastics (9.24%), diapers (6.9%) and others (11.46%). It is assumed that composition of waste coming to the Bassioun TS will be similar.

The proposed upgraded TS will receive the MSW from Bassioun Markaz. The MSW stream will be directed to Sadat landfill, until the construction of Kafr El Zayat MBT facility.

Table 3-1: Waste quantities and composition

Waste component	Urban (%)	Rural (%)	Weighted average (%)
Plastic	9.24	6.34	7.00
Paper	2.99	3.43	3.33
Metal	0.39	1.41	1.17

Waste component	Urban (%)	Rural (%)	Weighted average (%)
Glass	1.02	4.22	3.48
Leather	0.00	0.00	0.00
Organic and animal	67.65	54.51	57.53
Diapers	6.90	7.22	7.15
Wood	0.00	1.52	1.17
Fabrics and textile	0.35	0.48	0.45
Dust	0.00	5.15	3.96
Electrical and electronic	0.00	0.15	0.11
Medical and hazardous	0.00	0.00	0.00
Other	11.46	15.58	14.63
Total	100.00	100.00	100.00

Source: Survey carried out by Chemonics in 2017

3.4 Existing Infrastructure

Chemonics' team reported that there are currently networks of utilities connected to the project site such as electricity, water, and that the site is located adjacent to the Sewage treatment plant. The project area is accessible from the Bassioun\ Kom El Naggar Road via an unpaved access road (130 m).

3.5 Structures within the Existing TS

The current TS consists of a fence, a small wooden guard room, and a small shaded parking area. The current TS is not divided into waste reception, unloading, and loading areas. Collection trucks unload waste in any area, leading to waste accumulation in different areas within the TS territory.

3.6 Proposed Project Components

The purpose of the proposed project is to upgrade the current Bassioun TS and to prevent waste accumulation. The municipal waste delivered by small collection trucks will be loaded into large trucks that will transfer it to the landfill (existing) or the treatment facility (when constructed).

The TS facility will contain an entrance area, a weighbridge with a control room, a guard/security room, a waste reception area, a loading area, an administration and staff building, a parking area for cars belonging to the TS workers and visitors, as well as a parking area for transfer trucks

3.6.1 Entrance Area

The entrance area has a total area of 175 m^2. This area will contain the gate to the transfer station for both small & large trucks and a room for guard/security occupied area of 20 m^2 (4 × 5 m).

3.6.2 Weighbridge

The weighbridge area is 54 m^2. The weighbridge will be associated with a weighbridge control room with an area of 19.25 m^2. The operator staff allocated for the weighbridge control room will be responsible for inspecting the delivered waste to confirm its acceptance, for registration of the incoming and outgoing trucks and waste amounts, as well as for cleaning the wheels of trucks from any occasionally stuck waste before the trucks enter the weighbridge when leaving the TS area. The waste will be collected and taken to the loading area.

3.6.3 Waste Reception Area

The reception area has an area of 845 m^2 placed at the top of ramp. It will serve the small collection trucks that do not have a tipping mechanism. These collection trucks will be manually unloaded in this area, then the wheel loaders will load waste into large trucks. The reception area will be equipped with concrete slabs to avoid leachate infiltration into the soil. This area will include a hopper to assist the loading of transfer trucks.

3.6.4 Loading area

The loading area will be established for handling 235 tons of waste per day in two shifts of 8 hours each. The loading area structures made of concrete slabs will ensure operations in two parts having different levels/elevations. Small trucks will unload within the upper level part (elevation +3.00 m) and large trucks will be loaded within the lower level part (elevation zero level). The loading area shall be established within a steel structure (e.g. a hangar) for odour and dust control.

3.6.5 Administration/Staff Building

The administration building is of an area of 200 m^2. The administration building will contain offices and rooms for workers.

Figure 3-6 shows the proposed Bassioun TS layout, including a preliminary design of the upgraded facilities. A detailed layout and design will be further presented by the contractor at later stage of the project.

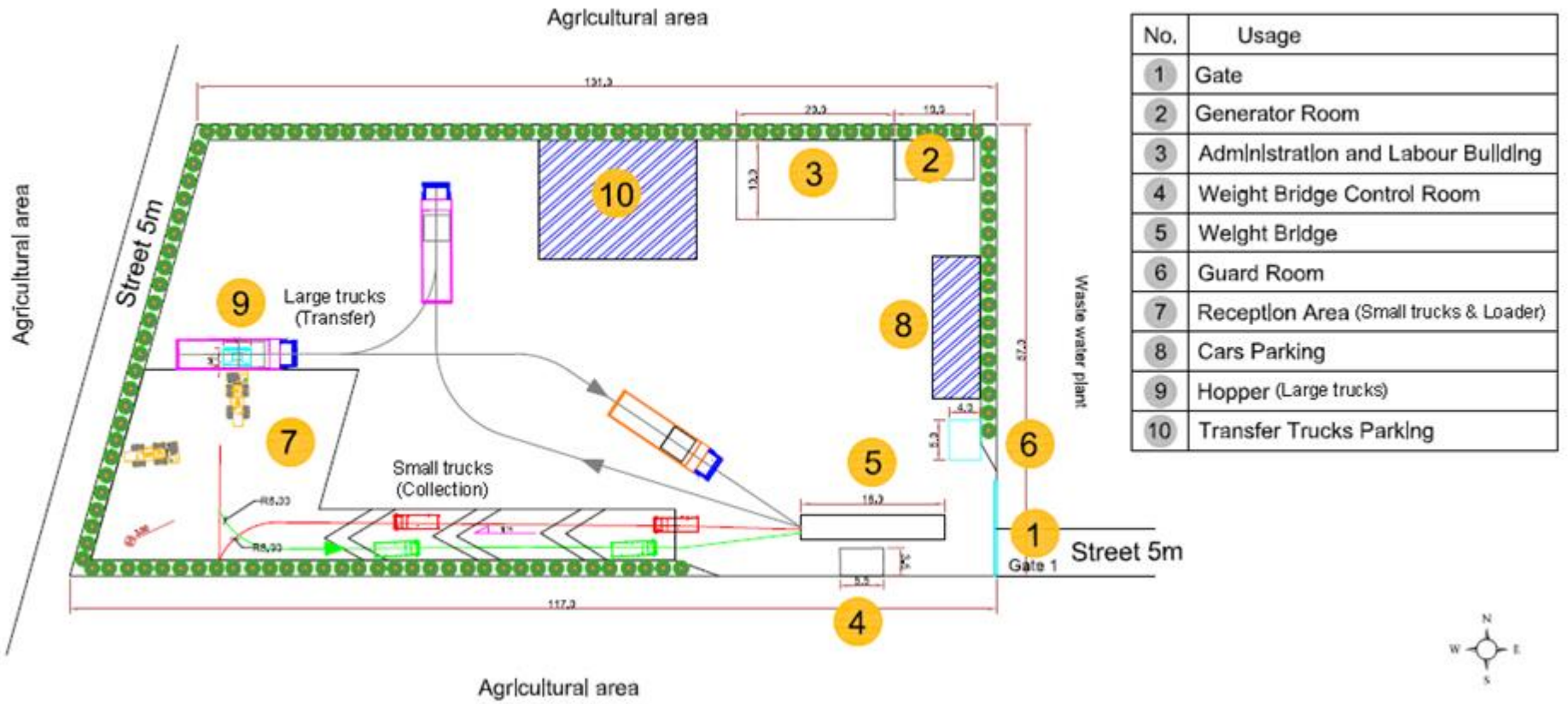


Figure 3-6: Layout for the Bassioun TS after the proposed upgrading

3.7 Construction Phase

The construction phase of the project is described taking into account the most stringent conditions in terms of project area and implications of construction works.

The overall construction, machinery installation, commissioning and stabilization of the proposed project components will take 6 months. Major construction activities will include construction of buildings and ramp, installation of electricity generator, weighbridge, testing, and commissioning. The following provides more details of the construction phase.

3.7.1 Pre-construction and Construction Activities

The main pre-construction and construction activities would include:

a) Solid waste removal
Currently, the accumulated solid waste within the site is being transported to Sadat landfill (100 km) to ensure the site clearing and preparation. The approach to handling of waste collected during the construction works for upgrading of the Bassioun TS is not defined yet in this phase of the project.

b) Geotechnical investigations
Prior to commencement of construction works, information on geotechnical investigation boreholes will be analysed to identify the soil properties and characteristics. Based on the geotechnical investigation results, the project structures and buildings will be located and constructed. Construction will also satisfy the requirements of Egyptian building codes.

c) Earthworks
The site will be levelled according to the designed plant layout to meet the operational and structural measures of the project.

d) Provision of site drainage
Drainage paths will be set up in order to facilitate liquid waste disposal as well as avoid flooding in case of rainfall (if needed).

e) Temporary site facilities and camp infrastructure
The temporary facilities that are needed for the construction phase, such as workers' accommodation, warehouses, etc. will be constructed. These facilities will be dismantled after the construction phase ends.

f) Foundations and civil works
After site excavation, the foundations are constructed for the buildings, structures, etc. During this stage, mechanical and concrete structures will be installed and constructed. All the previous steps are to serve this particular step.

3.7.2 Utilities

Utilities during construction phase are expected to include:

- Wastewater collection system (It is not known yet if it will be connected directly with the adjacent wastewater treatment plant, or there is an existing connection); and
- Fuel storage.

However, detailed information on such utilities is not available at this stage.

3.7.3 Construction Equipment

Table 3-2 shows the main construction equipment, not necessarily that all listed equipment will be on-site in the same time.

Table 3-2: List of main construction equipment

Name of equipment	Number of equipment
Excavator	1
Dump truck	1
Loader	1
Road Roller	1
Pick-Up	1
Concrete vibrators	2
Concrete mixers	1

3.7.4 Inputs during Construction Phase

a) Raw Materials

The main materials utilized in the construction process include cement, sand, gravel, steel, pipes, geotextile, etc. Also, lubricating oils and materials required for maintenance of equipment in addition to diesel fuel, no chemicals or other materials are required for the construction activities. Table 3-3 shows the main raw materials with the required quantities that will be used in the construction phase.

Table 3-3: Raw materials used during construction phase

Raw Material	Approximate quantity
Cement	200 ton
Sand	1500 m^3
Gravel	750 m^3
Tensile/mild steel	100 ton
Steel sections	65 ton
Pipes	300 m

b) Water Consumption

The project will consume water at expected rate 5 m^3/day in the construction phase. Water will be mainly provided from water network in the site.

c) Electricity

The project will consume 30 of electricity KW in the construction phase per day. Electricity will be mainly provided from the grid.

d) Fuel

Diesel will be used as a fuel for construction equipment, the total consumption of diesel is 0.5 m^3/day.

3.7.5 Emissions and Wastes during Construction Phase

The construction phase activities may generate gaseous emissions, liquid effluents noise and solid wastes as follows:

a) Gaseous Emissions

Vehicles and other construction machinery are expected to generate gaseous emissions including NO_x, CO, SO_2 and PM_{10} (IFC, and WHO, 2007a), Generally, gaseous emissions result from the following construction activities:

- Operation of heavy equipment and vehicles

Although vehicle exhaust emissions will be released close to ground level (i.e. close to the breathing zone of receptors), these emissions will generally be released in open areas where rapid dispersion and dilution is expected to take place due to the open area and wind speed.

The governorate and regulatory authorities will ensure that contractors will carry out the necessary measures to minimize impacts. This is to be included in the contractor's scope of work (contract). Possible measures include maintaining and inspecting machinery and vehicles in good working conditions to minimize fugitive emissions International (IFC, WHO, 2007a).

b) Dust

Dust result from the following construction activities:

- Movement of heavy equipment and vehicles in the location and unpaved roads.
- Levelling, excavation and backfilling activities in the construction site.
- Mixing of building aggregates.

The governorate and regulatory authorities will ensure that contractors will carry out the necessary measures to minimize impacts. This is to be included in the contractor's scope of work (contract). Possible measures include:

- Speed restriction on unpaved roads and avoidance of unnecessary vehicle movements; and
- Site dust suppression measures to minimize dust emissions (IFC, WHO, 2007a).

c) Noise

The predominant noise generation during construction will result from the operation of heavy equipment, and vehicle movement.

The use of construction equipment may generate localized, short-term high noise levels. Operation of construction equipment will generate noise, which could impact neighbouring activities as well as on-site workers.

All equipment would be maintained and inspected for efficient normal working conditions to minimize noise. Moreover, major noise generating activities would be avoided during night times, as feasible.

d) Wastewater

Wastewater generated from the proposed project in the construction phase is expected to be:

- Purging and cleaning of cement trucks; and
- Municipal (domestic) wastewater

The governorate and regulatory authorities will ensure that contractors will carry out the necessary measures to minimize impacts. This is to be included in the contractor's scope of work (contract). Possible measures include:

- Setting special conditions in the construction contractor for safe disposal of any purging water or disposal wastes in any surface water and to commit the safe disposal through an authorized subcontractor.
- Continuous surveillance and inspection on the trucks' purging and cleaning activities near the surface waters.

Municipal wastewater will be generated from the construction workers in the location of the project. As the daily number of workers is changing depending on the type and level of needed labour (civil, welding, electromechanical, etc.) the sanitary wastewater amount will therefore change.

The expected rate of generation of municipal wastewater is 4.5 m^3/day. Domestic wastewater will be collected and in above ground tanks. The tanks will be regularly emptied at the adjacent wastewater treatment facility (located east of the project site) via a direct connection or through authorized subcontractor.

e) Solid Wastes

Non-hazardous solid waste will be generated from construction activities, which will include:

- Packaging materials (paper, cardboard, plastics) and wood scrap waste
- Construction spoil and debris and unused construction materials
- Municipal solid waste
- Construction wastes such as sand, cement, brick, aggregates, steel parts, aluminium, empty drums and containers (plastic and metal), wood (pallets), etc.

The expected rate of generation of non-hazardous solid wastes is 50 m^3/month. The non-hazardous solid waste will be collected and sent to authorized landfill via licensed contractor.

f) Hazardous Wastes

The hazardous wastes generated during construction activities are shown in Table 3-4.

Table 3-4: Hazardous wastes generated during construction phase

Hazardous Waste	Rate of generation	Storage	Disposal
Batteries; oil filters; empty oil, paint	1 m^3	Onsite	El Nassrya

Hazardous Waste	Rate of generation	Storage	Disposal
containers; and fabrics contaminated with oil			Hazardous waste landfill
Waste oils, lubricants, fuels, paint; and thinners	1 m^3	Onsite	El Nassrya Hazardous waste landfill

The governorate and regulatory authorities will ensure that the contractor will implement all necessary measures for good housekeeping and spill prevention. Moreover, most of the location will actually be lined with concrete and internal roads are paved. The hazardous waste will be collected in separate area and sent to El Nassrya hazardous waste landfill via licensed contractor. The spent oil will be sent to Petrotrade.

3.7.6 Labour Force and Work Shifts

The estimated labour force required for the project construction phase is approximately 20 employees (20 males and 0 females) hired through direct jobs. The project construction works will be implemented through one work shift per day; each shift of 8 hours. The governorate will encourage contractors to hire most workers from Gharbia and gender equality will be considered in this phase of the project.

3.7.7 Schedule of Construction Phase

The construction phase for upgrading of the transfer station will last for 6 months according to NSWMP plans.

3.8 Operation and Maintenance Phase

The estimated TS facility lifespan upon upgrading is 40 years. The total area of the proposed project site is 5,650 m^2. The proposed upgrade facility is designed to receive 235 ton/day of solid waste. The actual quantity is expected to be 85,775 tons/year in 2021; i.e. approximately 200 tons/day. The following section describes the proposed facility.

The total loading time for compacting transfer truck taking 50 tons of MSW is estimated to be from 50 to 60 minutes. Total loading time for non-compacting transfer truck is estimated to be 20 minutes for loading 20 tons of MSW and 40 minutes for loading a truck taking 40 tons of waste.

3.8.1 Weighbridge during O&M phase

Collection trucks will enter the facility and will be inspected visually for any unaccepted waste such as hazardous waste. Then, trucks will be weighted before and after dumping the waste to determine the amount of waste they have unloaded at the TS.

3.8.2 Loading area during O&M phase

The small trucks will enter the loading area at the upper deck through a ramp of length of 45 m and a slope 1:15 meters. The small trucks will unload the

delivered waste into the hopper installed over a large truck placed at the lower deck and receiving that waste falling through the hopper.

However, there are some small trucks that do not have a tipping mechanism which will be unloaded manually. Therefore, the TS will include a small reception area on top of the ramp for receiving waste from these trucks. Furthermore, this reception area will be utilized to avoid the congestion of small collection trucks. After unloading waste in the reception area, the wheel loaders will be used to push waste into large transfer trucks.

3.8.3 O&M of Equipment and Vehicles

The equipment that will be used in the TS is mentioned in Table 3-5. As mentioned above, the wheel loader will be used for loading waste into transfer trucks. Moreover, it could be used to clean the paved surfaces during and after each day of the TS operation.

Table 3-5: List of main equipment for O&M of the proposed TS

Name of equipment / vehicle	Number of equipment / vehicle
Weighbridge	1
Hopper	1
Large Truck	4 (20-tons truck) or 2 (40-tons truck)
Wheel loader	2

3.8.4 Access roads and ramp during O&M phase

Each of the small trucks delivering waste will enter the TS via the gate, and then it will be weighed and will climb the ramp leading to the waste reception area/deck for tipping the waste into the hopper directing waste into the transfer truck placed under the hopper. The empty waste collection truck will be directed to the weighbridge, weighed and then leave the site via the gate. If the small trucks do not have a tipping mechanism, they will be manually emptied within the waste reception area, where from the loaders will put the waste through the hopper for loading the transfer truck.

The large trucks will enter the station from the gate and weighed empty. Then they will be directed to the loading area. Upon leaving the loading area, the transfer trucks will be directed to be weighed and then will go to the landfill for disposal or to the treatment facility (when constructed).

3.8.5 Traffic management onsite/offsite during O&M phase

Details are not available at this phase of the project. However, further details will be provided in the Impact Assessment and Management Plan chapters.

3.8.6 Utilities during O&M phase

Utilities during the operation and maintenance phase are expected to include:

- Potable Water Network
- Wastewater Collection System
- Electrical Power Supply, Network and Distribution System
- Fuel Storage

Detailed data and information on such utilities are not currently available.

3.8.7 Inputs during O&M phase

a) Municipal Solid Waste

The station will receive MSW from Bassioun Markaz and ensure its transfer to Sadat landfill till the construction of Kafe El Zayat MBT facility. The TS is designed to receive and transfer 235 tons/day. Therefore, no waste is expected to accumulate in the TS.

b) Water Consumption

The project will consume water at expected rate of 10 m^3/day in the operation phase. Water will be mainly provided from the water network. The main uses of water in the project includes consumption by the staff for domestic needs, cleaning of the loading area, and watering of the green areas.

c) Electricity

The project will consume electricity of 10 KW per day in the operation and maintenance phase. Electricity will be mainly provided from the grid. Electricity will be used for station lighting system, weighbridge, in the buildings.

d) Fuel

Diesel will be used as a fuel during the operation phase for the power generator and equipment, the total consumption rate of diesel is estimated 0.1 m^3/day.

3.8.8 Emissions and Wastes during O&M Phase

The operation phase activities may generate gaseous emissions, liquid effluents noise and solid wastes as follows:

a) Gaseous Emissions

Gaseous emissions could result from the following operation and maintenance phase activities:

- Vehicle emissions which contains NO_x, SO_x, CO, and PM (IFC, and WHO, 2007a);
- Odour from the municipal waste (IFC, and WHO, 2007b); and
- Dust and bio-aerosols (IFC, and WHO, 2007b)

b) Noise

The predominant noise generation sources during the O&M phase will result from the vehicle movement and the equipment used at the site, such as the trucks and the power generator. This noise will be localized within the site and would only affect the workforce over the project lifetime. Noise from small and large trucks moving to and from the transfer station will affect inhabitants of areas along the roads. To further minimize noise intensity levels, the following control measures can be considered:

- Maintain machinery, equipment and vehicles in good working conditions to minimize noise generated;
- Perform proper maintenance on all noise producing equipment to prevent excessive rattling and vibration of metal surface;

c) *Wastewater during O&M phase*

Municipal/sanitation wastewater at the project site will be generated in the staff rooms. The expected rate of generation of municipal wastewater 4 m^3/day. Municipal/sanitation wastewater will be drained directly into the existing public sewer network.

No significant quantities of leachate are expected to be generated from the municipal solid waste as the waste will not be accumulated at the TS. Some small quantities of leachate may come with trucks in case they transport humid waste due to rain or flood. However, the waste has high organic content potentially generating some leachate during collection and transfer of the waste. Trucks for waste collection and transfer will be equipped with tanks/containers for leachate accumulation. These tanks will be emptied at designated facilities (e.g. including a leachate evaporation pond with impermeable bottom).

d) *Solid wastes and litter during O&M*

Municipal solid waste will be generated in the staff amenity areas and as litter from the loading area. The expected quantity of municipal solid waste generated will be 0.1 ton/day. The solid wastes will be collected and put through the hopper.

Litter may generally pose a problem during the project operation phase. Municipal solid wastes can have a high content of plastic, paper and fines, which may cause litter problems offsite if not managed correctly. Litter can be generated from open loads, plastic, paper and rejects blowing away transfer operations. Accordingly, litter would be controlled by:

- Requiring loads of incoming/outgoing material to be covered;
- Fencing the whole site perimeter (e.g. with high walls made of mesh/nets) to avoid offsite dispersion and facilitate collection of litter, especially it is surrounding by agricultural lands; and
- Collecting litter as soon as possible before it becomes scattered offsite.

e) *Hazardous Wastes*

Hazardous waste generated during operation activities are shown in Table 3-6.

Table 3-6: Hazardous wastes generated during operation phase

Hazardous Waste	Rate of generation
Oil filters	20 kg/month
Empty oil containers	20 kg/month
Used oils	200 kg/month
Oil contaminated fabrics	10 kg/month

Hazardous waste will be collected in separate area and sent to El-Nassrya hazardous waste landfill in Alexandria via a licensed contractor. The spent oil will be sent to Petrotrade.

3.8.9 Maintenance Procedures and Frequency

Maintenance of equipment used in the operation phase will be carried out on a frequent basis. Maintenance activities will be recorded in the maintenance log. Large trucks, trucks, and loaders will be maintained according to the manufacturer requirements. The frequency of weighbridge and hopper maintenance are not known at this stage of the project. More maintenance procedures will be described later in the environmental and social management plan chapter.

3.8.10 Labour Force and Work Shifts

The estimated labour force required for the project operation is approximately 15 employees (including males and females) hired through direct jobs. The project will be implemented through an 8-hours shift. It is recommended to hire most workers from Gharbia, and gender equality shall be considered in this phase of the project.

3.8.11 Site Security

A 3 m height fence made of bricks surrounds the site. Entrance will be restricted to project staff only. The site will have one guarded gate. The project will recruit a minimum of two security personnel.

3.8.12 Site Tidiness

Site tidiness will be accomplished by good housekeeping practices. Moreover, no waste will be accumulated in the TS. The site tidiness and housekeeping procedures are described in detail in the chapters related to the impact assessment and the environmental and social management plan.

3.8.13 Vector and Wildlife Management

The vector and wildlife management are described in the environmental and social management plan chapter. The proposed management plan will depend on the following:

- Good hygiene and housekeeping during the operation phase, which is expected to limit the presence of pests;
- Efficient management of incoming waste to reduce the chance of organic matter accumulation.

3.9 Time Schedule for Project Implementation

The time schedule for project implementation has not been determined in the current phase of the project.

3.10 Decommissioning Phase

A decommissioning plan is not available at this stage. NSWMP/Governorate will need to prepare such plan as part of the integrated project's HSE Plan.

3.11 Emergency Procedure

Solid waste management projects need to incorporate safeguards against hazards, which could expose workforce to danger, interrupt the facility operations, or create abnormal pollution problems. Potential hazards include:

- Fire starting in wastes before/during handling;
- Extreme weather conditions; and
- Breaking into the site for theft or scavenging.

The emergency procedures will include:

- Emergency Reporting;
- Emergency Actions;
- Investigating the Emergency; and
- Reporting the case of emergency.

Details on the emergency procedures are described in the chapter on the environmental and social management plan.

4. Baseline Environmental and Social Conditions

4.1 Methodology

A description of the environmental status of the site and the hinterland has been carried out, to include physical, biological and socio-economic conditions. Baseline information has been obtained through intensive literature review and previous studies and reports on the area as well as from a field visit to the site carried out by Chemonics's (Designer) team in February 2021. The information collected from visiting the site has been shared with the Environics team to support the preparation of this chapter.

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

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

4.1.1 Physical Environment

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

4.1.2 Biological Environment

Information and data on the wider area were gathered from previous direct observations, published material, reports analysis of satellite images and from recent studies performed by Environics and other entities. Data and information on biodiversity of the project site and immediate surroundings were mainly obtained from Chemonics' site visit that included a visual assessment of the area. Findings were recorded using a GPS and digital photography.

The Red List issued by the International Union for the Conservation of Nature (IUCN) was used to determine the international status of species. The local status (whenever available) was based on Baha El Din (2006) for herpetofauna, Tharwat (1997) and BirdLife International (2019) for avifauna and Basuony et al. (2010) for mammals. As some of these references are not very recent and require updates, the local status obtained from literature was sometimes modified to reflect the actual status of animals, based on

professional judgment. The status of species is determined following the IUCN Red List categories' guidance[6].

4.1.3 Socio-economic Environment

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

- GIS maps of the project area and surroundings;
- Former technical reports in adjacent areas and localities; and
- Official Central Agency for Public Mobilization and Statistics (CAPMAS) data and statistics.

Field-based activities included:

- Field reconnaissance of the area;

Accordingly, in addition to secondary data sources, primary data collection for the integrated project included a total of 18 Key Informant Interviews conducted with local officials at the Governorate, Markaz, City, and Village levels. These included 4 KIIs in the Governorate of Gharbia, 4 KIIs in Zefta Markaz, and 10 KIIs in Samanoud Markaz.

4.2 Physical Environment

4.2.1 Project Location

The proposed project is located in Gharbia Governorate within the Nile Delta. The project administratively falls within Markaz Bassioun. The project's location extends between latitudes 30°56'3.32"and 30°56'1.56"north, and longitudes 30°51'10.13" North and 30°51'5.96" East (**Error! Reference source not found.**).

[6] EX: Extinct; EW: Extinct in the Wild; CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Near Threatened; LC: Least Concern; DD: Data Deficient; NE: Not Evaluated

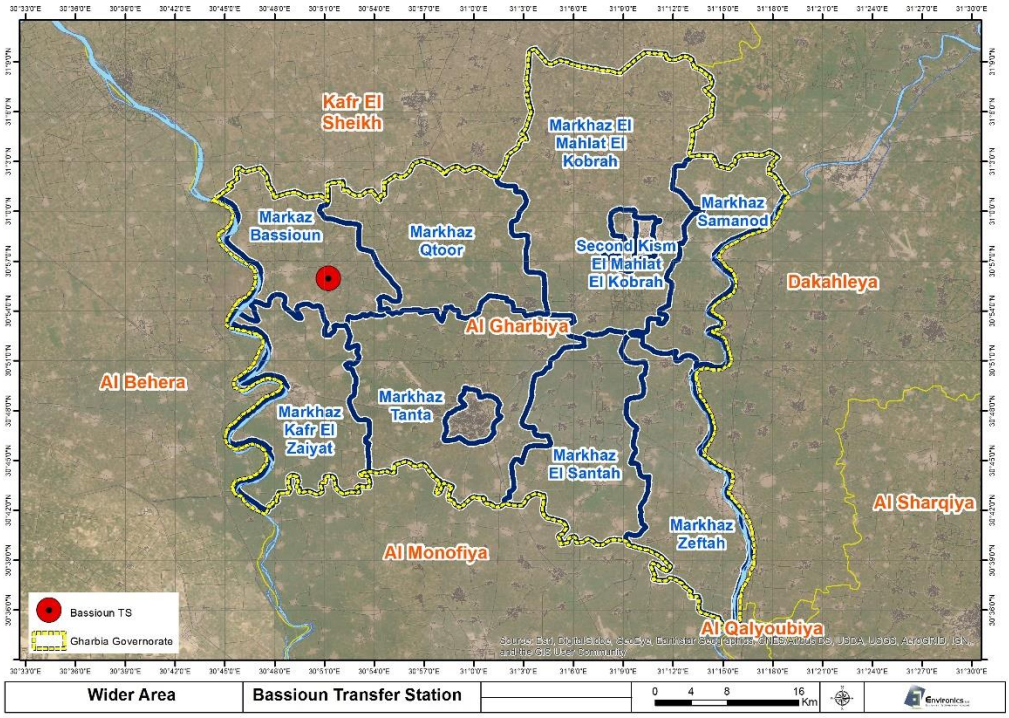


Figure 4-1: Location of the project site (in red) and administrative boundaries (yellow: Governorate and blue: Markaz)

Bassioun Transfer Station (subject to the proposed upgrading project) occupies approximately 5,650 m^2 and is specifically located at the southern part of Markaz Bassioun. Scattered houses are located about 450 to 475 m north and east the project site and they are deemed to be the nearest residential houses to the project. In addition, there are some residential settlements at the vicinity of the project area such as Mashal, Ezbet Nabil and Ezbet Qaranshu. Mashal is the nearest settlement to the project site, located about 480 m, and followed by Ezbet Nabil and Ezbet Qaranshu which are located about 1 km and 1.5 km respectively. The project site is surrounded by agricultural lands from three sides; south, west and north, at the eastern side sewage treatment plant is present. The surrounding land use of project site (shown in **Error! Reference source not found.**) can be summarized as follow:

- North: Agricultural lands;
- West: Narrow unpaved road, canal and agricultural lands;
- East: Agricultural lands, sewage treatment plant, and minor paved road;
- South: Agricultural lands.

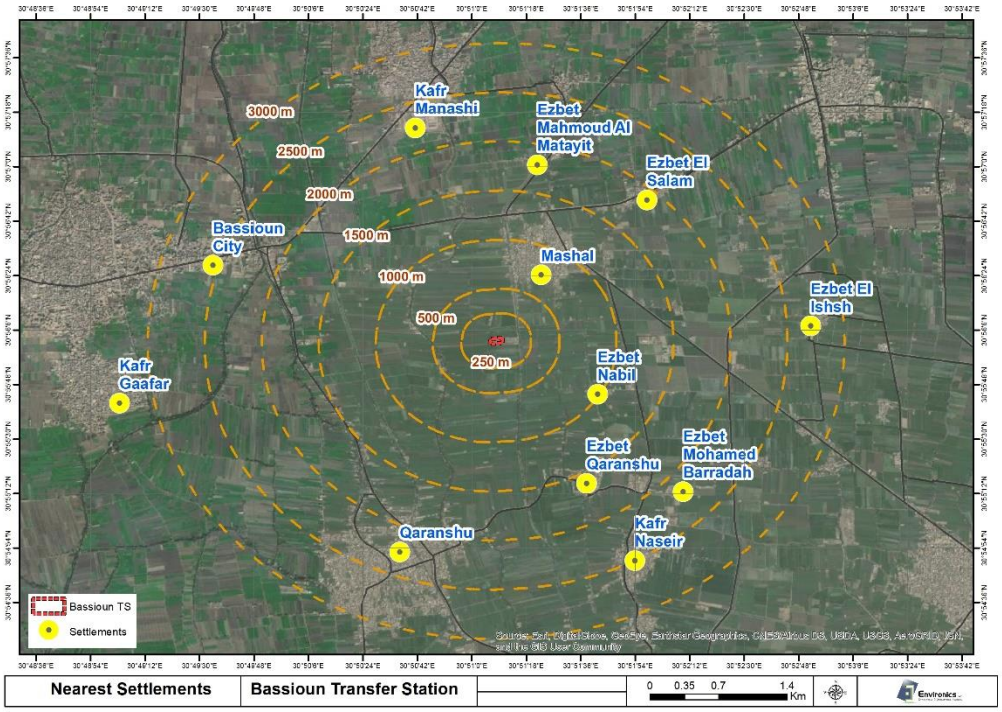


Figure 4-2: The distance of settlements from the project site and surrounding environment

4.2.2 Climate

The meteorological data was obtained from Meteoblue global meteorological database (Meteoblue, 2020), which includes 30 years of hourly weather data (from 1990 up to 2020). The baseline relied on the nearest station to the project site; Mashal Station with coordinates 30.94°N 30.86°E. Mashal station is located about 940 m northeast of the project site. The climatic features of the project area can be characterized as follows.

a. Temperature

The monthly average for the maximum temperature reaches its peak value in July and August (36 °C), and its minimum value in January and February (20 °C) whereas the monthly average of minimum temperature reaches its highest in August (21 °C) and its lowest in February (6 °C). **Error! Reference source not found.** and **Error! Reference source not found.** show the monthly maximum, minimum and mean temperatures at the project area.

Table 4-1: Average monthly temperature in the Project Area (based on 30 years of data)

Air Temp.	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max °C	20	20	23	28	32	35	36	36	34	30	26	21
Min °C	7	6	8	10	14	18	20	21	19	16	13	9
Mean °C	13.5	13	15.5	19	23	26.5	28	28.5	26.5	23	19.5	15

Source: Meteoblue, 2020

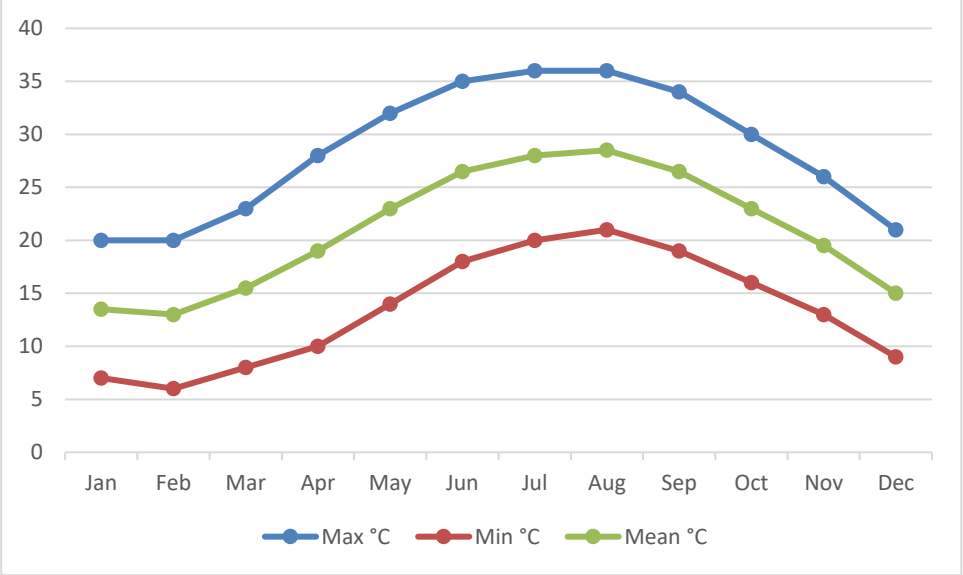


Figure 4-3: Average monthly temperature in the Project Area
(based on 30 years of data)

b. Rainfall

The distribution of rainfall in Egypt shows its maximum values over the Mediterranean coast, with a rapid decrease towards the south. The mean annual precipitation in the last thirty years at the project area is 31 mm. The rainfall reaches its maximum value during winter season in December, January and February (6 mm). Furthermore, June, July, August, and September zero precipitation as shown in **Error! Reference source not found.** and **Error! Reference source not found.**.

Table 4-2: Average rainfall data in the Project Area (based on 30 years of data)

Rainfall	Month												Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(mm/ month)	6	6	5	2	2	0	0	0	0	1	3	6	31

Source: Meteoblue, 2020

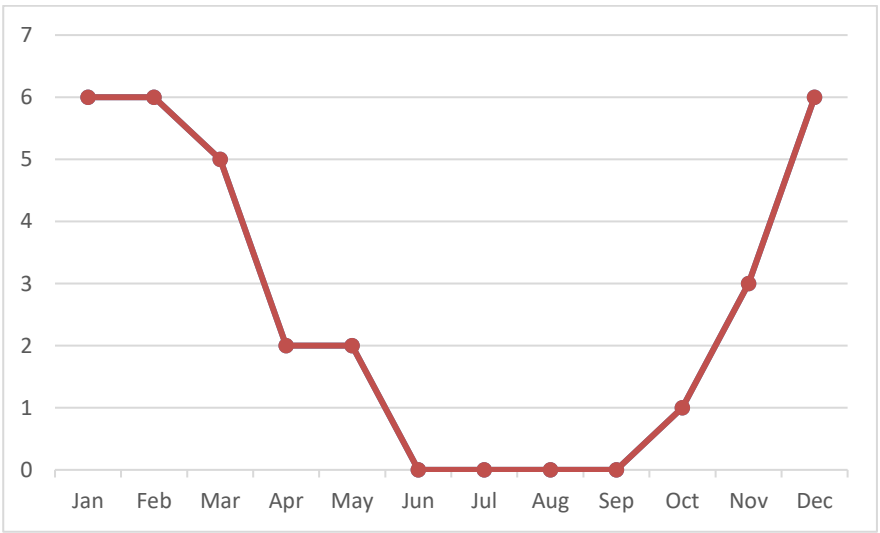


Figure 4-4: Average rainfall data in the Project Area (based on 30 years of data)

c. Wind Speed

According to Meteoblue meteorological data, the average monthly wind speed ranges between 12 Km/h and 15.5 Km/h as shown in **Error! Reference source not found.** and **Error! Reference source not found.**. The maximin wind speed in June and July is 25 Km/h. Dry hot dust-laden which blows mainly from south and southeast as Khamasin winds blows occasionally for about 50 days during spring.

Table 4-3: Average monthly wind speed in the Project Area (based on 30 years of data)

Wind Speed	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max. (Km/h)	20	22	24	24	24	25	25	24	23	22	20	20
Min. (Km/h)	6	6	6	5	5	6	7	6	5	5	6	6
Avg. (Km/h)	13	13.5	15	14.5	14.5	15.5	12	15	13	13.5	13	13

Source: Meteoblue, 2020

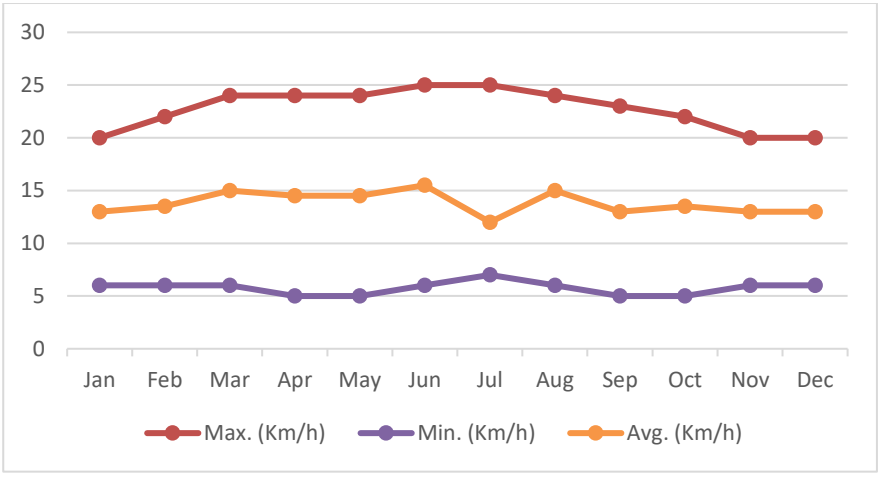


Figure 4-5: Average monthly wind speed in the Project Area (based on 30 years of data)

The prevailing winds at the project area blow from North and North West directions, as shown in the Wind Rose (**Error! Reference source not found.**).

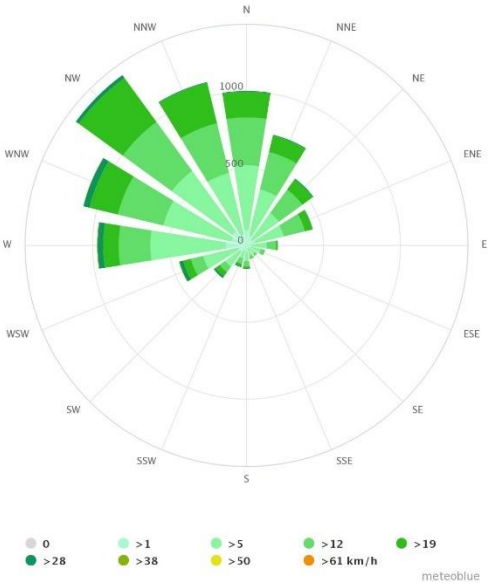


Figure 4-6: Wind directions in the Project Area (based on 30 years of data)
Source: Meteoblue, 2020

4.2.3 Topography

The ground surface elevation within the project area ranges from 1.4 to 5 meters as shown in the topographic map of the Nile Delta (**Error! Reference source not found.**). The site elevation is approximately 5 m as it is located on the highest contour lines in this elevation class (1.4-5 m).

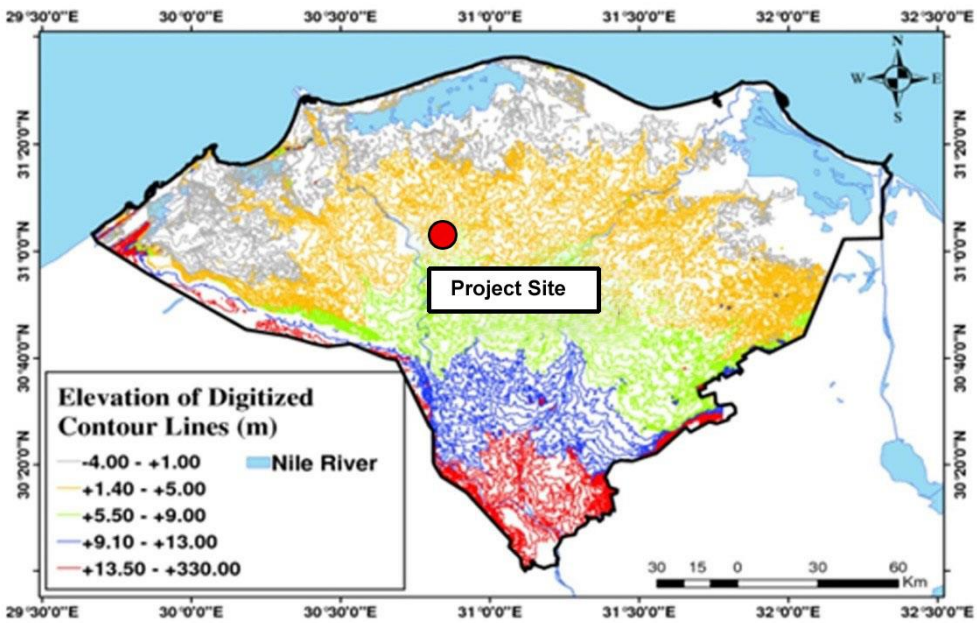


Figure 4-7: Digitized contour lines (left) from the topographic maps of the Delta region
Source: Mohammed El-Quilish *et al.* (2018)

4.2.4 Geomorphology

The geomorphologic features of the project area in the Nile Delta include three main geomorphologic units (RIGW, 1992) namely; the Offshore Submerged

Plain, the Foreshore Plain and the Young Fluvial Plains, as shown in **Error! Reference source not found.**.

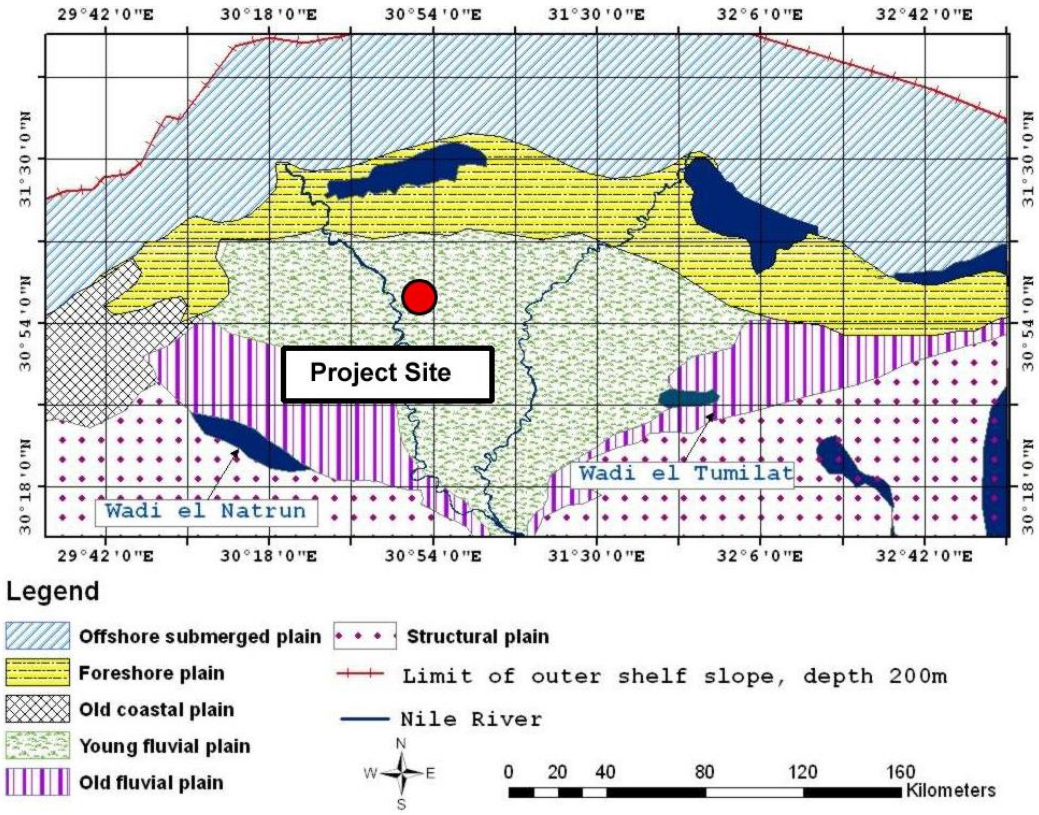


Figure 4-8: Project site within the geomorphologic units of the Nile Delta region
Source: modified from RIGW, 1992

a) *Offshore Submerged Plain*

The offshore submerged plain is characterized by the occurrence of a number of limestone ridges. It is also known as the continental shelf.

b) *Foreshore Plain*

The foreshore plain occupies the area determined by the coastal lakes and their inland extension into the brackish water lagoons. The landforms that exist in that plain include the wetland areas of the main lakes and the sabkhas deposits. Irrigation canals and drains break through these plains to serve the agricultural activities.

c) *Young Fluvial Plains*

The young fluvial plains, where the project area is located, dominate the cultivated lands bordering the channel of the Nile River and its two branches. These plains cover most of the Nile Delta Region. The ground surface elevation is sloping gently in the northward direction by an average value of 10 cm/km (RIGW, 1992). The area is generally flat and covered by Recent and Quaternary sediments that were formed from the disintegrated igneous and metamorphic rocks of the Ethiopian Plateau and southern Sudan. The Nile River and its tributaries transported these sediments to the Delta during the flood seasons for more than 10,000 years. The old and traditionally cultivated lands are dominant in these areas. Similar to the offshore Plain, irrigation canals and drains break through these plains to serve the agricultural activities.

4.2.5 Geology

There are two main geological units in the Nile Delta region. These are the Quaternary deposits and the Tertiary Deposits as shown in **Error! Reference source not found.**. In general, the Tertiary deposits include the Pliocene, the Miocene, the Oligocene, the Eocene and the Paleocene sediments.

The Nile Delta, Tertiary deposits include the stratigraphic columns as follows:

1. The Pliocene forms the lower boundary of the main water bearing formation.
2. The Miocene deposits (e.g. the Moghra Formation) exist underneath the surface with thickness that reaches up to 2000 meters.
3. The Oligocene and Eocene are of a little hydrogeological interest due to their small contribution to groundwater (Elewa, 2010).

The Quaternary deposits in general include the Holocene and Pleistocene sediments. The project area includes the Holocene sediments that comprise sand dunes, coastal deposits, sabkha deposits and silty clay sediments capping the flood plain (this characterizes the project area).

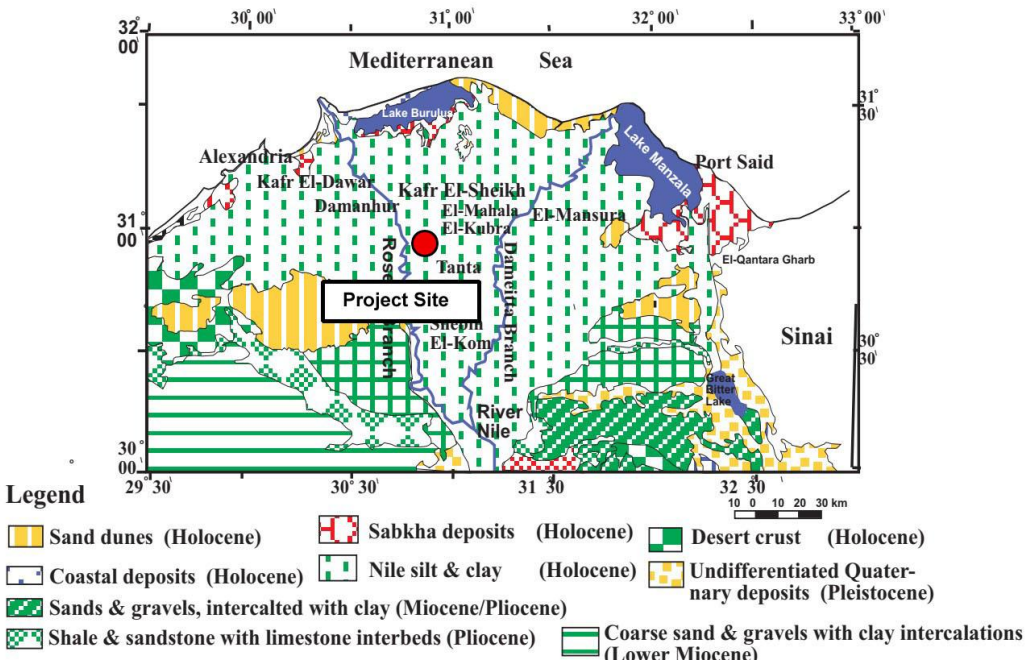


Figure 4-9: Geological Map of the Project Area
Source: Elewa, 2010

The stratigraphic column for the soil in Bassioun Markaz is as follows (Chemonics, 2021):

- Consolidated silt with a thickness (1 m) from 0 ground level to -1 m.
- Consolidated silt and trace fine sand with a thickness (1.5 m) from -1 m ground level to -2.5 m.
- Consolidated brown clay and trace fine & coarse sand with a thickness (5.5 m) from -2.5 m ground level to -7 m.

- Brown clay, trace coarse sand, and fine gravel with a thickness (4 m) from -7 m ground level to -11 m.
- Yellow gravel and coarse sand with a thickness (4 m) from -11 m ground level to -15 m.

4.2.6 Hydrogeology

a) Groundwater

- *Hydrogeological characteristics of the main aquifer systems*

  The project area is located in the flood plain of the Nile Delta. Within the Nile Delta, there are four different hydrogeologic units of different importance for groundwater exploitation. These formations in the project area are the coastal deposits, the Sabkha deposits, the sand dunes and the Nile floodplain deposits (Sharaky et al., 2016).

  The Nile floodplain deposits are the most important hydrogeological formation in the project area. These deposits belong to the Nile Quaternary aquifer. The uppermost layer of the floodplain deposits includes clay and silt with low permeability. The uppermost layer acts as a capping for the main Quaternary aquifer. This layer consists of Nile silt, sandy clay, clayey sand, occasionally with fine sand intercalations. The thickness of this capping layer could be more than 20 meters. The water in this layer is in contact with the main underlying aquifer through downward or upward leakage. An extensive irrigation and drainage network cuts through this layer to serve the agricultural development. The average vertical hydraulic conductivity of the clay capping is estimated 2.5 mm/day, and the average horizontal hydraulic conductivity varies between 50 and 500 mm/day. The water in this layer tends to flow horizontally with a vertical flow interaction between the canals, drains and the main underlying Quaternary aquifer. **Error! Reference source not found.** shows the Contour map of the base of the Quaternary aquifer (inferred from RIGW, 1980).

  According to the Hydrological map of Egypt 1992 – Nile Delta tile (scale 1:500,000), the depth of the groundwater approximately 2 m in the project area.

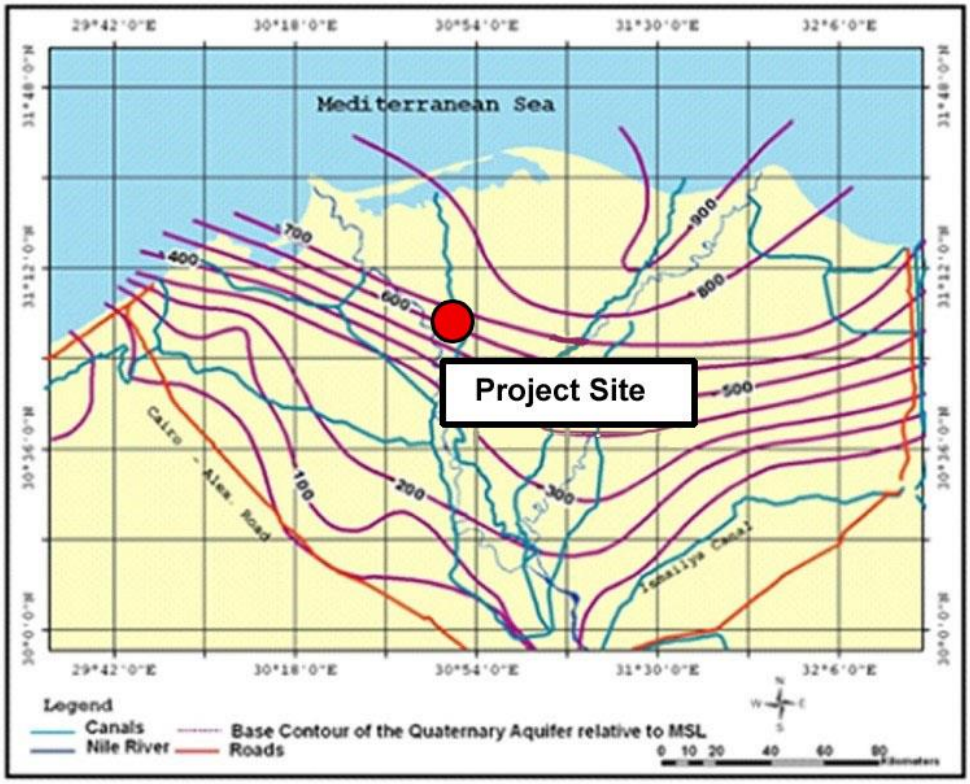


Figure 4-10: Contour map of the base of the Quaternary aquifer relative to the mean sea level
Source: RIGW, 1980

- *Recharge-discharge sources of the aquifer systems*

  Recharge of groundwater is taking place by five processes: (1) Infiltration of rainfall; (2) Downward leakage of the excess irrigation; (3) Seepage from the irrigation canals and drains; (4) Inter-aquifer flow of groundwater; and (5) Artificial recharge. For the top clay layer and the main Quaternary aquifer, these two aquifers are recharged by the direct seepage from the existing irrigation canals and drains as well as the downward leakage of the excess irrigation.

  Discharge of groundwater takes place by three components: (1) outflow into the drainage system, (2) direct evaporation and (3) groundwater extraction. For the sabkha deposits, the groundwater table is shallow, and groundwater is discharged naturally by evaporation. In the study area, no groundwater extraction from the Quaternary aquifer is reported since the groundwater is saline and not suitable for irrigation or drinking purposes. Due to the low transmissivity of the top clay layer, this layer is not considered an aquifer that could be used economically. **Error! Reference source not found.** shows the elements of recharge and discharge of the aquifer (modified from Norris, *et al*., 2007).

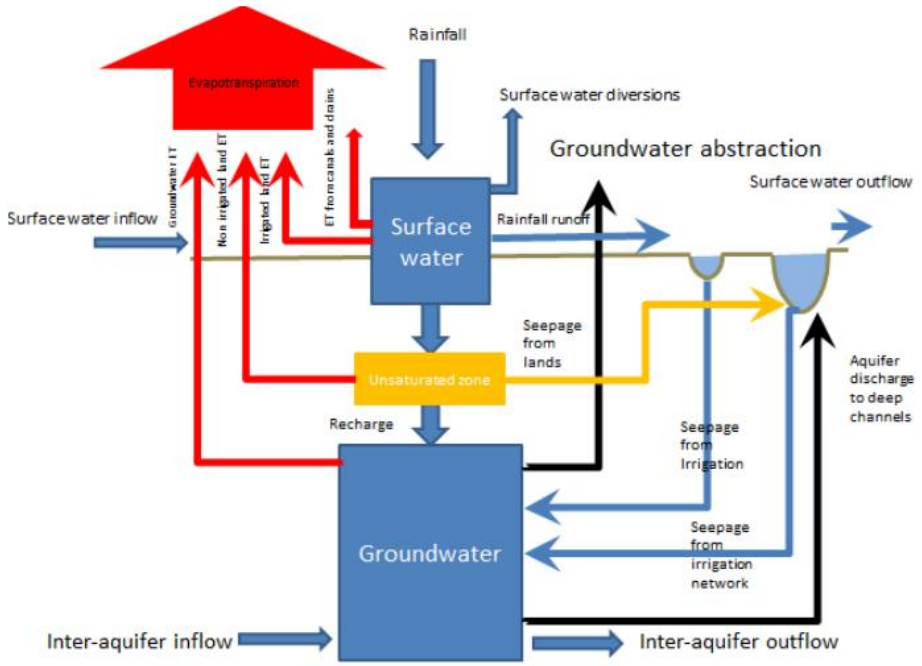


Figure 4-11: Diagram of recharge and discharge elements of the aquifer
Source: modified from Norris *et al*., 2007

- *Hydrogeochemistry of the Nile Delta Aquifer*
  The main recharge source of the Nile Delta aquifer is the Nile, which flows from the Ethiopian Plateau. Therefore, the groundwater is of meteoric origin. The meteoric water of Pleistocene sediments covers the entire Delta except the coastal area, which is occupied by saline water of marine origin coming from either the Mediterranean Sea or from the old marine deep aquifers.

  A Geoelectrical and hydrogeochemical study was carried out along the Middle Delta Region (Ebraheem *et al*., 1997). The study revealed that the water salinity and the hydrochemical parameters showed large variation with depth. Salinity distribution for shallow groundwater in Nile Delta aquifer (up to 125m) is shown in **Error! Reference source not found.** (Nofal *et al*., 2015).

  According to the Hydrological map of Egypt 1992 – Nile Delta tile (scale 1:500,000), the aquifer productivity is generally an extensive to highly productive aquifer that receives continuous recharge from irrigation or from the Nile water. Consisting of Quaternary graded sand and gravel and intercalated by clay lenses.

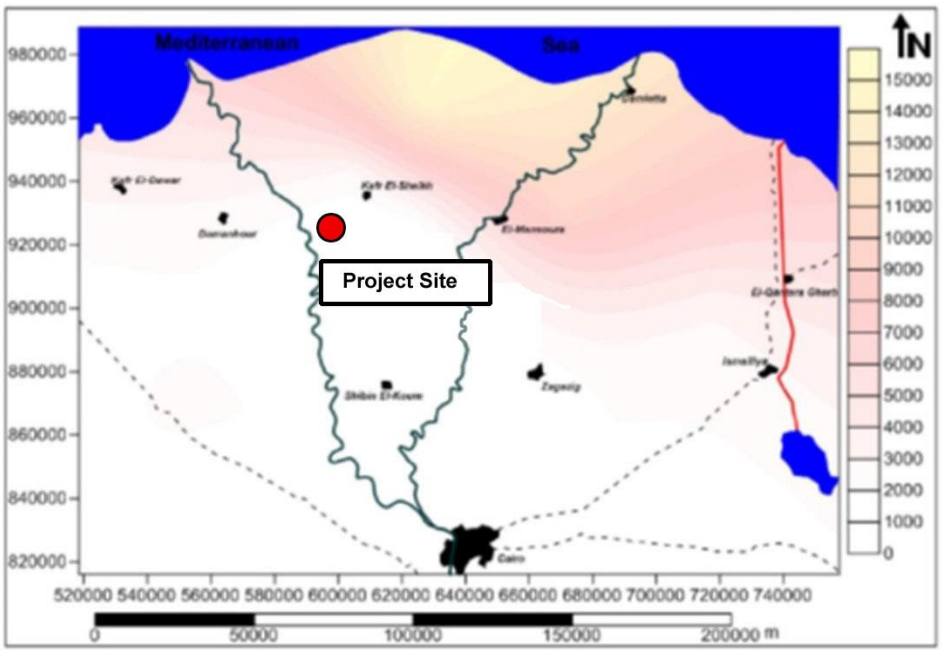


Figure 4-12: Salinity distribution for shallow groundwater in Nile Delta aquifer (up to 125m)
Source: Nofal *et al*., 2015

b) Surface Water

There are some canals and drains surrounding the project site. The closest canal to Bassioun Transfer Station is adjacent to the western border of the site while as the closest drain is located about 140 m at the east next to the sewage treatment plant. **Error! Reference source not found.** shows the main canals and surface drains of the Nile Delta. The main canal in project area is Tirat Al Batanuniah approximately 1,1 km to east project site.

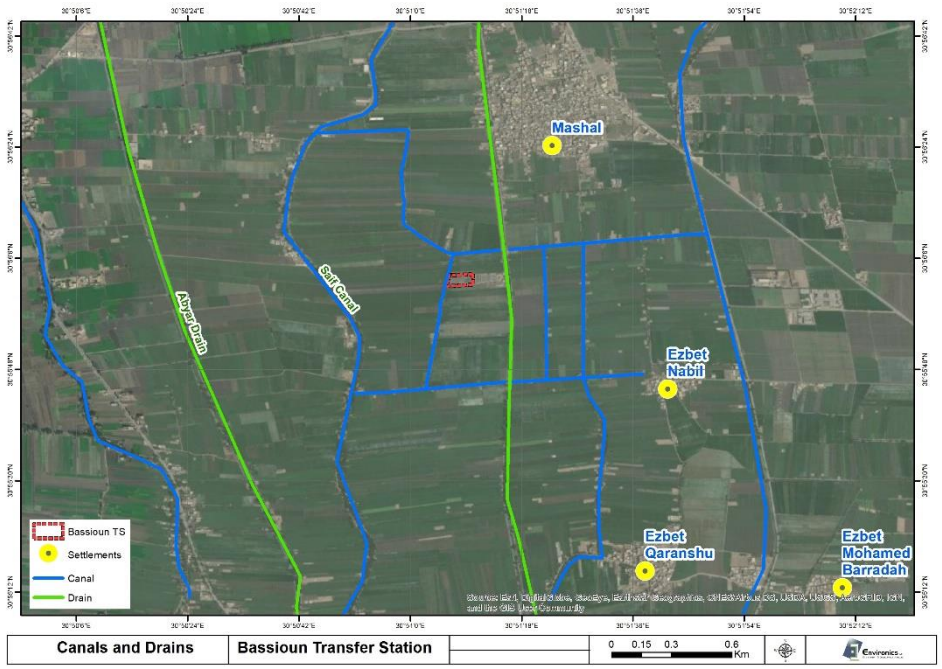


Figure 4-13: Canals and drains at the Project Area

c) Surface Water and Groundwater Relationship

There is a distinct hydrogeological relationship between the groundwater and surface water in the study area, where this area is dissected by many surface freshwater canals and drains at four directions and salt canal at the west. The contact between surface water and groundwater in the study area varies according to the nature of sediments, infiltration rate, groundwater water table relative to the surface water level, hydraulic conductivity of the soil, and the difference in hydraulic properties of both surface and groundwater (Nossair, 2011).

4.3 Biological Environment

Gharbia Governorate is located in the Nile Delta in Egypt. The modern Nile environs are a result of anthropogenic influences turning it into an essentially man-made ecosystem (Hoath, 2009). The intensive cultivation and the widespread use of agrochemicals have eliminated many of the native animals of the region. **Error! Reference source not found.** shows the intensity of cultivated land in Gharbia Governorate.

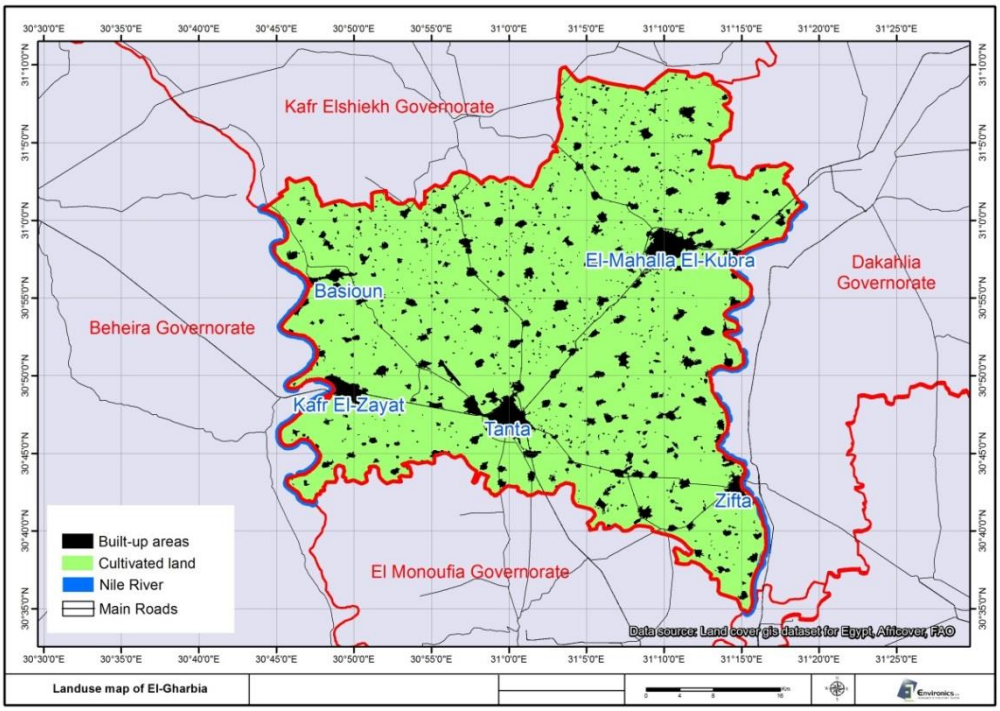


Figure 4-14: Habitats of Gharbia Governorate

4.3.1 Ecology of the Wider Area

a) Habitats

The main habitats surrounding the project area (**Error! Reference source not found.**) are grouped into three main categories; agricultural lands, towns and villages (built environment) and; Nile River and Irrigation Network (aquatic habitat). A description of each habitat is provided below.

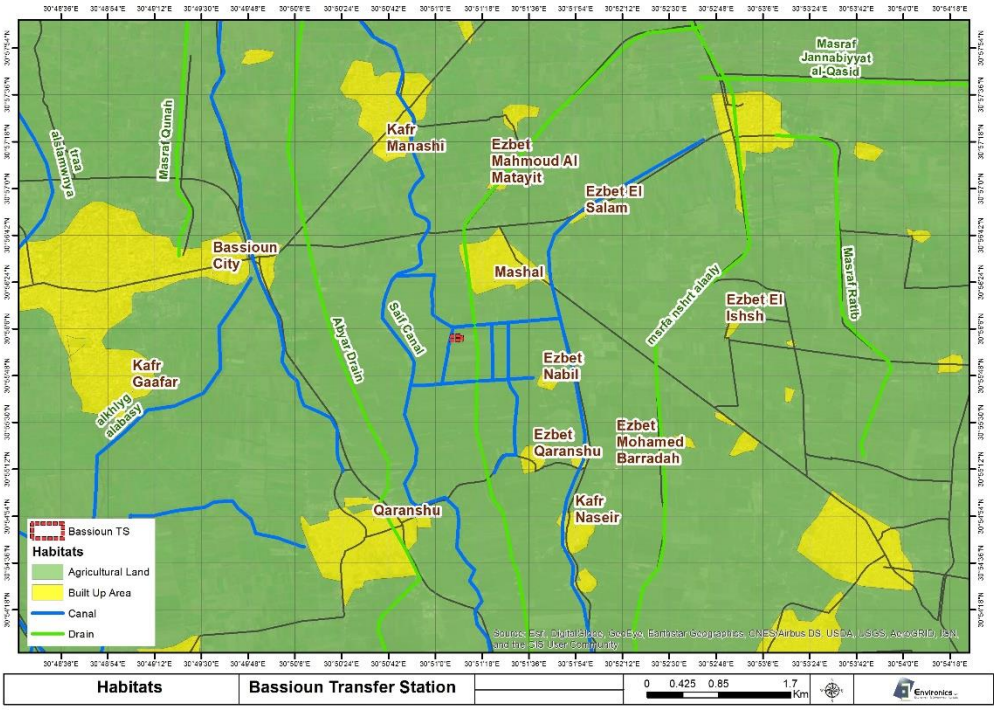


Figure 4-15: Habitats surrounding the project site

- *Agricultural Lands*
  They are composed of orchards, including palm plantations, and agricultural fields, adjacent to or intersected by irrigation and drain ditches. Arable lands are some of the most productive habitats. Land use in the Nile Delta is intensive and nearly all arable land is either cultivated or built upon. Agricultural activities in Gharbia are famous for potatoes and flax production (Gharbia Governorate, 2020). Fauna is mainly composed of birds, domestic animals as well as agricultural pests such as insects, worms and rodents. The only substantial feral lands are patches along canals, roads, railroad tracks and field edges. Although of limited proportions, these feral patches usually contain native vegetation, thus act as a reservoir for native species and wildlife refuges (Environics, 2012). The Bassioun transfer station site is surrounded with agricultural lands from 3 directions.

- *Towns and Villages*
  There is a multitude of villages and human settlements of different sizes at project area. Among the closest settlements to Bassioun Transfer Station, there is Mashal village, located at 480 m away to the northeast. Fauna in rural and urban areas is mainly used for of commensal species associated with human activities. Some wild species are commensal with man and have perfectly adapted to this man-made habitat (Environics, 2012).

- *Nile River and Irrigation Canals and Drains*
  The River Nile and its extensive network of irrigation canals with their ramifications to the level of field ditches and the similarly extensive drainage network provide aquatic habitats of various dimension including water, bank and embankment habitats (EEAA, 1993).

These areas provide vital habitats for amphibians and other micro-fauna (Environics, 2012). The closest canal to Bassioun Transfer Station is unnamed Canal (width 5m), located at west border, Tirat Al Batanuniah approximately 1,1 km east, the Nile River located at about 6 km to the west, unnamed Drain (width 10m) is located at about 140 m east (**Error! Reference source not found.**).

b) Flora

A description of the main floral diversity of the above-mentioned habitat types is herein provided.

- *Agricultural Lands*
  Cultivated lands of the Nile Delta offer habitat for a diversity of weeds and ruderal vegetation in the fields, canal and drain banks, road and railway embankments, fallow fields, etc. Some of these are exotic species that were unintentionally introduced but have now become naturalized, such as the Mexican Prickly Poppy (*Argemone mexicana*), Saltmarsh Aster (*Aster squamatus*) and Billy Goat Weed (*Ageratum conyzoides*) (Boulos and El-Hadidi, 1984 in EEAA/UNEP, 1993).

- *Towns and Villages*
  Virtually all trees seen in urban environments are exotic, and, in rural areas, the ubiquitous *Eucalyptus* spp. is an import from Australia. Other common trees found in rural and urban areas are the Date Palm (*Phoenix dactylifera*) and *Casuarina* trees, which are widely used as wind-breakers and to border fields. *Ficus* sp. is commonly used as an ornamental plant (Environics, 2006).

- *The Nile River and Irrigation Network*
  The Nile River, irrigation canals, drains and their banks support important microhabitats for native flora, including several locally rare species, such as the Water Cabbage (*Pistia stratiotes*) and the White Egyptian Lotus (*Nymphaea lotus*). Willows (*Salix* sp.) are common along the Nile River and some of the larger canals. The introduced and invasive Water Hyacinth (*Eichhornia crassipes*) is widespread in inland wetlands. The Common Reed (*Phragmites australis*) and the Southern Cattail (*Typha domingensis*) are also common (EEAA/UNEP, 1993).

  Other plants that can be found in the area include *Sonchus macrocarpus* a plant within the sunflower family, which is found in moist ground, Nile and canal banks (Ali, 2010).

c) Fauna

Due to fauna mobility, the majority of species are not associated with a distinct habitat type. However, habitat preferences are mentioned.

- *Amphibians*
  Amphibians are found in in aquatic habitats, including irrigation canals and drains. Amphibians found in this area include the Green Toad (*Bufotes viridis*), Mascarene Frog (*Ptychadena mascareniensis*), Levant

Water Frog (*Pelophylax bedriagae*) and the Egyptian Square-marked Toad (*Sclerophrys regularis*) (Environics, 2006). The endemic Nile Delta Toad (*Sclerophrys kassasii*) seems to prefer habitats near standing freshwater (Parsons Brinckerhoff, 2002).

- *Reptiles*
  Species associated with cultivated and rural areas include the Turkish Gecko (*Hemidactylus turcicus*), Eyed Skink (*Chalcides ocellatus*), African Chameleon (*Chameleo africanus*), Egyptian Cat Snake (*Telescopus dhara*), Flowered Snake (*Platyceps florulentus*), African Beauty Snake (*Psammophis sibilans*) and the highly venomous Egyptian Cobra (*Naja haje*). The Bean Skink (*Trachylepis quinquetaeniata*) lives near buildings, not far from agricultural lands and canal sides. The Diced Water Snake (*Natrix tessellata*) is also found in agricultural lands but is more related to aquatic habitats (Baha El Din, 2006).

- *Birds*
  Common breeding birds of the Nile Valley and Delta include not less than 66 species. At least 14 of these are not known to breed outside this habitat. Common species include the Palm Dove (*Streptopelia senegalensis*), Rock Dove (*Columba livia*), Barn Swallow (*Hirundo rustica*), House Sparrow (*Passer domesticus*), Spur-winged Lapwing (*Vanellus spinosus*) Hooded Crow (*Corvus corone*), Little Green Bee-eater (*Merops orientalis*), White Wagtail (*Motacilla alba*) and Cattle Egret (*Bubulcus ibis*). The latter is strongly associated with human activities and is omnipresent in agricultural fields, waste dumping areas and along irrigation canals and drains.

  Other characteristic species of the Delta include the Crested Lark (*Galerida cristata*), Graceful Warbler (*Prinia gracilis*) Purple Heron (*A. purpurea*) and Glossy Ibis (*Plegadis falcinellus*) (EEAA/UNEP, 1995; Baha El Din and Atta, 2002).

  Aquatic birds of the Nile include Grey Heron (*Ardea cinerea*), Purple Heron (*A. purpurea*), Moorhen (*Gallinula chloropus*), Little Bittern (*Ixobruchus minutus*) and Glossy Ibis (*Plegadis falcinellus*) (EEAA/UNEP, 1995; Baha El Din and Atta, 2002). The Pied Kingfisher (*Ceryle rudis*) and Common Kingfisher (*Alcedo atthis*) are very common near drains and irrigation canals (Environics, 2006).

- *Mammals*
  Mammals of the area include common commensal animals of agricultural and urban areas including the House Mouse (*Mus musculus)*, the Brown Rat (*Rattus norvegicus)* and the House Rat (*R. rattus)*. It is interesting to note that the endemic Egyptian Weasel (*Mustela subpalmata*) is an almost entirely urban animal in Egypt (Hoath, 2009).

  Other mammals also include the Egyptian Mongoose (*Herpestes ichneumon*), which is also found in agricultural areas with water and

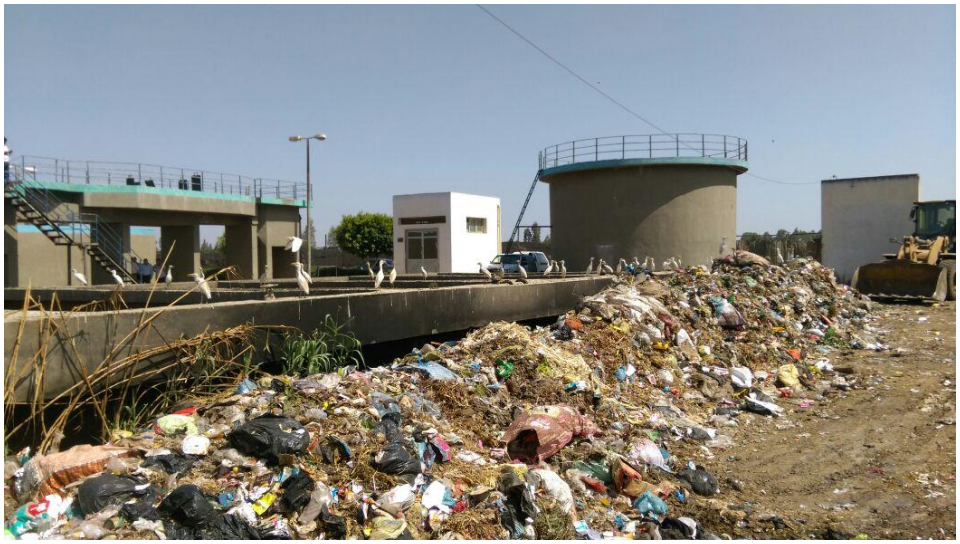
the Jungle Cat (*Felis chaus*) which inhabits areas with thick cover such as agricultural lands, marshes and reed beds (Environics, 2006).

Chiropteran fauna include the Egyptian Fruit Bat (*Rousettus aegyptiacus*), Greater Mouse-tailed Bat (*Rhinopoma microphyllum*) and Kuhl's Pipistrelle (*Pipistrellus kuhlii*). Bats are common in the region and inhabit old monuments, caves and abandoned buildings (Environics, 2006; Hoath, 2009).

The Egyptian Pygmy Shrew (*Crocidura religiosa*) populates fields near current water and drains banks. However, it is very rare and its presence in the project's wider area is deemed unlikely (Environics, 2006; Hoath, 2009).

4.3.2 Ecology of the Project Site

Chemonics conducted a site visit in February 2021. The site subject to upgrading is currently used as a waste transfer station and is surrounded by agricultural lands from south, west and north, and has a wastewater treatment facility adjacent to its eastern border. No threatened species were observed within the area. Only stray dogs and some common birds including Hooded Crow (*Corvus corone*) and Cattle Egret (*Bubulcus ibis*) were observed (**Error! Reference source not found.**). Pests such as flies and rodents were also present within the area. An unnamed canal is located east of the project site. The canal may include amphibians; however, they were not observed during the site visit.



4.3.3 Ecological Value

The project site is currently used as a transfer station with accumulated waste and does not include habitats and/or species of biodiversity concern. The wider area is mainly composed of a man-made agricultural habitat of limited

ecological value, although some of its features and species need to be preserved. The following sections describe the main sensitive ecological receptors of the wider area.

a) Habitats

Special emphasis should be given to Date Palm Groves, which are man-made but can be included among the valuable habitats of the area. In addition to forming spectacular and attractive landscapes, the dense vegetation of the Date Palm Groves contributes to the natural protection of the habitat. They prevent soil erosion and form a natural barrier against desertification. The Date Palm possesses adventitious roots which do not penetrate deep into the soil, which makes its presence without posing much stress on the deeper layers of the soil. This allows the presence of side cultivations and its replacement by other trees, if needed. The Date Palm Groves form, therefore, a traditional man-made landscape composed of native species of high ecological and socio-economic importance.

b) Flora

Most of the project area is cultivated with crops of exotic origin but of economic value, used for human consumption or as animal fodder (e.g. Egyptian clover).

The Date Palm is probably the only native tree of the area. The fruits of the Date Palm (*Phoenix dactylifera*) are harvested for commercial sale. Date Palm trees, unlike other fruit trees cultivated in the area can live hundreds of years. When subjected to aging, they are substituted by new generations to guarantee the permanence of this valuable and almost unique species. This ensures that the time factor is in favor of its dominance rather than its disappearance (Environics, 2006).

Sonchus macrocarpus is listed as Data Deficient by the IUCN. It is found in moist ground, Nile and canal banks (Ali, 2010).

c) Fauna

Some species of concern might occur in the wider area. The Nile Delta Toad (*Sclerophrys kassassii*), although apparently widespread, is endemic to the Nile Valley and Delta in Egypt. It is an adaptable species that might be present in irrigation canals and drains and in nearby agricultural fields.

Migratory and wintering birds are listed under the provisions of international conventions to which Egypt is a signatory and all Falconiformes (falcons) and Strigiformes (owls) are protected species included in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendices I or II. Besides, many resident birds, although being common and widespread, are locally protected as useful to agriculture according to the list attached to decree of the Minister of Agriculture No. 28 of 1967, issued in implementation of the provisions of article 117 of Law No. 53 of 1966 promulgating the Law on Agriculture.

The Jungle Cat (*Felis chaus*) is listed in CITES Appendix II and subspecies *nilotica* is endemic to Egypt. It inhabits moist vegetated areas

and may be found in the area. It is probably the cat species that has adapted best to the disturbed habitats created by human activities.

The Egyptian Weasel (*Mustela subpalmata*) is endemic to Egypt and classified as VU by Basuony *et al*. (2010) due to its restricted range. However, the animal is common and widespread in the Delta urban, semi-urban and rural environments and not at risk of extinction. It is commensal with humans and often trapped in human habitations, including underground larders and even cars.

4.4 Socio-Economic Environment

4.4.1 General Background

As previously mentioned in the project location section, the project is located in Gharbia Governorate. The total area of the governorate is 1,943.27 km^2, representing about 0.19 % of Egypt's area. The governorate is divided administratively into 8 cities and encompasses 4 districts, 69 local units and 1,408 villages and Izab (Gharbeia, 2019) The project's location is within the administrative borders of Markaz Bassioun which occupies approximately 160 km^2 and represents 8.2% of the governorate's total area (Urban Planning Authority, 2017). Markaz Bassioun includes one city, 4 main village, 23 subsidiary villages and 108 Izab (EEAA, 2008).

The socio-economic baseline information is mainly provided on Markaz Basioun and is compared with Governorate. However, some information is solely provided at the governorate level based on availability.

The socio-economic data provided rely mainly on secondary data sources and on publicly available and accessible information such as those of the CAPMAS, documents and reports covering the same area, as well as satellite images.

4.4.2 Demographic Profile

a) Population size

The population of the governorate reached 4,999,633 in 2017 (CAPMAS, 2017b) and most of the population (71.8% of the total population) lives in rural areas, which is higher than the national average (57%). The total population of Markaz Bassioun reached 296,355 inhabitants and its approximately 80,247 households represent an average family size of 3.7 members. Most of the population in Markaz Bassioun (77.8%) lives in rural areas.

b) Gender ratio and distribution across the administrative centres

Error! Reference source not found. shows the males to females ratio across the governorate and Markaz Bassioun.

Both of Gharbia Governorate and Markaz Bassioun show a tilt towards male/female with ratio (51/49) and (51.3/48.7) respectively.

Table 4-4: Distribution of the population by sex in both of Gharbia Governorate and Markaz Bassioun in 2017

Administrative Division	Population		
	Males	Females	Total
Markaz Bassioun	152,223	144,132	296,355
%	51.3%	48.7%	100%
Gharbia Governorate	2,555,427	2,444,206	4,999,633
%	51%	49%	100%

Source: CAPMAS, 2017b

c) Education and literacy rates

In Gharbia Governorate, about 30% total population (+10 years) received a pre intermediate education, 32% intermediate, 3% post intermediate, and about 14% have a university degree or higher as shown in **Error! Reference source not found.**.

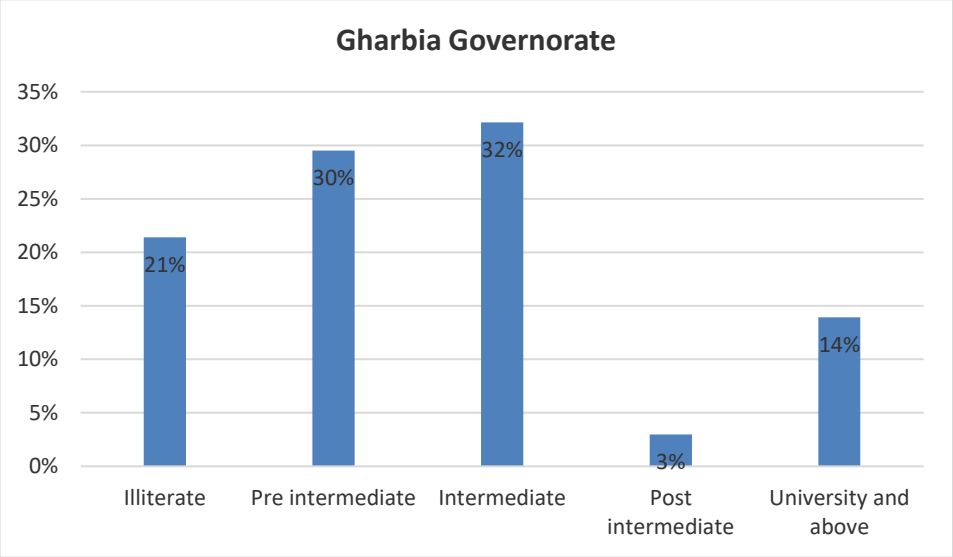


Figure 4-16: Education levels in Gharbia Governorate
Source: CAPMAS, population by education, 2017

The illiteracy rate in Markaz Bassioun (26%) is higher than the governorate's rate (21%) and lower than the national average rate in total (30%). About 30% of total population (+10 years) have received pre intermediate education, 32% intermediate, 3% post intermediate, and about 10% have a university degree or higher (**Error! Reference source not found.**).

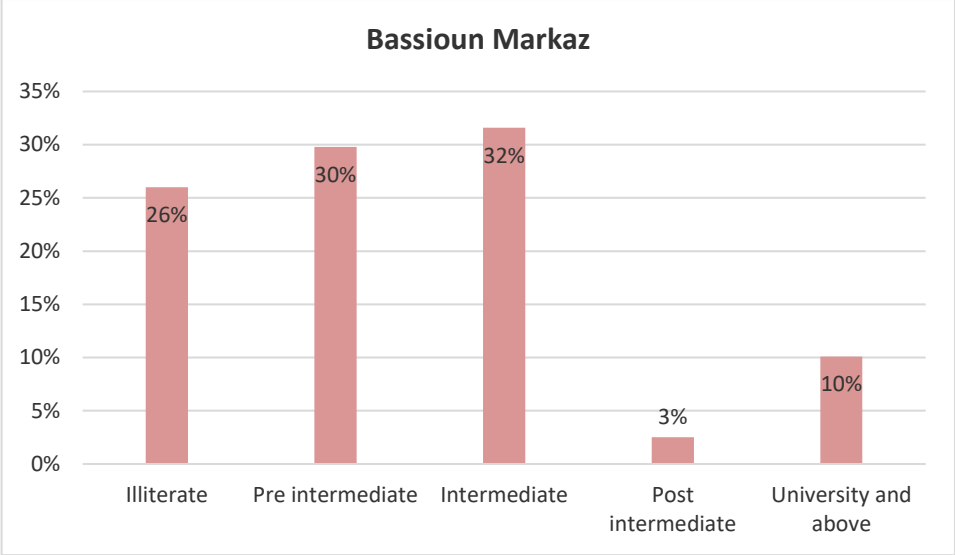


Figure 4-17: Education levels in Markaz Bassioun

4.4.3 Public Health

a) Public health status

Typhoid is a highly common disease in Gharbia. Additionally, the total number of infection (including Typhoid and Hepatitis A, B and C) cases reached about 1669 cases in 2017. During the same period, the number of infected males was significantly higher than the number of infected females. **Error! Reference source not found.** shows the number and cases of infectious diseases in Gharbia Governorate in 2017 (CAPMAS, 2017c).

Table 4-5: Distribution of infection cases and common diseases.

Gender	Typhoid	Hepatitis (A)	Hepatitis (B)	Hepatitis (C)	Unknown Hepatitis	Total
Males	517	271	26	57	12	883
Females	490	228	19	34	15	786
Total	1007	499	45	91	27	1669

Source: CAPMAS, 2017c

b) Health centers, Hospitals and Ambulance Centers

Gharbia Governorate includes 33 public hospitals and 58 private hospitals with a total number of 7163 beds **Error! Reference source not found.**).

Table 4-6: Total hospitals categorized by sector

Sector	Public Hospitals		Private Hospitals		Total	
Gharbia Governorate	unit	beds	unit	beds	unit	beds
	33	5039	58	2124	91	7163

Source: CAPMAS, 2017c

Bassioun Central Hospital lies at distance of about 6.5 km (20 minutes) from the proposed site at coordinates (latitude: 30.9379134°, longitude: 030.8015962°). In addition to health units in Bassioun city and Mashal village.

4.4.4 Economic Profile

Industrial activities such as weaving and dyes production, oil and soap and fertilizers productions, as well as agriculture, are the main activities of Gharbia residents.

In addition to the traditional crops, the governorate is famous for growing potatoes. Markaz Bassioun contributes with small percentage of fruit production especially the citrus. Moreover, cattle and poultry breeding activities are also present (Gharbia Governorate, 2020); there is a project of 30 million eggs in Kafr El Sheikh Selim village in Tanta.

The governorate is one of the industrial governorates where it has the largest industrial castles for textiles and dyeing in Tanta and Zefta; oil and soap industry in Tanta and Kafr El-Zayat in addition to fertilizers manufacturing, chemicals, pesticides and paper in Kafr El-Zayat (Gharbia, 2019).

4.4.5 Employment

According to CAPMAS (2017 d), the total labor force in Gharbia Governorate in 2017 was 1,624,500. The number of employed persons was 1,419,000 leaving 205,500 unemployed persons.

The unemployment rate at the level of Gharbia Governorate (12.6%) is relatively higher than the national unemployment rate (11.7%). At the governorate level, the unemployment rate of females (49%) is lower than the unemployment rate of males (51%).

The agricultural and fishing sector employs about 22 % of the labour force in Gharbia Governorate. The Manufacturing sector employs 16% of the labour force. About 13 % of the labour force is engaged in both of construction and health sectors. About 11% of the labour force is engaged in the trade and retail sector. 9% and 8% of the labour force are engaged in administrative and transportation sectors respectively while the rest of the economic activities are distributed between human health and infrastructure supply (**Error! Reference source not found.**).

Table 4-7: Distribution of labour force between economic activities in Gharbia

Economic activity	Gharbia	%
Agricultural and Fishing	319,100	22%
Mining & oil	0	0%
Manufacturing	220,000	16%
Infrastructure supply	16,700	1%
Construction	178,400	13%
Trade & retail	152,300	11%
Transport & storage	115,300	8%
Social services	188,800	13%
Administrative	166,100	9%

Economic activity	Gharbia	%
Human Health	62,300	4%
Other services	0	0%
Total	1,419,000	100%

Source: CAPMAS, 2017d

4.4.6 Infrastructure, Utilities and Services

a) *Potable water*

There are 248 water purification stations in Gharbia with a total water production of 363,400,000 m^3 per year (CAPMAS 2017e). About 99.4% of the household living in Markaz Bassioun has access to the public network as a source of drinking water (CAPMAS 2017e).

b) *Sewage system*

There are 35 treatment stations in Gharbia as of the year 2017 with a capacity of 603,000 m^3/year of secondary treatment (CAPMAS, 2017e). According to the Annual Bulletin of Public Utilities Services (2017), the estimated annual total quantity of wastewater of Gharbia is about 355,400,000 m^3.

About 93% of the population living in Markaz Bassioun has access to sewage systems through public or private sewage network (CAPMAS, 2017e) while about 6.4% depend on septic tanks.

c) *Roads and transportation*

The project site has access to some local road such as Mashal – Kafr Soliman Road. The nearest railway to the project site is far about 10 km northeast the site. Desouk/ Tanta road is located about 3.5 km from site, this is the main road to the capital of the Governorate (Tanta city).

d) *Waste Management*

The total production of solid waste in Gharbia Governorate reaches 77,000 tons per year (CAPMAS, 2017). The total municipal waste generated by Bassioun is 155 tons per day (Chemonics, 2021).

4.4.7 Archaeological Sites

The project area does not include any archaeological sites. The nearest archaeological site, named "Saa El Hagar", is located about 9 km northwest the project site at Markaz Bassioun (Ministry of communication and information technology, and Ministry of culture, 2001).

5. Project Alternatives

The following alternative analysis aims at discussing the most viable alternatives that balance the project needs, economics and its compliance with the national environmental requirements and IFC performance standards.

The alternatives are proposed from baseline investigations, stakeholders, and site visit. The suitable alternatives are identified according to one or more of the following:

- Stakeholders' meetings;
- Solid waste management manuals; and
- Project designer meeting.

5.1 No-Project Alternative

The no-project alternative to the proposed project is used as a scenario with which the environmental and social impacts of the project could be compared.

The current land use of the location is TS with accumulated waste and limited capacity for its timely loading for further transportation. Solid waste from Bassioun Markaz is collected, and consolidated in this site, then it is transferred to Sadat landfill. However, the low performance of the TS led to waste accumulation (15,000 tons) at the site. It is reported that the site poses negative environmental and social impact on the surroundings (gaseous and odour emissions, waste spontaneous combustion, generation of leachate and thus impacts on public health).

The "no-project" alternative will result in the continuous bad operation of the TS and waste accumulation with the related negative impacts, if the current condition of the TS will continue. Furthermore, the current solid waste management is not efficient as organic waste is dumped without treatment.

The proposed Bassioun TS is part of an integrated waste management system for Gharbia Governorate that includes Bassioun, Zefta and Samanoud transfer stations, recycling in different MBTs already located in the governorate or planned to be constructed. The reject of waste treatment at MBT facilities will be sent for final disposal outside the governorate in El Sadat Landfill (Menoufya Governorate). However, so far, the Kafr El Zayat MBT plant planned for treatment of waste from Bassioun has not been constructed and has no allocated funds for its construction. Thus, collected waste from Bassioun will be landfilled directly without treatment, but will be treatedat Kafr El Zayat MBT facility as soon as this facility is constructed.

Therefore, the "no development" scenario will also affect the implementation of the future integrated MSW management system with the risk that waste will continue being accumulated in Bassioun TS.

In addition, the "no-project" alternative will prevent possible job creation opportunities generated from the project construction and operation.

Furthermore, the opportunity of sorting inorganic waste, recycling organic waste and converting it into fertilizers, and producing Refused-derived Fuel (RDF) through MBT facilities will be seriously affected.
Taking into consideration that the proposed Bassioun TS is an important component of the integrated solid waste management system for Gharbia Governorate and that it will reduce the current impacts of the current TS, the "no-project" alternative is not further assessed.

5.2 Alternative Project Location

The proposed project is the upgrading of the existing Bassioun TS without increasing the area of the current TS.

Based on the above, the project location alternative is no further investigated.

5.3 Alternative Loading Technologies

The unloading of the solid waste in the TS has many alternatives ranging from simple technologies to complex and expensive ones. The following section describes the different technologies and their advantages and disadvantages.

.

5.3.1 Option with Direct Dumping into Transfer Vehicle

Waste is directly unloaded through a hopper into the open top of the transfer vehicle. This technology is most adequate for small TSs in rural areas with a relatively short distance to the waste disposal site (EPA, 2002). The advantages of this technology are as follows (EPA, 2002):

- Simple arrangement;
- No moving equipment parts. Therefore, the equipment is rarely damaged;
- Low capital cost; and
- Small building footprint.

The disadvantages of this technology are as follows (EPA, 2002):

- Transfer station cannot accept waste in case of the absence of transfer trucks;
- No short-term storage to store the inflow of peak periods;
- Fall hazard;
- Limited ability to screen and remove unacceptable wastes, and material recovery;
- Breakdown of transfer trucks due to direct dumping of heavy materials; and
- Not suitable for receiving loads from large trucks.

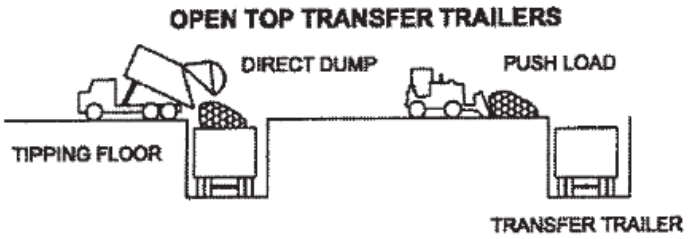


Figure 5-1: Direct Dumping into Transfer Vehicle (EPA, 2002)

5.3.2 Option with Storage and Disposal of Waste

This technique relies on dumping the waste on the tipping floor, and then moved by bulldozer to large trailers of transfer trucks. The peak waste flow can be stored on the pitting floor, reducing the needed number of transfer trucks (EPA, 2002). The bulldozer is used also to compact the waste before loading to the transfer trucks (EPA, 2002). Because waste is often unloaded directly on the tipping floor, this technique might not be suitable for materials recovery (EPA, 2002). Therefore, this technique is suitable for large transfer stations and high peak flows (EPA, 2002). The advantages of this technique are as follows (EPA, 2002):

- Flexible operation as the non-availability of transfer vehicles does not stop the operation;
- The breaking up of bulky items is allowed and the compaction of waste to increase the amount of waste transported to disposal sites; and
- Decreases the potential of collision between equipment and transfer vehicles.

The disadvantages of this technology are as follows (EPA, 2002):

- High capital cost;
- Fall hazard;
- Extra building level;
- Equipment is needed to reload the waste into the transfer trailer; and
- Requires additional fire control system and equipment (e.g., fire hoses, water cannon) to control fires in waste piles.

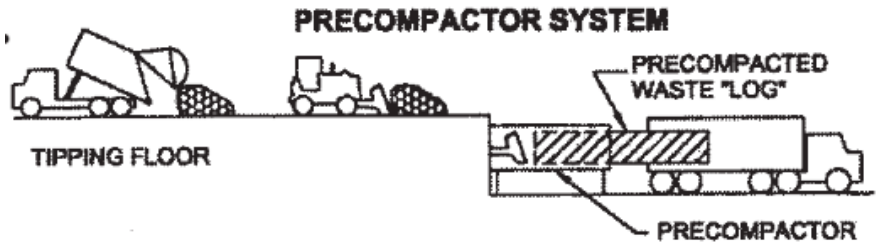


Figure 5-2: Storage and Disposal of Waste (EPA, 2002)

5.3.3 Option with Baler System

Balers are equipment units that compress waste into dense blocks/briquettes of waste mass (bales). The bales are moved by forklifts to the trailers (EPA, 2002). The baler system is suitable for large transfer stations (EPA, 2002). The advantages of this technology are as follows (EPA, 2002):

- Allows for increasing the density of the waste and minimizing the transportation costs;

The disadvantages of this technology are as follows (EPA, 2002):

- High cost;
- Complex equipment; and
- The transfer station is closed in case of equipment failure.

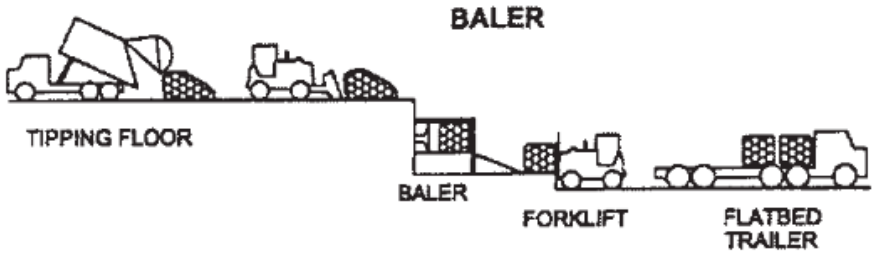


Figure 5-3: Baler System (EPA, 2002)

5.3.4 Option with Loading using Surge Pit

The surge pit itself is not a loading technology, but an intermediate step normally used with open-top or pre-compactor systems. The pit can store peak waste flow, thus reducing the number of transfer trucks/trailers needed. A tracked loader or bulldozer is used to compact the waste before loading, increasing the payload (EPA, 2002).

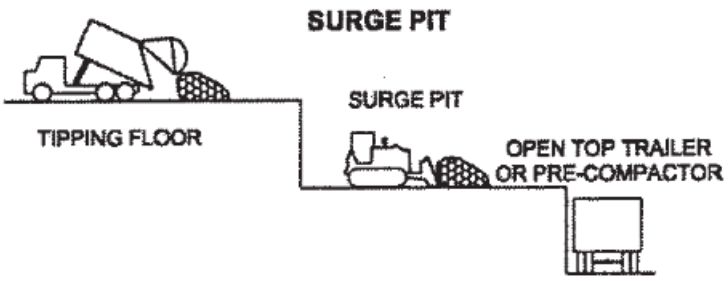


Figure 5-4: Surge Pit (EPA, 2002)

5.3.5 The Option Selected for Bassioun TS

The Project Designer has decided to implement the option with direct dumping into transfer trucks. This option was chosen as the quantity of waste expected to be received is 230 tons/day (relatively small). This option assumes that transfer trucks shall be available for loading at the site at any specific time of the facility operation. Moreover, the facility will be supported with a reception

area to receive the unloading waste in case of truck delay or have a manual tipping mechanism. It is worth mentioning that this simple system was proposed as the governorate resources are limited.

6. Environmental and Social Impacts Assessment and Mitigation Measures

6.1 Methodology

Environmental assessment was carried out to cover potential impacts of the project on the environment as well as impacts of the environment on the project. The assessment was carried out in four 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. Evaluation of 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. 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 and amenity
  - Traffic and road safety
  - Employment
  - Community

6.1.2 Evaluation and Assessment of Impacts

After exclusion of the irrelevant impacts and identifying the positive impacts, the remaining "potential negative impacts" were assessed on the Area of Influence (i.e. mainly the project area and immediate surroundings) based on the following criteria. Impacts that may extend beyond this area (i.e. district, regional, etc.) are also categorized according to the adopted spatial scale.

- The temporal scale or duration of the impact;
- The *spatial scale* or size of the impact;
- The *severity scale* or intensity of the impact;

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

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

1. The temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact (Table 3-4).

Table 6-1: Temporal scale category description

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

2. The *spatial scale* (size) defines the physical extent of the impact (Table 6-2).

Table 6-2: Spatial scale category description

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

3. The *severity scale* (intensity) is used in order to scientifically evaluate how severe negative impacts would be particularly affecting the whole system or a particular party (Table 6-3). It is a methodology that attempts to remove any value judgments from the assessment, although it relies on the professional judgment of the specialists.

Table 6-3: Severity scale category description

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

4. The MAGNITUDE scale is an attempt to evaluate the importance of a particular impact taking into account the temporal, spatial and severity scales. Temporal scale + spatial scale + severity scale = Magnitude of impact:
   - Large
   - Medium
   - Small
   - Negligible

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

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

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

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

   In the absence of quantified standards, significance can be evaluated through considering the magnitude of an impact in combination with the importance/quality/value (and sometimes sensitivity) of the receptor or resource that is affected as shown in the significance matrix (Table 6-4).

Table 6-4: Significance Matrix

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

Impacts/effects of more than minor significance may warrant re-examination to see if an impact magnitude can be reduced further. Different mitigation options may be examined and the reasons for selecting one and rejecting others explained. Some impacts/effects that

cannot be adequately mitigated may need to be addressed through the consideration of offsets or compensation.

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

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 favoured 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, KfW Sustainability Guideline (2019) as well as the NSWMP ESIA Guidelines for MSW Projects (2019).

6.1.4 Residual impacts

Residual impacts are evaluated and stated after considering the proposed 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).

Generally speaking, 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 archaeology*
  The nearest archaeological site is located about 9 km northwest the project site at Markaz Bassioun. Thus, impacts on archaeology should be scoped out. However, as Egypt is rich in archaeology, potential impacts have been assessed for the unlikely event of unearthing archaeological remains during the construction phase. A chance find procedure is provided according to the national prevailing regulations.

- *Land acquisition, compensation and involuntary resettlement*
  This topic is scoped out as the project site is on a state-owned land already used as a transfer station and no private land acquisition (and related compensation procedures) or involuntary resettlement of local people will take place for implementation of the project.

- *Impacts on vulnerable groups*
  Vulnerable groups in the context of the proposed project include women and children, as well as the informal waste pickers.

  Article 11 of the Egyptian Constitution guarantees equality between women and men. Accordingly, the project's recruitment policy for the operation phase is expected to provide equal employment opportunities for men and women (e.g. as truck drivers, weighbridge operators). Nevertheless, although women are involved in the solid waste informal sector, recruitment of female workforce for the present state-owned project is not immediately anticipated for technical and cultural reasons.

  Informal waste pickers and recyclers (Zabbaleen) are also a vulnerable group that could be affected by changes in the formal SWM system.

  The informal solid waste sector includes a risk of child labour. However, the project is state-owned, and the national laws forbid child labour. Moreover, the nature of the project itself requires adult specialized workers.

  Therefore, due to the nature of the project and ownership by the State, the impacts on vulnerable groups including women and children are scoped out. Potential impact on informal waste pickers is considered in the ESIA underlining the need for integration of the informal sector planned by the State within the NSWMP.

- *Impacts on indigenous people*
  The local communities are part of the Nile Delta population (Egyptians) and no populations to whom Indigenous People Criteria could apply are present in the area. Therefore, this impact is scoped out from the present project.

6.2.2 Positive Impacts

- *Environmental and public health improvements*

Positive impacts include the improvement of public health, environmental conditions, working conditions, visual impression of the site and economic sustainability. The current land use of the project site is TS. However, the TS is badly managed, leading to waste accumulation (15,000 tons). The accumulated waste emits gaseous and odour emissions, and leachate emissions. The proposed project will upgrade the current TS, leading to waste accumulation minimization, and reducing the emissions due to clean-up of the site prior to the TS construction and due to the proposed TS operation technology – recently collected solid waste delivered to the facility is not expected to stay more than one day within the site, i.e. the waste decomposition causing emissions will not occur.

The proposed Bassioun TS project is an element of an integrated waste management system with the Zefta, and Samanoud TS facilities; the Gharbia's recycling facilities and Sadat landfill in Menoufya Governorate. Waste management improvements are essential for the overall public health improvement in Gharbia Governorate resulting in the following:

- Reducing waste disposal in the streets that presently act as a breeding ground for flies and rodents;
- Reducing the odour nuisance from waste layers covering the large areas;
- Reducing waste burning for preventing the emission of toxic and hazardous gases and the odour nuisance from smoke; and
- Reducing risks of fire breakouts as a result of open-air burning of waste.

Moreover, the project will have a significant positive impact on increasing the performance and cost efficiency of the waste management services. The overall integrated project will improve the handling of organic waste by turning it to compost.

- *Reduction of Greenhouse Gas Emissions*

The emission of methane to the atmosphere is reported as the principal greenhouse impact of concern for composting and related organics-processing facilities, because methane has about 21 times the greenhouse warming potential of carbon dioxide (USEPA, 2002).

Landfills are usually oxygen poor, so methane is generally produced from the decomposition of organics in landfills. Although methane can be captured and flared from the landfill, this is never 100% efficient, so the landfilling of organics will always release methane into the environment.

On the other hand, a well-managed recycling of organics will produce minimal amounts of methane, so this activity can contribute to a reduction of global warming by keeping organics out of the landfill. As the Bassioun TS is an integral part of the planned integrated waste management system, its upgrade/establishment will contribute to the success of the system, including organic waste recycling and minimization of organic loads reaching the landfill upon finishing the construction of Kafr El Zayat MBT facility.

- *Improved visual impact*
  Bassioun TS is proposed to be constructed within current TS with accumulated waste located in an area surrounded by farmlands, sewage treatment plant, and away from the main roads and residential buildings, which means low visual exposure to the site. However, the visual value will increase in the project area especially from the perspective of the surrounding farmland owners.

  The site development proposed within the NSWMP will include clean-up of the accumulated waste and construction of an engineered facility including a large hangar-like building and a number of smaller buildings, paved areas in two levels, as well as green areas with trees and other plants. The fence and the buildings will be painted in light and pleasant colours. The site area will be kept clean and tidy. A large poster will be placed at the entrance clearly presenting the site functionality and providing information on further contacts regarding its operation.

- *Waste valorisation*
  As part of the integrated waste management system, the Bassioun TS upgrading/establishment will contribute in optimization of waste transportation scheme and waste valorization through recycling and composting upon finishing Kafr El Zayat, which is an important means of generating revenue from a source that, otherwise, would be lost.

- *Income and Employment*
  The project is expected to create 20 job opportunities in the construction phase, and 15 in the operation phase. It is expected that the labour force will be recruited from nearby areas. Moreover, the proposed project will help in reducing the costs of solid waste transfer.

6.2.3 Potential Negative Impacts

Using the impact identification matrix (Table 6-5), 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 6-5: Potential / Residual Impacts Matrix

Activities (Sources of impacts)	Aspects	Environmental Attributes[1]										
		Physical Environment				Biological Environment		Socio-economic Environment				
		Air Quality	Greenhouse gases	Noise level	Soil and Groundwater Quality	Terrestrial life	Aquatic Life	Public Health and amenity	Employment	Work place H & S	Traffic	Community impact
Pre-construction and Construction Phase												
Site levelling Civil works Construction equipment Transport vehicles	Dust Emissions	-/I_m	NA	NA	NA	-/I_m	NA	-/I_m	NA	-/I_m	NA	NA
	Gas emissions (vehicles & equipment)	-/I_m	-/I_m	NA	NA	-/I_m	NA	-/I_m	NA	-/I_m	NA	NA
	Noise (vehicles & equipment)	NA	NA	-/I_m	NA	-/I_m	-/I_m	-/I_m	NA	-/I_m	NA	NA
	Construction Waste	NA	NA	NA	-/I_m	NA	-/I_m	NA	+	-/I_m	NA	NA
	Accidents and spills (vehicles & equipment)	NA	NA	NA	-/I_m	NA	-/I_m	-/I_m	NA	-/I_m	-/I_m	NA
	Traffic	NA	NA	NA	NA	NA	NA	-/I_m	+	NA	-/I_m	NA
Construction workers	Sewage and solid waste from workers	NA	NA	NA	-/I_m	-/I_m	-/I_m	NA	+	-/I_m	NA	NA
	Labour demand	NA	NA	NA	NA	NA	NA	NA	+	NA	NA	+
	Physical stress	NA	NA	NA	NA	NA	NA	NA	NA	-/I_m	NA	NA
Operation Phase												
Waste unloading, loading, and transfer Electricity generator	Dust emissions	-/I_m	NA	NA	NA	-/I_m	NA	-/I_m	NA	-/I_m	NA	NA
	Gas and odour emissions (vehicles & equipment, waste)	-/I_m	-/I_m	NA	NA	-/I_m	NA	-/I_m	NA	-/I_m	NA	NA
	Noise (equipment & vehicles)	NA	NA	-/I_m	NA	-/I_m	-/I_m	-/I_m	NA	-/I_m	NA	NA
	Accidents and spills (vehicles & equipment)	NA	NA	NA	-/I_m	NA	-/I_m	-/I_m	NA	-/I_m	-/I_m	NA
	Traffic	NA	NA	NA	NA	NA	NA	-/I_m	+	NA	-/I_m	NA
	Informal Waste Scavengers	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-/I_m
Waste trucks	Lubricating oil	NA	NA	NA	-/I_m	-/I_m	-/I_m	-/I_m	+	-/I_m	NA	NA
	Truck cleaning waste	NA	NA	-/I_m	-/I_m	NA	-/I_m	NA	+	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
	Labour demand and training	NA	NA	NA	NA	NA	NA	NA	+	NA	NA	+
	Physical stress	NA	NA	NA	NA	NA	NA	NA	NA	-/I_m	NA	NA

[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

6.3 Assessment of Potentially Negative Impacts and Proposed Mitigation Measures

Potential negative impacts have been assessed to cover the pre-construction / construction and operational phases. The assessment does not include the decommissioning phase as a decommissioning plan is not available at this stage of the project. NSWMP will need to prepare such plan as part of the integrated project's HSE Plan.

6.3.1 Impact on the Physical Environment

The current situation of the site is a TS with accumulated waste with neither lining nor insulation. The current project will remove all disposed waste and will establish an insulated waste transfer station and in turn will improve the physical environmental aspects. The project therefore, will have an overall positive impact on the physical environmental.

a) *Air Quality*

Pre-construction and Construction Phase
Gaseous, and dust emissions are expected to be generated from the pre-construction and construction phase. Vehicles, other construction machinery are expected to generate gaseous emissions including NOx, CO, SO_2 and PM_{10} (IFC, and WHO, 2007a). Dust is expected to be generated from the following construction activities:

- Movement of heavy equipment and vehicles in the location and unpaved roads;
- Levelling, excavation and backfilling activities in the construction site; and
- Mixing of building aggregates.

Such impacts will occur for relatively a short-duration period and are expected to affect mainly the site location and potentially neighbouring farms, agro-fauna, and the near residential area. Since the construction phase will be carried out on a small area (*localized*) and for a total of 6 months (short-term), with a small air quality impact (slight) the magnitude of the impact is considered SMALL. The importance of the receptor (ambient air) is Medium; therefore, the overall significance of the impact is assessed as MINOR.

Mitigation Measures
The governorate will ensure that the contractors will carry out the necessary measures to minimize impacts. Mitigation measures would include:

- Dust suppression using water and chemical controls such as calcium chloride;
- 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;
- Modify timing of construction where possible, to coincide with favourable climate conditions.

Residual Impacts

The above mitigation measures are anticipated to be efficient for minimizing the potential impacts. Therefore, the significance of residual impacts of construction on the air quality in the pre-construction and construction phase is considered to be INSIGNIFICANT.

Operation Phase

Gaseous emissions result from the following operation activities:

- Vehicle and generator emissions which contains NO_x, SO_x, CO, and PM (IFC, and WHO, 2007a);
- Odour from the municipal waste (IFC, and WHO, 2007b); and
- Dust and bio-aerosols (IFC, and WHO, 2007b)

An odour is the organoleptic attribute of certain volatile substances. There is a wide variation between individuals as to what is deemed unacceptable and as to what can affect an individual's quality of life. As it may cause offense to human senses, odour is defined as a pollutant.

Activities at the TS site itself have the potential to generate odour through the handling and temporary storage of wastes that contain food and other degradable organic materials. The intensity of odour generated by such materials depends on the content of organic materials in waste, the age of the organic materials (and hence their degradation degrees), the amount and surface area of present waste containing the odorous materials.

Waste will come to the facility from collection points and could be 1-2 days old. The waste will be transported to the site in closed waste collection trucks and will leave the site in closed transfer trucks. The highest potential for odour release will be during the collection truck unloading via a hopper, through which the waste is falling down into the opened transfer truck, and during accumulation of waste for filling the transfer truck. This kind of waste accumulation within the site will be limited to a few hours. No storage of waste on the floor is planned.

The loading area will be located within a hangar-like building made as a steel structure. The odour emissions will come out of the openings in the building.

The nearest sensitive receptors to the site are scattered houses located about 450 - 475 m to the north and east, up prevailing wind direction from north. The site layout including the buildings and green areas, as well as the operation routines will take into consideration the wind direction.

The control of odours will be undertaken through the implementation of effective site management which will be detailed in an Odour Management Plan (OMP). The essence of the OMP will the minimisation of the

generation of odours by the materials handled and temporarily stored on site. The general requirement will be that if any operations, particularly during a long warm period, are identified as causing, or likely to cause, an odour annoyance beyond the site boundary, or if abnormal odours are observed within the site, then the Site Manager will immediately modify, reduce or suspend those operations until effective remedial actions can be taken.

All incoming loads will be inspected by the site operator staff. Any loads considered to be highly odorous, or likely to give rise to strong and offensive odours during storage on site, will be refused entry to the site or will be covered until it could be sent out as soon as possible.

A high standard of housekeeping will be adopted particularly around the household waste storage area. Any spillages on the TS territory will be cleared promptly. Loose materials will be cleaned from on or under the facility structures at least weekly to avoid the build-up of anaerobic material. The floor of the loading area will be cleaned and washed on a regular basis to prevent the accumulation of anaerobic material and leachate.

The volume of potentially odorous wastes present on-site at any one time will be kept to a minimum through the regular transfers to the receiving facility. This will minimise the potential for material to become anaerobic and odorous. Wastes with the potential to generate odours will be removed from site within 24 hours of delivery and, if possible, on the same day as receipt of the waste. Movement and agitation of waste will be kept to a minimum to prevent the releases of odours. In the event any waste material stored within the building on site becomes strongly odorous and is deemed likely to cause an odour annoyance outside the site boundary, the dust suppression system will be utilised which contains a deodorising additive.

The impacts on air quality will occur for the project lifetime and are expected to affect the site location and potentially the Markaz due to transportation activities of the solid waste. The emissions are classified as *slight*, long-term but at the *district* (*Markaz*) scale. The magnitude of emissions from the operational phase is assessed to be of SMALL magnitude. The importance of the receptor is Medium; therefore, the overall significance of the impact is assessed as MINOR.

Mitigation Measures

- Misting system (if needed);
- Building orientation with respect to predominant wind direction;
- Implement good housekeeping procedures;
- Waste will not be left to accumulate for a long time;
- Sweep waste management areas;
- Providing workers with good practice driving and machinery usage;
- Carry out monitoring tests for the generator and ensure their compliance with the national laws;
- Inspection and Maintenance of machinery and vehicles to keep them in good working conditions to minimize fugitive emissions; and

- Clean and wash vehicles routinely;
- Plant trees as a barrier to absorb and disperse odours;
- Establish and implement Odour Management Plan (OMP) including a telephone line for community complains regarding odour; address the complains immediately.

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 in the operation phase are deemed INSIGNIFICANT.

Table 6-6: Potential impacts on air quality during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• Movement of heavy equipment and vehicles in the location and unpaved roads; • Levelling, excavation and backfilling activities in the construction site; and • Mixing of building aggregates.	MINOR	• Dust suppression using water and chemical controls such as calcium chloride; • 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; • Modify timing of construction where possible, to coincide with favourable climate conditions.	INSIGNIFICANT
Operation	• Vehicle and generator emissions which contains NOx, SOx, CO, and PM; • Odour from the municipal waste; and • Dust and bio-aerosols	MINOR	• Misting system (if needed); • Building orientation with respect to predominant wind direction; • Implement good housekeeping procedures; • Sweep waste management areas; • Providing workers with good practice driving and machinery usage; • Carry out monitoring tests for the generator and ensure their compliance with the national laws; and • Inspection and Maintenance of machinery and vehicles to keep them in good working conditions to minimize fugitive emissions; and • Clean and wash vehicles routinely. • Plant trees as a barrier to absorb and disperse odours; • Odour Management Plan with "odour compliant" phone line and response	INSIGNIFICANT

b) *Green House Gases Emissions*

Pre-construction and Construction Phase
Vehicles and machinery used during the construction phase are expected to emit GHG emissions resulting from fuel burning. The GHGs expected to be generated during construction include carbon dioxide (CO_2), NOx, and CO. Moreover, black carbon and non-absorbing aerosols might be generated (Sims et al., 2014).

Such impacts will occur for relatively a short-duration period and are expected to affect mainly the site location and potentially neighbouring farms, agro-fauna, and the near residential area. Since the construction phase will be carried out on a small area (*Localized*) and for a total of 6 months (short-term), with slight impact. The magnitude of the impact is considered SMALL. The importance of the receptor (ambient air) is Medium; therefore, the overall significance of the impact is assessed as MINOR. The assessment on GHGs emissions during construction phase is deemed NEGLIGIBLE (less than 5 years) (EBRD, 2017)[8]. The importance of the receptor is Medium; therefore, the overall significance of the impact is assessed as INSIGNIFICANT.

Mitigation Measures
Although potential impacts are assessed as insignificant, mitigation measures will still be applied and shall be included in the contracts of the subcontractors 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;
- Provide workers with awareness on maintaining good practice for machinery usage;
- Maintain machinery and vehicles in good working conditions and ensure regular maintenance; and
- Ensure that gas emissions are below international and national limits.

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

Operation Phase
Fuel combustion from equipment, transport vehicles, and diesel generator may result in the release of CO_2, NOx, and CO. Moreover, black carbon and non-absorbing aerosols, are emitted mainly during diesel engine operation, have short lifetimes in the atmosphere of only days to weeks, but can have significant direct and indirect radiative forcing effects and large regional impacts (Sims et al., 2014). Waste accumulation may result in CH_4 emissions. However, it is unlikely to be produced as formation of CH_4 starts about six months after depositing the organic material and waste

[8] EBRD (2017). EBRD protocol for greenhouse gases.

will not be left more than a day at the transfer station before being transferred to an MBT.

Such impacts will occur for the project life-time and are expected to affect mainly the site location and potentially the Markaz due to transportation activities of the solid waste. The emissions are classified as *slight*, long-term at the *district* (*Markaz*) scale. The magnitude of GHG emissions is deemed SMALL. As the sensitivity of the receptor is deemed Medium, the significance of impacts from GHG emissions is assessed as MINOR.

Mitigation Measures

In addition to the mitigation measures included in the construction phase, waste should not be left to accumulate.

Residual Impacts

The above mitigation measures are anticipated to be efficient for minimizing the potential impacts and decrease their significance to INSIGNIFICANT.

Table 6-7: Potential impacts on GHGs emissions during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• GHGs emitted from vehicles and machinery used during construction phase	INSIGNIFICANT	• 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; • Provide workers with awareness on maintaining good practice for machinery usage; • Maintain machinery and vehicles in good working conditions and ensure regular maintenance; and • Ensure that gas emissions are below international and national limits.	INSIGNIFICANT
Operation	• Fuel combustion from equipment, transport vehicles, and diesel generator may result in the release of CO_2, NOx, CO, black carbon and non-absorbing aerosols. • Waste accumulation may result in CH_4 emissions. However, it is unlikely to happen	MINOR	• 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; • Provide workers with awareness on maintaining good practice for machinery usage; • Maintain machinery and vehicles in good working conditions and ensure regular maintenance; and • Ensure that gas emissions are below international and national limits. • Waste should not be left to accumulate	INSIGNIFICANT

c) *Noise levels*

Pre-construction and Construction Phase

The predominant noise generation during construction will result from the operation of heavy equipment, and vehicle movement. Such impacts will occur for relatively a short-duration period and are expected to affect mainly the site location and potentially neighbouring farms, agro-fauna, and the near residential area. Since the construction phase will be carried out on a small area (*Localized*) and for a total of 6 months (Short-term), with a small air quality impact (slight) the magnitude of the impact is considered SMALL. As there are close residential areas, their vulnerability is High. Therefore, the significance of the impact prior to mitigation measures is MINOR to MODERATE.

Mitigation Measures

The next mitigation measures will be communicated in the contracts of the contractors.

- Maintain machinery and vehicles in good working conditions to minimize noise generation and ensure that they do not exceed permissible limits;
- Maintain site roads in good condition to reduce noise and vibration from vehicle movements;
- Select equipment that has low noise emission levels;
- Use buildings to contain inherently noisy plant equipment;
- Follow the manufacturers' recommended maintenance schedule for engine and mechanical parts, including proper tire pressure; and
- Construction should be carried out at proper times during daytime.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of construction activities on the noise are deemed MINOR.

Operation Phase

Noise during operation can result mainly from workers, machines and vehicles used during the operational phase of the project. Noise during the operational phase is considered *slight*, *localized* and long-term. The magnitude of impact of noise level prior to mitigation measures is deemed SMALL. As most sensitive receptors are located near the site, their vulnerability is high, and the significance of the impact is therefore MINOR to MODERATE.

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 will be installed for noise generating equipment, wherever possible;
- Regular inspection and maintenance of equipment; and
- Waste transfer should be conducted during daytime.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the operation activities on the noise are deemed MINOR.

Table 6-8: Potential impacts on noise levels during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• The predominant noise generation during construction will result from the operation of heavy equipment, and vehicle movement.	MINOR to MODERATE	• Maintain machinery and vehicles in good working conditions to minimize noise generation and ensure that they do not exceed permissible limits; • Maintain site roads in good condition to reduce noise and vibration from vehicle movements; • Select equipment that has low noise emission levels; • Use buildings to contain inherently noisy plant equipment; • Follow the manufacturers' recommended maintenance schedule for engine and mechanical parts, including proper tire pressure; and • Construction should be carried out at proper times during daytime.	MINOR
Operation	• Noise during operation can result mainly from workers, machines and vehicles used during the operational phase of the project.	MINOR to MODERATE	• Potential noise generating machines and equipment are designed to meet statutory regulations concerning noise; • Acoustic enclosures are installed for noise generating equipment, wherever possible; • Regular inspection and maintenance of equipment; and • Waste transfer should be conducted during daytime.	MINOR

d) *Soil and groundwater*

Construction Phase

Generally, the construction activities are unlikely to result in soil contamination that will need future decontamination and clean-up activities. However, the groundwater table is shallow and expected to be found at depth approximately 2 m below ground level. Moreover, the project will remove previously disposed solid waste in the area that might have resulted in localized contamination of groundwater. Other potential impacts during the construction phase generally result from domestic wastewater management, material and waste storage, and accidental spills from machinery. 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.

Potential impacts from project construction activities are deemed *slight*, *localized*, of short-term and their probability of occurrence is low. Impacts of the construction phase on soil and groundwater are thus considered of SMALL magnitude. Given the high vulnerability of the receptor because the groundwater is found at close level, the impact is considered MINOR to MODERATE. However, the impacts on groundwater due to previous waste dumping are UNKNOWN.

Mitigation Measures

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

- 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;
- 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 adjacent treatment plant at adequate intervals or internal agreement between the treatment plant and project contractor. This proximity will facilitate this activity.
- Ensure the proper management of hazardous waste, treatment and disposal by an accredited contractor

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the construction activities on the soil and groundwater are deemed MINOR.

Operation Phase

During the project operation, potential soil and groundwater impacts may arise from contamination caused by leaks of oil products from vehicles and diesel generator, sanitary wastewater generated in staff amenity rooms, as well as wastewater from cleaning of the loading area, which could contain leachate generated during collection and transportation of waste. However, the leaks are highly unlikely, because the TS operations will be carried out within an insulated surface paved with asphalt and concrete. Most of the leaks are considered to be accidental. Leachate, if generated in significant amounts, will be sent to adjacent wastewater treatment facility, and the wastewater will be disposed of directly into the sewage system. The parameters (quantity and quality) of wastewater are not known currently. Pre-treatment requirements for wastewater discharge into the sewage system will be taken into consideration. The oil/water separators, traps for solids, other treatment systems will be installed and operated, if required.

This impact is *slight*, *localized* and long-term. The magnitude of the impact is deemed SMALL prior to the implementation of mitigation measures. As the vulnerability of the receptor is considered High, the significance of the impact is assessed as MINOR to MODERATE.

Mitigation Measures

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

- Use impermeable materials for roads, waste handling areas, and vehicle washing areas, and install curbs to prevent runoff to permeable areas;
- Ensure that the diesel generator is well insulated;
- Use secondary containment and drip pans for storage and handling of fuel and oil, other chemicals;
- Collect runoffs from areas used for waste handling, and treat runoff to meet applicable environmental standards before discharge to the municipal sewage system (e.g., screen to remove large material, install silt traps to remove particulates, and remove separate-phase liquids with an oil/water separator);
- Discharge of runoff to the municipal sewage system (via pipe or tanker truck) shall be authorised by the Holding Company of Water and Wastewater;
- In case wastewater parameters exceed the limits defined by the law, the governorate/operator will communicate with the Holding Company of Water and Wastewater to agree on the requirements for wastewater disposal;
- To reduce the amounts of leachate generated at the TS, through applying the operational plan the delivered waste will be via a hopper unloaded from collection trucks directly into the transfer trucks (with open top), in which the waste will not be left to accumulate within the facility for more than 1 day;
- Waste collection and transfer trucks could be equipped with leachate tanks that will be emptied at designated facilities;
- Continuous staff training on operation activities should be implemented.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the operation activities on the soil and groundwater are deemed MINOR.

Table 6-9: Potential impacts on soil and groundwater during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• Domestic wastewater, material and waste improper management; • Accidental spills from machinery.	MINOR to MODERATE	• 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; • 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	MINOR

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
			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 adjacent wastewater treatment plant at adequate intervals through a licensed contractor. Ensure the proper management of hazardous waste, treatment and disposal by an accredited contractor	
Operation	• Domestic wastewater, material and waste improper management; • Accidental spills from machinery, vehicles, and diesel generator; • Leachate generation and leaks. However, it is unlikely to happen; • In case the transported waste is humid, some leachate could come with the trucks;	MINOR to MODERATE	• Use impermeable materials for roads, waste handling areas, install curbs to prevent runoff to permeable areas; • Ensure that the diesel generator is well insulated; • Collect runoffs from areas used for waste handling, and treat runoff to meet applicable environmental standards before discharge to the municipal sewage system (e.g., screen to remove large pieces, install silt traps to remove particulates, and remove separate-phase liquids with an oil/water separator); • Waste collection and transfer trucks could be equipped with leachate tanks; • As per the operation plan, waste will not be left to accumulate at the TS for more than 1 day. • Continuous staff training on operation activities should be implemented	MINOR

6.3.2 Impacts on the Biological Environment

The project is surrounded mostly by agricultural lands that are expected to encompass significant agrobiodiversity. The current situation of the site is a TS with accumulated waste with no lining nor insulation. The current project will remove all disposed waste and will establish an insulated waste transfer station surrounded by a 3-meter high fence.

a) *Disturbance to wildlife*

Construction Phase

The construction phase has duration of 6 months. Thus, it is expected that the impacts on biodiversity during this phase would be of short-term. Impacts on biodiversity during the construction phase include the following:

Air emissions, noise and vibrations as well as human presence may affect local wildlife during construction phase. These stressors may drive fauna away from the site and disturb nearby fauna in agricultural fields. Increased traffic may increment animal road kills. However, the current fauna onsite is mainly composed of opportunistic and pest species and no species of concern are expected to be present in nearby agricultural areas. Additionally, any spillage from vehicles and sewage mismanagement may affect aquatic wildlife in nearby canals and drains. These impacts are *slight*

in intensity, of short-term and at the *study area* level. Their magnitude is considered SMALL. Given the Low importance of the receptors, these impacts are deemed INSIGNIFICANT.

Mitigation Measures

- Same mitigation measures as measures aiming at reducing air emissions and noise; and
- Provide awareness to the workers on the negative impacts of disturbing any wild fauna;
- Avoid working at night and avoid high intensity light that may disturb fauna; and
- Ensure speed control and the prohibition of off-track driving.

Residual Impacts

Residual impacts are INSIGNIFICANT.

Operation Phase

Waste transfer trucks may disturb fauna within the site and surroundings during operational times. Additionally, in case of oil spillage, waste or wastewater mismanagement, aquatic life nearby may be disturbed (e.g. amphibians that may be present in drains and canals). These impacts are *slight* in intensity, of long-term and at the *study area* level. Their magnitude is considered MEDIUM. Given the Low importance of the receptors, this impact is deemed MINOR.

Mitigation Measures

Same mitigation measures as stated for the construction phase.

Residual Impacts

Residual impacts are deemed INSIGNIFICANT.

b) *Attraction of pests*

Construction Phase

Solid waste and sewage wastewater 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. This impact is *slight* in intensity due to the fact that it will be conducted within a waste disposal area, of short-term and at the *study area* level. The magnitude is considered SMALL given its short duration. Given the Medium vulnerability of receptors (facility workers and nearby community) to pests, this impact is deemed MINOR.

Mitigation Measures

Mitigation measures will mainly include the following:

- Develop, implement and update a solid waste, hazardous waste and wastewater 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 by animals; and

- Ensure proper housekeeping practices.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the construction activities on the biological environment are deemed INSIGNIFICANT.

Operation Phase

Pests such as insects, rodents and stray dogs and cats can cause nuisance problems. On the other hand, the waste transfer station shall reduce pests in the area as a result of proper management of waste. However, TS putrescible wastes can still attract pests as they can provide a food source for vermin and insects. Pests can also be disease vectors.

Presence of pests is classified as *slight* in intensity, of long-term and at the *study area* level. The magnitude is considered SMALL. Given the Medium vulnerability of the receptors (facility workers and nearby community) to pests, this impact is deemed MINOR.

Mitigation Measures

The following control measures should be considered to minimize anticipated impacts:

- Construction and maintenance of an adequate fence around the site to limit undesired faunal access;
- Avoid delaying the transfer of newly delivered and rapidly decomposable wastes;
- If necessary, use environmentally safe biocides to control mosquitoes and flies; and,
- Inspect site for growth of marginal vegetation and regularly remove it, should it develop.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts are deemed MINOR to INSIGNIFICANT.

Table 6-10: Potential impacts on biological environment during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• Air emissions, noise and vibrations as well as human presence may affect local wildlife; • Increased traffic may increment animal road kills; • Any spillage from vehicles and sewage mismanagement may affect aquatic wildlife in nearby canals and drains; and • Solid waste and sewage wastewater	MINOR to INSIGNIFICANT	• Same mitigation measures aiming at reducing air emissions and noise; and • Provide awareness to the workers on the negative impacts of disturbing any wild fauna; • Avoid working at night and avoid high intensity light that may disturb fauna; and • Ensure speed control and the prohibition of off-track driving • Develop, implement and update a solid waste, hazardous waste and wastewater management plan to include waste collection, storage, transport and disposal in an environmentally sustainable manner to avoid attraction of vermin and the	INSIGNIFICANT

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
	mismanagement may result in the attraction of pests and alien species to the area.		potential consumption of waste by animals; and • Ensure proper housekeeping practices.	
Operation	• Domestic wastewater, material and waste improper management; • Accidental spills from machinery, vehicles, and diesel generator; • Leachate generation and leaks. However, it is unlikely to happen; • In case the transported waste is humid, some leachate could come with the trucks •	MINOR	• Use impermeable materials for roads, waste handling areas, and vehicle washing areas, and install curbs to prevent runoff to permeable areas; • Ensure that the diesel generator is well insulated; • Collect runoffs from areas used for waste handling, and treat runoff to meet applicable environmental standards before discharge to surface water or the municipal sewage system (e.g., screen to remove large material, install silt traps to remove particulates, and remove separate-phase liquids with an oil/water separator); • Discharge of wastewater to the municipal sewage system (via pipe or tanker truck) will be arranged on agreement with the Holding Company of Water and Wastewater; • The wastewater will be monitored periodically to be sure that it is within the law limits before being discharged into the sewage network. In case wastewater parameters exceed the limits of the law, NSWMP will communicate with the Holding Company of Water and Wastewater to agree on the requirements for wastewater disposal; • Waste collection and transfer trucks could be equipped with leachate tanks that will be emptied at designated facilities; • Waste will not be left to accumulate for more than 1 day.	MINOR to INSIGNIFICANT

6.3.3 Socio-economic Impacts

a) *Public health and amenity*

Construction phase

Impacts on public health from construction are dust, gas emissions, noise, and health hazards from waste mismanagement. Additionally, accidents from transport vehicles may arise. However, this is highly unlikely as accidents are not an ongoing event. Public health impacts during the construction phase are short-term at *the study area* level and are deemed *slight*. The magnitude of impacts on public health during construction is deemed SMALL due to the presence of residential areas. Since agricultural lands are located close by to the site while residential areas do not exist around it, the vulnerability of the receptors is MEDIUM. Accordingly, the significance of impacts on residential areas is MINOR.

Mitigation Measures

The recommended mitigation measures are the same as recommended for air quality and noise in addition to the below points:

- Choose routes for construction trucks that avoid passing by the local communities;

- Monitor air pollution regularly to take corrective actions timely, if needed;
- Engage effectively with local residents and farmers who live or make their living in the close vicinity of the project site;
- Include a community grievance mechanism explaining the objective of the mechanism, channels of complaints and comments boxes, and a clear complaint form that ensures the feedback on the concern or grievance;
- Traffic and road safety measures shall be followed; and
- Develop of non-technical material to be disclosed and disseminated to the public to explain the Project, positive and negative impacts, the grievance mechanism, and hotlines to reach project staff in case of inquiries or emergencies.

Residual Impact

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the construction activities on the public health are deemed MINOR to INSIGNIFICANT.

Operation phase

During the operational phase, disturbances may arise from noise, dust, odour, and litter caused by onsite waste transfer operations and offsite waste transportation. The presence of the transfer station may also cause aesthetic concerns, although the project is expected to improve the previously accumulated waste visual disturbance. These impacts are long-term at *the study area* level, and its impacts are deemed *slight*. The magnitude of the impact is deemed SMALL. Since agricultural lands are located close by to the site while residential areas do not exist around it, the vulnerability of the receptors is MEDIUM. Accordingly, the significance of impacts on residential areas is MINOR.

Mitigation Measures

The recommended mitigation measures are the same as recommended for air quality and noise in addition to the below points:

- Choose routes for waste transfer trucks that avoid passing by the local communities, if possible;
- Maintain the trucks and assure that the solid waste is covered during transportation;
- Waste will not be left to accumulate for a long time.
- Build a high fence of 3 meters around the site to isolate it completely from residential areas, to avoid offsite dispersion and facilitate collection of litter;
- Collect litter as soon as possible before it becomes scattered offsite;
- Plant with a green belt the whole site perimeter to improve aesthetics;
- Monitor air pollution regularly to take corrective actions timely, if needed
- Undertake periodical community engagement activities and implement a grievance mechanism; and
- Implement traffic and road safety mitigation measures shall be followed.

Residual Impact

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the operation activities on the public health are deemed MINOR to INSIGNIFIGANT.

Table 6-11: Potential impacts on public health and amenity during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• Dust, gas emissions, noise, and health hazards from waste mismanagement, that may impact close by residential areas; • Accidents from transport vehicles may arise.	MINOR	• Choose routes for construction trucks that avoid passing by the local communities; • Monitor air pollution regularly to take corrective actions timely, if needed; • Engage effectively with local residents and farmers who live or make their living in the close vicinity of the project site; • Include a community grievance mechanism explaining the objective of the mechanism, channels of complaints and comments boxes, and a clear complaint form that ensures the feedback on the concern or grievance; • Traffic and road safety measures shall be followed; and • Develop of non-technical material to be disclosed and disseminated to the public to explain the Project, positive and negative impacts, the grievance mechanism, and hotlines to reach project staff in case of inquiries or emergencies.	MINOR to INSIGNIFICANT
Operation	• Disturbances may arise from noise, dust and litter caused by onsite waste transfer operations and offsite waste transportation; • The presence of the transfer station may also cause aesthetic concerns.	MINOR	• Choose routes for waste transfer trucks that avoid passing by the local communities, if possible; • Maintain the trucks and assure that the solid waste is covered during transportation; • Build a high fence of 3 meters around the site to isolate it completely from residential areas, to avoid offsite dispersion and facilitate collection of litter; • Collect litter as soon as possible before it becomes scattered offsite; • Plant with a green belt the whole site perimeter to improve aesthetics; • Monitor air pollution regularly to take corrective actions timely, if needed • Undertake periodical community engagement activities and implement a grievance mechanism; and • Implement traffic and road safety mitigation measures shall be followed.	MINOR to INSIGNIFICAT

b) *Traffic and road safety*

Pre-Construction and Construction Phase

Currently, part of the accumulated solid waste is being removed from the site for site preparation. The site still receives waste till now. It is not decided till now how the project will handle the collected waste in the construction phase. It is worth mentioning that Bassioun markaz is connected to a regional network of roads that ensures the delivery of

collected waste to the landfill in Sadat City. Therefore, the traffic volume for transporting the collected waste is not known.

The construction phase may also potentially increase traffic caused by transport vehicles for construction material. 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 *slight* and of short-term and at the *regional* level and are therefore deemed of SMALL magnitude. The vulnerability of the traffic is deemed Medium and the significance of traffic and road safety impacts is assessed as MINOR.

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
- Install lightings on the roads if lacking
- Add signs, signals, and pavement markings.
- Require adequate queuing distance.
- Require an onsite traffic pattern design.
- Schedule operating hours and delivery.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the construction activities on the traffic and road safety are deemed INSIGNIFICANT.

Operation Phase

The operational phase may potentially increase traffic caused by transport vehicles of solid waste. Potential safety impacts may also arise from potential traffic accidents during transportation. However, it is not expected to happen frequently if traffic rules are followed. The impacts of this phase are long-term, at the *regional* level but *slight* therefore deemed of SMALL magnitude. The sensitivity of the traffic is deemed Medium and the significance of traffic and road safety impacts is assessed as MINOR.

Mitigation Measures

The recommended mitigation measures are the same as recommended for the construction phase, in addition to the below points:

- Equipping all collection and transfer trucks with a simple GPS tracking system to monitor, manage, and control their speed limits, routes, and fuel consumption if feasible. This measure will help in save the assets through automating truck maintenance schedule based on the odometer reading and engine hours.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the operation activities on the traffic and road safety are deemed INSIGNIFICANT.

Table 6-12: Potential impacts on traffic and road safety during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• The traffic volume for transporting the collected waste is not known as it is not decided till now how the project will handle the collected waste in the construction phase; • A potentially increase in traffic may be caused by transport vehicles for construction material transportation; • Potential accidents during transportation of material might have potential safety impacts.	MINOR	• 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 • Install lightings on the roads if lacking • Add signs, signals, and pavement markings. • Require adequate queuing distance. • Require an onsite traffic pattern design. • Schedule operating hours and delivery.	INSIGNIFICANT
Operation	• A potentially increase in traffic might be caused by transport vehicles of solid waste. • Potential safety impacts may also arise from potential traffic accidents during waste transportation.	MINOR	• Same mitigation measures mentioned in the construction phase • Equip all collection and transfer trucks with a simple GPS tracking system to monitor, manage, and control their speed limits, routes, and fuel consumption if feasible.	INSIGNIFICANT

c) *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, and accidental slipping of workers, falls from heights. 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 (with certain trends in the climate change) and mechanical accidents. These impacts are short-term, *localized*, and *moderately severe*; the magnitude is deemed MEDIUM. The significance of impacts on workers (Medium sensitivity receptors) prior to mitigation measures is deemed MODERATE.

Mitigation Measures

- The 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, training for its use;
- 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;
- Ensure access to potable water, hygienic routines, schedule of work hours and breaks taking into consideration the climate conditions;
- Provide and install fire extinguishers and fire kit and ensure that workers are trained to use them;
- Implement good housekeeping practice and ensure that proper hygiene measures are taken;
- Ensure the constant availability of a car within the site to drive an injured/sick worker to the hospital as rapid as possible when necessary;
- 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 of the construction personnel on the safe use of equipment and on environmental issues related to construction;
- 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, etc.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the construction activities on the workplace health and safety are deemed MINOR.

Operation Phase

Impacts during operation phase on workers' health and safety may arise from waste exposure and handling, noise emitted from equipment, and

accidents. Fire may arise from badly stored waste. However, the project will not keep waste accumulated for a long period. Additionally, the presence of insects and pests within the wastes may cause health issues to waste handlers. These impacts are considered *severe* and long-term impacts, but *localized*. The magnitude of impacts is deemed MEDIUM. The significance of impacts on workers (Medium sensitivity receptors) prior to mitigation measures 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:

- IFC Performance Standard 2 for labour and working conditions shall be maintained;
- Add sprinkler systems;
- Add fire extinguishers and fire kit; and
- Use fire resistant /retardant material in building construction.

Residual Impacts

The above mitigation measures are expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the operation activities on the workplace health and safety are deemed MINOR.

Table 6-13: Potential impacts on workplace health and safety during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• Dust and air emissions, increased noise levels from machines and vehicles, and accidental slipping of workers may have potential negative impacts on the workers; • Solid waste and sewage mismanagement may pose health concerns • Physical stress may arise from heat and mechanical accidents.	MODERATE	• The 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; • 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; • Ensure access to potable water, hygienic routines, schedule of work hours and breaks taking into consideration the climate conditions; • Provide and install fire extinguishers and fire kit and ensure that workers are trained to use them; • Implement good housekeeping practice and ensure that proper hygiene measures are taken; • 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 of the construction personnel on the safe use of equipment and on environmental	MINOR

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
			issues related to construction; • 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, etc.	
Operation	• Waste exposure and handling, noise emitted from equipment, and accidents may have negative impacts on the health and safety of workers; • Fire may arise from badly stored waste. However, no accumulated waste is expected to be kept in the TS • The presence of insects and pests within the wastes may cause health issues to waste handlers.	MODERATE	• Implement measures like during the construction phase • IFC Performance Standard 2 "Labour and Working Conditions" shall be maintained; • Add sprinkler systems; • Add fire extinguishers and fire kit; and • Use fire resistant /retardant material in building construction.	MINOR

d) *Impact on local community*

Construction phase and operation phases

Waste scavengers (*Zabbaleen*) in general are considered an important pressure group of NSWMP. They make their living by being the elements of the informal chain from picking the recyclable materials from solid waste, refining them and selling to local contractors or companies engaged either in the trade of recyclable waste or the recycling of these items.

The proposed project for Bassioun TS is expected to impact livelihoods and income generation of Zabbaleen. The scavengers are not expected to be prevented from collecting and sorting waste at collection points. It is worth mentioning that scavenging activities are currently carried out within the current Bassioun. Upon finishing the project, these scanenging activities will be prevented. This would mean a certain restriction of access to waste for the scavengers. In case of improved collection services, the scavengers could be also affected by higher frequency of services that will result in shorter time intervals between emptying the public containers and require routine changes for scavenging (e.g. during night hours).

The impact is classified as long-term, severe but localized. The magnitude of impacts is deemed MEDIUM. The vulnerability of the receptor (*Zabbaleen*) is Medium. Thus, the significance of impacts on informal waste scavengers is deemed MODERATE.

Mitigation Measures

- Engage with scavengers to better understand their concerns about the Project. It is also important to communicate with them the positive impacts on community health and on their health, and to discuss with them how would be the best way to integrate them in the Project's activities while protecting their livelihoods and benefits.

- Engagement should continue throughout the project until an agreement is reached.
- Develop a full Grievance Mechanism (GM) explaining the objective of the mechanism, channels of complaints and comments boxes, and a clear complaint form that ensures the feedback on the concern or grievance.

It is worth mentioning that a national plan is currently under development for informal sector integration requested by the president. A TOR for the study of the economic, social, and environmental aspects is underway. Integration of the informal sector, hence waste pickers, are a part of a bigger scheme that will include but not limited to: (i) work under the formal sector umbrella when operational budget is in place (ii) criminalized by the new law as anyone who will work in waste management should be licensed.

Residual Impacts

The above mitigation measure is expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the construction and operation activities on the impact on local community are deemed MINOR.

Table 6-14: Potential impacts on local community during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction and Operation	• The Bassioun TS project is expected to directly impact the livelihoods and income generation of scavengers (Zabbaleen), as they will not be prevented from collecting and sorting waste within the Markaz territory. However, the scavengers will not have access to waste at the TS	MODERATE	• Engage with scavengers (Zabbaleen) in to better understand their concerns about the Project. It is also important to communicate with them regarding the positive impacts on community health and on their health, and to discuss with them what would be the best way to integrate them in the Project's activities while protecting their livelihoods and benefits. • Develop a full Grievance Mechanism (GM) explaining the objective of the mechanism, channels of complaints and comments boxes, and a clear complaint form that ensures the feedback on the concern or grievance.	MINOR

e) *Impacts on archaeology*

Construction and operation phases

Vibrations and digging during construction and operation phases might impact archaeological remains if present on site. On the other hand, no known cultural heritage components exist within the project area (a TS with accumulated waste) and around it. 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

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:

- The governorate 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 archaeological 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 work 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 archaeological remains that could delay the project activities.

In case archaeological remains are found, the impact will be *localized*, long-term and *severe* (if this leads to damages to archaeological remains) during the construction activities. On the other hand, since no archaeological remains are expected within the project location, the magnitude will be SMALL (due to the low probability of occurrence and depending the type of archaeological remain). As the importance of archaeological resource is High, the significance of impact on the archaeology is deemed MODERATE. However, impacts on potential archaeological 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.
- Chance find procedure will be communicated to the contractors.

Residual Impacts

The above mitigation measure is expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts on the archaeology are deemed INSIGNIFICANT.

Table 6-15: Potential impacts on archaeology during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction and Operation	• Vibrations and digging during construction and operation phases might impact archaeological remains if present on site.	UNKNOWN	• 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. • Chance find procedure will be communicated to the contractors.	INSIGNIFICANT

6.3.4 Impact of the Environment on the Project

Impacts described in the sections below and well as potential impacts of other extreme weather conditions (e.g. due to climate change) will be addressed in the emergency preparedness and response plans as described in Section 7.4.

a) *Impacts of flash floods*

A flash flood is a rapid flooding of low-lying areas caused by heavy or excessive rainfall in a short period of time. However, the project site receives little or no rain (31 mm per year) with maximum 6 mm per month during winter season. A flood is an overflow of water onto normally dry land. Flooding is a longer-term event than flash flooding. Moreover, the project site is not intersected by any flood streams thus not potentially subject to flash flood hazards.

Accordingly, this potential impact is assessed to be *slight* (because of its low probability, low duration and very low frequency), affecting the *study area* and short-term. The magnitude of this risk is deemed NEGLIGIBLE. Therefore, although the importance of the waste transfer station and vulnerability of receptors (workers) are deemed High, the significance of potential impacts of flash floods is assessed as INSIGNIFICANT.

Mitigation Measures

Not required.

Table 6-16: Potential impacts from flash floods during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction and Operation	• The project site receives little or no rain (31 mm per year) with maximum 6 mm per month during winter season. • The project site is not intersected by any flood streams.	INSIGNIFICANT	• Not required	INSIGNIFICANT

b) *Impacts of sand storms*

Construction Phase

Higher wind speed potentially increases the performance losses due to abrasion and/or deposition of aeolian dust. The Markaz Bassioun 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 impact is assessed to be *slight* (being seasonal, of short duration and of low frequency) of short-term and affecting the *study area*. The magnitude of this risk is deemed NEGLIGIBLE. As the importance of the receptors (the workers) is deemed Medium, the significance of potential impacts of sand storms is assessed as INSIGNIFICANT.

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.

Operation Phase

Adverse impacts as a result of sandstorms may also cause waste particles to spread-out. 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 impact is assessed to be *slight* (being seasonal, of short duration and low frequency) but on the long-term throughout the project lifetime and affecting the *study area*. The magnitude of this risk is deemed SMALL. As the vulnerability of the receptors (the workers) is deemed Medium, the significance of potential impacts of sand storms is assessed as MINOR.

Mitigation Measures

In addition to the mitigation measures stated in the construction phase and workers health and safety the following shall be implemented:

- Ensure that waste transfer station is fenced.

Residual Impacts

The above mitigation measure is expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the sand storms on the project are deemed INSIGNIFICANT.

Table 6-17: Potential impacts from sandstorms during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction	• Higher wind speed potentially increases the performance losses due to abrasion and/or deposition of aeolian dust. • The area experiences sand storms during spring and	INSIGNIFFICANT	• Mitigation measures provided in the worker health and safety section; • Avoid working during sand storms;	INSIGNIFICANT

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
	autumn. This may pose potential health risk to construction workers		• Ensure that workers are wearing PPEs (masks and eye protection equipment); • Ensure that all materials are stored properly.	
Operation	• Adverse impacts resulting from sandstorms may cause waste particles to spread-out. • Sandstorms may impact workers through physical irritation and dust inhalation.	INSIGNIFICANT	• Mitigation measures provided in the worker health and safety section; • Avoid working during sand storms; • Ensure that workers are wearing PPEs (masks and eye protection equipment); • Ensure that all materials are stored properly. • Ensure that TS station is fenced.	INSIGNIFICANT

c) *Impacts of venomous species*

Construction and Operation Phases

Venomous species may potentially be present in the agricultural area and may pose a health risk to workers. These include some species of snakes such as the Egyptian Cobra (*Naja haje*) in wet areas such as canal banks. The impact of this is assessed to be *severe* but of low probability, at the *study area* level and of long-term. The magnitude of this risk is deemed MEDIUM, the receptors vulnerability is Medium and accordingly the significance of this impact is assessed as 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 may hide;
- Avoid walking barefoot
- Training and awareness of workers to learn which snakes may be present in the area and familiarize with their habits;
- Coordinate with the near hospitals and find out which hospitals that have the anti-venom available;
- A qualified person trained on how to deal with snake bites should be present at the project site during field activities;

Residual Impacts

The above mitigation measure is expected to be efficient for minimizing the potential impacts. Therefore, the residual impacts of the venomous species on the project are deemed MINOR.

A significance-rating summary of potential impacts during construction and operation before and after mitigation is presented in Table 6-19.

Table 6-18: Potential impacts from venomous species during construction and operation and proposed mitigation measures

Phase	Potential Impacts	Significance before mitigation	Mitigation Measures	Significance after mitigation
Construction and Operation	• Venomous species may potentially be present in the agricultural area and may pose a health risk to workers.	MODERATE	• Project staff should not turn over a stone with bare hands or put a hand or foot into a crevasse or hole where snakes may hide; • Avoid walking barefoot • Training and awareness of workers to learn which snakes may be present in the area and familiarize with their habits; • Coordinate with the near hospitals and find out which hospitals that have the anti-venom available; • A qualified person trained on how to deal with snake bites should be present at the project site during field activities;	MINOR

Table 6-19: Significance rating summary of the impacts of the transfer station activities during construction and operation

Issue / Impact	Phase	Without Mitigation						With Mitigation
		Temporal	Spatial	Severity	Magnitude	Sensitivity / Vulnerability / Importance of Receptor / Resource	Significance	Significance
PROJECT ON THE ENVIRONMENT								
Physical Environment								
Air quality	C	Short-term	*Localized*	*Slight*	SMALL	Medium	MINOR	INSIGNIFICANT
	O	Long-term	*District*	*Slight*	SMALL	Medium	MINOR	INSIGNIFICANT
GHG Emissions	C	Short-term	*localized*	*Slight*	NEGLIGIBLE	Medium	INSIGNIFICANT	INSIGNIFICANT
	O	Long-term	*District*	*Slight*	SMALL	Medium	MINOR	INSIGNIFICANT
Noise levels	C	Short-term	*Localized*	*Slight*	SMALL	High	MINOR to MODERATE	MINOR
	O	Long-term	*Localized*	*Slight*	SMALL	High	MINOR to MODERATE	MINOR
Soil and groundwater	C	Short-term	*Localized*	*Slight*	SMALL	High	MINOR to MODERATE	MINOR
	O	Long-term	*Localized*	*Slight*	SMALL	High	MINOR to MODERATE	MINOR
Biological Environment								
Disturbance to wildlife	C	Short-term	*Study area*	*Slight*	SMALL	Low	INSIGNIFICANT	INSIGNIFICANT
	O	Long-term	*Study area*	*Slight*	MEDIUM	Low	MINOR	INSIGNIFICANT
Attraction of pests	C	Short-term	*Study area*	*Slight*	SMALL	Medium	MINOR	INSIGNIFICANT
	O	Long-term	*Study area*	*Slight*	SMALL	Medium	MINOR	MINOR to INSIGNIFICANT
Socio-economic Environment								
Public health and amenity	C	Short-term	*Study area*	*Slight*	SMALL	Medium	MINOR	MINOR to INSIGNIFICANT
	O	Long-term	*Study area*	*Slight*	SMALL	Medium	MINOR	MINOR to INSIGNIFICANT
Traffic and road safety	C	Short-term	*Regional*	*Slight*	SMALL	Medium	MINOR	INSIGNIFICANT
	O	Long-term	*Regional*	*Slight*	SMALL	Medium	MINOR	INSIGNIFICANT
Workplace health and safety	C	Short-term	*Localized*	*Moderately severe*	MEDIUM	Medium	MODERATE	MINOR
	O	Long-term	*Localized*	*Severe*	MEDIUM	Medium	MODERATE	MINOR
Local Community	C/O	Long-term	*Localized*	*Severe*	MEDIUM	Medium	MODERATE	MINOR
Impacts on archaeology	C/O	Long-term	*Localized*	*Severe*	SMALL	High	MODERATE / UNKNOWN	INSIGNIFICANT

Issue / Impact	Phase	Without Mitigation						With Mitigation
		Temporal	Spatial	Severity	Magnitude	Sensitivity / Vulnerability / Importance of Receptor / Resource	Significance	Significance
ENVIRONMENT ON THE PROJECT								
Impacts of flash floods	C/O	Short	*Study area*	*Slight*	NEGLIGIBLE	High	INSIGNIFICANT	INSIGNIFICANT
Impacts of sand storms	C	Short-term	*Study area*	*Slight*	NEGLIGIBLE	Medium	INSIGNIFICANT	INSIGNIFICANT
	O	Long-term	*Study area*	*Slight*	SMALL	Medium	MINOR	INSIGNIFICANT
Impacts of venomous species	C/O	Long-term	*Study area*	*Severe*	MEDIUM	Medium	MODERATE	MINOR

6.4 Cumulative Impacts

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

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

With the mitigation measures provided, the project is not expected to have cumulative impacts of particular concern. On the other hand, the project along with the rest of the solid waste management components in Gharbia will help in improving both public and environmental health.

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 Bassioun Transfer Station 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 and residual impact: to identify appropriate effective measures that will reduce potential adverse environmental impacts to acceptable levels.
- Staffing a Health, Safety and Environment Department: to manage environmental and social aspects and 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 NSWMP, WB/IFC and KfW 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 the NSWMP guidelines and in accordance with international regulations including the WB/IFC and KfW 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
- Improved working conditions - Increase in employment opportunities - Reduced negative impacts of the accumulated waste on environment and human health - Reduction of Greenhouse Gas Emissions - Improved visual impact	- Impacts on air quality - Impacts from greenhouse gases - Impacts from noise level - Impacts on soil and groundwater quality - Impacts on terrestrial and aquatic life - Impacts on public health - Impacts on local community - Impacts on traffic - Impacts on workplace health and safety	- Impacts from flash flood - Impacts on archaeology - Land acquisition, compensation and involuntary resettlement - Impacts on vulnerable groups - Impacts on indigenous people

The residual impacts are mitigated/ addressed through an integrated management plan as described in Section 7-3.

7.2 Summary of Mitigation Measures and Residual Impacts

This section summarizes the potential negative environmental impacts of the project, mitigation measures and residual impacts after mitigation in Table 7-2 and Table 7-3.

Table 7-2: Impact assessment and mitigation measures summary during construction phase

Topic	Impact	Mitigation	Residual Impact
PROJECT ON ENVIRONMENT			
Physical Environment			
Air Quality	MINOR	• Dust suppression using water and chemical controls • Dust management through slowing the driving speed of transportation vehicles • Providing workers with awareness on maintaining good practice driving and machinery usage • Maintaining machinery and vehicles in good working conditions • Modify construction timing with favorable climate conditions	INSIGNIFICANT
GHGs Emissions	INSIGNIFICANT	• 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 in good working conditions • Ensure that gas emissions are below international and national limits	INSIGNIFICANT
Noise Levels	MINOR to MODERATE	• Maintain machinery and vehicles in good working conditions • Maintain site roads in good condition • Select equipment that has low noise emission levels • Use buildings to contain inherently noisy plant equipment • Follow the manufacturers' recommended maintenance schedule for engine and mechanical parts • Construction should be carried out at proper times during daytime.	MINOR
Soil and Groundwater	MINOR to MODERATE	• 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 • Ensure waste collection by a licensed contractor for treatment and final disposal • Sewage storage tank should be properly insulated for leak prevention. Contents should be emptied regularly for disposal at the adjacent wastewater treatment plant • Ensure the proper management of hazardous waste, treatment and disposal by an accredited contractor	MINOR

Topic	Impact	Mitigation	Residual Impact
Biological Environment			
Disturbance to wildlife	INSIGNIFICANT	• Same mitigation measures aiming at reducing air emissions and noise; and • Provide awareness to the workers on the negative impacts of disturbing any wild fauna; • Avoid working at night and avoid high intensity light that may disturb fauna; and • Ensure speed control and the prohibition of off-track driving.	INSIGNIFICANT
Attraction of pests	MINOR	• Develop, implement and update a solid waste, hazardous waste and wastewater 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 by animals; and • Ensure proper housekeeping practices.	INSIGNIFICANT
Socio-economic Environment			
Public health and amenity	MINOR	• Choose routes for construction trucks that avoid passing by the local communities • Monitor air pollution regularly to take corrective actions timely, if needed • Include a clear community grievance mechanism • Traffic and road safety measures shall be followed • The development of non-technical material to be disclosed and disseminated to the public to explain the Project with its impacts	MINOR to INSIGNIFICANT
Traffic and road safety	MINOR	• 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 • Drivers and staff shall maintain a good driving conduct • Install lightings on the roads if lacking • Add signs, signals, and pavement markings • Require adequate queuing distance • Require an onsite traffic pattern design • Schedule operating hours and delivery	INSIGNIFICANT

Topic	Impact	Mitigation	Residual Impact
Workplace health and safety	MODERATE	• The contractors will take into account the IFC/EBRD requirements for caravans or workers accommodation • 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 fire kit and ensure that workers are trained to use them • Implement good housekeeping practice and ensure that proper hygiene measures • 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 of the construction personnel on the safe use of equipment • 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	MINOR
Local Community	MODERATE	• Continuous engagement and potential involvement of the waste pickers in the formal sector of waste management	MINOR
Impacts on archaeology	MODERATE / UNKNOWN	• 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 and the chance find procedure mentioned in Chapter 7 will be applied. • Chance find procedure will be communicated to the contractors.	INSIGNIFICANT
ENVIRONMENT ON THE PROJECT			
Impacts of flash floods	INSIGNIFICANT	• Not required	INSIGNIFICANT
Impact of sand storms	INSIGNIFICANT	• Apply workplace health and safety mitigation measures • Avoid working during sand storms • Ensure that workers are wearing PPEs • Ensure that all materials are stored properly	INSIGNIFICANT

Topic	Impact	Mitigation	Residual Impact
Impacts of venomous species	MODERATE	• Project staff should not turn over a stone with bare hands or put a hand or foot into a crevasse or hole where snakes may hide • Avoid walking barefoot • Training and awareness of workers to learn which snakes may be present in the area • Coordinate and find out which hospitals that have the anti-venom available • A qualified person trained on how to deal with snake bites should be present	MINOR

Table 7-3: Impact assessment and mitigation measures summary during operation phase

Topic	Impact	Mitigation	Residual Impact
PROJECT ON THE ENVIRONMENT			
Physical Environment			
Air Quality	MINOR	• Misting system if needed • Building orientation with respect to predominant wind direction • Implement good housekeeping procedures • Sweep waste management areas • Providing workers with good practice driving and machinery usage • Inspection and Maintenance of machinery and vehicles to keep them in good working conditions • Clean and wash vehicles routinely	INSIGNIFICANT
GHGs Emissions	MINOR	Waste should not be left to accumulate	INSIGNIFICANT
Noise Levels	MINOR to MODERATE	• Design machines and equipment are designed to meet noise statutory regulations • Acoustic enclosures are installed for noise generating equipment, wherever possible • Regular inspection and maintenance of equipment • Waste transfer should be conducted during daytime	MINOR
Soil and Groundwater	MINOR to MODERATE	• Use impermeable materials for roads, waste handling areas, and vehicle washing areas, • Collect runoffs from areas used for waste handling, and treat runoff to meet applicable environmental standards before discharge to surface water or the municipal sewage system • Discharge of runoff to the municipal sewage system is preferred versus discharge to local surface waters. • Waste will not be left to accumulate for a long time through applying the operational plan. • Continuous staff training on operation activities should be implemented.	MINOR
Biological Environment			
Disturbance to wildlife	MINOR	• Same mitigation measures as in construction phase	INSIGNIFICANT
Attraction of pests	MINOR	• Construction and maintenance of an adequate fence around the site to limit undesired faunal access; • Avoid delaying the transfer of newly delivered and rapidly decomposable wastes; • If necessary, use environmentally safe biocides to control mosquitoes and flies; and, • Inspect site for growth of marginal vegetation and regularly remove it, should it develop.	MINOR

Topic	Impact	Mitigation	Residual Impact
Socio-economic Environment			
Public health and amenity	MINOR	• Choose routes for waste transfer trucks that avoid passing by the local communities, if possible • Maintain the trucks and assure that the solid waste is covered during transportation; • Build a high fence of 3 meters around the site to isolate it completely from residential areas and plant the whole site as a botanic forest; • Monitor air pollution regularly to take corrective actions timely • Include a community grievance mechanism • Traffic and road safety mitigation measures shall be followed	MINOR to INSIGNIFICANT
Traffic and road safety	MINOR	• Same as construction phase • Equip collection and transfer trucks with tracking system if feasible	INSIGNIFICANT
Workplace health and safety	MODERATE	• IFC performance standard of labour and working conditions shall be maintained. • Add sprinkler systems • Add fire extinguishers and fire kit • Use fire resistant /retardant material in building construction	MINOR
Local Community	MODERATE	• Continuous engagement and potential involvement of the waste pickers in the formal sector of waste management	MINOR
Impacts on archaeology	MODERATE / UNKNOWN	• 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. • Chance find procedure will be communicated to the contractors.	INSIGNIFICANT
ENVIRONMENT ON THE PROJECT			
Impacts of flash floods	INSIGNIFICANT	• Not required	INSIGNIFICANT
Impacts of sand storms	MINOR	• Follow mitigation measures of impact of sand storms during construction phase • Ensure that waste transfer station is fenced	INSIGNIFICANT
Impacts of venomous species	MODERATE	Follow same procedures as the Impacts of venomous species in construction phase	MINOR

7.3 Environmental and Social Responsibilities

7.3.1 Establishment of Health, Safety and Environment Department

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

- An occupational health and safety officer
- One security supervisor
- One Community Liaison Officer (CLO)
- One doctor/nurse

7.3.2 Responsibility of HSE Staff

The health and safety management department will be responsible for daily safety work (walks-over) at the site, for inspecting the safety, housekeeping, personal protection and to control unsafe action/condition.

When construction work poses high risk that threatens the workers' safety and health, the health and safety officer will have the right to stop the activity in order to prevent potential danger, in addition, he has the right to report workers who do not comply with safety regulations on site.

- Responsibility of occupational HSE officer
  - Implements the contractor's HSE plan;
  - Review reports and takes measures for HSE corrective actions on 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 monthly reports;
  - Prevents and corrects potential safety risk behaviours; and
  - Plans and supervises all environmental monitoring aspects and proposes potential corrective actions.

- Security Supervisor
  - Supervises the execution of safety measures;
  - Reports accidents; and
  - Supervises the site.

- CLO Responsibilities
  The Community Liaison Officer (CLO) collects and responds to community concerns and grievances and will require coordination with the Site or HSE Officer before engaging with the community on any issues. Moreover, he/she will also submit monthly brief reports to the HSE Officer concerning any grievances.

  The specific tasks of the CLO 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 including the waste pickers.
- Prepare the annual plan for engagement and consultation 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;
- Participate in the regular updates of the stakeholder engagement plan and matrix;
- Write quarterly grievance reports collating and analysing the grievances along with recommendations to top management.

7.4 Environmental Management Procedures

The following is a general outline of the environmental management plan of the project. The governorate will then develop the procedures to be implemented to be able to implement the management plan. Additionally, the governorate will ensure that compliance with the national regulations as well as the IFC and KfW guidelines.

7.4.1 Environmental Management during the Construction Phase

The environmental dimension will be incorporated throughout the construction phase. It is worth mentioning that the contractor will be responsible for the preparation, and implementation of the environmental management plan. However, the governorate 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 labour. The following shows the minimum management plans that the contractor will follow.

- *Solid Waste Management*
  Domestic solid waste generated during the construction phase will be collected from the site. Waste shall be properly stored according to the national regulations and disposed with a certified waste contractor. Waste will be disposed off-site periodically through a certified contractor. Solid wastes management will be proceeded in accordance to the requirements of Laws 4/1994 and 37/1967. If possible, wastes that can be recycled shall be transferred to a certified contractor.

- *Wastewater Management*
  The generated wastewater will be collected in a closed and sealed above-ground 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 Transfer Station:

  HW Generation
  The following hazardous wastes are generated from the proposed project:
  -Batteries;
  -Oil filters;
  -Empty oil, and paint containers;
  -Fabrics contaminated with oil;
  -Spent oils;
  -Waste lubricants, fuel, paint, and thinner;
  -Contaminated sand; and
  -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 storage area in a specifically categorized zone (e.g. labelled HW zone), which would be provided with suitable fire extinguishers and other safety equipment. Furthermore, each HW type will have color-coding and will be labelled with the containers content and the required precaution instructions.

  HW Disposal
  The HW will be transported to El Nassreya HW landfill in Alexandria, via a certified contractor. On the other hand, 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.

A maintenance schedule will be prepared for mechanical work as well as periodic replacement of parts before breakdown occurs.

- *Transportation management*

The Project will prepare a management plan prior to the construction phase start-up, which will include:

- Transportation route of construction materials;
- Transportation schedule of construction materials; and
- Process of transporting construction material and management measures.

- *Antiquities excavation*

The project site is property of the State and not recorded as an archaeological area and the governorate obtained official permission for this project. 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:

- The governorate 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 archaeological 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 archaeological 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 incident to minimize its 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.

The governorate 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 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; and
- 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 that 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 the operation of the TS and help return it 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 the project.

7.4.2 Environmental Management during the Operational Phase

The governorate/operator will be responsible for the preparation, implementation, and monitoring of the environmental management plan during the operation phase. The management plan will also comply with the project specific guidelines of the IFC "Environmental, Health, and Safety Guidelines for waste management facilities".

- *Environmental Register*
  The governorate/operator 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 governorate/operator 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 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

- *Pest management*
  - Use integrated pest-control methods to manage pests with insecticide and rodenticides approved by the Ministry of Agriculture, if needed;
  - Store waste properly to prevent its accessibility by rodents and ensure its proper transmission to transfer trucks;
  - Prevent, as much as possible, rodents from entering the facility;
  - Maintain good housekeeping conditions.

- *Controlling Odours*
  Odours will be controlled through the following procedures:
  - Provision of adequate ventilation in closed areas;
  - Ensure good housekeeping practices and avoid any waste accumulations;
  - Use technologies that eliminate odours at sites with risk of odour emissions; and
  - Cover trucks during waste transportation to and from the TS.

- *Housekeeping*
  The project will follow a good housekeeping management as follows:
  - Promptly intervene in case of any accidental spills from machines and vehicles;
  - Reduce the storage time of any wastes and avoid its accumulation; and
  - Implement regularly good cleaning practices.

- *Preventive Maintenance*
  The governorate/operator 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 of any repetitive equipment failure or breakdown and emissions. The general maintenance measures include:

- Maintaining equipment history cards at equipment locations; and
- Maintaining a master preventive maintenance schedule.

Maintenance schedule will be prepared for the mechanical work and the periodic replacement of parts before breakdown occurs. A maintenance schedule will specifically be made for important equipment such as:

- Transfer trucks;
- Personal protection devices; and
- Diesel generator.

- *Solid Waste Management*
  Domestic solid waste from workers will be added to the transfer trucks and will be handled as part of the solid waste handled in the TS.

- *Hazardous 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 (oil, lubricating oil and pesticides);
  - 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 extinguishers of suitable type;
  - Place sign labels on stored materials;
  - Provide material safety data sheets (MSDS) for hazardous materials used;
  - 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; and
  - Hazardous waste shall be disposed via a certified contractor to El Nassriya Landfill.

- *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 Transfer Station
  - 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
- Training to handle pesticides
- First Aid training

- *Emergency and Fire Alarm Plans*

  First: contingency plans

  Identify specific risks

  This includes potential risks related to equipment, devices, materials, buildings, and storing procedures; in order to identify the type, quantity and the magnitude of risks that could induce fire, personnel fatality, or building collapse. These risks include the following:
  - Activities that may pose risks on the workers;
  - Quantities and types of hazardous materials/wastes 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 equipment and sites needed to combat risks. The following activities will be identified:
  - 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, provide the emergency support and services, and determine the type of assistance needed.
  - Determine fire prevention and control requirements

  Implementation

  The plan should include the level of implementation carried out by individuals or groups according to the following steps:

  Warning and Alarm plan

  The selected warning method should be effective in terms of communicating the warning message to all employees of the site and making sure that they are aware of the nature of the risk and provide them with the opportunity to confront or escape from it. The alarm must be visible and audible to reach all employees on the site.

  Response

  Responses are carried out according to the type, rate of spread, damages and consequences of the hazard through trained personnel, either directly or manually, using smart devices or through offsite control.

Medical assistance and services

An ambulance shall be available for potential injured workers 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 governorate/operator 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; and
- 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

The Transfer Station 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 be comprised of the following:

- Fire hose reels
- Automatic sprinkler systems

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

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). Periodical training for the firefighting team will be provided by the governorate/operator in collaboration with the Civil Defense Authority. Moreover, guidelines for the training which will include firefighting procedures and emergency evacuation procedures will be prepared and delivered to the team. Finally, a firefighting plan will be developed prior to the project operation and will be approved by the Civil Defence Authority.

- *Transportation management*
  The governorate/operator will prepare a management plan prior to the operational phase which will include:
  - Transportation schedule of waste;
  - Process of transporting of material and waste.

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 governorte/operator will prepare and implement monitoring programs for various environmental aspects during construction and 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 the environmental monitoring is a dynamic process. Subsequently, regular updates and modifications as needed shall be carried out based on the results of the first monitoring round. Moreover, A detailed monitoring plan will be made available by the governorate/operator at the operation phase.

7.5.1 Environmental Monitoring during the Construction Phase

A detailed environmental monitoring plan is not required for the construction phase due to its short duration (6 months). The following simple monitoring activities are deemed sufficient.

- *Air Quality*
  The construction contractor, under the supervision of the governorate, should carry out visual inspection of dust emissions from construction equipment and inspect proper maintenance of vehicles and equipment to avoid emissions beyond limits.

- *Noise Intensity*
  Increased noise intensity is anticipated to mainly impact on site workers. As such, spot measurement of noise during the construction activities should be conducted. Noise levels recorded should be compared to levels set within the national legislation. The limit stipulated in Law No. 4/1994 for work places with 8 hours shift is 85 decibel (A). Moreover, measurements beyond the site are recommended to measure noise intensity where the residential receptor is located. Limits detected should be compared to levels set within the guidelines. The limit stipulated in Law No. 4/1994 for areas on roads whose width is 12 m or more, or industrial areas, which comprise light industries and other activities is 70 decibel (A) during daytime.

- *Workers' Health and Safety*
  Regular visual inspection and medical checkups should be sufficient for worker health and safety monitoring. Any reoccurring incidents such as irritations, rashes, respiratory problems, etc., should be recorded and appropriate mitigation measures updated and enhanced. Management should monitor workers to assure that all health and safety measures and protective gear are being used for their assigned purpose.

  Table 7-5 presents the potential impacts and related monitoring aspects for the construction phase, including location, target/indicator, frequency, responsible and implementation entity and estimated cost.

- *Surface Water*
  Surface water will be monitored twice during the construction phase (quarterly intervals). Samples will be taken from two locations in the upstream and downstream of the TS and compare them to determine the impact of the proposed TS on the surface water quality. Chemical, physical, and biological parameters will be monitored as identified in Appendix A – Supplement for Transfer Stations of the latest version of the ESIA Guidelines for Municipal Solid Waste Management Projects developed for NSWMP in 2019. Table 7-4 shows the surface water and groundwater parameters that will be monitored in the construction phase.

Table 7-4: Parameters for Monitoring of Surface water and groundwater

Monitoring Parameter	Surface Water	Groundwater
Fluid Level	•	•
Flow rate	•	•

Monitoring Parameter	Surface Water	Groundwater
Temperature	•	•
Dissolved oxygen	•	
pH	•	•
Electrical conductivity	•	•
Total suspended solids	•	
Total dissolved solids	•	•
Ammonia (as N)	•	•
Total oxidized nitrogen (as N)	•	•
Total organic carbon	•	•
Biological oxygen demand	•	
Chemical oxygen demand	•	
Metals	•	•
Total alkalinity (as $CaCO_3$)	•	•
Sulphate	•	•
Chloride	•	•
Molybdate Reactive Phosphorus	•	•
Cyanide (Total)	•	•
Fluoride	•	•
Trace organic substances	•	•
Faecal & Total Coliforms	•	•

Source: NSWMP, 2019b

It is worth mentioning that surface water will be monitored in the construction phase only as the TS will have paved areas. Furthermore, the waste will be handled in an insulated area. Therefore, leachate is not expected to reach the surface water, and monitoring of surface water is not deemed necessary.

- *Groundwater*

  As groundwater might have been contaminated due to previous waste dumping activities, it is important to obtain baseline groundwater analyses before starting the construction activities in order to demonstrate that potential groundwater pollution (if any) is not related to the project.

  In this respect, groundwater will be monitored three times; once before starting any construction works and twice during the construction phase (quarterly intervals). Three samples will be taken (one sample will be taken upgradient of the proposed TS, and two samples will be taken downgradient of the proposed TS). The results will be compared to determine the impact of the proposed project on the groundwater. Chemical, physical, and biological parameters will be monitored as shown in Table 7-4.

  It is worth mentioning that groundwater will be monitored in the construction phase only as the TS will have paved areas. Furthermore, the waste will be handled in an insulated area. Therefore, leachate is not expected to reach the groundwater, and monitoring of groundwater is not recommended.

Table 7-5: Monitoring activities during the construction phase

Source of impact / Receptors	Type of monitoring	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
Air quality	Standard air measurements	Construction equipment /vehicles	Compliance of emissions to standards	Monthly	All contractors and sub-contractors, supervised by the governorate	Third party (research entity or certified lab)	5,000 per monitoring activity
Noise	Noise intensity measurements	Project site	Compliance of noise intensity to standards	Monthly	All contractors and sub-contractors, supervised by the governorate	Third party (research entity or certified lab)	1,000 per measurement
Neighbouring communities	Air and noise measurements	Neighbouring residential area	Compliance of air emissions and noise intensity to standards	Monthly	All contractors and sub-contractors, supervised by the governorate	Third party (research entity or certified lab)	6,000 per monitoring activity
Workforce	• Air and noise measurements • Medical checkups	Project site	• Compliance of air emissions and noise intensity to standards • Workers' health status	Monthly	All contractors and sub-contractors, supervised by the governorate	• Third party (research entity or certified lab) • Medical insurance company	• 6,000 per monitoring activity • 500 per medical checkup
Surface Water	Standard water measurement	Upstream and downstream of the TS location	Upstream sample will be compared with downstream sample	Quarterly	All contractors and sub-contractors, supervised by the governorate	Third party (research entity or certified lab)	Variable, according to the third party
Groundwater	Standard water measurement	Upgradient and downgradient of the TS location	Upgradient sample will be compared with downgradient samples	Quarterly	All contractors and sub-contractors, supervised by the governorate	Third party (research entity or certified lab)	Variable, according to the third party

7.5.2 Environmental Monitoring during the Operational Phase

Proposed monitoring during the operation phase will include the following:

- *Ambient Air and GHGs Quality Monitoring*
  Air emissions will be monitored bi-annually to check their 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; and
  - Annex 6 of the Executive Regulations of Law No. 4 of 1994 (amended by decree 964 of 2015) for vehicle exhausts.

  Section 2.1.4 in Chapter 2 provides details on these limits.

  Monitoring of odour emissions from the site will be made at the start of the day, prior to the commencement of site operations and then 1-2 times a day during the operations, particularly in case of wind direction and speed changes. A flag on a pole installed within the TS site could be used for visual monitoring of wind direction and speed. Monitoring could be performed with involvement of staff not accustomed to waste odours (e.g. the site guards). This will include an assessment of any impacts at the downwind boundary and/or the boundary facing the nearest sensitive recipient. All observations and findings, including wind and other weather conditions, will be noted in the site logbook.

  Should strong odours be present at the site boundary, the Site Manager will act promptly to identify the source(s) of the odours and take the necessary corrective action. Each event, its cause and the action taken will be recorded in the site logbook. The site daily records will be kept available for inspection on request. In the event of any substantiated complaint, the odour management scheme will be reviewed and amended as necessary.

- *Pest monitoring*
  Continuous visual inspection will be sufficient to indicate whether changes have been brought about to the biodiversity of the area and if the number of pests (rodents, insects, etc.) has increased. If deemed necessary, rodent pest monitoring (Meerburg *et al*., 2004) can be done through:
  - Estimating the abundance of rodents using traps, or tracking plates or electronic devices; and
  - Reviewing the results by checking which species of rodents are the major pests and if abundance is above thresholds.

- *Workplace Monitoring*
  Air emissions
  Monitoring the emissions inside utilities workplace will be performed bi-annually. Generator and vehicles may produce various emissions. Measurement results will be compared to the limits provided in Annex 8 of

Law 4/1994 and Law 12/ 2003 (stated in section 2.1.4 in Chapter 2). The following parameters will be monitored: SO_2, NO_2, CO, and TSP.

Noise

During operation of utilities, the governorate/operator 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 2.1.10 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 guidelines. Noise measurements will be carried out bi-annually at the locations generating increased noise levels.

Wastewater

Wastewater generated within the site will be monitored periodically by the governorate/operator. However, monitoring from a certified third party is needed quarterly. Measurement results will be compared to the limits given in Article 14 Decree 44/2000 of the Ministry of Housing modifying the executive regulations of Law 93/1962 (stated in section 2.1.7 in Chapter 2).

Health conditions

Monitoring the health conditions of the workers who handle wastes through periodic health exams that include clinical assessment and blood/urine tests.

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 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; and
  - Level indicators for liquid storage tanks (if any) will be checked periodically to ensure their effectiveness.

Table 7-6 presents the impacts and related monitoring aspects, including location, target/indicator, frequency, responsible and implementation entity and estimated cost.

Table 7-6: Monitoring activities during the operational phase

Source of impact / Receptors	Type of monitoring	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
Air quality and GHGs	GHGs measurements	• Generator • Mobile sources /vehicles	• Compliance of parameters (SO_2, NO_x, CO, and TSP to air quality standards • Compliance of smoke density to air quality standards	Biannual	The governorate/operator	Third party (research entity or certified lab)	5,000 per monitoring activity
Ambient Air	Standard air measurements	Four corners of the project location	• Compliance of parameters (SO_2, NO_x, CO, PM_{10} and TSP to ambient air quality standards	Biannual	The governorate/operator	Third party (research entity or certified lab)	3,000 per corner
Noise	Standard noise measurements	At noise generating locations (at generator unit, loading, and unloading areas)	Compliance to noise levels standards	Biannually	The governorate/operator	Third party (research entity or certified lab)	1,000 per measurement
Soil and groundwater	Visual inspection	Project site	Proper housekeeping	Daily	The governorate/operator	HSE Staff	Included in workforce salary costs
	Visual inspection of wastewater	Loading area	Compliance to Article 14 limits of decree 44/2000	As required	The governorate/operator	HSE Staff	Included in workforce salary costs and operation costs
	Wastewater sampling		Compliance to Article 14 limits of decree 44/2000	Quarterly	The governorate/operator	Third party (research entity or certified lab)	Variable, according to number of analyzed parameters

Source of impact / Receptors	Type of monitoring	Monitoring location	Target / Indicators	Frequency of monitoring	Responsibility	Implementation	Estimated cost (EGP)
Terrestrial biodiversity	Visual inspection	Within and around the site	Proper housekeeping and limited pests	Weekly	The governorate/operator	HSE Staff	Included in workforce salary costs
Community impacts	Visual inspection	Offsite (roads and nearby areas)	• Regulations are followed • Grievances are minimized	As necessary	The governorate/operator	• CLO • Security supervisor	Included in workforce salary costs
Traffic	Visual inspection	Transport roads	• Rules are followed • Minimized accidents	As necessary	The governorate/operator	• HSE Staff • Security supervisor	Included in workforce salary costs
Public health	Visual inspection	Offsite	• Rules are followed	As necessary	The governorate/operator	HSE Staff	Included in workforce salary costs
Workplace Health and Safety	Workers' use of PPEs	Inside the transfer station	• Rules are followed	Daily	The governorate/operator	HSE Staff	Included in workforce salary costs
	Air and noise measurements	Within the transfer station	• Compliance of air and noise measurements to quality standards	Bi-annually air and noise quality measurements	The governorate/operator	Third party (research entity or certified lab)	3,000 per monitoring activity
	Medical checkups for the bio-indicator parameters (e.g organo-phosphates, cholinesterase and alkylphosphates)	TS workers	Workers healthy status	Monthly medical checkups	The governorate/operator	Medical insurance company	4000 / year / worker (cost of medical insurance)

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 the governorate 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 section.

7.6.1 Labour and Working Conditions

The governorate will ensure that contractors during the construction phase are implementing suitable health and safety measures. During operation, the governorate/operator will adhere to the Law 12/2003 and IFC workplace health and safety guidelines.

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 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, vibration, traffic if any); key contacts for the project; and other information as needed. More details are provided in Chapter 8.

7.6.4 Grievance Management

A grievance management plan is presented in 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 governorate/operator is authorized to change and re-issue the ESMP. The Site Supervisor should be informed of any changes made 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 Engagement

Consultation with the community and stakeholders is an important element in the ESIA process. The current chapter presents details of the individual consultations carried out by Environics during preparation of the ESIA.

8.1 Methodology

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; and
- Consultation during the preparation of the ESIA.

As the Gharbia SWM is an integrated project which includes Bassioun, Zefta and Samanoud TS facilities as well as the Sadat Landfill in Menoufya, individual meetings with project stakeholders were carried out for the whole Gharbia SWM integrated project, as the three subprojects were considered to be interrelated.

As mentioned in Section 4.1.3, a total of 18 Key Informant Interviews (KIIs) were conducted with local officials at Governorate, Markaz, City, and Village levels. These include 4 KIIs in the Governorate of Gharbia, 4 KIIs in Zefta Markaz, and 10 KIIs in Samanoud Markaz.

A public consultation was carried out for the Zefta and Samanoud TS projects as per KFW's request at the 8th of September, 2020. Moreover, a Public Consultation and Disclosure meeting is expected to be carried out for the Sadat landfill project. Various alternatives for Bassioun disclosure of the project information are envisaged (see Section 8.4.2).

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 preparation of the study.

Stakeholders have been identified considering the following factors:

- Project's nature and activities;
- Land use of surrounding area; and
- Environmental aspects of the project.

Table 8-1 shows the main concerned stakeholders and their respective roles in the project, identified during the preparation of the scoped ESIA.

Table 8-1: Main Project stakeholders

Stakeholder	Role / Potential attention
Egyptian Environmental Affairs Agency - EIA Central Department - Solid Waste Management Department - Inspection Department - Climate Change Central Department - Gharbia Regional Branch office	Overall coordinating body of monitoring, enforcement and regulating developments through setting the EIA system, managing the protection and preservation of natural environment in coordination with concerned and responsible authorities
Gharbia Governorate: - Cleaning and Beautification Authority - Department of Environmental Affairs, Gharbia Governorate	Governorate official bodies responsible for licensing, implementation and follow up of regulations
Markaz Bassioun	Markaz official bodies responsible for licensing, implementation and follow up of regulations.
NSWMP	NSWMP is responsible for establishing a number of MSW projects in four Governorates. These are Kafr El Sheikh and Gharbia in the Nile Delta, and Assiut, and Qena in Upper Egypt.
Local community	Residents near the project's area, since they are familiar with the project's area and may be positively or negatively affected by the project. Furthermore, the management of the wastewater treatment facility next to the site is considered from the local community impacted from the project
Non-governmental organizations (NGOs) and /or community representatives	Protect the environment, influence decision-making, and represent the local community.
Members of the Parliament	Representing the local community and aware with important social issues
Scientific community	Owns the technical knowledge of the project's area characteristics

8.3 Individual Scoping Meetings

The TS project is part of an integrated management system in the governorate. The new SWM in the governorate will include Zefta, Bassioun, and Samanoud TS projects, and Sadat landfill. The new proposed projects meetings with relevant stakeholders were carried for both Zefta and Samanoud TS projects. The meetings aimed at the following:

- Define the main characteristics of the project's site and the surrounding land use;
- Identify the specific requirements and local concerns to be considered in the ESIA; and
- The expected positive and negative impacts of the project.

8.3.1 Meeting at the Gharbia Governorate Headquarter

This Individual meeting was carried out in the preparation of the ESIA for the TS projects with the following stakeholders:

- Head of Governor Office;
- Head of solid waste Directorate at El Gharbia Governorate;

- Officer at the solid waste Directorate at El Gharbia Governorate; and
- Officer at the Environmental Directorate at El Gharbia Governorate.

The meeting was held at the governorate building on 22/12/2019 at the Head of Governor Office. The main topics discussed during the meeting are:

- The main characteristics of the project's site and the surrounding land use;
- The previous land use of the Zefta and Samanoud project locations, and the quantity of waste transferred from the sites to Sadat landfill;
- The current and proposed SWM in the governorate;
- The importance of the projects to the governorate;
- The need of the governorate to establish MBT in each Markaz;
- The impact of the projects on the waste pickers. It was reported that jobs were offered to waste pickers with a salary of 2,000 EGP. However, the waste pickers rejected these job offers;
- The specific requirements and local concerns to be considered in the ESIA; and
- The expected positive and negative impacts of the project.

8.3.2 Meetings in Zefta

Individual meetings were carried out during the preparation of the ESIA for the Zefta TS project with the following stakeholders:

- Head of Zefta City and Markaz;
- Deputy Head of Zefta City;
- Head of solid waste Directorate at Zefta City; and
- Head of monitoring and evaluation at the solid waste Directorate at Zefta City

The meetings were held at the city council building on 22/12/2019 at the headquarter building of Zefta City and Markaz. The main topics discussed during the meeting are:

- The main characteristics of the project's site and the surrounding land use;
- The previous land use of the Zefta project location, and the quantity of waste transferred from the site to Sadat landfill;
- The current and proposed SWM in Zefta city and Markaz;
- The importance of the project to Zefta city and Markaz;
- The impact of the project on the waste pickers. It was reported that the main scavenging activities are carried out during the collection phase and at the dumpsite. It was also reported that it is not expected that the project would have a major impact on the livelihood of the waste pickers, as scavengers extract most of the recyclables at the collection phase and that this activity will not be prevented;
- The specific requirements and local concerns to be considered in the ESIA; and
- The expected positive and negative impacts of the project.

8.3.3 Meetings in Samanoud

These individual meetings were carried out during the preparation of the ESIA for the Samanoud TS project with the following stakeholders:

- Deputy Head of Samanoud City;
- Head of SW Directorate at Samanoud City;
- Head of Awareness Raising Department at solid waste Directorate at Samanoud City;
- Operation Management Officer at solid waste directorate at Samanoud City;
- Monitoring and Evaluation officer at the solid waste Directorate at Samanoud City;
- Officer of Technical Assistance at solid waste Directorate at Samanoud City; and
- Head of Environmental Directorate at Samanoud City.

The meetings were held at the City Council building on 23/12/2019, the headquarter building of Samanoud City and Markaz. The main topics discussed during the meeting are:

- The main characteristics of the project's site and the surrounding land use;
- The previous land use of the Zefta and Samanoud project locations, and the quantity of waste transferred from the site to Sadat landfill;
- The current and proposed SWM in Samanoud City and Markaz;
- The importance of the project to Samanoud City and Markaz;
- The impact of the project on the waste pickers. As for Zefta, it was reported that the main scavenging activities are carried out at the collection phase and at the dumpsite and that that the project would not impact the livelihood of the waste pickers, as they will not be forbidden extracting recyclables at the collection phase;
- The specific requirements and local concerns to be considered in the ESIA; and
- The expected positive and negative impacts of the project.

It should be mentioned that only male persons attended the meetings and were consulted during preparation of the ESIA.

8.4 Information Disclosure and Stakeholder Engagement

The IFC Performance Standard PS 5 recognizes the importance of an open and transparent engagement between the project's management team, its workers, and local communities. 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.

8.4.1 Stakeholders Identification

Stakeholders' identification is a continuous process that is carried on during the different phases of project development. Stakeholders can be categorized as follows.

- *Primary stakeholders*
  Primary stakeholders are the beneficiaries of a development intervention who will be directly affected, positively or negatively. They include local populations (individuals and the community-based organizations) in the project area. These are in particular, the local poor and marginalized groups who have traditionally been excluded from participating in development efforts and outcomes; as well as the local community-based organizations which represent their interests in the project. Given the nature of current project, the public and any groups which have interest in the solid waste at all levels are considered key primary stakeholders. Accordingly, primary stakeholders would include:
  - The public of Gharbia Governorate will benefit directly from the Project especially the residents of Zefta, Bassioun, and Samanoud cities;
  - Households with vulnerable members, e.g., infants, poor households, female headed households, people with chronic diseases, and disabled are at higher risk than other people in the local communities and subject to be more impacted by adverse impacts of unmanaged solid waste;
  - Local residents, farmers and workers adjacent to the land allocated for the Project;
  - The management of the wastewater treatment facility adjacent to the project site;
  - Scavengers are considered an important pressure group to this project. They make their living from sorting solid waste and selling the sorted items to local contractors or companies engaged either in the trade of sorted solid waste or the recycling of these items;
  - Local Non-governmental organizations (NGOs) working in the area of solid waste collection and management. Many of such NGOs run small to medium projects; and
  - Local solid waste contractors or companies who buy sorted solid waste items from scavengers to sell it to larger contractors/recycling factories or who run themselves small to medium recycling facilities.

- *Secondary stakeholders*
  Secondary stakeholders are 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 to improve the design, or because of their ability to provide mitigations of environmental and social impacts, or because of their influence on the development; and also those likely to be indirectly affected by the project. They mainly include Central Government, line ministries, local government/authorities, implementing agencies, project staff, private sector firms, national and international donors and lending institutions, pertinent development agencies, media, and academic institutions.

  Secondary stakeholders include:

- Ministry of State for Environmental Affairs;
- EEAA and its Middle Delta Regional Branch Office (RBO) located in Tanta;
- The Environmental Directorate at Gharbiya Governorate, Markaz, and City level;
- The Solid Waste and Cleanliness Directorate at the Governorate, Markaz, and City level;
- Gharbia Governorate, Markaz and City Councils, and Village councils;
- The Project staff, engineers, and consultants;
- The private sector and contracting companies;
- Consulting firms and academic institutions; and
- National and international donors and lending institutions.

Table 8-2 shows the name, position and contact details of the different stakeholders interviewed in Gharbia Governorate.

Table 8-2: Stakeholders interviewed in Gharbia Governorate

#	Name	Position	Date of meeting	Contact
El Gharbia Governorate				
1	Mamdouh Hagras	Head of Governor Office	22/12/19	01065217878
2	Hosny Radwan	Head of SW Directorate at El Gharbia Governorate	22/12/19	01276333243
3	Osama Ibrahim Tawfik	Officer at the SW d Directorate	22/12/19	8865759
4	Saeed Abbas Mohamed	Officer at the Environmental Directorate at El Gharbia Governorate	22/12/19	01099631280
Zefta Markaz				
1	Ahmed Abdel Maqsoud El Nahal	Head of Zefta City and Markaz	22/12/19	6886587
2	Megahed El Darf	Deputy Head of Zefta City	22/12/19	01027868784
3	Mohamed Eweis	Head of M&E at SW Directorate at Zefta City	22/12/19	--
4	Bahaa Ahmed	Head of SW Directorate at Zefta City	22/12/19	01156364720
Samanoud Markaz				
1	Saeed el Sharkawi	Mechanical Engineer at Chemonics	23/12/19	01092823720
2	Ali Atrees Swaidan	Head of Awareness Raising Department at SW Directorate at Samanoud City	23/12/19	01274208348
3	Adel El Sayed Abd Raboh	Operation Management Officer at SW Directorate at Samanoud City	23/12/19	01272168711
4	Mahmoud Abdallah El Eefaie	M&E Officer at SW Directorate at Samanoud City	23/12/19	01004155971
5	Mohamed Ismail El Zamel	Officer of Technical Assistance at SW Directorate at Samanoud City	23/12/19	01018096777
6	Mohamed Samir Tunis	Head of SW Directorate at Samanoud City	23/12/19	01009070783
7	Gamal El Raei	Head of Environmental Directorate at Samanoud City	32/12/19	01225686843
8	Abdel Aziz Mohamed Aggag	Deputy Head of Samanoud City	23/12/19	0122550302

#	Name	Position	Date of meeting	Contact
9	Essam Abou Deif Hamouda	Solid Waste Contractor and Guard of the land allocated for the Project	23/12/19	01021483176
10	Mohamed El Saeed Badreya	Worker at a pottery adjacent to the land allocated for the Project	23/12/19	--

8.4.2 Public Consultation and Disclosure

As previously mentioned, the project is categorized as Scoped B and Public Consultation/Disclosure is not required as per the EEAA regulations. In addition, due to COVID-19 (Coronavirus) outbreak, the government has currently banned all types of gatherings and meetings. Therefore, to maintain the consultation process throughout the project development and to involve the public in the disclosure phase, various alternative methods are envisaged. The various disclosure methods that can be applicable are presented below.

A remote (on-line) consultation can be carried out by publishing information via social media and a billboard at the site. Information would include a presentation of the project highlighting pros and cons, explaining mitigation measures and allowing questions and suggestions until a certain date.

Other way for including the public is to post a newspaper advertisement on the project, which includes a phone number, a postal address and/or an e-mail address. People interested in requesting information about the project and the ESIA or those who have any question or complaint regarding them, could either call to request information or post any questions concerning the project or the ESIA process. This method of involving the public assures that the consultation process is continuous and keeps the public informed about the project at any time throughout its development.

Also, local TV channels could be used as a medium to inform the public about the project and related studies, as well as NGOs that could be informed to take over the role of explaining the project and the ESIA.

A previously used method is to post an advertisement in the newspaper stating that the ESIA is available at the NSWMP headquarter for whoever is interested. The NSWMP would assign a person responsible for meeting interested people and providing them with all the requested information. The newspaper advertisement would clearly indicate the address of the company, the phone number and the name of the responsible person to be contacted.

Another method could be the use of the project website (https://nswmp.net/) to display information. In the website, an email address should be included for any questions regarding the project, the ESIA study and potential complaints.

At the present stage, the latter option seems to be the most appropriate. On the other hand, the NSWMP will investigate the other options and select the most performing one (or a combination of many) in coordination with KfW.

As per KfW request, a public consultation was carried out by Chemonics for engaging the relevant stakeholders and the public, and showing them the results of the ESIAs. The public consultation was carried out for the Zefta and Samanoud TS projects. The public consultation meeting was held in the meeting hall of the General Diwan of Gharbia governorate in the 8th of September, 2020. Table 8-3 shows the public consultation meeting attendees.

Table 8-3: Public consultation meeting attendees

S	Entity	Quantity
1	General secretary of GHB governorate	**1**
2	GHB governor's advisor	**1**
3	vice Military Advisor of GHB governorate	**1**
4	Head of Zifta Markz and city	**1**
5	Head of Samanoud Markz and city	**1**
6	SWMU of GHB governorate	**6**
7	Head of SWMU in Zifta	**1**
8	Head of SWMU in samanoud	**1**
9	EEAA at GHB governorate	**1**
10	DTL of NSWMP at kafr EL-Sheikh	**1**
11	Chemonics Egypt consultant	**1**
12	Representative of man power	**1**
13	Civil Protection **(**Fire Department**)**	**1**
14	East Gharbia electricity sector	**1**
15	Directorate of Social Solidarity	**1**
16	Officials at GHB governorate building	**4**
17	Officials at Zifta City Presidency Building	**5**
18	Officials at Samanoud City Presidency Building	**3**
19	Public attendees from Zefta	**1**
20	Public attendees from Samanoud	**2**
21	Press (EL-Hayat ELYoum website)	**1**
Total		**36**

The following points were discussed in the public consultation:

- The farmers attended the public consultation reported that the previous dumpsite (before waste removal) had a negative impact on their livelihood. A farmer reported that an acre and half surrounding the Samanoud's old dumpsite location were not cultivated.
- The time schedule for the construction phase of the project
- The risk of fire in MSW handling projects

It is expected that during the public disclosure of the present ESIA for the planned upgrading of the Bassioun TS and the stakeholder consultation the participants will support the proposed project focused on improving the site operation.

It is worth mentioning that the information disclosure and stakeholder consultation activities regarding the ESIA for Sadat landfill extension project

were conducted in October 2020 and in February 2021. The ESIA has been disclosed via the websites and Facebook pages of NSWMP and Chemonics.

8.4.3 Stakeholder Engagement Strategy

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

- *Engagement activities undertaken to date*
  So far, consultation with primary and secondary stakeholders is taking place. The Directorate of the Environment together with the Directorate of Solid Waste and cleanliness at the City and Markaz level join the project staff during the site visits to inspect lands allocated for the Project (i.e. the landfill and TS sites). They also engage to a limited extent with local residents in the local communities around these lands. Moreover, a public consultation meeting was carried out to disclose project information to the public. Any issues risen in the public consultation is taken into consideration by the project designers.

  However, Project Implementation Units / Committees are not yet formulated in pertinent cities and Markazes. These need to be established before the Project implementation.

- *Future Engagement Activities*
  The Project needs to undertake responsive consultation activities with all primary stakeholders mentioned above as follows:
  - Engage with the public to disclose information about the Project and raise their awareness through conducting awareness campaigns and public hearings to allow local residents to learn about the positive impacts expected from the Project, and to express their concerns or submit their complains, if any.
  - Engage effectively with local residents, farmers, herders or workers who live or make their living in the close vicinity of the lands allocated for the whole integrated Project (i.e. landfill and TSs). This is highly recommended in particular for local residents. The project description, the expected positive and negative impacts, as well as grievance mechanism and channels need to be communicated to them clearly and in due time.
  - Engage with scavengers in pertinent local communities to better understand their concerns about the Project. It is also important to communicate with them the positive impacts on community health and on their health, and to discuss with them how would be the best way to integrate them in the Project's activities while protecting their livelihoods and benefits.

- Engage with local and national NGOs active in the area of solid waste collection and management to discuss with them grounds of collaboration in consultation, awareness raising, and capacity activities.
- Engage with local and national solid waste contractors and companies to discuss areas of collaboration that help protect them and the scavengers at the same time.

As mentioned in Section 7.3.2 of the Environmental and Social Management Plan (Chapter 7), it is recommended to 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 HSE Supervisor. The CLO shall submit monthly brief reports to the Site Manager 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 NSWMP staff or through a public advertisement throughout the lifetime of the Project.

8.5 Grievance Management

NSWMP/Governorate 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 the project management or contractors 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"[9].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.

8.5.1 External Grievances

a. Current grievance redress actions

Because NSWMP/governorate 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

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

a procedure to receive and facilitate resolution of community concerns and grievances.

In addition, NSWMP/governorate should hire a Community Liaison Officer (CLO) for this project. The CLO is responsible for community engagement and public relations 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 NSWMP/governorate's preliminary thinking about the grievance resolution mechanism (why the NSWMP/governorate 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, note or letter to the Project through comment boxes located at Project site, near workforce accommodation, and in public locations in communities 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 project management can, or cannot, provide. He shall also provide a phone number or email that can be used if the complainant has any questions or facilitate a meeting with complainant to discuss any questions. Confidentiality of the complainant from the lodging of a grievance onward shall be assured and that information will be treated confidentially and sensitively by the CLO, and any other authority involved in the resolution of the issue. Acknowledgement shall be communicated in a culturally appropriate manner, either through a letter, telephone call or providing the signed acknowledgment slip attached to the Grievance Form.

The complainant will be acknowledged within three days of the 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 to address grievances.

  Low-urgency concerns will be assigned and handled directly by the CLO. The CLO 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 CLO, 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. NSWMP/Governorate 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 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 General Site Manager 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 Site Manager will determine the appropriate response or the need to escalate the issue to the NSWMP/governorate managing unit. 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 project management 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 HSE representative. Complaints that threaten the operation of the project shall be

reported without delay to the Site Manager. The weekly report will indicate the status of grievances 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 analyse 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 NSWMP/governorate is dealing with complaints in a responsive way.

8.5.2 Internal Grievances

a. 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 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; and
- 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 project hierarchy. If complaint is not resolved at this step, then a higher level of project management will get involved. Ultimately, the grievance may reach the highest levels of management. If the grievance remains unresolved through the highest levels of management within the project, 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 labourers 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 NSWMP/governorate to monitor grievances that are delivered to the sub-contractors from the workers and the local communities as well. This monitoring shall involve the construction contractor, the field manager and the CLO.

8.5.3 Consultation and Raising Awareness on the Grievance Mechanism

Before designing and implementing the grievance mechanism, NSWMP/governorate shall reach out to a broad group of stakeholders (employees, contractors, managers, community leaders, local officials) through public meetings or a series of focus groups. 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 project. 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.

It is expected that NSWMP/governorate will further develop the Grievance Management Plan at the ESMS stage to include details of responsibilities and implementation. It will also provide considerations and how complaints received by contractors from community members and employees or through sub-contractors will be reported and how resolutions will be coordinated.

9. References

Ali, M.M. (2010). *Sonchus macrocarpus*. The IUCN Red List of Threatened Species 2010

Baha El Din, M. and Atta, G.A. (2002) *The World of Birds in Egypt*. BirdLife International/EEAA, Cairo: 44 pp. (in Arabic).

Baha El Din, S. (2006) A Guide to the Reptiles and Amphibians of Egypt. Oxford University Press.

Chemonics Egypt Consultants, 2021. Bassioun Current Transfer Station Site Report.

CAPMAS, (2017a) Population Census, Egyptian Population by Age Groups.

CAPMAS, (2017b) Population Census, Egyptian, Population by Sex.

CAPMAS, (2017c). Annual Bulletin of Health Services.

CAPMAS, (2017d). Annual Bulletin of Labor force.

CAPMAS, (2017e). Annual Bulletin of Public Utilities Services.

EEAA/UNEP (1993) *Habitat Diversity: Egypt*. Publications of the National Biodiversity Unit, 1, EEAA, Cairo: 302 pp.

EEAA/UNEP (1995) *Egypt Country Study on Biological Diversity*. Publications of the National Biodiversity Unit, 3, EEAA, Cairo: 217 pp.

EEAA, (2008) Environmental description of El Gharbiya Governorate

Elewa, H. H. (2010) Potentialities of water resources pollution of the Nile River Delta, Egypt. *The Open Hydrology Journal*, 4(1)

El-Quilish, M.; El-Ashquer, M.; Dawod, G. and El Fiky, G. (2018) Development and Accuracy Assessment of High-Resolution Digital Elevation Model Using GIS Approaches for the Nile Delta Region, Egypt. *American Journal of Geographic Information System*, 7(4), 107-117.

EPA (2002) *Waste Transfer Stations: A Manual for Decision-Making*. United States: Environmental Protection Agency (EPA)

European Investment Bank (2018).Environmental and Social Standards

Gharbia Governorate (2020) General Features of the Area

German Development Bank, KfW, (2017). Environmental & Social Impact Assessments.

GIZ (2015) Anne Scheinberg, Rachel Savain. Valuing Informal Integration: Inclusive Recycling in North Africa and the Middle East.

Government of Egypt (n.d.) Egypt's Vision 2030

Hoath, R. (2009) *A Field Guide to the Mammals of Egypt*. The American University in Cairo Press, Cairo, Egypt

International Finance Corporation (IFC), World Bank Group (WBG) (2007a) Environmental, Health, and Safety Guidelines, General EHS Guidelines: Environmental.

International Finance Corporation (IFC), World Bank Group (WBG), (2007b) Environmental, Health, and Safety Guidelines, Waste Management Facility.

Meteoblue (2020) Climate (modelled) "Bassioun Station"

Ministry of communication and information technology, and Ministry of culture (2001) El Gharbia Archaeological Sites Atlas

Negm, A.M.; Sakr, S.; Abd-Elaty, I. and Abd-Elhamid, H.F. (2018) An Overview of Groundwater Resources in Nile Delta Aquifer. In: *Groundwater in the Nile Delta* (pp. 3-44), Springer, Cham

Nofal, E.R.; Amer, M.A.; El-Didy, S.M., and Fekry, A.M. (2015) Sea water intrusion in Nile Delta in perspective of new configuration of the aquifer heterogeneity using the recent stratigraphy data. *J Am Sci*, 11(6), 281-292.

Norris, R.; Dyer, F.; Hairsine, P.; Kennard, M.; Linke, S.; Merrin, L. and Williams, D. (2007) A baseline assessment of water resources for the National Water Initiative. Level 2 assessment. River and wetland health theme. Assessment of river and wetland health: potential comparative indices

Nossair, A.M. (2011) *Climate changes and their impacts on groundwater occurrence in the northern part of east Nile Delta*. MSc thesis, Faculty of Science, Zagazig University, Zagazig

NSWMP (2014) *National Strategic Directives for Waste Management in Egypt*, National Solid Waste Management Program

NSWMP (2019a) *National Solid Waste Management Program Egypt: Main Report*, National Solid Waste Management Program

NSWMP (2019b) *ESIA Guidelines for Municipal Solid Waste Management Projects*, National Solid Waste Management Program

RIGW (1980) Safe use studies for groundwater reservoirs in the Nile Delta and Upper Egypt. Research Institute for Groundwater, Cairo

RIGW (1992) Hydrogeological Map of Nile Delta, Scale 1: 500,000, 1st Ed., Nile Delta, Research Institute for GroundwaterSims R.; Schaeffer, R.; Creutzig, F.; Cruz-Núñez, X.; D'Agosto, M.; Dimitriu, D.; Figueroa Meza, M.J.; Fulton, L.; Kobayashi, S.; Lah, O.; McKinnon, A.; Newman, P.; Ouyang, M.; Schauer, J.J.; Sperling, D. and Tiwari, G. (2014) Transport. In: *Climate Change 2014: Mitigation of Climate Change*. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O.; Pichs-Madruga, R.; Sokona, Y.; Farahani, E.; Kadner, S.; Seyboth, K.; Adler, A.; Baum, I.; Brunner, S.; Eickemeier, P.; Kriemann, B.; Savolainen, J.; Schlömer, S.; von Stechow, C.; Zwickel, T. and Minx, J.C. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

Sharaky, A.M.; El Hasanein, A S.; Atta, S.A. and Khallaf, K.M. (2016) Nile and groundwater interaction in the western Nile Delta, Egypt. In: *The Nile Delta* (pp. 33-62). Springer, Cham

USAID (2013) The National Strategy for Integrated Municipal Solid Waste Management – A Framework for Action

Urban Planning Authority (2017) Future planning, vision and projects for the development of Gharbia Governorate