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Greater Cairo Air Pollution Management and Climate Change Project

Environmental and Social Management Framework (ESMF)

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AQI	Air Quality Index
AQM	Air Quality Management/Monitoring
APCC	Air Pollution and Climate Change
BUR	Biennial Update Report
BSA	Baseline Site Assessment
CAIP	Cairo air improvement project
CAPMAS	Central Agency for Public Mobilization and Statistics
CBA	Cost-Benefit analysis
CBSM	Community-based Social Marketing
CCCD	Climate Change Central Department
CCU	Climate Change Unit
CHS	Community, Health and Safety
CTA	Cairo Transport Authority
CPTC	Cleaner Production Technology Center
DBO	Design, Build and Operate (DBO) modality
ECGBVS	The Egypt Economic Cost of Gender-Based Violence Survey
EEAA	Egyptian Environmental Affairs Agency
EHS	Environmental, Health and Safety
EOS	Egyptian Organization for Standardization
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMMF	Environmental and Social Management and Monitoring Framework

ESMP	Environmental and Social management plan
ESS	World Bank Group Environmental and Social Safeguards
EV	Electric Vehicles
GBV	Gender Based Violence
GC	Greater Cairo
GCAPCCP	Egypt Air Pollution and Climate Change Project
GCA	Greater Cairo Agglomeration
GCF	Green Climate Fund
GFDRR	Global Facility for Disaster Reduction and Recovery
GOEIC	General Authority for Export and Import Control
GRM	Grievance Mechanism
HSE	Health, Safety and Environment
IC-AQMP	Integrated Climate and Air Quality Management Plan
INDC	Intended Nationally Determined Contribution
IWMF-10R	Integrated Waste Management Facility at the 10th of Ramadan
JTF	Joint Task Force
LMP	Labor management procedures
LTRA	Land Transport Regulatory Authority
MoE	Ministry of Environment
MoLD	Ministry of Local Development
MoHP	Ministry of Health and Population
MoTI	Ministry of Trade and Industry
MoT	Ministry of Transport
MoH	Ministry of Housing

MRV	Monitoring, Reporting, and Verification
MSW	Municipal Solid Waste
NUCA	New Urban Communities Authority
NCC	National Council for Climate Change
NCHR	National Council for Human Rights
OSH	Occupational Safety and Health
PM	Particulate Matter
PMEH	Pollution Management and Environmental Health
PMU	Project Management Unit
PPP	Public Private Partnership
PPE	Personal Protective Equipment
QRA	Qualitative Risk Assessment
RF	Resettlement Framework
SC	Steering Committee
SEA/SH	Sexual Exploitation and Abuse/ Sexual Harassment
SEP	Stakeholder Engagement Plan
SWM	Solid Waste Management
SLCP	Short-Lived Climate Pollutants
SQI	Soil Quality Indicators
TIA	Traffic impact assessment studies
TIU	Technical Implementation Unit
TSP	Total Suspended Particles
UNFCCC	United Nations Framework Convention on Climate Change
WB	Working Group

WMP	Waste management plan
WQI	Water Quality Index
WMRA	Waste Management Regulatory Authority

1 INTRODUCTION

1.1.1 Background

One of the most critical environmental problems in Greater Cairo (GC) is air pollution. The air quality in GC has deteriorated throughout the years due to intense human activities in the city such as industries, traffic, poor waste management and uncontrolled burning of waste in open dump sites. According to World Health Organization (WHO) Global Ambient Air Quality Database, Greater Cairo was ranked as the world's third most air polluted mega city in 2015 in terms of fine particulate matter (PM).

Two of the most significant contributors to PM concentrations in GC are the transport sector and open burning of waste. Each of these two sources represents about one third of pollution concentrations. However, air pollution in GC has decreased by 3% in the recent years due to the operation of the 3rd metro line in 2012 and its extension in 2014. Moreover, the reduction of fuel subsidies that took place under the 2016-2019 WB/IMF reform program resulted in 4% reduction in PM by 2017. Regarding industrial pollution, it has been controlled and managed by a multi-donor project initiated by the WB in 1998. This project, which is still ongoing, is the Egyptian Pollution Abatement Project (EPAP) I, II & III. It is noteworthy that the transport sector in Egypt mostly depends on public transport, with about 63% of 22 million motorized trips a day in GC. Public transportation in GC includes metro, public buses, mini-buses and microbuses that mainly run on diesel fuel. This justifies why public transportation represents the largest portion of GC air pollution from the sector. Furthermore, vehicle emissions and open burning of solid waste are significant emitters of greenhouse gases emissions (GHGs) such as CO_2 and methane. In this context, this project "Egypt: Greater Cairo Air Pollution Management and Climate Change" has emerged in response to Egypt's commitments to reduce GHG emissions and achieve its sustainable development goals including reduction of air pollution and combating climate change.

The Egypt Air Pollution and Climate Change Project (GCAPCCP) project builds on the analytical work and the various initiatives on air pollution management implemented by the MoE and other concerned authorities in the GoE. The most recent studies were conducted over four years, from 2016 to 2019, by the World Bank in close collaboration with the MoE and with participation of the MoHP. The GCAPCCP is focusing on the two main sources of air pollution: open burning of solid waste and vehicle emissions, which are two major contributors to air pollution in Greater Cairo (GC). GCAPCCP will geographically cover Greater Cairo (i.e., Cairo, Giza and Qayoumi Governorates) and will include five components (1) enhancing the air quality decision support system; (2) support

the operationalization of SWM master plan in GC; (3) vehicle emissions reduction; (4) Stakeholders engagement and communication; and (5) Project management and monitoring and evaluation

1.1.2 Project Development Objectives

The main objective of this project are as follows:

- Reduction of air emissions from critical sectors to improve air quality in Greater Cairo, including air pollutants such as PM_{10} and $PM_{2.5}$
- Reduction of climate pollutants known as short-lived climate pollutants (SLCP): CO_2 or "black carbon" from vehicle emissions

The project development objectives level indicators are:

- Emission reduction from public buses
- Emission reduction from municipal SWM
- Increased resilience to air pollution
- Greenhouses gasses (CO2 equiv) emissions from public buses on selected routes (percent reduction in g/km)
- Short Lived Climate Pollutants (Black Carbon) emissions from public buses on selected route (percent reduction in $\mu g/m^3$)
- Greenhouse gasses ($CO2\ equiv_)$ emission from municipal solid waste (Tons/year)
- People provided with improved living conditions
- People provided with improved living conditions – Female
- Greater Cairo Climate and Air Quality Action Plan developed and submitted to the Council of Ministers

1.2 ESMF Objectives

According to the World Bank Environmental and Social Framework (ESF) , an Environmental and Social Management Framework (ESMF) is required since the project consists of series of subprojects, where exact locations, scope and nature of some interventions are not yet known. Therefore, the ESMF sets out the principal, guidelines and procedures to identify, assess and manage the environmental and / or social impacts that may accompany the subprojects.

1.3 ESMF Scope

The scope of this ESMF incorporates all activities and subprojects under the five project components that are described in details in Chapter 2. In addition, it provides guidance for assessing, managing and monitoring the environmental and social aspects related to

the proposed subprojects throughout their lifecycle, i.e. requirements before the construction phase (e.g. ESIA studies), construction phase, and operation phase.

1.4 Rationale For ESMF

This ESMF was developed in compliance with the World Bank requirements to set rigorous environmental and social requirements and road map for the implementation of the sub-projects, including:

- Legal, regulatory and institutional framework
- Methodology for evaluating the different alternatives
- Assessment of the environmental and social impacts of the sub-projects
- Identification of mitigation measures for the environmental and social impacts of the project
- Implementation arrangements and capacity to manager E&S risks
- Public consultation and disclosure

1.5 Methodology For Preparation of ESMF

The following subsections will explain the methodology followed to prepare the ESMF:

1.5.1 Legal and Institutional Framework

- Identify national legislations that are / may be applicable to the project
- Identify the pertinent standards and policies of the World Bank
- Evaluation of the ESSs relevant to the project and the ESF
- Conduct a gap analysis between the WBG requirements and national legislations
- Determine the standards / criteria that the project should follow throughout the different phases of its life cycle
- Identify the international conventions relevant to the project that Egypt is committed to implement
- Define the institutional framework related to each of the subprojects

1.5.2 Environmental and Social Settings-Baseline

- Collect data on the characteristics of the project intervention areas in terms of their vulnerability and sensitivity to positive and negative environmental and social impacts and risks, such as: air quality, water bodies, infrastructure, climate, land and social and environmental conditions
- Determine the general baseline conditions in the subproject's areas

- Determine the environmental and social context that may require detailed investigations in subsequent studies, after clearly identifying the project intervention locations
- Analyze the elements of the natural environment, built environment, and infrastructure in addition to the economic and social environment conditions to determine the scope of the monitoring system and develop such system accordingly
- Determine the level of details needed for describing the environmental and social settings, methods to be followed, types of measurements and surveys to be conducted

1.5.3 Analysis of Alternatives

- The alternatives will be evaluated for each subproject based on social and environmental advantages and disadvantages of each proposed alternative. The evaluation includes:
  - "No Action" alternative
  - Technical alternatives
  - Economic alternatives
  - Project site alternatives
- The chosen alternative will be evaluated in detail in subsequent detailed studies

1.5.4 Environmental and Social Impact Mitigations Framework

A preliminary assessment of the potential positive and adverse impacts during the construction and operation phases for different project components was performed and significance of impacts determined. Significance was determined on the basis of severity of the impact and/or risk level determined from severity and probability of the impact. A rating method was applied to determine the significance of the impacts.

The scope of the impact and risk assessment of project components on:

- Natural physical environment (air quality, ambient noise levels, water bodies, soil and landscape
- Biological environment (fauna and flora)
- Socio-economic aspects such as livelihood
- Built environment such as infrastructure and underground utilities
- Labor and working conditions
- Resources and pollution
- Community health and safety
- Land-related aspects

- Cultural resources

An Environmental and Social Impacts Mitigation Framework was developed on the basis of mitigation hierarchy approach for identified impacts and risks associated with the project. The mitigation framework consists of relevant plans required to mitigate potential impacts identified from the preliminary assessment of impacts. The methodology to select specific mitigation measures constituting the plans outlined in the mitigation framework should be based on consideration of costs, manpower, local availability of equipment and technology needs and timing to ensure implementation. The specific plans are components of ESS instruments, i.e., ESIAs, which are prepared prior to construction and are part of the PMU's responsibility.

1.5.5 Environmental and Social Management and Monitoring Framework (ESMMF)

An Environmental and Social Management and Monitoring Framework (ESMMF) was developed to provide guidance and principles on measures and plans including the need for additional instruments (ESIA, feasibility studies, environmental audits, etc.) to safeguard ESS for the project using the Mitigation Hierarchy approach to avoid, minimize, mitigate and/or offset adverse risks and impacts. The ESMMF defines responsibilities, requirements (measure and plans), and associated estimated costs for implementation and supervision.

On the basis of ESMMF, staffing requirements for implementing entities including types of skills and associated training needs to properly manage and implement environmental and social duties throughout the project life cycle and in accordance with ESMF and RF requirements were determined.

1.5.6 Public Consultation and Engagement

- Consultation activities will be conducted in a public consultation session and interviews with concerned parties
- These activities will be carried out in accordance with all national regulations related to public consultation as well as the World Bank Group Environmental and Social Safeguards (ESSs) related to public disclosure and consultation:
  - ESS 10 and the World Bank Policy on Information Disclosure
- Results of the consultations should be included in the ESMF
- ESMF must be developed in conjunction with the Stakeholder Engagement Plan (SEP)
- Comprehensive guidelines must be provided to follow during project implementation once the physical footprint of the site's activities is better known

- Provide guidelines for meaningful consultations and, to the extent possible, specify methods, locations and timing of consultations to be conducted at different stages of the project life cycle
- The ESMF and RF must be publicly disclosed within the country and on the World Bank website before the project is evaluated
- Key principles for effective participation that guide stakeholder consultations including:
    - Ensure that all sessions are free from intimidation or coercion
    - Provide useful information in an understandable and culturally appropriate form and language tailored to the needs of the targeted stakeholder group (s)
    - Be inclusive in representing perspectives, including different ages and genders, and integrate vulnerable groups and / or minorities who may be ignored or marginalized due to their own circumstances
    - Respecting local traditions in decision-making processes

2 PROJECT DESCRIPTION

2.1 Overview

The project comprises five components with the objective of reducing air pollutants and GHGs from open burning of solid waste and vehicle emissions, which are two major contributors to air pollution in GC. The project will be implemented in the geographical zone of GC, which covers Cairo Governorate, the urban areas of Giza Governorate and Qalyoubia Governorate.

2.2 Project Components

The five components of the project are described briefly in the following subsections:

2.2.1 Component 1: Enhancing the Air Quality Decision Support System

The main purpose of this component is to bolster the decision support system of Air Quality Management (AQM) in GC. This will be achieved through strengthening the existing infrastructure of AQM, capacity building, emergency response plans and raising public awareness. Component 1 will build on the achievements of the ongoing World Bank project Pollution Management and Environmental Health (PMEH) that is supporting EEAA to enhance air quality monitoring. These activities include procuring monitoring equipment, training on the equipment, and the analysis. In addition, component 1 will offer evidence-based solutions to mitigate pollution and create a rapid response system to enable the government to act in emergency situations and allow the public to take self-protective actions in case of extreme pollution days. There are two sub-components that fall under this component, which are:

2.2.1.1 Sub-component 1.1: Reduction of air pollution and GHGs

A better comprehension of key sources and determining effective control and prevention actions will be achieved through the following activities under this sub-component:

- Prepare an Integrated Climate and Air Quality Management Plan (IC-AQMP) for reducing air and climate emissions in GC to identify sector specific policies and interventions to reduce air pollution;
- strengthening Air quality Monitoring (AQM) information system to include mobile source emissions, SLCPs and GHGs; and
- assessing the environmental health, and economic benefits of priority climate and air quality interventions and evaluating the priority measures based on financial cost estimation and cost-effectiveness analyses

2.2.1.2 Sub-component 1.2: Strengthening Resilience to Air Pollution

This sub-component aims at reinforcing the resilience capacity of GC's population to help adapting to extreme pollutions days including:

- Improving Air Quality Forecasting through improving the quality of the current air quality forecasting tools, and the integration of these tools with local air quality monitoring data. Establishing institutional response mechanisms to extreme pollution days

2.2.2 Component 2: Support the Operationalization of SWM Master Plans in GC

The objective of this component is to enhance operationalization of the governorate solid waste management master plans that set out the required actions and investments in each governorate. Component 2 includes a combination of enabling institutional and capacity building activities for the operationalization of the SWM master plans of the governorates, as well as development and upgrading of strategically important waste management infrastructure. Due to the complex characteristics of GC, a gradual approach is suggested to obtain tangible results. GCAPCCP is aiming also at creating the enabling environment for enhancing the role of the private sector in financing the capital investments and the operations and maintenance costs of same elements of the value chain such as treatment and recycling facilities or controlled landfills.

2.2.2.1 Waste Management Infrastructure

The GCAPCCP will finance partially or fully some strategically important waste management infrastructure including:

1- Integrated Waste Management Facility at the 10th of Ramadan (IWMF-10R):

The Integrated Waste Management Facility at the 10th of Ramadan (IWMF-10R) is planned to cater treatment and disposal of different types of wastes generated in Cairo and Qalyoubia governorates for 50 years. The private sector will play a significant role, through different PPP modalities, in developing and operating the different components of the IWMF-10R after developing the needed the infrastructure by the government. GCAPCCP is aiming at creating the enabling environment for enhancing the role of the private sector in financing the capital investments and the operations and maintenance costs of same elements of the value chain. The following table provides an overview of IWMF-10R main components and highlights the components which will be financed by GCAPCCP:

Item #	Component	Developed by	Phasing	Source of Fund
1.1	Infrastructure in the facility and the main axes, serving both Cairo Governorate and Qalyoubia Governorate. This includes (main road around the facility, main internal axis roads, fences, water and wastewater connections and electricity connections from the utilities to the facility	Government considering private sector requirements.	The infrastructure needed for the operation of the IWMF-10R will be developed in the first year of the project	GCAPCCP
1.2	Municipal Waste Treatment facilities for Qalyoubia governorate	Private sector through a Design, Build and Operate (DBO) modality	First year- Estimated capacity for the first 5 years is around 2000 ton/day	Government fund
1.3	Municipal Waste Treatment facilities for Cairo governorate	Private sector through a Design, Build and Operate (DBO) modality	First or second year Estimated capacity for the first 5 years is around 3000 ton/day	Government fund
1.4	Sanitary Landfill for Qalyoubia governorate	Private sector through a Design, Build and Operate (DBO) modality	First year- Estimated capacity for the first 5 years (first cell) is around 7 million tons	GCAPCCP
1.5	Sanitary Landfill for Cairo governorate	Private sector through a Design, Build and Operate (DBO) modality	First or second year Estimated capacity for the first 5 years is around 14 million tons	Government fund
1.6	Medical waste treatment and disposal facility for Cairo and	Private sector through a Design, Build and Operate (DBO) modality	This will be developed by year 2 or 3 subject to feasibility study to	GCAPCCP

Item #	Component	Developed by	Phasing	Source of Fund
	Qalyoubia governorates		determine the capacity and technology	
1.7	Construction and Demolition Waste treatment facility for Cairo and Qalyoubia governorates	Private sector through a Design, Build and Operate (DBO) modality	Estimated capacity of the facility is 100 ton/day	GCAPCCP
The following Item is subject to feasibility study that will determine if the facility will be established in the 10th of Ramadan or other location (Kuraymat). The feasibility study will be financed by GCAPCCP				
1.8	**Potential** Industrial Hazardous treatment and disposal Facility for Cairo, Qalyoubia and might serve also other governorates	Private sector through a Design, Build and Operate (DBO) modality	Second or Third year- **subject to feasibility study to determine** the location, technology and capacity. Noting that the item #8 may be excluded	GCAPCCP

2- Closing and Rehabilitation/Containment of Priority Dumpsites:

- GCAPCCP will Support the preparation of an environmental audit of the site, a feasibility study and detailed engineering studies for the closure of the dump site.
- GCAPCCP will finance the closure and containment of Abu Zaabal's dumpsite, which will contribute to the improvement in the ambient air and environmental quality of the region.

Noting that the closure will start after the development of the sanitary landfill for Qalyoubia governorate in IWMF-10R.

3- Hazardous Waste Treatment and Final Disposal Facility:

The MoE and WMRA are planning to establish an industrial hazardous waste treatment and disposal facility with a preliminary capacity of 1000 ton/day to serve GC and other governorates. The two available sites for establishing this facility are located either in IWMF-10R or Kuraymat, the two sites are further described in the following sections.

GCAPCCP will finance:

- preparing a feasibility study to compare between the two sites to determine the suitability of both location, technology and capacity.
- Preparing the environmental and social assessments studies needed for the development of the facility
- Financing the establishment of the hazardous waste facility in year two or three of the project.

4- Construction of Environmentally Controlled Transfer Stations:

GCAPCCP will support:

- Establishment of two environmentally controlled transfer stations (Site not determined-possibly in Giza Governorate)
- Developing a technical and financial operation manual for the sustainable and sound operation and maintenance of transfer stations.

5- Purchase of Heavy Equipment for Transfer of municipal waste from Collection Points to the 10th of Ramadan Site (IWMF-10R)

- GCAPCCP will Finance, depending on budget availability, the acquisition of heavy equipment for the transfer of waste from collection points in Qalyoubia governorate to the 10th of Ramadan site.

6- Solid Waste Educational Center:

- GCAPCCP will Finance, depending on budget availability Establishment of a solid waste educational center for the general public at the IWMF-10R to promote improved waste handling, segregation at source, re-use and recycling, with special recreational and educational material and activities for children and adults (to be implemented through Component 4).

2.2.2.2 Technical Assistance for the Environmental Upgrade of Akrasha Recycling and Industrial Zone in Qalyoubia:

- GCAPCCP will finance preparing a detailed assessment of Akrasha area (institutional, technical and financial) to formulate recommendations to address various issues of the site and identify project's intervention.

2.2.2.3 Enabling Activities, Capacity Building and Institutional Strengthening Activities

This sub-component of the project focuses on the establishment and reinforcement of institutional and regulatory frameworks, financial sustainability and cost recovery mechanisms that are crucial for the SWM value chain. This will entail design and planning, monitoring and evaluation instruments, capacity building, advisory services for waste operators and relevant studies and assessments needed for the identification, design and

implementation of proposed investments. These activities will be implemented by the Waste Management Regulatory Authority and the Executive SWM Unit at the MoLD.

2.2.2.3.1 Waste Management Regulatory Authority (WMRA)

The following activities will be performed to support GCAPCCP-related activities within WMRA:

- Development and adoption of model bidding documents and performance-based contracts for the different stages of waste management (collection, transportation and disposal)
- Establishment and implementation of a management information system to monitor and evaluate the effectiveness of various programs, initiatives and contracts being implemented across governorates, including cost-recovery mechanisms
- Assessment and formulation of recommendations for channeling collected fees and other earmarked funds to the relevant authorities and developing a proper financial management system and modus operandi of these funds (including internal by-laws/ guidelines, regulations, planning procedures, etc.);
- Creating and supporting initiatives that reduce the volume of wastes to be disposed of in landfills/dumpsites, including encouraging solid waste recycling, recovery of raw materials and introduction of financial incentives for avoiding plastic use and regulatory controls for single use plastics, etc.
- Development of financially viable business models, model bidding documents, model performance-based contracts, etc.
- Support Egypt in developing structuring and procurement strategies for the establishment of treatment and disposal facilities such as waste-to-energy (WtE) facilities.
- Technical studies (feasibility studies, engineering designs, etc.) to support new interventions such as development of national strategy for private sector participation in solid waste management, Waste-to-Energy, waste volume minimization waste reuse/ recycling, etc.
- Assessment of institutional mandates, roles and responsibilities at the center level and in governorates including restructuring the Cleanliness and Beautification Authorities, the enhancement of the role of the SWM Units in the Governorates, etc. to improve service delivery, monitoring and oversight on the long-term and ensure the sustainability of the SWM system in place

2.2.2.3.2 Executive SWM Unit at the MoLD

The following activities will be performed to support GCAPCCP-related activities within the SWM Unit at MOLD:

- Establishment and operation of the newly established SWM Unit at the Ministry of Local Development and the regional units to be created in the three governorates through equipment, information systems, a vehicle, training, part-time and full-time expertise
- Support the establishment of the Regional SWM units to be created in the three governorates.
- Training and capacity building programs for the central and regional staff of SWM unit, officials of the governorates, regulators (EEAA/WMRA) and all other stakeholders
- Other TA activities

2.2.3 Component 3: Vehicle Emissions Reduction

This component of the project is mainly concerned with reducing air emissions from public transport sector through a pilot project to introduce around 100 electric buses (e-buses) with accessibility measures for users with disabilities (e.g., wheel chairs, visual impairments, etc.) in GC. The main objective of this component is to collect pertinent data that will help in scaling up this project and replicate it on a larger scale. Cairo Transport Authority (CTA) is the formal entity that will be responsible for the operation of these buses. Therefore, the project will assist in upgrading CTA facilities such as retrofitting the depositories of the existing buses to have electric charging stations, power supply and appropriate safety equipment. In addition, capacity building activities for CTA staff such as bus drivers and mechanics will be conducted.

In order to ensure the sustainability of the service through the procured buses, the project will be designed in a way that enhance the new buses competitiveness with other modes of transport like the informal microbuses that can manoeuvre easier in high traffic. Hence, this can be achieved through service quality improvements such as air conditioning, on-board USB charging, higher service frequency, and stopping at designated stops. However, the bus routes should be short, up to 10 km to be able to achieve the service frequency with the low number of e-buses in the pilot project phase.

The project will be divided into two consecutive phases to leverage the lessons learned in the first phase. Two routes will be selected in each phase of the project to cater a specific market in high demands zones in Cairo to be competitive with other transport modes. The nominated routes include:

- El Tahrir Square and Cairo University (5.0km)
- Al Azhar University and Stadium Station (3.0km)
- Citystars Mall and Subway Line 3 Stadium Station (6.0km)

- Subway Line 1 El Ahram Metro Station and Line 1 Saray El-Kobba Station (3.0km) serving Line 3 commuters heading to north-eastern areas of the region that Line 1 serves

2.2.3.1 Low/no Emission Public Transport Fleet and Related Infrastructure

The project will finance the following:

- Study to select the final set of routes where the e-buses will be deployed considering topography, demand, and that optimizes charging of the batteries, i.e. centralized charging and bus depots and decentralized charging along the route. The study will also determine what type of battery is better suited i.e. fast or slow charging. The study will also analyze implications on the power supply and determine if there is a need for installing new transformers.
- The design of the bus, the design of the retrofit needed in a selected bus depot to accommodate charging stations, maintenance facilities, and power supply.
- Design of the retrofit in chosen buses depositories to accommodate charging stations, including:
    - installation of fast charging stations and slow charging stations, depending on the fleet size and operational plan
    - maintenance and cleaning facilities,
    - improvements to local distribution grid to provide power supply adequate for the number of fast charger and e-buses,
    - safety equipment and facilities for the proper handling of chargers and e-buses
- Procurement of e-buses will take place through international competitive bidding. Also, private operators may be contracted by CTA to operate and maintain e-buses, as it currently does with different services that are contracted to 17 private operators. The bidding process will also consider accessibility measures in the buses for users with disabilities (wheel chairs, visual impairment, priority seating, etc.)

2.2.3.2 Subcomponent 3.2: Enabling Activities

The enabling activities include transport infrastructure planning. In light of the World Bank support to the Ministry of Transport or the establishment of the Land Transport Regulatory Authority that is responsible for regulating the urban public transport sector, among other mandates, and developing Master Mobility Plan for GC Region, the following activities will be undertaken:

- A module/chapter in the Master Mobility Plan to address environmental economic (i.e. environmental, health and economic) perspective

- Capacity development for LTRA staff to appraise policy and investment proposals with respect to environmental economic impacts as part of their planning tasks
- Establishment of dynamic and continuing air quality monitoring system
- Awareness raising / capacity development - Recognizing the need for significant capacity development of CTA employees and broader audience to properly handle new technologies

2.2.4 Component 4: Stakeholders Engagement, Awareness Raising and Communication

The main objective of this component is to ascertain the engagement of all stakeholders in all phases of the project, i.e. design, implementation and monitoring. Such active involvement and the full consultative participatory approach will result in a constructive relationship between the different stakeholders and the government. This component represents an integral part to the stakeholders' engagement comprehensive plan, which is part of the environmental and social risk management and the Stakeholders Engagement Plan (SEP).

The identification of the project's stakeholders will take place at an early stage depending on the possible impacts of the project on them, their interest, and their support for the project. In order to ensure the successful implementation of this component, stakeholders have to be fully aware of the project, which subsequently requires sharing information in a timely, transparent, understandable, accessible and appropriate manner and format, in addition, the opinions of stakeholders about the different phases of the project have to be considered in the design, implementation and monitoring of the project.

Moreover, this component will help in the implementation of the MoE's Communication and Visibility Plan of 2019 through provision of support to the sector related programs, such as the Waste Management Program. The targeted groups entail:

- Senior policy and decision makers
- Managers, technical staff and clean transport stakeholders
- General public
- Civil Society Organizations (CSOs) and Non-governmental Organizations (NGOs)
- Women, youth and children
- The informal service providers sector (e.g., traditional waste collector's community, the Zaabaleen)

The proposed activities to be carried out under this component are:

- Development and delivery of communication plans under the different themes (general air pollution, SWM and reduction of vehicle emissions) to:
    - Create a basic understanding of the SWM master plans and of the vehicle emissions reduction plan
    - Reach consensus and receive the endorsement of targeted beneficiary groups
    - Inducing positive behavioral changes.
- Development of differentiated knowledge and general awareness products for each targeted group. Different related topics to be included are:
    - Clean transport
    - Air pollution and the associated measures
    - Solid waste management (including topics related to the SWM cycle, the cost of the service, stakeholders' roles and responsibility, etc.)
- Adoption and rolling out a Community-based Social Marketing (CBSM) approach to stress on personal contact between community members aiming to boost behavioral change, how to overcome barriers, and development of a pilot program. Behavioral change that are sought by the project include:
    - Increase the recycling at the source by the population
    - Increase payment for garbage collection
    - New attitudes for garbage pickers
- A continued consultation process with the relevant stakeholders' groups.

- Implementation of pilot projects to demonstrate the role that CSOs and NGOs can play in:
    - Monitoring the performance of the solid waste service providers
    - Engaging with the population at the street and district level and implementing awareness campaigns
- Implementation of beneficiaries' feedback activities that would inform the performance of the project. It would also allow systematic opportunity for different stakeholders to spell out their feedback and views and allow taking corrective actions during the life cycle of the project
- Implementation of specific actions included in the SEP
- Media campaigns for stakeholders, media, advanced and sophisticated websites; mobile applications that are targeting the larger public (beyond CBSM targeted communities).

2.2.5 Component 5: Project Management and Monitoring and Evaluation

This component will cover project management functions that includes fiduciary management, monitoring and evaluation, technical reporting and audits. A project

management unit (PMU) will be established at the Ministry of Environment, which is a project partner along with the Ministry of the Local Development (MoLD) and will be responsible for the implementation of components 1, 3 and 4. However, the project will also work with other ministries such as the Ministry of Transport, Ministry of Electricity and Ministry of Health and Population, while the executing entities of the project will be EEAA, WMRA, the Central and Regional SWM Units of the MoLD, Qalyoubia Governorate and CTA.

The project will contribute to the operational costs of the PMUs to be established, but will not pay salaries or topping-up of salaries of government officials. The PMU will be in charge of the overall management and coordination of the project through:

- Preparation of annual work plans and budgets
- Coordination of monitoring and evaluation activities with the other executing agencies
- Having the fiduciary responsibility for the entire project, including financial management procurement and environmental and social risk management

The project will also consider setting up an efficient monitoring and evaluation system to help in the decision making given the demonstration nature of some of the planned interventions and given the intended contribution of some of the activities to broader national level targets of indicators set in national programs and plans.

Moreover, Technical Implementation Units (TIUs) or working groups will be established in the key institutions of the first three components to guarantee the involvement of these institutions: each in their respective sector. These units will be chaired by the respective institutions with official mandate for that component and it may also be co-chaired based on the situation. In addition, a Joint Task Force (JTF) will be established to coordinate with the PMU. The JTF meets every quarter to share information and knowledge, as well as planning and taking corrective actions. It is composed of two coordinators and technical specialists who attend as required.

This component will also entail formation of a national steering committee which consists of the key partners, the civil society, representatives of the private sector, media and other resource persons. This committee will be responsible for:

- Provision of strategic guidance to the project
- Facilitating the coordination between all concerned parties
- Approval of the annual work plans and budgets
- Monitoring progress towards achievement of the national and project specific target indicators

3 LEGAL AND INSTITUTIONAL FRAMEWORK

The project has to comply with both Egyptian laws and the World Bank ESF. This section will review the national legislations as well as the World Bank standards applicable for this project. It will also provide a gap analysis, and the institutional framework for the project.

3.1 National Legal Framework

The governing laws applicable to the scope of this project are:

1. Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law) and its amended Articles by Resolution 1095 of 2011, Decree No. 710 of 2012, Decision of the Prime Minister No. 964 of 2015 and Decree No. 618 and 1963 of 2017. The aforementioned amendments entailed articles related to hazardous and solid waste management (collection, handling, transport and disposal). This law controls the potential environmental impacts of the proposed subprojects.
2. Law No. 38 of 1967 (the Public Cleanliness Law) and its executive regulations issued by the Ministry of Housing dealing with solid waste to regulate the collect and disposal of construction and operation waste generated from subprojects under the first three components and maintaining the cleanliness of roads and public properties
3. Law No. 48 of year 1982 concerning protection of the Nile River, and waterways and its executive amendment
4. Law No. 63 of year 1974 for Electricity Sector facilities, which is relevant to component 3 of the project, which requires refurbishment in buses depositories to add charging stations
5. Law No. 93 of 1962 concerning sewage disposal on domestic wastewater network and its implementing regulations
6. Law No. 102 of 1983 regarding the nature reserves, and its complementary decrees in preservation of rare and endangered wild animals to protect flora and fauna in subprojects locations, where relevant.
7. The new Local Administration Law, which stipulates the responsibilities of waste management in neighborhood, districts and cities
8. Decree No. 3005 of 2015 on establishing the Waste Management Regulatory Authority (WMRA) and its mandates, which is a key stakeholder in the execution of this project
9. Traffic Law No. 66 of 1973 amended by Law 121 of 2008 and decree No. 143 of 2014 to regulate the movement of vehicles due to activities resulting from the

project components such as transporting construction materials and waste and the movement of e-buses.

3.1.1 The Egyptian Environmental Law No.4 of Year 1994

The main legal framework for environmental issues is Law No. 4 of 1994 amended by Law No. 9 of 2009 and Law 105 of 2015 and its implementing regulations amended by Resolution 1095 of 2011, then Resolution 710 of 2012, Resolution 964 of 2015, and Resolution 618 and 1963 of 2017 known as the Environmental Protection Law. This law mainly regulates the anticipated environmental impacts resulting from physical subprojects such as landfills, transfer stations and e-buses depositories and charging stations. The Egyptian Environmental Affairs Agency (EEAA) was established by Prime Minister Decree No. 631 of 1982 to be the administrative body responsible for environmental affairs in Egypt. Law 4/1994 states that EEAA is the body responsible for environmental affairs.

Law no. 4 applies to project components with activities having potential impacts on the environment, i.e., components containing physical interventions. Project activities for Component 2 involve construction activities as well as operation activities which will affect environmental receptors. Component 3 involves construction activities and generation of hazardous waste during operation phase, which can affect environmental receptors.

3.1.1.1 Environmental Impact Assessment (EIA)

In accordance with Article 19 of Law 4 of 1994, the entity responsible for a particular project must undertake an environmental impact assessment study for any new project and for extensions and renovations of existing projects to assess the impacts of the project on the natural environment prior to project implementation. In this context, it is required to prepare EIA studies for the physical subprojects of this project such as landfills and transfer stations.

The law considers the EIA as a main condition for licensing and thus the project that does not prepare an EIA or does not abide by the EIA conditions could be subjected to its license revoke (Articles 10, 12 and 19 of the executive regulations of Law 4/1994, modified by the decree 1741/2005.

The articles (19, 20, 21, 22, 23, 34, 70, 71, and 73) of Law no. 4 of 1994 stipulate measures and procedures related to the preparation of the EIA. These are further clarified by the provisions of articles no. (10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 34, 57, 59, and 60) of the Executive Regulations issued by the Prime Minister's Decree No. 338 of 1995, modified by decree no 1741/2005.

In 2009, EEAA issued specific Guidelines for EIA preparation. The objectives of the guidelines are to:

- Describe the objective of the EIA process and its legal requirements
- Identify the projects for which EIAs are required
- Indicate the criteria for classification and the different levels of assessment
- Describe the requirements for EIA of different categories
- Describe the requirements for public consultation

In addition, these guidelines incorporate specifications for legal framework, EIA system, project categorization (A, B or C) and the requirements of each as well as requirements and scope of the disclosure of EIA outcomes.

The Guidelines also entail requirements for public consultations, where key stakeholders have to be engaged in the consultation process during both the planning and implementation phases.

Concerned parties should include at minimum:

- EEAA and its regional offices
- Competent administration authorities based on the project location and nature
- Governorate, where the project is located
- Local city councils
- Representatives of the affected groups such as residents or nearby buildings based on project location and nature and the associated impacts
- It can also include:
    - Local NGOs
    - Universities and research institutions
    - Others
- Consultations should be conducted twice; once during the EIA scoping phase and another one other after preparation of the EIA draft
- Continuous consultation with community and concerned parties throughout project operation to achieve social compatibility, which is a main requirement by international funding agencies and the World Bank

It is required to develop a plan showing public consultation methodology that will be followed. The plan should also identify concerned parties, consultation mechanism and other points. This plan needs to be discussed with EEAA to make sure that all key parties are involved.

Scoping Consultation

The following should be entailed in the consultation plan:

- Objectives of consultation: scoping phase aims to evaluate environmental and social impacts based on project nature and the affected environment
- Consultation mechanism: either individual meetings (focus groups) with representatives from each concerned party, or a plenary session (collective meeting) that gathers concerned parties altogether. In either case, whoever responsible for preparing and submitting the EIA study, is responsible for providing a summary on project description, environmental aspects and consultation methodology. The following will be presented in the meeting:
  - Project components and activities associated with each component
  - A brief on characteristics of project location
  - List of key parties identified based on the project location and nature
  - Vision of the submitter of the study on environmental and social aspects and potential impacts of the project
  - Commitment of project owners towards improving the environmental situation in the surrounding area and supporting the surrounding community
  - Aspects discussed in the EIA study

In case of individual meetings with concerned parties, a report on consultation outcomes should be presented to EEAA to reach final agreement on EIA components, while in case of plenary sessions, agreements should be reached during the session.

EEAA is responsible for making decisions on whether to announce the public consultation in local newspapers or inviting each concerned party individually based on project nature and affected environment.

Public Consultation about the EIA Draft

- Objective of consultation: to announce the outcomes of the EIA study and allowing the concerned parties to make sure that all concerns raised during the previous consultations have been addressed and integrated in the study.
- Consultation mechanism: holding a plenary session where all concerned parties, who attended previous consultations, should contribute. The following is presented in the consultation:
  - Outcomes of the study indicating the discussed points in the scoping session
  - Presenting mitigation measures to alleviate the potential negative impacts from the project

Enough time, not less than a third of the total time of the session, should be allocated for discussions

In case of any objections, EEAA has the right to invite the EIA submitter and parties who have concerns, to discuss these concerns. EEAA can ask for further clarifications and scientific responses from the EIA submitter to make sure that all concerns have been addressed.

The public consultation outcomes should be incorporated in the EIA study as a main section including:

- Methodology to inform and engage concerned parties in EIA process
- Analysis of collected data
- A table with all points discussed in the public consultations and how they are addressed or mitigated
- Followed methodologies by project owners to ensure continuity of public consultation and community acceptance
- Commitment of the project owner to improve the surrounding environment and support community
- Documenting public consultations and meetings in the annex including dates, names of attendees, meetings agendas and subjects of discussions

3.1.1.2 Environmental Register

In accordance with Articles 22 and 23 of Law 4/1994, the owner of the project, will keep a written record of the impact of the project activity on the environment (environmental register) according to the model set forth in Annex 3 of the executive regulations of the law. Articles 17 and 18 of the Implementing Regulations define the rules for the preparation of the environmental register as well as the time frame of the obligation of the entity to maintain it and the data to be entered therein.

3.1.1.3 Environmental Protection Regulations against Air Pollution

Outdoor Air Pollutants

The provisions of Articles 34 to 40, 42, 43 and 47 bis in Law 4/1994, amended by Law 9/2009, Article 42 and Annex 5 and 6 of the Implementing Regulations set out maximum permissible limits for outdoor air pollutants.

Indoor Workplace Air Pollutants

According to Article 43 of the Law, the owner of an establishment is held to take all precautions and procedures necessary to prevent the leakage or emission of air pollutants inside the work premises except within the permissible limits as defined by the executive regulations of this Law, whether they result from the nature of the establishment activities or from malfunctioning equipment.

Regarding the monitoring of carbon black, it is not mentioned in the environmental law. However, the threshold limits of carbon black inside the workplace is given.

Component 2 involves waste facilities development/construction as well as operation releasing dust and gaseous emissions, which can affect air quality. Component 3 involves hazardous waste generation and gaseous emissions during operation, which can affect air quality.

3.1.1.4 Noise

Article 42 of the environmental law sets maximum permissible limits for noise levels during the construction and operation phases of the project according to types of areas. Noise levels must not exceed the sound intensity levels given in Annex 7 of the Executive Regulations.

Component 2 involves waste facilities construction and operation leading to increase in noise and vibration levels. Component 3 involves construction activities that can affect noise levels in surrounding areas.

3.1.2 Regulations Pertinent to Solid Waste and Hazardous Waste Management

Since the project incorporates subprojects that deal with waste during construction and operation phases, this section states the pertinent regulations. The collection, transportation and safe disposal of solid wastes from houses, public places, commercial and industrial establishments is regulated through the public cleanliness law 38/1967 amended by law 31/1976 and its executive regulations issued by Minister of Housing Decree Number 134 of 1968, the environmental law 4/1994, its executive regulations and amendments, as well as the prime minister decree no. 338 of 1995 and the national waste management strategy issued in 2018. Additionally, law no. 159 for the year 1953 regulates the cleanliness of fields, roads and streets as well as organization of collection and transport of waste. There is also a decree that endorses "the Egyptian Code of Design Principal and Implementation Conditions for Municipal Solid Waste Management Systems", which is the Ministerial Decree No. 717 of the year 2019. Other laws that might be pertinent to waste management in Egypt are:

- Law 10/2005 establishing a solid waste collection fee system with the electricity bill
- Laws 106/1976 and 101/1996 allow local governments to include the management of construction and demolition waste in the permits required for construction activities
- Law 140/ 1956 regarding occupation of public roads

- Law 84/ 1968 regarding public roads

Component 2 relates to construction and operation of waste management infrastructure including waste transfer and disposal systems, which will involve collection, handling and disposal of waste and are regulated by this set of laws. Component 3 involves construction activities generating waste requiring handling and disposal.

3.1.2.1 Egyptian Code of Design Principal and Implementation Conditions for Municipal Solid Waste Management Systems Number 717/2019

The Housing and Building National Research Center has prepared this Solid Waste Management Code, hereinafter referred to as the "Code", to provide an authoritative reference to the design requirements and specifications of the implementation of solid waste management systems. Annex 1: Egyptian Code of Design and Implementation Requirements of Sanitary Landfill Systems provides all the detailed technical and non-technical specifications of the code.

The Code aims to support the design and implementation of a modern, economical system that is effective and efficient in dealing with municipal solid waste, thus preserving and enhancing the public health and environment of the different population groups.

The Code incorporates requirements and guidelines for the effective procedures for sequencing SWM that include:

- Reduction of solid waste generation
- Solid waste reuse
- Solid waste recycling
- Solid waste recovery
- Solid waste treatment
- Safe disposal of solid waste

In addition, it provides guidance on the requirements for waste segregation, collection and transportation systems.

Regarding landfills, there are also guidelines to be followed on the design, construction and operation of landfills and closure of landfills and dumpsites that include:

- Selection of landfill location
- Selection of landfill lining system
- Preparation of feasibility studies and environmental impact assessment
- Criteria for landfill designs
- Conditions for the construction of landfill
- Conditions for the operation of controlled or sanitary landfill

- Converting an open dump into a controlled landfill
- Requirements for the design of the final cover layer for sanitary and controlled landfills
- Closure of open dumps

Project Component 2 involves site selection, design, construction and operation, for municipal and sanitary waste, which are regulated under this law.

3.1.2.2 Public Cleanliness Law Number 38/1967

Law 38 for the year 1967 amended by law 31/1976 and its Executive Regulations issued by decree 134/1968 prohibit the dumping of solid wastes in any location other than those designated by the municipal authorities. This includes solid waste treatment and disposal, in addition to the temporary storage in undesignated containers.

The Public Cleanliness Law and its Executive Regulations requires the municipal authority responsible for public cleanliness or the contracted entity assigned by it for the collection, transportation, and disposal of solid wastes, to carry out these processes in accordance with the specifications stipulated in the Executive Regulations and any other regulations by the municipal authority including necessary licenses, health and safety guidelines, specifications of waste transfer trucks, disclosure of trucks garage parking locations and associated licensing, maintenance of waste transfer equipment.

Project component 2 consists of construction and operation of municipal waste cells, landfill as well as transfer stations, which involve handling of waste regulated by this law.

3.1.2.3 Environmental Law 4/1994

In general, Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law) and its amended Articles by Resolution 1095 of 2011, Decree No. 710 of 2012, Decision of the Prime Minister No. 964 of 2015 and Decree No. 1963 of 2017 prohibits the disposal of any solid wastes except in areas designated for this purpose through articles 38, 39 and 41 of the executive regulations. These articles require that during excavation, construction or demolition activities, the entity undertaking the work must take the necessary precautions to safely store and transport the resulting wastes in accordance with the set procedure.

Prime minister Decree no. 964/2015 amending the Executive Regulations of law 4/1994 sets out regulations for SWM and responsibility of the competent authority to assess landfill sites in coordination with EEAA in accordance with Annex 11 of the amended Executive Regulations 964 /2015 of Law No. 4 of 1994. Some locations are not defined yet; therefore, selection criteria under this law apply.

Regarding the hazardous wastes, and in accordance with the provisions of articles 25 to 33 of the executive regulations of law 4/1994, which is equivalent to law 9/2009 and latest amendments on articles 26, 28 and 38 in Decree No. 1963 of 2017, the entity producing hazardous wastes in gaseous, liquid or solid form is committed to collect and transport the generated waste to designated disposal sites, which are predetermined by the local authorities, the competent administrative authorities and the Egyptian Environmental Affairs Agency.

The law sets out guidelines for hazardous waste management facilities including licensing requirements for transport vehicles and specifications of the facilities. The facilities for hazardous waste treatment and disposal are to be located in an area that is no less than three kilometers from residential and urban communities.

When necessary, the facility's location may be in an area that is less than three kilometers away from residential and urban gatherings, and the height of the surrounding wall is less than 2.5 meters whenever the granting authority considers it after taking the opinion of the authorities referred to in Article 29 of these regulations, and provided that it does not violate safety conditions that prevent any public damage or from being exposed to people and in a manner that guarantees the safety of the environment.

The EEAA is responsible for reviewing the tables of hazardous wastes that are subjected to the provisions of the law, in coordination with the relevant ministries, regarding the tables issued by them in this regard.

One of the subcomponents of component 2 includes developing a hazardous waste management facility, to which this law applies. This law also applies to Component 3 which will result in hazardous waste generation (e-batteries).

3.1.2.4 Basel Convention Controlling Transboundary Movement of Hazardous Wastes and Their Disposal

The component relating to e-buses will involve generation of hazardous waste, which may be subject to transboundary movement of hazardous waste. If transboundary movement of hazardous waste is applicable in this project, specifically the consumed electric buses batteries, requirements of Basel Convention will have to be fulfilled.

3.1.3 Regulations Pertinent to Water and Wastewater Management

3.1.3.1 Discharge of Wastewaters Law 93/1962

The wastewater disposal into the drainage systems is regulated by law 93/1962 and its executive regulations amended by decree 44/2000. The law prohibits the disposal of domestic, industrial and commercial wastewater, treated or untreated, in public drainage

system without obtaining a prior approval. Article 14 of the executive regulations set the parameters required regarding the quality of the wastewater discharged to the public sewage network.

3.1.3.2 Protection of Nile River Water and Egypt waterways from pollution Law 48/1982

Law number 48 for the year 1982 defines the water ways to which this law is applicable. The fresh water sources are: the Nile River and its branches and bays, as well as the branches and canals of all sizes; non-fresh water sources consist of all types of open type drainages, lakes, ponds and enclosed water bodies and underground water reservoirs.

The law states that for all the stated water ways, it is prohibited to dispose or dump any solid, liquid or gaseous waste from all residential, commercial and industrial activities as well as waste water unless an approval is obtained from the Ministry of Water Resources and Irrigation according to the regulations issued in this regard.

These laws apply to Component 2 and 3 involving construction and operation resulting in waste generation posing risk on waterbodies in case of improper waste disposal.

3.1.4 Laws Related to Traffic

Laws related to traffic are relevant to this project, where some subprojects will lead to increase in the traffic movement during construction and operation phases, such as transport of construction materials, e-buses movement, and waste transport.

The laws applicable to traffic and road work are governed by Traffic Law No. 66 of 1973, as amended by Law No. 121 of 2008. Law No. 121 of 2008 stipulated that all passenger transport vehicles (referring to taxis, buses and microbuses) exceeding 20 years of age cannot renew their license to operate. The law is also concerned with traffic planning during the construction of projects. Law No. 140 of 1956 concerning the use and occupation of public roads, and Law No. 84 of 1968 concerning public roads, including highways, main roads and regional road.

The laws require that no actions affect the flow of traffic without prior authorization, and the laws specify that the competent administrative authority can use public roads for a fee. The executive regulations of Law No. 140 of 1956 specify the requirements for the management of construction and demolition. In general, vehicle drivers are prohibited from causing any pollution by dumping waste on the road, construction waste or any other materials.

Component 2 and 3 involve construction and operation activities involving traffic movement.

3.1.5 Egypt's Commitments Towards Combating Climate Change

Egypt has adopted various climate change initiatives and agreements including ratification of the United Nations Framework Convention on Climate Change in 1994. Egypt also signed the Paris Convention in 2015, which was ratified by the Egyptian Parliament in June 2017. Moreover, Egypt has submitted its Intended Nationally Determined Contribution (INDC) in 2015, which was automatically converted to Nationally Determined Contribution in 2017 with the submission of its instruments of ratification to the UNFCCC.

Other national policies and strategies related to combating climate change and reducing air pollution include the Sustainable Development Strategy (Egypt Vision 2030.) Egypt's SDS addresses economic, social and environmental dimensions of development, and included indicators to reduce energy consumption, which is a state-driven approach to reducing greenhouse gases that cause climate change. Furthermore, Egypt developed the framework of the low-emission development strategy (LEDS), which is an important tool for decision-makers to define Egypt's voluntary commitments in light of the Paris Agreement 2015.

In this context, this project will result in GHG emissions reduction due to use of e-buses, proper solid waste management, methane capturing in landfills, and composting.

3.1.6 Social Legislations

The applicable social legislations in Egypt are explained in the following sections:

3.1.6.1 Work Environment and Occupational Health and Safety

Articles 43 - 45 of Law No. 4/1994 and articles 44 - 47 of its modified Executive Regulations by Decrees No. 1095/2011 and 710/2012 stipulate the provision of protective equipment and all necessary safety measures to work crew involved in construction activities.

Labor Law No. 12/2003 addresses requirements for workforce safety and assurance of the adequacy of the working environment. The law also deals with the provision of protective equipment to workers and firefighting/emergency response plans.

Ministerial Decree No. 211/2003 of the Ministry of Manpower defines requirements to prevent adverse physical, chemical, biological and mechanical hazards in the workplace.

Other laws and decrees relevant to occupational health and safety provisions consist of:

- Decree No. 126/2003 replacing Decree No. 75/1993 defining procedures and forms for the notification of work-related accidents, injuries, fatalities and diseases,

- Decree No. 211/2003 replacing Decree No.55/1983 specifying conditions and precautions essential for the provision of OSH measures at the workplace,
- Decree No. 134/2003 replacing Decree No. 116/1991 defining the types of establishments covered, OSH services and committees, and related OSH training institutions.
- Decree No. 155/2003 identifies works, occupations and industries prohibited for women workers,
- Law 137/1981: Labor and Workforce Safety,
- Minister of industry Decree 91/1985 for implementing Law 2/1985,
- Law No. 79/1975 as amended by Law No. 25/1977 defining the Social (and Health) Insurance
- Law No. 12/1996 enacts the Child Law according to Law No. 12/2003,
- Minister of Manpower Decree No. 48/1967 for implementing Law No. 79/1975, requires employers to inform their employees that they are dealing with hazardous waste, accordingly every worker is required to follow protective measures and observe safety precautions set by the employer. The establishment is authorized to take disciplinary action against a worker who does not follow the safety precautions as prescribed (article 218 of the law, article 57 of Law No. 79/1975, and Decree No. 48/1967).

Table 3-1: Labor national requirements including the labor law12/2003

Legislation	Relevant Article	Requirements
Law 12/2003 on Labor and Workforce Safety	Articles 80-87	▪ Regulates working hours and rest times for workers ▪ The working hours shall include a period of one or more meals and rest not less than one hour in total and the period shall not exceed five consecutive hours. The competent minister may, by a decision, determine the cases or works which are imperative for technical reasons or operating conditions. ▪ Work hours and rest periods should be organized so that the period between the beginning and the end of working hours does not exceed ten hours per day. ▪ Work shall be organized at the facility so that each worker shall receive a weekly rest of not less than 24 hours after six working days at most. In all cases, weekly rest shall be paid. ▪ The employer shall put on the main doors used by the workers for entry, as well as in a visible place in the establishment a schedule showing the weekly rest day, working hours and rest periods for each worker and the amendment to this schedule.

	Book 3 - Single worker contract: Article 32	The employer shall be obliged to issue the contract in writing in Arabic in three copies. The employer shall keep one and deliver a copy to the worker. In particular, the contract shall include the following data: ▪ Name of employer and place of work. ▪ The name of the worker, ▪ his qualification, ▪ his profession or craft, ▪ his insurance number, ▪ his place of residence and what is necessary to prove his identity. The nature and type of work being contracted. ▪ If there is no written contract for the worker, the unit to prove his rights, all methods of proof. The employer shall be given a receipt for the papers and certificates he has deposited with him.
Law 12/2003 on Labor and Workforce Safety and Book V on Occupational Safety and Health (OSH) and assurance of the adequacy of the working environment	Minister of Labor Decree 48/1967. Minister of Labor Decree 55/1983. Minister of Industry Decree 91/1985 Minister of Labor Decree 116/1991.	▪ The owner of the project is bound with the provision of protective equipment to workers and fire-fighting/emergency response plans. Moreover, the following laws and decrees should be considered: ▪ The contractor should have appropriate number of first kits in relation to the size of the site and the number of workers on site
	Article 211 and article 34 of the Decree of the Minister of Labor and Manpower no. 211/2003	▪ The establishment should prepare, records / reports/register for chemical safety
Law 137/1981	Article 117	▪ The employer should inform his workers of the hazards associated with non-compliance with safety measures
Decree 458/2007		▪ Egyptian Drinking Water Quality Standards should be met for all water bought and stored on site for the workers' use.

The environmental aspects that have to be taken in consideration for the workplace are noise, ventilation, temperature, and health and safety, which are as follows:

Noise

Annex 7 of the Executive Regulations amended in 2012 of Law no.4/1994 stipulates the permissible limits for sound intensity and safe exposure times in workplaces.

Ambient Air Quality

Annex 8 of the Regulations of Law no.4/1994 lists the maximum allowable limits for air contaminants within the working environment.

Temperature and Humidity

Article 44 of Law 4/1994 and Article 46 of its amended regulation 710/2012 stipulate conditions and requirements for temperature and humidity in the workplace. Annex 9 to the Regulations sets out the major and minor limits for temperature and humidity, exposure periods and safety precautions.

Component 2 and 3 will involve workers. Aforementioned laws govern the national occupational health and safety standards applicable to permanent or temporary workers.

3.1.6.2 EEAA EIA Guidelines Related to the Public Consultation

- Conduct a public consultation as part of the ESIA study according to the EEAA guidelines methodology. The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process with concerned parties.
- Preparation of the Public Consultation Plan before starting the consultation activities in the EIA scoping phase, the project proponent prepares a plan indicating the methodology of the public consultation to be adopted in the two public consultation phases (EIA scoping phase and consultation on the draft EIA). The plan should indicate the concerned parties that will be consulted, method of consultation and other points.
- An individual chapter in the EIA will be prepared for public consultation
- Disclosure of relevant material is an important process and should be undertaken in a timely manner for all Category C projects. This process permits meaningful consultations between the project proponent and project-affected groups and local NGOs is required to take place. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties.
- Paragraph 6.4.3.1: Scope of Public Consultation
- Paragraph 6.4.3.2: Methodology of Public Consultation
- Paragraph 6.4.3.3: Documentation of the Consultation Results
- Paragraph 7: Requirement and Scope of the Public Disclosure

These guidelines outline requirements for the public consultation session to be held prior to publishing of the ESMF study and disclosure of its results therein.

3.1.6.3 Cultural Heritage

Archaeological and cultural heritage is protected by the following laws:

- Law 117 of 1983 on the protection of monuments and cultural heritage, amended by Law 12 of 1991.
- Consolidated Building Law No. 119 of 2008, which aims to regulate the planning and construction of residential areas in addition to preserving the current real estate wealth

These laws apply to project component 2, which may involve deep excavation activities and possible unearthing of artifacts.

3.1.6.4 Land Acquisition Laws

The Egyptian Constitution has preserved the right of private property, Egyptian Constitution (1971, amended in year 1980) and Egyptian Constitution (2014, articles 33 and 35). The Egyptian Civil code 131/1948, articles 802-805 recognize private ownership right and stipulates that the owner of a certain property has the sole right of using and/or disposing his property.

Property expropriation for public benefit is indicated by Law No. 10 of year 1990 and its amendments by Law No. 24 for the year 2018, and law No. 1 for the year 2015. The law describes the cases of property expropriation for public benefit, considering waste management facilities projects as public benefit activities. Land acquisition procedures according to this law are as follows:

The land acquisition procedures start with declaring the project for public interest. Afterwards a presidential decree is issued accompanied with a memorandum specifying the plots required for the project as well as a complete plan for the project and its structures (Law 59/1979 & Law 3/1982 stipulated that the Prime Minister may issue the Expropriation decree).
The decree and the accompanying memorandum must be published in the official newspapers; a copy for the affected communities must be placed at the main offices of the concerned Local Government unit.

This law has specified, through Article 6, the formation of the “Compensation Valuation Commission”. This Article states that the commission is established at the Governorate level and consists of a delegate from the relevant Ministry’s Surveying Body (as President), a representative of the Agricultural Directorate, a representative of the Housing and Utilities Directorate, and a representative of the Real Estate Taxes Directorate in the Governorate. The compensation shall be estimated according to the prevailing market prices at the time of the issuance of the Decree for Expropriation. Amendments of the law in 2015 has specified the period allowed for submitting a grievance to be 15 days and allowed additional 30 days to submit all relevant documents.

This law applies to project component 2 which involves establishing the IWMF-10R and hazardous waste management facilities, in which multiple land plots might be acquired for the landfill sites, hence the land acquisition laws may apply**.**

3.1.6.5 Law No. 94/2003, Protection of Communities' Human Rights Laws

The Law on Establishing the National Council for Human Rights (NCHR) 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. A summary of the national regulations related to socio-economic environment is shown in Table 3-2.

Table 3-2: Summary of national regulations related to socio-economic environment

Title of legislation	Summary and how this legislation apply to this project	Year
EEAA guidelines related to the Public Consultation		
Law 4/1994 on Environmental Protection	Consultation of the community people and concerned parties with the needed information about the project. All stakeholders should be invited. Paragraph 6.4.3 from Law 4/1994 on Environmental Protection provides detailed information on the scope of public consultation, methodology and documentation. **Paragraph 6.4.3 Requirements for Public Consultation:** ▪ Paragraph 6.4.3.1 Scope of Public Consultation ▪ Paragraph 6.4.3.2 Methodology of Public Consultation ▪ Paragraph 6.4.3.3 Documentation of the Consultation Results ▪ Paragraph 7 Requirement and Scope of the Public Disclosure	1994
Land acquisition due to public interest and involuntary resettlement		
Law 24/2018	Replace the provisions of Articles 2 (fourth paragraph), 3, 5 (second paragraph), 6 (second paragraph), 7 (first paragraph), 13, 15 (first paragraph) of Law No. 10 of 1990 regarding expropriation of real estate for the public benefit, texts the following: The public benefit report shall be attached to the decision of the President of the Republic or his authorized representative, accompanied by ▪ A note stating the project to be executed. ▪ A drawing of the overall planning of the project and the real estate necessary for it.	2018

	The compensation is estimated according to the prevailing prices at the time of the expropriation decision, plus (20%) twenty percent of the value of the estimate. Existing expropriation procedures. The decision for the public benefit shall be published with a copy of the memo referred to in Article (2) of this law in the Official Gazette. In addition, affixed in the place prepared for advertisements at the headquarters of the local administration units, in the mayor or police headquarters, and in the primary court located in the property department, and on the front The property is subject to expropriation in a visible manner.	
Law 1/2015	On the amendment of some provisions of Law No. 10 of 1990 on the land acquisition due to public interest. The amendments provided: The first section of article 7 of the law states that: After depositing the compensation, the entity in acquisition charge shall prepare lists with the real estate subject to acquisition, areas, locations, names of owners and property holders, their addresses, and the value of compensations stipulated. These lists and respective maps showing the location of all properties, shall be sited in the head office of the entity in charge, - while article 8 after amendment stated that: "The concerned owners and holders of rights have the right to object to the information contained in such lists within 15 days from the date of posting and publishing the lists and information of the expropriated properties.	2015
Law 10/1990	On Property Expropriation for Public Benefit identifies transportation projects as public benefit activities. It describes acquisition procedures as follows: 1. The procedures start with the declaration of public interest pursuant to the presidential decree accompanied with memorandum on the required project and the complete plan for the project and its structures (Law 59/1979 and Law 3/1982 provided that the Prime Minister issues the decree); 2. The decree and the accompanying memorandum must be published in the official newspapers; a copy for the public is placed in the main offices of the concerned local Government unit. This law has specified, through Article 6, the members of the Compensation Assessment Commission. The commission is made at the Governorate level and consisting of a delegate from the concerned Ministry's Surveying Body (as President), a delegate from the Agricultural Directorate, a delegate from the Housing and Utilities Directorate, and a delegate from the Real Estate Taxes Directorate in the Governorate. The compensation shall be estimated according to the prevailing market prices at the time of the issuance of the Decree for Expropriation.	1990
Law 577/1954	**Law 577/54**, which was later amended by Law 252/60 and Law 13/162, and establishes the provisions pertaining to the	1954

	expropriation of real estate property for public benefit and improvement.	
Law 27/ 1956	**Law No. 27 of 1956**, which stipulates the provisions for expropriation of districts for re-planning, upgrading, and improvement, and the amended and comprehensive Law No.10 of 1990 on the expropriation of real estate for public interest. The **first article of Law No. 27 of 1956** allows for the expropriation of districts for their improvement, upgrading, re-planning, and reconstruction. Article 24 of Law 577/54 also stipulates that in case only partial expropriation of real estate property is required, and the remaining un-expropriated part will not be of benefit to the owner; the owner shall be given the right to submit a request within 30 days (beginning from the date of final disclosure of the list of the expropriated property) for the purchase of the entire area. It should be noted that the new law has not restricted the right to request the purchase of the remaining un-expropriated portion of real estate whether it is a building or land.	1956
Egyptian Constitution (That was cancelled after the 25th of January Revolution, but main issues related to private ownership was included in the new constitution declaration 2011	**The Constitution Chapter Two Part One: Social and Moral components** The State shall guarantee equality of opportunity to all Egyptians and coordination between woman's duties towards her family and her work in the society, considering her equal to man in the political, social, cultural and economic spheres without detriment to the rules of Islamic jurisprudence	
	The Constitution Chapter Two: Economical components **Article 29** States that ownership subject to the control of people is protected by the State, and is divided into three types: public, co-operative and private property.	1971

3.1.6.6 Land Tenure and Related Laws to Land and Structures Expropriation

There are three main forms of land ownership in Egypt (as shown in Table 3-3).

Table 3-3: Land ownership type in Egypt

Land ownership type

Public or State land[1]	This is divided into the State's public domain that cannot be alienated and the State's private domain, which can be alienated generally through sale, lease, "Takhssiss" (i.e. transfer of ownership conditional on meeting certain criteria, such as keeping the land use unchanged and paying the remaining installments of the land price) or through Haq Intifaa,
Private land	(In Arabic *Mulk horr*), which may be alienated/transferred freely. The constitution is in Article 24, which states that "private property is protected; and it shall not be expropriated except for the public benefit, and in return for fair compensation, to be paid in advance. All of this is in accordance with the law. This may be alienated/transferred freely
Endowment land	Land held as a trust/endowment for religious or charitable purposes, which is often subject to covenants on transfer or use, and which is typically transferred through leasehold or usufruct.
Customary Rights	There are some areas in Sinai and in the northern coast with implicitly recognized to land to the benefit of Bedouins. In these areas, someone wishing to acquire land often has to make two payments, first to the Bedouin claimant (s) for the right of use and then to the State to regularize and register their land tenure/ownership and be able to obtain services.

It is important to note that the Civil Code (No. 131 of 1948) recognizes possession of immovable/movable property without ownership as a legitimate channel to acquire ownership of the property in question through adverse possession, provided that this has been "peaceful, unchallenged and uninterrupted" for a period of 15 years[2]. By Law, ownership through adverse possession does not, however, apply to State lands.

This law would apply to project component 2 which might involve acquiring land plots**.**

3.1.7 The Relevant International Treaties Signed by Egypt

Egypt has signed and ratified a number of international conventions that oblige the country to preserve environmental resources:

- UNESCO Convention for the Protection of the World Cultural and Natural Heritage (Paris, 16 November 1972)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington, 1973)

[1] The Ministry of Local Administration estimates that 15.7 million Egyptians (22.3% of the population) live in 1,105 informal or squatter settlements, including unlawful urbanization of agricultural lands, unplanned/ unauthorized land subdivisions, and squatting on public or privately owned lands

[2] The large majority of land in Egypt is public or State-owned desert land that is for the most part undeveloped (estimated to be 90-95% of the national territory).

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)
- United Nations Convention on Climate Change (New York 1992). The Convention covers measures to control greenhouse gas emissions from various sources, including transportation.
- United Nations Framework Convention on Climate Change and the Kyoto Protocol (Kyoto, 1997)
- Convention on the Prevention and Control of Occupational Hazards caused by Carcinogenic Substances (Geneva, 1974)
- Convention on the Protection of Workers from Occupational Hazards in the Work Environment due to Air Pollution, Noise and Vibration (Geneva 1977)
- ILO: Basic labor standards to be followed during project implementation. Egypt has been a member of the International Labor Organization (ILO) since 1936 and has signed 64 conventions that regulate labor standards and working conditions. In 1988 Egypt ratified the Occupational Safety and Health Convention of 1979 (No. 152).

3.2 World Bank Requirements

The World Bank requires that the projects it finances to be in compliance with both the country's national standards as well as their own environmental and social policies. Therefore, in addition to the national regulations, the project components aim at complying with the WB Environmental and Social Standards described in Annex 5: Brief Description of the World Bank's Environmental and Social Standards (ESS). The standards help to ensure the environmental and social soundness and sustainability of investment projects. They also support integration of environmental and social aspects of projects into the decision-making process. In addition, the standards promote sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and the environment.

3.2.1 World Bank Environmental and Social Safeguards (ESSs)

The World Bank (WB) has identified 10 environmental and social standards that should be complied with in its financed projects.

The following ESSs are relevant to the Project (ESS1, ESS2, ESS3, ESS4, ESS5, ESS8 and ESS10):

3.2.1.1 ESS 1: Assessment and Management of Environmental and Social Risks and Impacts

Project activities for components 2 and 3 will involve large scale physical interventions, which will impact environmental receptors including air quality, noise levels, water bodies, and soil. A significant segment of project activities will include generation and handling of hazardous types of waste. If not managed properly, activities will negatively impact environmental receptors.

Project activities involve a significant social component due to planned locations of activities in urban areas or in close proximity to communities, and implications of the projects on livelihood of communities (informal waste collectors)

ESS1 is relevant to this project due to the environmental and social risks and impacts associated with the activities.

3.2.1.2 ESS 2: Labor and Working Conditions

Project activities for components 2 and 3 will involve large scale physical interventions, which will involve employment of labor. The nature of activities will involve general construction and associated health and safety risks and hazards. The project will involve specialized activities involving generation and handling of hazardous wastes and associated safety hazards and risks including fire hazards and explosions due to methane pockets. The scale of the project is expected to require employment of various types of workers including direct, contracted, and primary suppliers.

ESS2 is relevant to this project due to the need for workers and health and safety impacts associated with the nature of project activities.

3.2.1.3 ESS 3: Resource Efficiency and Pollution Prevention and Management

Project activities will involve generation of pollution in the form of waste, emissions of gases and dust, etc. Project activities will also involve resource consumption in the form of water, electricity etc.

ESS3 is relevant to this project due to activities involving consumption of resources and generation of pollution.

3.2.1.4 ESS4: Community Health and Safety

Project activities involving infrastructural physical interventions are not planned in close proximity to communities. The operation of the project will involve management of hazardous wastes, handling of electricity with possible risks on the community health and safety if not managed properly.

ESS4 is relevant to the project due to possible risks and impacts on the community health and safety from project activities.

3.2.1.5 ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

Project activities involve infrastructural works that will require land. Land has been allocated in the 10th of Ramadan City and in Al Kuraymat. Land has not yet been allocated to the transfer stations.

ESS5 is relevant to this project due to the possible need for land acquisition.

3.2.1.6 ESS 8: Cultural Heritage

Project activities will involve excavation works in the GCA. Egypt is known to contain archeological sites, therefore, there are risks of finding tangible physical cultural heritage.

ESS8 is relevant to the project due to possible chance of finding physical cultural heritage as a result of excavation works.

3.2.1.7 ESS 10: Stakeholder Engagement and Information Disclosure

Project activities involve the SWM, which is a complex sector in Egypt involving various stakeholders both formal and informal. Project activities especially operation will impact livelihoods of several types of stakeholders.

ESS10 is relevant to the project due to the involvement of various stakeholders and complex implications of the project. There is a whole component in the project, which is component 4 (refer to Section 2.2.4), dedicated to communication and stakeholders engagement as explained in more details under the project description above.

3.2.2 World Bank Group Environmental, Health and Safety (EHS) Guidelines

The general World Bank Group Environmental, Health, and Safety Guidelines will be followed to ensure that all the project components and subcomponents comply with the Environmental Health and Safety standards and requirements of the WB during the different phases of the project. Environmental health and safety guidelines are organized to identify common themes applied to any industrial sector or project (Table 3-4). These guidelines are based on good international industrial practices and the achievable levels of performance in new facilities at reasonable costs through existing technology. It is important to note that if national regulations differ from the levels and measures contained in the environmental health and safety guidance, the project developer is expected to achieve the most stringent.

Table 3-4: Themes of the WBG EHS guidelines

1.1.1 Environmental	a. **Air Emissions and Ambient Air Quality** b. **Energy Conservation** c. **Wastewater and Ambient Water Quality**

	d. **Water Conservation** e. **Hazardous Materials Management** f. **Waste Management** g. **Noise** h. **Contaminated Land**
1.1.2 Occupational Health and Safety	a. General Facility Design and Operation b. Communication and Training c. Physical Hazards d. Chemical Hazards e. Biological Hazards f. Radiological Hazards g. Personal Protective Equipment (PPE) h. Special Hazard Environments i. Monitoring
1.1.3 Community Health and Safety	a. Water Quality and Availability b. Structural Safety of Project Infrastructure c. Life and Fire Safety (L&FS) d. Traffic Safety e. Transport of Hazardous Materials f. Disease Prevention g. Emergency Preparedness and Response
1.1.4 Construction and Decommissioning	a. Environment b. Occupational Health and Safety c. Community Health and Safety

3.3 Gap Analysis

In case of any discrepancy between the requirements of Egyptian legislations and the requirements of the World Bank, the more stringent requirements will be applied. In cases where the WB standards or Egyptian standards do not exist, the existing standard will be complied with. For discrepancies in permissible levels, the standard with more stringent levels will apply.

3.3.1 Gap Analysis for ESSs and National Laws

Results of the gap analysis between the national laws and WB ESS standards are shown in Table 3-5

Table 3-5: Gap analysis between ESS and national laws

ESS	National Laws	Gap
ESS 1: Assessment and Management of Environmental	▪ Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law) and its amended Articles of Association amended by Resolution	▪ Discrepancies in air quality, water quality and noise limits between the national laws and WB standards

And Social Risks And Impacts	1095 of 2011, Decree No. 710 of 2012, Decision of the Prime Minister No. 964 of 2015 and Decree No. 618 and 1963 of 2017 ▪ Public cleanliness law 38/1967 amended by law 31/1976 and its executive regulations ▪ Law no. 159 for the year 1953 regulates the cleanliness of fields, roads and streets as well as organization of collection and transport of waste. ▪ Law 10/2005 establishing a solid waste collection fee system on the electricity bill ▪ Laws 106/1976 and 101/1996 allow local governments to include the management of construction and demolition waste in the permits required for construction activities ▪ Law 140/ 1956 regarding occupation of public roads ▪ Law 84/ 1968 regarding public roads ▪ Law 93/1962 on Wastewater disposal into the drainage systems ▪ Law 48/1982 on protection of Nile River Water and Egypt waterways from pollution	▪ Egyptian legislations do not entail any regulations regarding the monitoring of carbon black ▪ No national e-waste management system developed for the disposal or recycling of batteries
ESS 2: Labor and Working Conditions	▪ Articles 43 - 45 of Law No. 4/1994 and articles 44 - 47 of its modified Executive Regulations by Decrees No. 1095/2011 and 710/2012 ▪ Labor Law No. 12/2003	▪ The Egyptian labor law does not include clear articles that guarantee application to all project workers including fulltime, part-time, contracted workers, primary supply workers, community workers, temporary, seasonal and migrant workers, ▪ The WB ESS2 ensure a clear GM for all workers without any discrimination. ▪ Egyptian Labor Law does not include an obligation to provide workers with facilities appropriate to the circumstances of their work, including access to canteens, hygiene facilities, and appropriate areas for rest. In addition to quality of accommodation, if needed.
ESS 3: Resource Efficiency and Pollution	▪ Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law)	

Prevention and Management	and its amended Articles of Association amended by Resolution 1095 of 2011, Decree No. 710 of 2012, Decision of the Prime Minister No. 964 of 2015 and Decree No. 618 and 1963 of 2017 ■ Public cleanliness law 38/1967 amended by law 31/1976 and its executive regulations ■ Law no. 159 for the year 1953 regulates the cleanliness of fields, roads and streets as well as organization of collection and transport of waste. ■ Law 10/2005 establishing a solid waste collection fee system on the electricity bill ■ Laws 106/1976 and 101/1996 allow local governments to include the management of construction and demolition waste in the permits required for construction activities ■ Law 140/ 1956 regarding occupation of public roads ■ Law 84/ 1968 regarding public roads ■ Law 93/1962 on Wastewater disposal into the drainage systems ■ Law 48/1982 on protection of Nile River Water and Egypt waterways from pollution	
ESS4: Community Health and Safety	■ Law no. 94/2003, Protection of communities Human Rights Laws	
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	■ Egyptian Constitution has preserved the right of private property, Egyptian Constitution (1971, amended in year 1980) and Egyptian Constitution (2014, articles 33 and 35) ■ Egyptian Civil code 131/1948, Articles 802-805 for private ownership right ■ Law No. 10 of year 1990 and its amendments by law No. 24 for the year of 2018, and law No. 1 for the year 2015 for property expropriation for public benefit	■ The cut-off date: The WB identifies a cut-off date in order to prevent people influx to the project area. The Egyptian laws does not set a cut-off date, particularly if the impacts are related to agricultural lands that might experience changes in crops and tenancy. ■ Monitoring and Evaluation: Monitoring or evaluation measures are not stipulated in Egyptian regulation. ■ Valuation of compensation: Egyptian regulations use prevailing price in the affected areas to calculate and compensate project affected people for their expropriated property. The

		prevailing price is assessed by a specialized committee created by the government. For crops, they are valuated according to the price lists developed by the agriculture directorate. Previous Egyptian experiences show that the full replacement principle as stated by ESS5 has not been realized by the affected group. ■ Income restoration (livelihoods): Egyptian law does not discuss compensation for loss of income, only land and assets.
ESS 8: Cultural Heritage	■ Law 117 of 1983 on the protection of monuments and cultural heritage, amended by Law 12 of 1991 ■ Consolidated Building Law No. 119 of 2008, which aims to regulate the planning and construction of residential areas in addition to preserving the current real estate wealth	
ESS 10: Stakeholder Engagement and Information Disclosure	■ EEAA EIA guidelines related to the Public Consultation	■ The Egyptian guidelines focus on the consultation phase during the preparation of the project's ESIA through holding public consultation sessions before starting the project to obtain the environmental approval. ■ World Bank standards indicate that the stakeholder engagement is an inclusive and ongoing process conducted throughout the project life cycle.

3.3.2 Gap Analysis For Key Egyptian and WB Environmental Issues

This section outlines the key environmental requirements of both the Egyptian Legislations and the World Bank policies and the gaps between both. **The limits in bold and italic in the tables below will apply (the more stringent).**

3.3.2.1 Air Quality

Table 3-6 shows ambient air quality limits in the Egyptian legislations and WB standards.

Table 3-6: Ambient Air Quality limits in the Egyptian legislations and WB standards

	Requirements of Egyptian Legislation				Requirements of World Bank			
	Outdoor Air Pollutants (in urban and industrial areas) as per Article 34 of law 4/1994 amended by law 9/2009 and Annex 5 of the Executive Regulations amended by Decree 710/2012.				Ambient Air Quality as per OP 4.01 WBG General EHS Guidelines (Table 1.1.1 [3] [4])			
Exposure Period	**1 hr**	**8 hr**	**24 hr**	**1 year**	**1 hr**	**8 hr**	**24 hr**	**1 year**
Carbon monoxide CO ($\mu g/m^3$)	***30 (urban and indus.)***	***10 (urban and indus.)***	N/A	N/A	N/A	N/A	N/A	N/A
Sulphur dioxide SO_2 ($\mu g/m^3$)	***300 (urban) 350 (indus.)***	N/A	125 (urban) 150 (indus.)	***50 (urban) 60 (indus.)***	N/A	N/A	***125 (IT-1) 50 (IT-2) 20 (guideline)***	N/A
Nitrogen Oxides NOx ($\mu g/m^3$)	300 (urban) 300 (indus.)	N/A	***150 (urban) 150 (indus.)***	60 (urban) 80 (indus.)	***200 (guide line)***	N/A	N/A	***40 (guideline)***

[3]World Health Organization (WHO). Air Quality Guidelines Global Update, 2005.

[4] IT stands for Interim Target, which are the increment values that should be targeted by an organization during the implementation of a project leading to the recommended guideline values.

	Requirements of Egyptian Legislation				Requirements of World Bank			
	Outdoor Air Pollutants (in urban and industrial areas) as per Article 34 of law 4/1994 amended by law 9/2009 and Annex 5 of the Executive Regulations amended by Decree 710/2012.				Ambient Air Quality as per OP 4.01 WBG General EHS Guidelines (Table 1.1.1 [3] [4])			
Exposure Period	**1 hr**	**8 hr**	**24 hr**	**1 year**	**1 hr**	**8 hr**	**24 hr**	**1 year**
Particulates PM_{10} ($\mu g/m^3$)	N/A	N/A	150 (urban) 150 (indus.)	70 (urban) 70 (indus.)	N/A	N/A	***150 (IT-1)*** ***100 (IT-2)*** ***75 (IT-3)*** ***50 (guideline)***	***70 (IT-1)*** ***50 (IT-2)*** ***30 (IT-3)*** ***20 (guideline)***
Particulates $PM_{2.5}$ ($\mu g/m^3$)	N/A	N/A	80 (urban) 80 (indus.)	50 (urban) 50 (indus.)	N/A	N/A	***75 (IT-1)*** ***50 (IT-2)*** ***37.5 (IT-3)*** ***25 (guideline)***	***35 (IT-1)*** ***25 (IT-2)*** ***15 (IT-3)*** ***10 (guideline)***
Total suspended particles TSP ($\mu g/m^3$)	N/A	N/A	***230 (urban)*** ***230 (indus.)***	***125 (urban)*** ***125 (indus.)***	N/A	N/A	N/A	N/A
Ozone O_3 ($\mu g/m^3$)	***180 (urban)*** ***180 (indus.)***	***120 (urban)*** ***120 (indus.)***	N/A	N/A	N/A	160 (IT-1) 100 (guideline)	N/A	N/A

3.3.2.2 Water Quality

Table 3-7 shows Water Quality limits in the Egyptian legislations and WB standards. Whereas, Table 3-8 shows limits for discharge of liquid effluent into sewer system.

Table 3-7: Egyptian legislations and WB standards concerning Water Quality

Requirements of Egyptian Legislations		Requirements of World Bank	
Reference	**Requirements**	**Reference**	**Requirements**
Executive Regulations issued by decree 92/2013 of Law 48/1982 (Article 49)	States the standards specifications of fresh waterways quality to which industrial water can be discharged	WBG General EHS Guidelines: Environmental	Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment.
Ministerial Decree No. 44/2000 of law 93/1962	Includes the quality of industrial wastewater discharged to the sewage network. The decree also states the entity should acquire the wastewater discharge licenses from the concerned authorities during the construction and operation phase	WBG General EHS Guidelines: Environmental	Includes in Table 1.3.1 the indicative values for treated sanitary sewage discharges

Table 3-8: Limits for discharge of liquid effluent into sewer system

Parameter/Pollutant	Effluent threshold (ER 44/2000 of law 93/1962	Effluent threshold (WB requirements)
pH	6-9.5	***6-9***
BOD (mg/l)	600	***30***
COD (mg/l)	1100	***125***
Total nitrogen (mg/l)	100	***10***
Total Phosphorous (mg/l)	25	***2***
Oil and grease (mg/l)	100	***10***
Total suspended solids (mg/l)	800	***50***
Total Coliform Bacteria (Most Probable Number/100 ml)	N/A	***400***

3.3.2.3 Noise

Table 3-9 and Table 3-10 show Ambient Noise limits in the Egyptian legislations and WBG standards. Whereas, Table 3-11 shows limits noise exposure in Work environments as per Egyptian and WB requirements.

Table 3-9: Egyptian legislations and WB standards concerning Ambient Noise

Requirements of Egyptian Legislations		Requirements of World Bank	
Reference	**Requirements**	**Reference**	**Requirements**
Law 4/1994 amended by law 9/2009 and its ERs amended by decree 1095/2011 and 710/2012	Maximum allowable limit for ambient noise intensity	WBG General Guidelines: Environmental Table 1.7.1	Limit of noise beyond the property boundary of the facilities.
Law 4/1994 amended by law 9/2009 and its ERs amended by decree 1095/2011 and 710/2012	Maximum noise limits in work environment	WBG General Guidelines: Occupational Health and Safety Table 2.3.1	Limit of noise exposure inside the work environment

Table 3-10: Limits for ambient noise as per Egyptian and WB requirements

Egyptian Law Permissible noise level				WB Permissible noise levels		
Area type		**Maximum permissible equivalent noise level [dB(A_{eq})]**		**Receptor**	**One-hour L_{Aeq} (dB_A)**	
		Day	**Night**		**Daytime**	**Night**
		7 AM – 10 PM	**10 PM – 7 AM**		**7:00 – 22:00**	**22:00 – 7:00**
Residential	Sensitive areas to noise exposure	***50***	***40***	Residential	***55***	***45***
	Residential suburbs with low traffic flow	55	45			
	Residential areas with some workshops, administrative activities, or recreational and entertainment activities overlooking public roads less than 12 meters	65	55			
	Areas overlooking public roads more than or equal 12 meters	70	60			
Industrial	Industrial areas with light industries	70	***60***	Industrial	***70***	***70***

	Industrial Zone with heavy industries	70	70			

Table 3-11: Limits noise exposure in Work environments as per Egyptian and WB requirements

Egyptian Law Permissible noise level		WB Permissible noise levels		
Type of place and activity	**Maximum permissible equivalent noise level [dB(A)] 8 hrs**	**Location/activity**	**Equivalent Level, L_{Aeq} 8 hrs**	**Maximum LA_{max}, fast**
a) Workplaces (workshops and industries) with up to 8-hour shifts (licensed before 2014)	90	Heavy Industry (no demand for oral communication)	***85 dB(A)***	110 dB(A)
b) Workplaces (workshops and industries) with up to 8-hour shifts (licensed since 2014)	85	Light industry (decreasing demand for oral communication)	***50-65 dB(A)***	110 db(A)

3.3.3 Gaps Regarding E-mobility

Regarding electric vehicles, the regulatory framework in Egypt is not yet developed.

3.3.4 Gaps Regarding Waste Legislations

There is no national e-waste management system developed for the disposal or recycling of batteries.

3.3.5 Gap Analysis of National and WB Requirements for Key Social Issues

- **The cut-off date:** The WB identifies a cut-off date in order to prevent people influx to the project area. The Egyptian laws does not set a cut-off date, particularly if the impacts are related to agricultural lands that might experience changes in crops and tenancy.
- **Monitoring and Evaluation:** Monitoring or evaluation measures are not stipulated in Egyptian regulation. Lack of the necessary legal provision needed to put in place monitoring and evaluation measures can negatively impact the accountability and transparency programs and plans may not be able to benefit from corrective action in cases of mistakes nor receive rewards in cases of good performance.
- **Valuation of compensation:** Egyptian regulations use prevailing market price in the affected areas to calculate and compensate project affected people for their expropriated property. The prevailing price is assessed by a specialized committee created by the government. The compensation is estimated according to the

prevailing prices at the time of the expropriation decision, plus (20%) twenty percent of the value of the estimate. For crops, they are valuated according to the price lists developed by the agriculture directorate. Previous Egyptian experiences show that the full replacement principle as stated by ESS5 has not been fully realized by the affected group.

- **Income restoration (livelihoods):** Egyptian law does not discuss compensation for loss of income, only land and assets. The well operators and tenants of lands will be unable to restore their income due to having no mechanism for income restoration. Hence, ESS5 principle regarding income restoration will be considered. Therefore, those whose income is going to be affected will be compensated for the loss of profit and income.
- **Stakeholders engagement:** The Egyptian guidelines focus on the consultation phase during the preparation of the project's ESIA through holding public consultation sessions before starting the project to obtain the environmental approval. World Bank standards indicate that the stakeholder engagement is an inclusive process conducted throughout the project life cycle. Where properly designed and implemented, it supports the development of strong, constructive and responsive relationships that are important for successful management of a project's environmental and social risks. ESS10 principle regarding stakeholder engagement and Information Disclosure will be considered.

- ESS2 stipulates number of requirements related to labor safety, welfare and working conditions. The most common gap between the Egyptian labor law and those requirements are that the latter did not set clear provisions for GRM of labor nor the work-related facilities to be offered for labor. The law assumed equitable treatment for labor without classifying the various types of labor.

3.4 Institutional Framework

In this section, the institutional set up for solid waste management, transport and climate change related affairs will be discussed.

3.4.1 Solid Waste Management (SWM) Related Affairs

Solid waste management responsibilities in Egypt are distributed among different entities as shown in Table 3-12.

Table 3-12: Institutional setup for SWM related affairs

Entities	Roles

Ministry of Environment /EEAA	▪ Policy directives and acts as a general facilitator. ▪ Responsible for the implementation of the provisions of environmental legislation and associated regulations and decrees, and assists governorates in identifying sites for waste facilities [2]
Waste Management Regulatory Authority (WMRA)	Key roles and responsibilities of WMRA include: ▪ Responsible for regulating, following up and monitoring all operations related to waste management ▪ Provide technical support and propose economic solutions for integrated waste management ▪ Develop standards and guiding forms for all contracting phases ▪ Capacity building to reform the waste management system in Egypt ▪ Distribution of roles and responsibilities among the different stakeholders according to the provisions of the law ▪ Providing technical consultancy services and recommendations to the competent authorities and other actors in the waste management system ▪ Preparation of main performance indicators for monitoring and evaluating waste management activities ▪ Providing technical support for public awareness raising programs and community commitment ▪ Preparing technical studies and proposing mechanisms for determining the tariffs of the integrated waste management services ▪ Encouraging research that contributes in improving and developing the performance of waste management ▪ Preparing studies for pilot projects and initiatives to develop integrated waste management system ▪ Proposing laws and decrees necessary for joining international conventions concerned with waste
Central Agency for Public Mobilization and Statistics (CAPMAS) - Department of Trading and Public Utilities	▪ Responsible for the compilation of waste data per governorate from representative CAPMAS offices in individual governorates and for the reporting of national waste data
CAPMAS representative offices on governorate level	▪ Responsible for the compilation of data from district councils and local village units across a given governorate.
Central statistics department	▪ Administered by the governorate and overseen by CAPMAS (technical oversight) ▪ Responsible for the distribution and recollection of empty and completed data collection forms issued from the governorate representing office of CAPMAS.

Cleaning Department at Governorates	▪ Responsible for the management of waste service provision via solid waste management units consisting of vehicle service centers and landfill disposal sites. The Cleaning department issues permits for NGOs and independent collectors to carry out waste management activities. The Cleaning department supervises solid waste management units.
District councils Cleaning and Beautification Authority- Cairo and Giza	▪ Manage the implementation and operation of SWM directly or through contracted private companies, NGOs and informal sector "zaabaleen" ▪ Set regional strategies ▪ Manage private sector, which includes planning contracting, supervising and monitoring operation ▪ Enforce laws and regulations ▪ Train and raise public awareness [2]
Cairo and Giza General Cleanness and Beautification Authorities and General Administration for Cleaning and Beautification in Qalyoubia	▪ Manage the implementation and operation of waste management directly (Agency's vehicles) or through independent collectors
Ministry of Local Development	▪ Responsible for the management and financing of district councils and local villager units [3] ▪ Contract private companies [4]
Ministry of Health and population	▪ Provides data pertinent to incineration of waste in all governorates through Health departments
Ministry of Finance [2]	▪ Approve the budget for solid waste management [5]
Climate Change Central Department CCCD (unit under the EEAA)	▪ Coordinating entity for MRV activities of GHGs in the current national institutional setup. CCCD files official requests for data exchange between subordinate entities (e.g. CAPMAS and Units responsible for GHG inventory calculation)
Solid Waste Management Units	▪ Responsible for the provision of waste collection and disposal services in districts and villages including landfill disposal sites and vehicle service centers. Supervised by Cleaning Department
NGOs	▪ Responsible for the provision of waste collection services in districts and villages. No supervision but require an invoice 'essal' from the Governor/City Council (Qalyoubia) to dispose in landfill

Independent Collectors	▪ Responsible for the provision of waste collection services in districts and villages. No supervision, but an invoice/permit 'essal' is issued from the mohafez/madina (Qalyoubia) to dispose in landfill. Independent collectors are hired by the mohafez on a case by case basis.

3.4.2 Transport Related Affairs

The introduction of electric vehicles in Egypt will need coordination between several entities (as shown in Table 3-13) [1]:

Table 3-13: Institutional setup for electric vehicles (transport) related affairs

Entity	Role
Cairo Transit Authority (CTA	▪ Responsible for procurement, operation and maintenance of Cairo bus fleet.
The Ministry of Environment and its executive arm EEAA	▪ Responsible for introducing the electric vehicles as a climate action. Moreover, the MoE will be responsible for the Monitoring, Reporting, and Verification of the action and quantifying the GHG reductions from the activity.
The Ministry of Electricity	▪ Provide the required electricity and infrastructure for charging stations of the e-buses
The Ministry of Interior	▪ Vehicle licensing and registration
The Ministry of Finance and Customs Authority	▪ Regulate custom duties for imported vehicles
The Ministry of Trade and Industry, its subsidiary General Authority for Export and Import Control (GOEIC) and the Egyptian Organization for Standardization (EOS)	▪ Set standards and oversee specifications and permits for electric vehicles and electric vehicles charging equipment and if manufacturing is potential
The Ministry of Housing and the New Urban Communities Authority	▪ Responsible for sustainable urban planning. All state lands need to be mapped and approved by General Authority for Urban Planning (previously, General Organization for Physical Planning GOPP)
The Ministry of Transport and the Land Transport Regulatory Authority (LTRA)	▪ Responsible for regulation and planning and operating bodies will be responsible for operating public transport (e-buses) in governorates

Cairo Governorate	▪ Provides approvals and permits to operate public and group transportation in Cairo Governorate.

3.4.3 Climate Change Institutional Setup

The government of Egypt issued some decisions related to the institutional set up of climate change issues in Egypt such as the Ministerial Decree No. 272 to have a National Climate Change Committee comprising representatives from different ministries and the responsibilities of this committee. However, this committee was restructured, and the National Council for Climate Change was established after a decision by the Prime Minister in 2015. Another decree, which is the prime ministerial decree No. 1129/2019, required the concerned key ministries and entities to assign one of their relevant units to work on climate change issues.

The entities involved in climate change affairs in Egypt related to this project are as follows:

- **Ministry of Environment (MoE):** MoE is the legal entity responsible for the environmental issues in Egypt, including climate change.
- **Egyptian Environmental Affairs Agency (EEAA):** is the executive arm of the MoE. There was a dedicated Climate Change Unit (CCU) at EEAA, covering mitigation, adaptation, technology and financial aspects. This unit was restructured to be the climate change central department (CCCD).
- **National Council for Climate Change (NCCC):** is the national focal point of the United Nations Framework Convention on Climate Change (UNFCCC). Established in 2015 and previously chaired by the Minister of Environment and representing all Ministries, the NCCC is now chaired by the Prime Minister following the prime ministerial decree No. 1129/2019 issued in May 2019. Also, the council consists of supreme committee, executive office and technical workgroups. The members of the supreme committee are:
    - Minister of Foreign Affairs
    - Minister of Investment and International Cooperation
    - Minister of Water Resources and Irrigation
    - Minister of Planning
    - Minister of Finance
    - Minister of Environment
    - Minister of Agriculture and Land Reclamation
    - Representative from the Ministry of Defense
    - Representative from the Ministerial Group for Services

The executive office comprises:

- Representative from the Ministry of Defense
- Representative from the Ministry of Foreign Affairs
- Representative from the Ministry of Water Resources and Irrigation
- Representative from the Ministry of Planning
- Representative from the Ministry of Finance
- Representative from the Ministry of Interior
- Representative from the Ministry of Agriculture and Land Reclamation
- Representative from National Security Authority
- Representative from CAPMAS
- Representative from Information and Decision Support Center
- Representative from the Ministry of Finance
- National Focal Point of Green Climate Fund (GCF) or a representative
- National Focal Point of UNFCCC

- **Climate Change Central Department (CCCD):** is the technical secretariat of the NCCC and the focal point for the UNFCCC. It is responsible for overseeing the preparation of climate change reports and promoting new policies related to climate change. CCCD is the coordinating entity in the national MRV institutional setup.
- **Central Agency for Public Mobilization and Statistics (CAPMAS):** is the only entity that has legal authority to collect data from the relevant ministries. It has a dedicated environmental affairs unit.
- **Other ministries:**
  - Ministry of Electricity and Renewable Energy
  - Ministry of Transport
  - Ministry of Trade and Industry
  - Ministry of Housing
  - Ministry of Local Development

4 ENVIRONMENTAL AND SOCIAL SETTINGS-BASELINE

Project components and sub-components are planned in the urban areas of Greater Cairo Agglomeration (GCA) consisting of Cairo Governorate, Giza Governorate and Qalyoubia Governorate. This section describes all relevant components of the physical, biological, and socio-economic environment, as well as health and safety baseline within the candidate areas for the project in GCA. The baseline information shall inform the identification of potential sensitive receptors that may be impacted by the project components

4.1 Natural Environment

4.1.1 Climate

In the candidate areas for the project, the highest and lowest average temperatures are 38 ^{o}C during July, and 8^{o} C during January, respectively; the GCA is characterized by seasonally high humidity levels in the summer.

Prevailing wind directions over the year come from the North-North-East (NNW) where highest speed reaches around 25 knots (12 m/s).

4.1.2 Ambient Air Quality

AQI levels in all GCA regions fall within “unhealthy for sensitive groups” and “unhealthy”, including the project’s candidate sites in Qalyoubia Governorate, 10th of Ramadan City in Sharqiyah Governorate and Giza Governorate as shown in Figure 4-1 The air pollution levels in GCA exceeds the WHO allowable limits (20 µg/m^3) and national permissible limits (70 µg/m^3) according to the EEAA’s State of the Environment Report in 2016. Air quality of candidate areas may be subject to cumulative impacts from emissions associated with project activities.

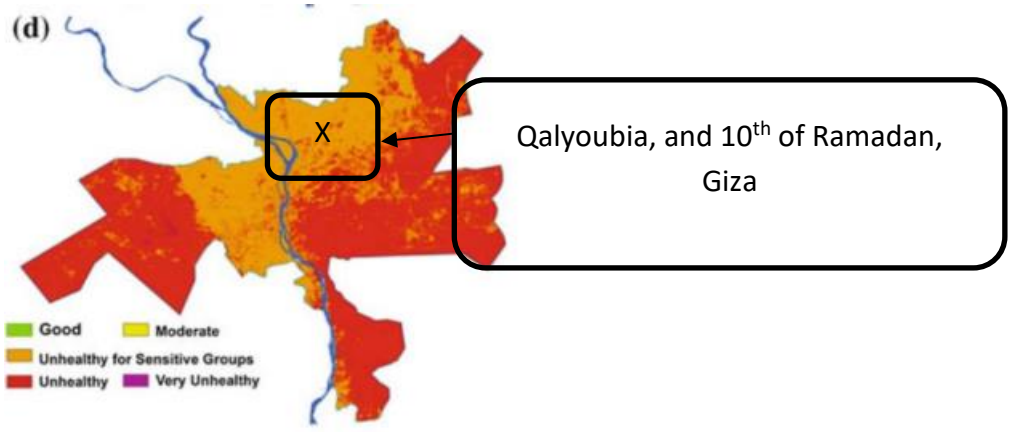


Figure 4-1: AQI map of GCA region, 2018 (source: Airvisual.com)

4.1.3 Ambient Noise Levels and Vibrations

Noise level measurements reported for industrial, commercial, main roads, residential areas in GCA average at around 74-75 dB exceeding the national permissible limits for the day and night periods in almost all locations according to State of the Environment Report in 2016.

As for vibration levels, most locations in Cairo fall below the German Institute for standardization (DIN) allowable limits for different types of areas including project candidate areas. .

4.1.4 Soil and Subsoil

The governorates of Cairo, Giza and Qalyoubia are dominated by an urban environment. Desert natural environment and oases surround the GCA from the north and west, especially in Giza Governorate.

4.1.4.1 Qalyoubia Governorate

Qalyoubia is characterized by urban areas and agricultural lands. The soil primarily consists of muddy clay, while, silt constitutes most of the cultivated lands in the delta and the Nile valley.

The main aquifer in the area is a Quaternary aquifer composed of unconsolidated sand and gravel with clay lenses and having a thickness varying from 200 m to 250 m. The Quaternary aquifer is capped by Holocene aquitard considered the main source of groundwater in the area. The sand, gravel, silt, and clay capping of these aquifers allow for higher permeability, making them potential receptors to the project activities.

Agricultural lands are located in proximity to the project candidate areas of Alkhankah and Abu Zaabal as shown in Figure 4-2.

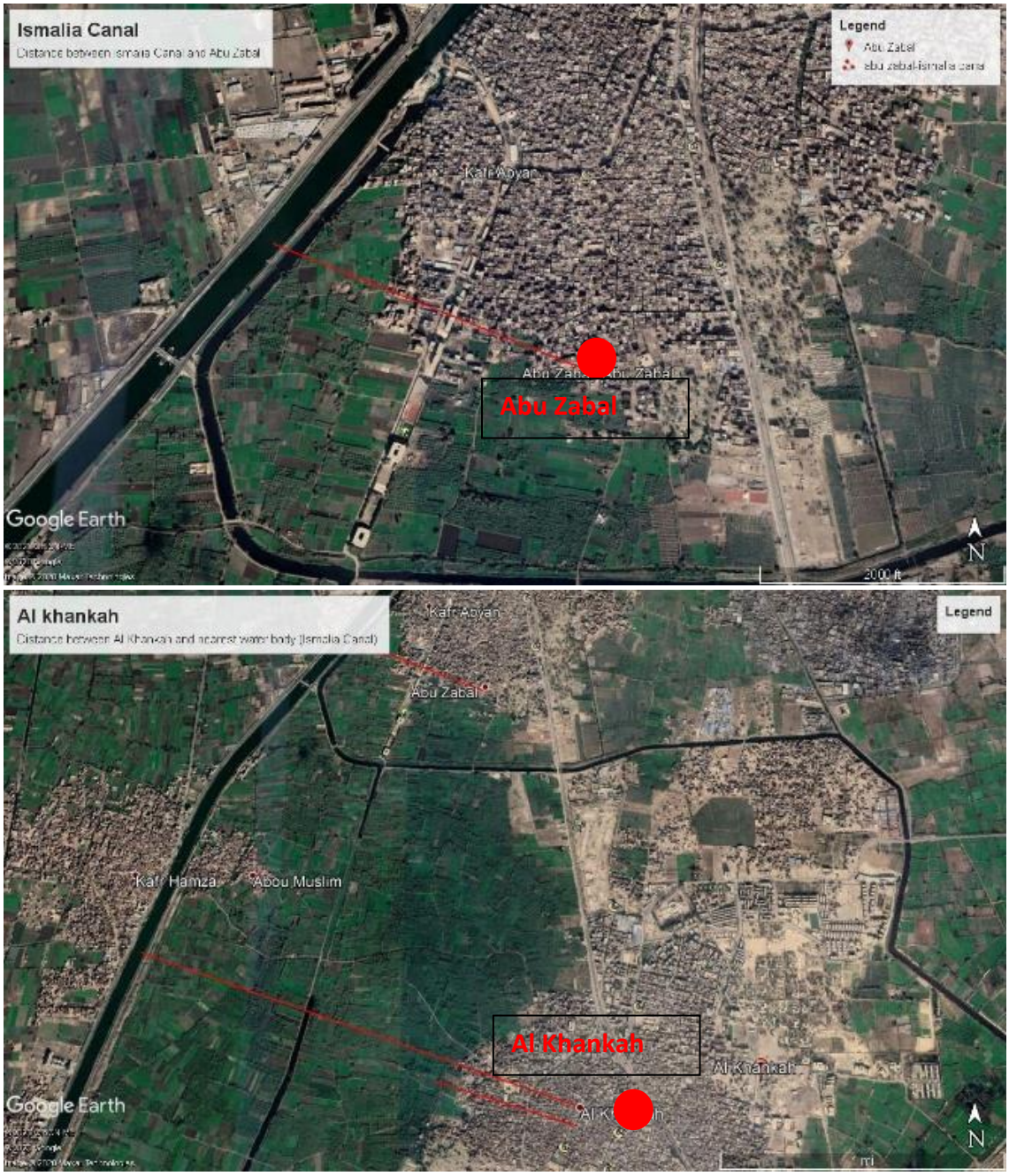


Figure 4-2: satellite images of Abu **Zaabal** and Al Khankah showing their proximity to agricultural lands

Soil contamination of agricultural areas in Qalyoubia has been reported; showed that agricultural management practices, urban, and industrial activities (e.g., open waste dumping and storage) are responsible for low-quality ground and surface water with high levels of heavy metals and salinity. [1]. Soil quality may constitute a sensitive receptor to potential pollution associated with project activities.

4.1.4.2 10th of Ramadan City in Sharqiyah

The surface soil consists mainly of sands, fluvial deposits, gravel and clay intercalations. Subsoil layers consist of impermeable clay or a cemented layer that slow water movement through soil, which limits infiltration.

There is an open drainage system existing in the area serving the nearby cultivated lands located to the South and South-west of 10th Ramadan City.

The location of the project candidate areas is shown in Figure 4-3; cultivated lands and the wastewater open drainage system may be potential receptors of project activities.

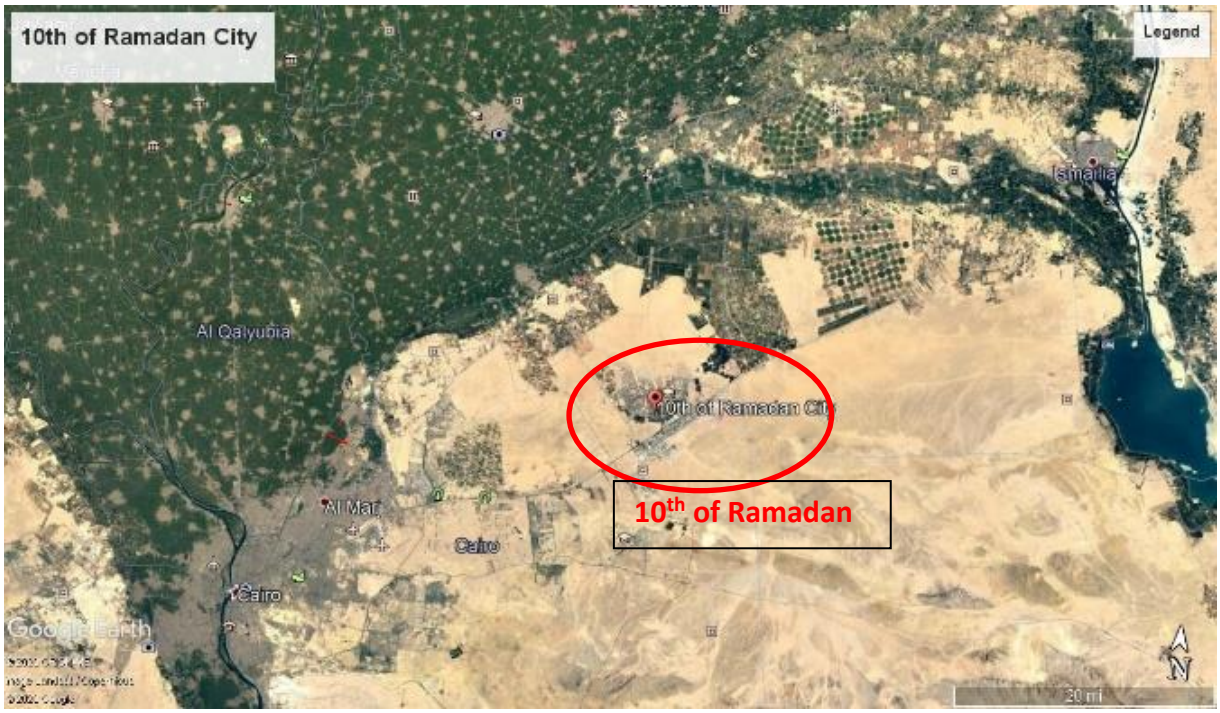


Figure 4-3: 10th of Ramadan City (East of Cairo) (source: Google Earth)

4.1.4.3 Kuraymat in Giza

The project's candidate site of Kuraymat is located at the northern extremity of the Eastern Desert, on the eastern side of the Nile Valley, about 2 km distant from the Nile bank, and 90 km South of Cairo in Giza Governorate. The surface soil of the area and surroundings consists mainly of a desert natural environment.

Cultivated lands and agricultural activities are located on the western part of the Nile Valley and some residential communities exist near the northern and southern extremities of the area, which may be potential receptors to the project activities as shown in Figure 4-4.

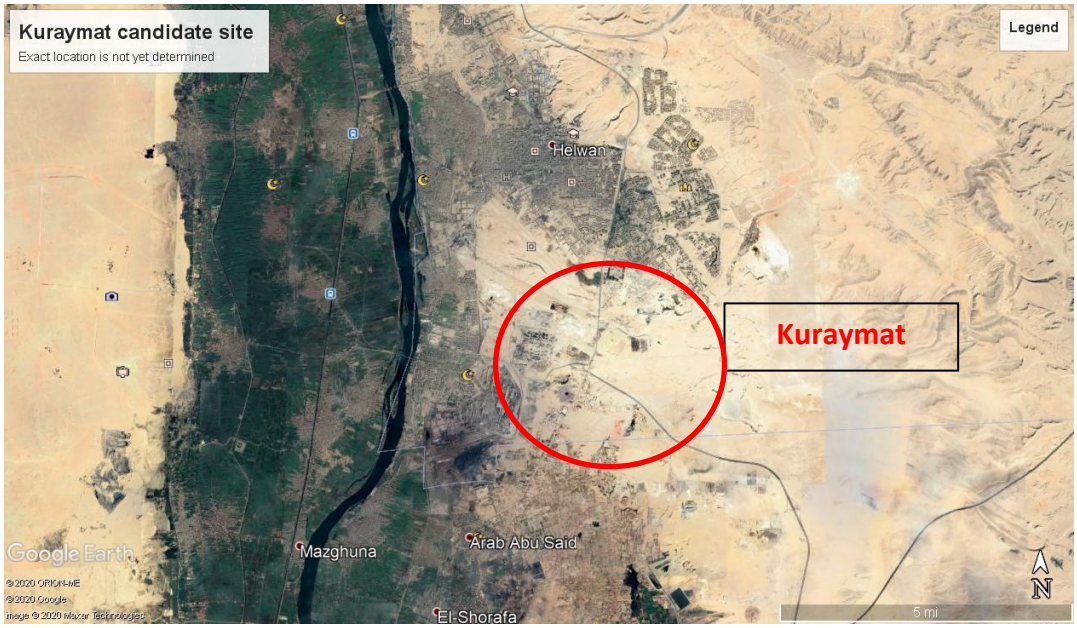


Figure 4-4: Kuraymat in Giza

4.1.5 Water Resources and Flood Risk

4.1.5.1 Water Resources and Quality

4.1.5.1.1 Qalyoubia

The main watercourse surrounding Qalyoubia is the Nile River as shown in Figure 4-5.

Figure 4-5: Distance between nearest water body and candidate site in Banha in Qalyoubia

The Ismailia Canal is the nearest watercourse and surface water system to the candidate areas of Al Khankah (2.5 km away) and Abu Zaabal (1 km away) as shown in Figure 4-6.

The Ismailia canal supplies water for about 12 million people and stretches over 128 km with 2.1 m depth and 18 m length.

High pollution loads have been identified in areas located 1 km away from the canal streams such as the Abu Zaabal and Al Khankah industrial areas due to the seepage of local pollutants into the aquifer resulting from the infiltration of domestic, agricultural and industrial wastes resulting in low water quality [3]. Therefore, these areas may constitute sensitive receptors to project activities. .

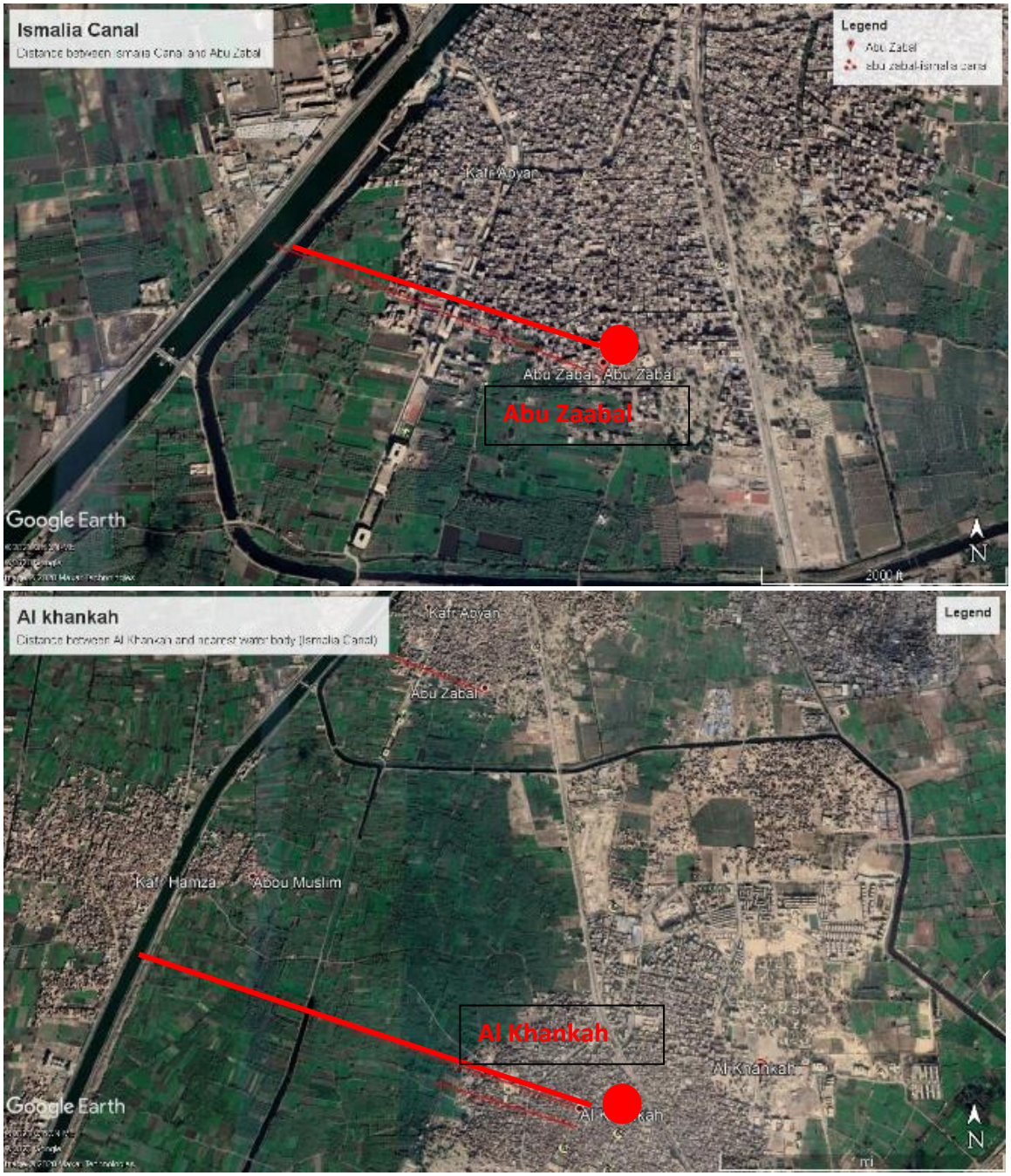


Figure 4-6 Distance between nearest water body and candidate sites in Abu Zaabal and Al Khankah

4.1.5.1.2 Kuraymat in Giza

The only surface watercourse surrounding Kuraymat is the Nile River, at approximately at 1.2 km Figure 4-7. The red dot intends to highlight the location of the Kuraymat area in general, and not the exact location of project activities, still undefined at this stage.

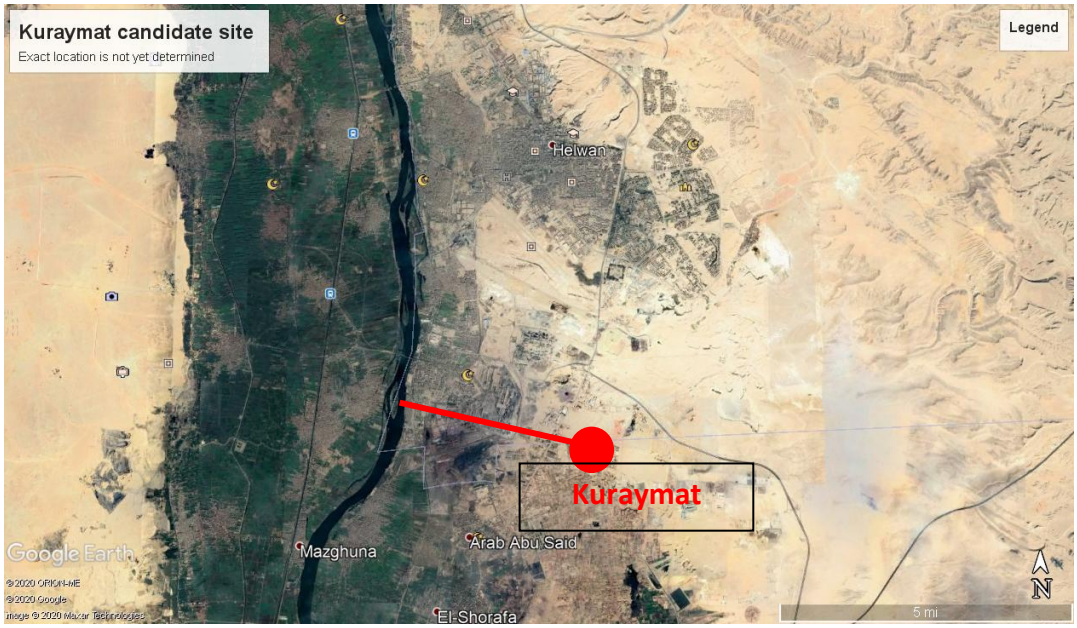


Figure 4-7: Kuraymat in Giza

4.1.5.1.3 10th of Ramadan City in Sharqiyah

The nearest watercourse is the Nile River, approximately 30 kilometers away as shown in Figure 4-8.

Figure 4-8 map showing no significant watercourses near the 10th of Ramadan City location

4.1.5.2 Flood Risk

Preliminary flood risk identification in the project candidate areas were conducted using *ThinkHazard*[5] flood maps. The flood risks in the project candidate areas are presented in Table 4-1:.

Table 4-1: Flood risk in the project areas and candidate sites

Project area	Flood risk level	Comments/Justification
10th of Ramadan City in Sharqiyah	Very low flood risk	Due to desert climate classification, there is very little rainfall during the year (<25 mm precipitation per year). This location is classified as BWh (Hot desert climate) by Köppen-Geiger climate classification system. The present hazard level may increase in the future due to the effects of climate change (extreme weather events).
Abu Zaabal and Al Khankah (candidate site) in Qalyoubia	Medium flood risk	Sealing of the fault planes by basalt increases surface flooding risks (from Ismailia Canal). Another contributor to floods is localized water nuisance problems including flaws in local water management systems, e.g. poorly dimensioned or maintained sewerage or drainage channels. The present hazard level may increase in the future due to the effects of climate change.
Kuraymat in Giza (candidate site for industrial hazardous waste treatment and disposal)	Low flood risk	The area is characterized by low mean annual precipitation (<10mm). However, heavy stormy rainfall may occur seasonally in winter and may be susceptible to flash flooding.
Greater Cairo (particularly Nasr City in East Cairo)	Very low flood risk	Although the hazard is considered to be very low based on the information available in ThinkHazard, hazard level may increase in the future due to the effects of climate change.

4.1.6 Biodiversity

All project candidate areas are all classified as urban or suburban. Therefore, pristine natural habitats are not likely to exist within these areas. None of the project areas or candidate sites lie within boundaries of Egypt's listed protected areas

4.2 Built Environment and Infrastructure

This section addresses the project's relevant human-made environmental elements involved with the identified project areas and candidate sites. Table 4-2 highlights the general environmental context of these areas.

[5] www.thinkhazard.org

Table 4-2: The general environmental context of the project areas and candidate sites

Area	General environmental context
Greater Cairo (GC)	GC is generally characterized by high air and water pollution levels, and waste management system deficiencies. With respect to planned developments, the Greater Cairo Urban Development Strategy published by the Ministry of Housing, Utilities, and Urban Communities in 2012 includes planning of new urban communities in GC for about 15 million people within the next forty years in the Eastern and Western parts of GC (6th of October and New Cairo). None of the planned development for communities are within the candidate areas. With respect to industrial development, the strategy includes moving highly polluting industries outside the main urban mass.
10th of Ramadan City in Sharqiyah Governorate	Located on Cairo-Ismailia desert road 55 km away from Cairo. It is one of GC's main Industrial areas including both light and heavy industries. It also contains few residential zones nearby. It is bound by El Shabab canal from the East, El Asher-Belbes road from the west, Ismailia Canal from the North and Cairo-Ismailia desert road from the South. Ambient air pollution levels are considered much higher than the national limits (70 µg/m^3 PM concentrations on annual basis). Sources of groundwater pollution include industrial, agricultural, domestic activities, and oxidation ponds (wastewater treatment ponds).
Abu Zaabal and Al Khankah (candidate site) in Qalyoubia Governorate	One of the main industrialized areas of Qalyoubia Governorate, housing chemicals and fertilizers industries. The area has overall high air and water pollution levels due to toxic material seepage into the nearby Ismailia Canal, which is 1 km away, and overloading the illegal dumpsite existing in the area. The dumpsite is the largest in the area. Ground water around the dumpsite is rising up, and acidic leachate forms and seeps into groundwater and the nearby Ismailia Canal, which is a primary source of potable water in the area. Ambient air pollution results from open burning of waste and release/seepage of toxins from industrial activities into the air. The area has one of the highest PM concentrations in GCA, with AQI categorized as "unhealthy for sensitive groups" The area lacks adequate roads and infrastructure. Most roads to and from Abu Zaabal are unpaved, with no direct main road/expressway access to the area Large amounts of waste accumulate on both sides of the road leading to the dumpsite, adding up to local pollution in the area.
Kuraymat in Giza (candidate site)	Located about 87 km South of Cairo, and 2 km to the Eastern side of the Nile. Ambient air quality is moderate in the area. surface and groundwater quality is generally good, with the exception of areas where there are concentrated sources of contaminants, such as irrigation drainage return waters, There are no significant habitats within the area. Main access road is Cairo/Beni-sueif road. This main road passes through Tebbin and El-Saff leading to Kuraymat.

4.2.1 Solid Waste Management (SWM) Current Conditions

Solid waste management represents one of the main environmental problems facing Egypt over the past decades. The increasing amount of waste generated, and the poor

Solid Waste Management (SWM) is responsible for human-made or self-igniting waste burning in dumps, which contribute to about a third of GCA's air pollution in terms of PM. Waste generation rates are increasing with the growing population and the changes in the production and consumption patterns in Egypt. According to the latest State of the Environment Report in 2016 published by the EEAA, total amount of waste generated in Egypt reached 90.76 million tons in 2016. Table 4-3 shows the waste generation breakdown per type of waste [11].

Table 4-3: Generated solid waste in Egypt in 2016 (Source: EEAA's SoE 2016)

Waste type	Generated quantity (in million tons)
	2016
Municipal solid waste	21
Construction and demolition waste	5.8
Agricultural waste	31
Industrial waste	4.9
Hazardous waste	0.54
Medical waste	0.52
Waterway cleansing waste	29
Sludge	2
Total	**90.76**

4.2.1.1 Municipal Solid Waste (Domestic)

In Greater Cairo, municipal solid waste is currently generated at a rate exceeding 1.2 kg/person/day (approx. 60% organic waste and 40% recyclable waste). Collection systems in Greater Cairo only cover about 70% of the total generated waste, and of this about half is collected by informal garbage collectors through door-to-door services.

According to findings from the conducted consultation and stakeholder engagement for this project, the informal collection system was reported to currently handle a total of 17,000 tons of waste out of total of 28,000 tons produced in Cairo and Giza. They collect about 6,000 tons from Cairo, and 4,000 tons from Giza and then transport them to open dumps in various locations including Manshiyet Naser, Ard El Lewa, Alkhosous, Abu Zaabal, Ain Shams, Almatareya, Toura, and 15th May. These locations involve sorting and segregation of waste for recycling or trading through small SMEs or by supplying to the private sector. Waste pickers typically work in these locations in sorting and segregating waste as a step of the wider trading and recycling activity. Different groups of informal waste collectors are involved in the process at different scales. Pig breeding is among the main activities associated with the waste sorting (particularly the organic matter) and also a main source of livelihoods for the garbage collectors' families.

The rest of the uncollected and poorly handled waste (30% of total produced waste) are placed in streets, rivers, lakes, drainage channels, or disposed of in open and uncontrolled dumpsites where they are either openly burned illegally, left until they self-ignite, or collected and sorted for recycling by informal garbage scavengers. Besides their environmental risks, the majority of illegal dumping sites are unsafe and unhygienic, subjecting workers who participate in the scavenging processes to many risks. Additionally, there are no preventive measures at these sites to prevent the self-ignition of waste. Figure 4-9 shows a flow diagram summarizing the key elements of the SWM current baseline in GCA.

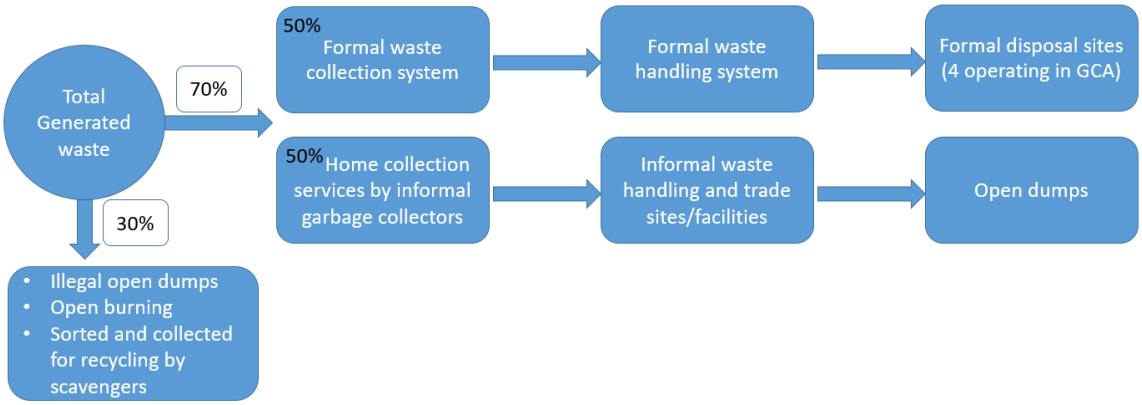


Figure 4-9: Flow diagram highlighting key elements of the SWM baseline in GCA

Regarding the identified project areas and candidate sites, Table 4-4 summarizes the common SWM practice currently taking place.

Table 4-4: Current SWM situation in the project areas and candidate sites

Area	Current situation	Comments/Notes
Cairo	The formal sector handles 50% of SW produced. Semi-private with different international/national private companies involved such as the AMA Arab Environment Co, and FCC Spanish Company, and the General Administration of cleanliness and beautification of the cities. There are currently 4 operating landfills [3]: ▪ Al Wafaa wa Al Amal (sanitary and open dump) ▪ 15th May (sanitary landfill) ▪ Helwan (sanitary) ▪ New Obour (sanitary)	Amongst the other private sector companies operating in Cairo was Europe 2000, whose contract was terminated by the Cairo Governorate in 2012 and was replaced with the Suez Cleanliness and Beautification Unit.

Area	Current situation	Comments/Notes
	The informal sector handles 50% of total waste produced by door-to-door collection system, SMEs for sorting and trading of waste to supply recycling facilities.	
10th of Ramadan City in Sharqiyah Governorate	SWM handled by General City Council. In 2015, The Cleaner Production Technology Center (CPTC), in collaboration with the African Development Bank and the Deauville Partnership Fund, launched a pilot recycling plant, which aims to turn waste into raw material for different industries. There are currently 3 landfills operating in Sharqiyah Governorate: • Al Khatara • Belis • Mashtool	Highly industrialized area for FMCG, textiles, Leather, and heavy industries, with few adjacent residential areas.
Qalyoubia Governorate	The formal SWM activities is implemented by the Governorate, except Shubra El-Kheima which uses private contractors. The informal collection system relies on donkey cart operators that work independently on waste collection, handling, and disposal. Waste is mostly transported to open dumpsites, the biggest of which is in Abu Zaabal. The open burning in the Abu Zaabal dumpsite also contributes to air pollution along with the existing chemicals and fertilizers production activities in the area. The area has one of the highest PM concentrations in Greater Cairo, and its AQI is considered “unhealthy for sensitive groups”. Illegal dumping in open and abandoned areas is a common scene. Waste is accumulated in the secondary streets’ corners. The residents openly dump their waste in the streets and waste is not collected on a regular base, causing health and environmental hazards to residents. Accumulation of waste leads to self-	Scavengers collect the recyclable items from waste dumped in the streets and in Abu Zaabal uncontrolled dumpsite. The road to the main dumpsite is unpaved. Large amounts of waste accumulate on both sides of the road. The dumpsite is rented to a private contractor for manual sorting of waste and collection of dry recyclables by informal scavengers. The sources of transported waste to this dumpsite include Qalyoubia municipalities, private companies and contractors, and waste collectors. The dumpsite accepts almost all types of waste; municipal, industrial and Construction and Demolition waste. This increases health and safety and environmental risks drastically. The Abu-Zaabal dumpsite is the largest in the surrounding area. It is developed over an old quarry and ground water nearby is rising up. Acidic leachate seeps into groundwater and the nearby Ismailia Canal, which is a primary source of potable water in Qalyoubia Governorate. Thus, water pollution levels and safety hazards are increasing in the area in parallel to the increasing air pollution level due to open burning of waste.

Area	Current situation	Comments/Notes
	ignition, or it is illegally openly burned seasonally in dumpsites.	Abu Zaabal landfill/dumpsite is the main swm facility currently serving Qalyoubia Governorate [4] and has reached its ultimate capacity and represent a major source for air pollution due to open buring and self-ignition. Waste collection equipment are insufficient and technically poor. The waste collection trucks are not covered during the service, which facilitates redistribution of waste in streets again during transportation.
Giza Governorate	SWM is handled by General councils in the cities of the Governorate. There are currently 3 landfills in Giza handling SWM: ▪ El Wasta ▪ Somesta ▪ Sanour	Industrialized area, primarily hosting medium to large power plants serving the surrounding region.

4.2.1.2 Industrial Hazardous Wastes and Medical Waste

The industrial sector is considered the largest producer of hazardous waste in Egypt. According to EEAA (2016), the industrial sector generates between 200,000 and 500,000 tons of hazardous waste per year [7]. In Greater Cairo alone, an estimated amount of 77,000 tons of hazardous waste is generated per year due to industrial activities. The current common practice for industrial hazardous waste includes selling it through auctions or to specific contractors without consideration for the final disposal of the waste, and illegal dumping in vacant lots and public spaces (under bridges, around facilities, or in remote areas). Other common practices include mixing hazardous waste with MSW streams and disposing of them in public dumps, discharging into the sewer network, or openly burning it into the air.

Another current hazardous waste handling practice involves use of waste as an alternative source of fuel through incineration in the cement industry.

In 2005, Nasiriya Hazardous Waste Treatment Centre (NHWTC) was established in Alexandria's Borg El Arab area with capacity of 40,000 tons in order to collect, recycle, treat and dispose of significant inorganic hazardous industrial waste, and provide temporary storage for organic hazardous waste (transfer station). The Centre includes a physical-chemical treatment plant for inorganic liquid hazardous waste, a solidification and stabilization treatment unit, storage units for organic and inorganic wastes, a 14,000 m^2 landfill, 5,000 m^2 area for leachate collection, an organic hazardous waste transfer station, as well as a laboratory. The EEAA authorizes three local private companies for

transporting hazardous liquid and solid waste to the facility. The Centre recently expanded to include a newly added treatment unit for mercury in discarded fluorescent lamps which includes a separation unit for lamp components (metal, glass, mercury, etc.), as well as two small incinerators used for disposal of solid organic hazardous wastes (primarily pharmaceutical waste).

According to the EEAA's Guidance Note on Medical waste in Egypt [3] [16], it is estimated that 104 tons are generated daily in Egypt from all healthcare facilities, amounting to 38,000 tons annually, and that Greater Cairo produces more than 20 tons of the daily total, which amounts to 7,300 tons per year. Collection, treatment and disposal of hazardous medical waste are the responsibility of the Governorates, either directly or by contracting private companies, contractors, or NGOs. Hazardous medical waste is mandatorily treated by controlled thermal incineration. Yet, the number of adequate hazardous medical waste disposal facilities available in Egypt is extremely limited. As of 2015 [3], there are a total of ١٥٤ operational incinerators and 38 shredding units distributed around Egypt. In addition, there are an estimated 92 incinerators and 5 shredding units that are non-operational. As a result, most medical waste still ends up disposed with municipal waste.

4.2.1.3 Electronic Waste (E-waste)

Due to the absence of governmental records for e-waste generation, there are no reliable quantitative data and studies regarding the numbers of computers, mobile phones, and batteries in Egypt. . However, in 2014, a UN reported generation rates for Egypt of approximately 37,000 tons annually half of which consist of plastics, and the other half toxic materials. A study conducted by Chemonics predicts that the amount could increase to 370,000 by 2024 [15]. According to the American Chamber of Commerce in Egypt (AmCham), only 20% of the total generated amount gets recycled. 80% of such amount is the household e-waste collected by informal traders located primarily in Wekalet el Balah in Cairo that scavenge for e-waste, sell, and export it without government supervision.

The common formal e-waste management practice for discarded hardware from government agencies is periodic auctions managed by the General Authority for Governmental Services (GAGS), which auctions the collected e-waste and sells it unseparated to recyclers. AmCham estimates that only 5% of recyclers are certified companies. In regard to the e-waste produced from corporates, they are also sold in auctions approved by the Ministry of Environment. Government and corporate e-waste that goes unsold at auctions are buried in one of the state-run dumpsites scattered around the country. No detailed information regarding the number or locations of these sites were identified or how much e-waste is buried; the largest known dumpsites is in Alexandria charging EGP 500/ton.

With respect to NHWTC facility, it was reported during the first stakeholder engagement session conducted for this project that the faciltiy stopped accepting E-waste for treatment or disposal.

The private sector has been involved in e-waste management in Egypt in the last few years through small/medium start-ups that collect and treat e-waste and export it, and a few telecommunication and computer companies' CSR plans.

In regards to waste batteries resulting from electric-vehicle deployment which are classified as toxic e-waste, Egypt has no legal framework for e-vehicle batteries disposal (as stated in section 4.2.2). However, one of the current options under consideration by the government is batteries disposal by returning it to the suppliers or manufacturers based on Extended Producer Responsibility Agreements (EPR).

4.2.1.4 Slaughterhouse Waste

According to the statistics of the Ministry of Agriculture published in a FAO report in 2017 on the broiler poultry industry in Egypt [11], the total number of poultry slaughterhouses was reported to be 309 units in 2015. Manual slaughterhouses are the most common throughout the country, totaling 200 units (65% of the total number). There are 62 semi-automated slaughterhouses (20%) and about 47 modern automated slaughterhouses (15%). According to the Poultry Wealth Division of the Cairo Chamber of Commerce, the average amount of waste is estimated at about 204,000 tons annually, produced primarily from bird slaughterhouses serving recycling factories that utilize the waste by treating it into animal protein products. By law, waste is directly transported from farms to recycling facilities to eliminate the impacts of emissions or odors of waste. Another type of poultry waste is the "glaucoma", which is poultry manure that can be used to produce biogas and organic fertilizer. Since 2016, the Ministry of Environment now has ongoing agreements with different farms for safe disposal and handling of most of its "glaucoma" waste to produce biogas.

In regards to other slaughterhouse wastes, according to the CAPMAS animal bulletin of 2016 [19], the estimated amount of waste generated from livestock (cows, buffalos, sheep, cattle, pigs and camels) in GCA is approximately 16,320 tons per year. The main treatment and handling methods include collection and transfer of waste to chopping and sterilization stations, and then fed into dedicated incinerators (crematoria). According to the same report, the number of operating chopping and sterilization stations and incinerators in GCA as of 2016 is 4 and 35 respectively.

4.2.2 Roads and Mobility Infrastructure

The transport activity in Egypt predominantly relies on road transport for both passenger and freight transport. Currently, the main modes of transport are public transit and buses. The modal share for 22 million daily motorized trips in Cairo is around 63% public transport (metro, buses, minibuses, and microbuses) and 37% cars, taxis, and motorbikes. Of the 22 million trips, 14 million trips (63%) are done via informal microbuses that run-on low-quality fuels. The main access roads within the identified project areas and candidate sites are summarized in Table 4-5.

Table 4-5: Access roads for the project's candidate areas

Area	Access roads and traffic
Component 3: Vehicle Emissions Reduction	
El Tahrir Square and Cairo University (5.0km)	This route in urban Central Cairo passes through Zamalek and Dokki to Cairo University. These highly urbanized areas characterized by high-traffic congestion in peak-hours due to high population density, numerous government agencies and office buildings, as well as high-volume commercial activities.
Al Azhar University and Stadium Station (3.0km)	The main access road on this route is the Nasr road (Autostrad) which is one of Cairo's main road in its network. It is characterized by its high congestion levels in peak hours. Other main roads on this route is Youssef Abbas road, one of the main high streets of Nasr City. It has high commercial activity volume, as well as high population density.
Citystars Mall and Subway Line 3 Stadium Station (6.0km)	The main access road on this route is Salah Salem, one of Cairo's Arterial roads that suffers high levels of congestion. The linking road towards City stars Mall from Salah Salem is Nozha street, another main high street in Nasr city that contains high population density and commercial activities
Subway Line 1 El Ahram Metro Station and Line 1 Saray El-Kobba Station (3.0km)	This route connects two highly urban areas of Heliopolis in Cairo. The main access road includes Orouba rd (Salah Salem) and Terrat Al Gabal. It passes through Merryland, Manshyet El Bakry, Gesr El Suez, and onto Saray Al Kobba. These residential areas are characterized by high population density.
Component 2: Waste Management Infrastructure	
Abu Zaabal and Al Khankah in Qalyoubia	Main access road is the Ismailia Agricultural road. Regarding secondary roads, the area lacks adequate roads and infrastructure. Most roads to and from Abu Zaabal are unpaved, with no direct main road/expressway access to the area, Large amounts of waste accumulate on both sides of the road leading to the dumpsite.
10th of Ramadan City in Sharqiyah	Main access road is the Cairo-Ismailia desert road at 55 km away from Central Cairo. Roads inside 10th of Ramadan city are adequately paved
Kuraymat in Giza	Main access roads include the Helwan-Kuraymat road, and the Asyut-Cairo Desert road.

4.2.2.1 E-mobility Infrastructure

More recently, in 2018, Alexandria governorate pioneered the introduction of electric public buses into its transport network. Alexandria Passenger Transport Authority (APTA) purchased 15 fully electric buses from Chinese manufacturer BYD (model K9 12-meter) and 18 charging stations as a pilot project that was launched in June 2018. Following a similar pilot project in 2019, Cairo Transit Authority (CTA) also introduced the first fully electric bus line running on a three-month trial operation from Maadi District to the 5th Settlement District in New Cairo covering a distance of a journey of 25 km. Further, in February 2020, a new route started from Central Cairo's Main Abdel-Moneim Riyad square, passing through Abbasiya, and terminating in Eastern Cairo at the American University in Cairo in Fifth Settlement, New Cairo. The bus covers a total distance of 200 km on a 30-minute charge. The bus model used is intended to save around 70% of the total cost of diesel used in conventional buses [18]. If the trial period succeeds, GCA plans to deploy more e-buses and integrate it into its transport network.

4.2.3 Utilities Sources

The project's physical interventions will require utility sources during their construction and operation. Table 4-6 addresses the potential sources for energy and water in the candidate areas.

Table 4-6: Potential sources for energy and water in the project candidate areas

Area	Water sources	Fuel sources	Electricity sources
10th of Ramadan City in Sharqiyah	Connected with two water purification plants with capacity of 621,000 m^3/day and station wells with capacity of 20,000 m^3/day	Natural gas supplied from the public network	Grid-supplied by the Canal Company for Distribution of Electricity
Abu Zaabal and Al Khankah (candidate site) in Qalyoubia	Most of industrial and non-industrial activities in Abu Zaabal rely on Ismailia Canal (approx. 1 km away) as a primary water source.	Natural gas supplied from the public network	▪ Grid-supplied by the North Cairo Electricity Distribution Co. distribution station located in Abu Zaabal, Al Khankah, Qalyoubia ▪ Self-generated electricity in some of the industrial plants in the area (Abu-Zaabal Company for Fertilizers and Chemical Industries)
Kuraymat in Giza (candidate site)	The main water source is the River Nile, 2 km away from the Kuraymat area	Natural gas supplied from the public network	Grid supplied. The area also hosts the first solar-thermal power (CSP) plant in Egypt

4.2.4 Air and GHG Emissions

4.2.4.1 Vehicle Emissions

According to Egypt's first Biennial Update Report (BUR), the road transport sectorcontributes to 15% of the total GHG emissions from Egypt. About 40 % of national transport emissions (45 million-ton CO_2-equivalent according to BUR) are attributed to the GCA region alone (World Bank 2010), which represents about 50 % of all motorized vehicles in Egypt. MoE has estimated that vehicle emissions represent about 90 % for carbon monoxide (CO) and 50 % for nitrogen oxides (NO_x) coming out of the transport sector. Since the modal share of public transport is the largest in GCA, with 63% of the 22 million daily motorized trips being done on public transit and buses, they currently make up a third of the total air pollution load (PM_{10}) from the transport sector in Greater Cairo. Transit buses in GCA have been estimated to release estimated emissions of CO, NO_x, and PM of 457, 614, and 57.4 tons/day, respectively [2]. These high emissions are mainly due to the incomplete combustion of low-quality fuel in vehicles, as well as the emissions from old cars and buses moving around Greater Cairo roads.

4.2.4.2 Emissions from SWM Sector

While sanitary and managed landfilling has been evolving in Egypt in the last few years (yet without regulations that provide basis for compliance or monitoring), open dumping is still the most common practice, hence contributing to air and greenhouse gas emissions. Egypt's BUR (2019) indicates that the waste sector contributes about 8.1% of total GHG emissions in Egypt, half of which is attributed to solid waste disposal activities as shown in Figure 4-10.

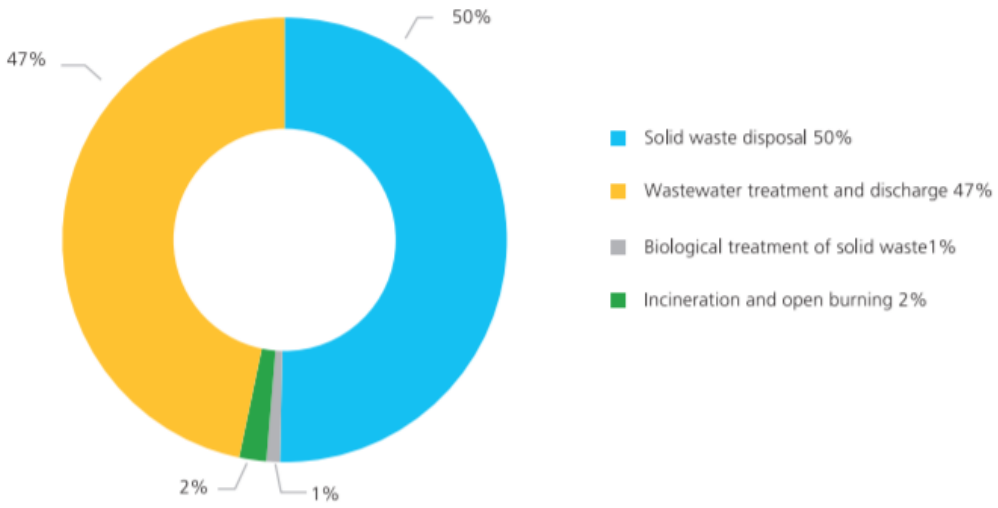


Figure 4-10: GHG emissions from waste sub-categories

In addition to GHG emissions, other local air pollutants exist in the project areas and candidate sites. Significant amounts of waste are transported to dumpsites existing within the project areas such as Abu Zaabal, which are either openly burned or left to self-ignite due to hot temperatures.

4.3 Socio-Economic Environment

This section contains a description of the baseline socio-cultural characteristics of the social environment at the proposed project areas and candidate sites. Description of the existing baseline socioeconomic conditions was assessed through a desk-based study based on a combination of both primary resources reviewed including statistical data and secondary data. This section will highlight the following: basic information about the candidate project areas; administrative areas; demographic characteristics, economic characteristics, and human settlements.

4.3.1 The Administrative Divisions

The proposed project candidate areas are located across three governorates, namely Cairo, Giza, and Qalyoubia, which represent the governorates of Greater Cairo Agglomeration (GCA). The GCA is characterized by high population density and wide urban scope. GCA is the largest metropolitan area in Egypt, with a total area of (17,393 km2) (38.9 million acres), representing about 1.7% of the total area of Egypt. The GCA is inhabited by about 24,495.969 million people, representing 27% of the total population of Egypt, according to the (CAPMAS 2019) census.

Cairo Governorate is located on the eastern bank of the River Nile stretching over 41,542 Km, Cairo is the capital of Egypt. It is bordered to the north by Qalyoubia, and Sharqiyah Governorates, to the south and west by Giza Governorate and to the east by Suez Governorate. The governorate's total area is 3,085 km2, forming 0.3% of the country's total area.

Qalyoubia Governorate is located east of the Nile at the beginning of the delta. Qalyoubia is the link between the governorates of Lower Egypt and the governorates of Upper Egypt, as the city of Shubra El-Kheima is the beginning of the agricultural highway to the governorates of Lower Egypt. The governorate's total area is 1,124 km^2, forming 0.1% of the country's total area.

Giza governorate is located on the west side of the Nile River. It is bordered by Qalyoubia, Menoufiya and Behera Governorates in the north, Fayoum and Giza in the south, in addition to 2 localities el Saff and Atfeeh which are located on the eastern side of the River Nile. Giza total area is 13.184 km^2, forming 1.3% of the country's total area.

4.3.2 Demographics Characteristics

4.3.2.1 Population

Based on the Statistical data from (CAPMAS, 2019), Table 4-7 shows the population in the governorates of the Greater Cairo Area, as well as the distribution of population according to gender.

Table 4-7: The Number of Population and Households in the Project Candidate Areas

Area	Households	Population		Total Population
		Male	Female	
Cairo Governorate	2,447,185	5,077,849	4,710,890	9,788,739
Qalyoubia Governorate	1,448,017	2,990,630	2,801,436	5,792,066
Giza Governorate	2,228,791	4,627,669	4,287,495	8,915,164

Source: CAPMAS, Census of population activities of the governorates, Arab Republic of Egypt, 2019

The data from the previous table shows the high population density in the project candidate areas. The numbers of males and females is approximate, and the number of males increases by a small percentage.

Table 4-8 shows the distribution of the population in the project candidate areas according to urban and rural areas.

Table 4-8: Population Estimates by Urban /Rural in the Project Candidate Areas

Area	Population		Urbanization rate
	Urban	Rural	
Cairo Governorate	9,788,739	0	100.0
Qalyoubia Governorate	2,479,382	3,312,684	42.8
Giza Governorate	5,410,061	3,505,103	60.7

Source: CAPMAS, Census of population activities of the governorates, Arab Republic of Egypt, 2019

It is clear from the data of the previous table that the urban percentage increase over rural areas in the project candidate areas, and it is at the highest rate in Cairo Governorate, which represents the largest urban cluster. The highest rural rates are concentrated in Qalyoubia Governorate, where the rural percentage represents more than 55%.

4.3.2.2 Age and Gender Distribution

The age and gender structure are of great importance in the study of the population, because it shows the demographic features of the society according to gender (males / females). It also determines the category produced in the age structure, or what is known as the percentage of society that has the burden of supporting the rest of its members. It also helps in determining the social characteristics of the population, such as the gender ratio and the extent of its impact on immigration from and to it influencing factors.

The age and gender structure are also a product of population growth, including births, deaths, and immigration, one of which cannot be considered entirely independent from the other, but any change in one of these factors leads to influence the other factors.

The age distribution for the whole governorates is shown in Table 4-9 for the year 2017.

Table 4-9: Age distribution of the population in the project candidate areas

Gender	0-4	5-14	15-44	45-59	60+
Cairo Governorate					
Males	9.5	17.0	49.4	15.2	8.9
Females	10.2	17.0	49.6	15.1	8.1
Total	**9.8**	**17.0**	**49.5**	**15.2**	**8.5**
Qalyoubia Governorate					
Males	12.5	21.8	47.4	12.5	5.8
Females	12.8	21.5	48.6	11.7	5.3
Total	**12.7**	**21.7**	**48.0**	**12.1**	**5.6**
Giza Governorate					
Males	13.8	21.1	47.5	11.8	5.8
Females	14.6	20.7	48.5	11.2	5.0
Total	**14.2**	**20.9**	**48.0**	**11.5**	**5.4**

Source: CAPMAS Statistical Yearbook, Population, 2017

The data of the previous table show the convergence of the age distribution between males and females in the three governorates, where there are moderate differences between them. It is also noted that the percentage of the age group 15-44 is higher among the population in the three governorates; this gives an indication of the rise in youth and the labor force.

4.3.3 Economic Characteristics

Economic characteristics contribute to determining the features of economic activities and the importance of their elements and their relation to the conditions of the geographical environment. It is also possible to determine the percentage of employment, its size, its importance and its multiple characteristics, knowing the unemployment rates and distributing them according to age, gender and profession.

Table 4-10 illustrates the labor sector according to the economic characteristics in the project candidate areas.

Table 4-10: Work Status in the Project Candidate Areas

Indicator	Gender	Project area		
		Cairo Governorate	Qalyoubia Governorate	Giza Governorate
Estimates of Labor Force by Sex (15 years +)	Male	24,383	13,865	19,468
	Female	8,230	4,321	4,686
	% Female to Total	25.2	23.8	19.4
Estimates of Employed Persons by Sex (15 years +)	Male	21,597	12,601	17,601
	Female	6,078	3,297	3,526
Unemployment Rate by Sex (15- 64 years) %	Male	11.4	9.1	9.6
	Female	26.1	23.7	24.8
	Total	15.1	12.6	12.5
Labor force increase rate %		2.2	10.2	12.3

Source: CAPMAS Statistical Yearbook, Labor, 2017

Data from the previous table show a decrease in the total workforce compared to the total population; this is due to the absence of the total labor force in official data, especially in rural areas where a large percentage of the population is employed in agricultural work. The employment in the agricultural land is a seasonal employment that varies according to the type of crop and therefore it is a variable employment that is difficult to record and limit in official statistics. In addition, women work in unpaid work, such as raising birds and dairy products, and working on agricultural land. It is worth noting that the informal sector represents a large percentage of the unregistered workforce.

Previous data indicate a higher unemployment rate for females than for males, especially in rural areas than in urban areas.

4.3.3.1 Industrial Economic Activity in Qalyoubia Governorate

Industry represents one of the main economic activities in Qalyoubia Governorate, due to the presence of many industrial activities that spread throughout the whole Governorate, and a large percentage of such activities are concentrated in the Khankah Markez. Abu Zaabal is one of the villages where many factories are concentrated, which makes it one of the largest industrial areas in the Markez. Moreover, it represents the largest percentage of the Khankah Markez.

Among the industrial zones that were established in recent years, the Al-Safa Industrial Area is located on an area of (142 acres) in the area of Arab Al-Olayakat in the Khankah Markez. This area was designated for Cairo air improvement project, taking into consideration that the projects in this region are designed according to the latest technological development for the foundry industry and have no polluting emissions.

In addition to the major industrial areas scattered in Qalyoubia Governorate, there are some random industrial areas that suffer from many informal industrial practices and the effects of pollution that spreads in those areas. Among the most famous of these regions:

Akrasha: "Akrasha" in Al Khankah is considered one of the most important and largest industrial slums, which includes about (500) factories, employing approximately (15 thousand) workers in multiple industries. The most important are chemicals, plastics, cartons and glass. Akrashah represents the largest random industrial and housing area in Al Khankah, which includes hundreds of workshops and thousands of workers.

Among the most important problems in the Akrasha area is the lack of sanitation for these factories, which results in the disposal of their waste in the agricultural drainages. This impacts the surrounding environment, especially the Abu Zaabal drainage that crosses the area (shown in Figure 4-11). The groundwater in the area is likely to be contaminated.

Figure 4-11: Abu Zaabal drainage, one of the main places for dumping waste

Bassus: Bassous area in Al-Qanatir Al-Khayriyah, where factories spread in houses. These factories manufacture electrical and household tools, pipes, etc., and they employ daily labor that exceeds 50% of the population of the Governorate. The region suffers from many environmental problems due to dumping of waste in drainage, in addition to the problem of spreading garbage in the streets.

4.3.4 The informal sector for solid waste collection in Greater Cairo

Sustainable waste management systems contribute to overall urban sustainability. In developing country cities such as Greater Cairo, the informal sector plays a vital role in these systems.

The informal sector for solid waste collection in Greater Cairo consists of two main categories, namely:

1- The Traditional Garbage collectors: This is the classical "Zabbaleen" group that currently also includes contractors and workers in the field of garbage collection, sorting and utilization. They depend on collecting solid waste from houses and shops, then selling recovered recyclables to factories and workshops after sorting and separating organic waste, which is predominantly used in feeding their livestock (Pigs). Garbage collectors' work depends on the family business, and roles are distributed within the family according to age and gender. Women and girls are heavily engaged in this field through participation in the family business, particularly in the recyclables recovering and sorting. According to CAPMAS data, women work in the field of sorting and classification of solid waste for an average of 50 hours per week (CAPMAS, Statistical Yearbook, Labor, 2017). Although there are no available official statistics on the children involvement in waste related activities, they are important players in this family-run business particularly during school holidays.

The following table shows the number of families in each solid waste collection area in Greater Cairo[1]

Table 4-11: Number of families in each solid waste collection area in Greater Cairo

Governorate	District	No. of families	No. of people
Cairo Governorate	Maadi - Tora	8,000	44,000
	Manshyet Nasser	6,000	33,000
	Helwan – 15 May	1,200	6,600
Qalyoubia Governorate	Al Khosous and Ezbet El Nakhl	4,000	21,700
	Akrasha	2,000	6,000
Giza Governorate	Ared El Lwaa	4,000	22,000

[1] Source: El Zabalin communities Survey, Youth Spirit Association, Manshyet Nasser, 2014.

	El Maatemdiah		

It is clear from the previous table that the garbage collectors' communities are concentrated in specific areas in each Governorate and they are also distributing their collection service/ work in specific areas according to known and coordinated plan among the different actors. Most of the waste sorting, recyclables recovery and in many cases also processing take place in the garbage collectors' residential areas.

The workforce in the informal sector in Al Khusous area, Qalyoubia Governorate, reaches around 1,200 Person, including 300 women and 250 children (Qalyoubia Governorate, 2019). This indicates an increase in women's employment in this sector, which could be classified as family unpaid labor.

Traditional garbage collectors in Qalyoubia Governorate are offering collection services, predominantly in Cairo and Giza residential and commercial areas. They also serve some areas in Qalyoubia (Shobra El Khema). In terms of the business modal that the traditional garbage collectors are following, it is worth noting that in many places the work is closely coordinated with the Government and the large-scale private operators. This is done through contractual agreement with the Zabbaleen established companies or through the issuance of work permits by the Government. The main interest this group has, and beyond the collection fee that they sometimes get from residents, is actually the garbage itself with all the valuable recoverable and recyclable matter which is the core of their business.

2- Other Non-traditional Informal Groups:

a) Street Containers Waste Pickers (*Al Nabashin*):

Those are the groups of waste pickers who roam around predominantly in urban area and try to salvage reusable or recyclable materials thrown away by others to sell or to use for personal consumption. Although there is difficulty to have a clear inventory of this groups due to their part time on and off nature of business, observations are suggesting that they represent the lowest percentage in the informal sector for solid waste management. They work individually (less likely on family business mode) and waste picking in most of the cases is only a partial source of livelihoods for them.

b) Donkey-carts and Tricycle Operators:

Members of this group, likely, own donkey carts and/or tricycles that they are using to roam around the street waste piles to recover recyclable materials and/or to pass by households and collect their waste bags. The consultation conducted in Qalyoubia Governorate clearly revealed that this group role is not very much appreciated by the Governorate and they are predominantly seen as a group that

is outlawed (unlicensed) and that does not care about the public's health and interest by creating a mess in the street to pick the recyclable materials. They are still operating in Qalyoubia Governorate, and the table below presents their distribution according to gender and area of operation.

Table 4-12: The number of Waste pickers in Qalyoubia Governorate, and their distribution according to gender and area (Qalyoubia Governorate, 2019)

Area	No. of Waste pickers	Equipment	Women	Child	Unpaid labor
Gharb District	40 – 45	Donkey cart + Tricycle	10	5	No data available
Shark District	50 - 60	Donkey cart + Tricycle	20	15	
Al Khanka	25	Donkey cart + Tricycle	3	2	

c) Disposal Sites Waste Pickers

This groups operates in full time mode in final disposal locations. Waste pickers in Abu Zabaal location are the most relevant to this project. They are around 35 males of different age groups. They operate under the main dumpsite operator who has a contract with the Governorate. They recover recyclables from the dumpsite and have connections to existing businesses taking place at the street piles and containers. The current working conditions of those individuals of the informal sector are highly threatening for their health and safety, with minimal protection measures followed in the process of recovering recyclables. In the meantime, children were observed to be engaged in some of the waste sorting activities in the dumpsite. Although it is not very clear at this stage how the phasing of work, technology and closure options…etc. will take place and accordingly the nature of the impacts on the livelihoods of this groups is very much unknown, it is still very likely that this group is among the most vulnerable to the planned closure activity. Relevant interventions as per the provision and the principles of ESS1 and ESS5 are essential to minimize the negative impacts of those individuals and their families.

4.3.5 Infrastructure

Based on information from the CAPMAS 2018, a brief summary of the extent to which access of basic infrastructure services are available in the project areas and candidate sites is given in Table 4-13.

Table 4-13: Percentage Distribution of Households Connected to The Public Network (electricity / water / health)

Governorate	% of households connected to the public sewage network %	% of households connected to the public water network %	% of households connected to the public electricity network %
Cairo Governorate	98.8	99.5	99.9

Qalyoubia Governorate	67.3	96.0	99.4
Giza Governorate	71.3	95.0	99.7

Source: CAPMAS Statistical Yearbook, Censuses, 2017

The data of the previous table shows the availability of infrastructure services in the study areas at a high rate. The least of these is sanitation services in the rural areas in Qalyoubia and Giza Governorates.

4.3.6 Public Transport[6]

The Cairo Public Transport Authority is considered one of the most vital facilities that millions of citizens depend on as a daily means of transportation within the Greater Cairo area, as three governorates "Cairo, Giza and Qalyoubia" connect with each other, and no less important than the subway lines.

The Public Transport Authority has 3 thousand buses in Greater Cairo, which work to connect the governorates of Greater Cairo, and are stored in 26 garages.

The price of the ticket for public transport buses traveling 30 km or less is 3 pounds (EGP), and 80% of the public transport authority buses that cover Greater Cairo travel 30 km over 273 lines. There are 44 lines for public transport buses that travel from 31 km to 40 km representing 12% of the authority's buses; the ticket costs 4 pounds (EGP).

Public transport buses that serve new cities travel from 41 km to 60 km over 27 lines, and represent only 8% of the authority buses, the ticket price reaches 5 pounds (EGP). The furthest destination for public transport authority buses is 60 km, such as Banha, El Badrashin, and new cities.

There are distinct bus lines that include internet service and air conditioning; tickets cost 14 pounds (EGP).

In Greater Cairo, public buses are among the key means of transport for women, particularly working women. It is heavily used because of its affordability. However, buses are always over-crowded for women, making them uncomfortable means of transport. Sexual harassment in public transport is also among the common violations, particularly in Greater Cairo region.

4.3.7 Gender Based Violence

In general, violence and sexual harassment against women is considered a serious social problem in Egypt. Violence not only has negative consequences for women but also their

[6] Guide to Public and Private Transport in Cairo, Cairo Governorate Information Center, 2018.

families, the community and the country at large. The 2015 survey "The Egypt Economic Cost of Gender-Based Violence Survey" (ECGBVS, 2015)[7] includes the most comprehensive data on violence against women in Egypt.

The ECGBVS is the first nationally representative study in Egypt presenting findings related to the various types and forms of violence experienced by women and girls. The sample consisted of 21,448 households in urban and rural populations. Women aged 18-64 who were residents or present in the household for a month or more before the survey were eligible for the survey.

The key outcomes and results of the study demonstrate that:

- Around 2.5 million women suffered from the various forms of sexual harassment on streets,
- More than 1.7 million women suffer from the various forms of sexual harassment in public transport,
- Around 30% of women age 18-64 have been exposed to at least one act of violence perpetrated by any of the three categories of perpetrators: spouse/fiancé, other close individuals or strangers in private and public spaces.
- 4% of women reported experiencing violence and sexual harassment at the workplace. Around 3% were subjected to physical or psychological violence and 1% experienced sexual harassment.
- Rural women were less vulnerable to harassment in public transport than urban women. 5% of women living in rural areas experienced harassment in public transport versus approximately 9% among urban women. The lowest incidence of harassment against women in public transport was observed in rural Upper Egypt; where only around 2% of women reported having been subjected to harassment in public transport.
- The number of women who report incidents to police yearly does not exceed 75 thousand women. Similarly, the number of women who sought local community services did not exceed 7 thousand women. The National Council for Women is one of the main channels for receiving complaints of GBV in all governorates of the Arab Republic of Egypt.

The previous data indicates the importance of taking into account the impacts associated with GBV in public transportation projects, and the field of work for any project, especially during the construction phase.

- [7] UNFPA, National Council for Women-Egypt, the Egypt Economic Cost of Gender-Based Violence Survey (ECGBVS) 2015.
https://egypt.unfpa.org/sites/default/files/pub-pdf/Costs%20of%20the%20impact%20of%20Gender%20Based%20Violence%20%28GBV%29%20WEB.pdf

5 ANALYSIS OF ALTERNATIVES

This chapter provides guidance and methods on how to assess different alternatives that should be considered while preparing documents such as feasibility studies, design studies, and ESIAs of any of the project components.

The alternatives pertain to components involving physical interventions, namely, component 2 on waste sector interventions and component 3 on public transit interventions. The criteria to be considered in the analysis of alternatives may be required in feasibility studies and/or ESIA depending on the component status (e.g., site selection if location has not yet been defined) are presented. References to the specific studies required to include for each criterion are made.

With respect to timeline, feasibility studies and ESIAs are performed during the project planning phase.

5.1 Alternatives for Waste Sector Interventions

5.1.1 No Project Alternative

The first alternative that is usually studied in any ESIA is the "No Project" option. In respect to the proposed project, this implies that Greater Cairo will remain one of the most polluted megacities in the world with a poor ambient air quality and a PM_{10} far exceeding the WHO limits mainly due to the waste and public transport sectors

In order to assess the "No Project" option for physical interventions in the waste sector, these guidelines will be followed:

- Conducting comparison between emissions of particulates that contain toxic substances and GHG emissions before and after the project
- Analyzing the adverse impacts on communities and residents living near open dumpsites such as bad odors generated by decomposing waste, attraction of vectors like rodents and flies, and toxic emissions from wastes open burning and how the project will mitigate these impacts
- Estimating the amount of mismanaged waste in Greater Cairo before and after the project
- Studying the impact of the project on imposing control over illegal dumping in public roads and sites not assigned for waste disposal and their intentional open burning

The 'No Project Alternative' should be part of FS and ESIAs identified for the project, specifically component 2 (all subprojects) and component 3.

5.1.2 Location Alternatives

This section demonstrates specific criteria for assessing location alternatives for the different subprojects.

5.1.2.1 Transfer Stations

The specific locations for the proposed transfer stations are not yet determined. Initially, criteria for exclusion of totally restricted sites, without further studies, will be developed. The site exclusion criteria include:

- Wetlands and floodplains
- Habitats of endangered and protected flora and fauna
- Areas of historical, archeological, and cultural significance
- National, provincial, and public parks
- Sites within a radius of 8 km from an airport (as per Alberta Transfer Station technical guidance manual)

Other criteria for selection of an appropriate site for the transfer station include technical, environmental and community-specific factors [25], as shown in Table 5-1.

Table 5-1: Criteria for selection of an appropriate site for the transfer station

Aspect	Criteria
Technical factors	▪ Centrality of the location of the transfer station to the service area in which the wastes are generated. ▪ Access to major transportation routes and road suitability to trailers load and size along planned transfer haul routes ▪ Safe entrances or exits onto public roads ▪ Sufficient land area for the transfer buildings, and other planned activities to meet current and future space requirements along the project lifetime ▪ Sufficient space for on-site roads to allow for efficient vehicle routing, queuing of collection vehicles, and parking for trailers and site staff ▪ Access to existing utilities including electrical power, natural gas services, and water and sewer utilities ▪ Gently sloping topography that is compatible for building necessary ramps
Environmental and community-specific factors	▪ Allowance for site buffers and landscaping including fencing, berms, open spaces, and trees. ▪ Site should be at a minimum distance of 300 m from residence, hospitals, food establishment, and schools. ▪ Proximity limits to religious places, recreation areas or businesses ▪ Active areas (e.g. tip area, storage compounds) should not be within 5 m of the site property line

	▪ Considering community concerns regarding: ○ Safety and health impacts ○ Traffic volume and noise ○ Litter, odor and dust ○ Impact on air quality ○ Insects, birds, and other scavenging animals, visibility and aesthetics and property values

Generally, a list with the potential sites for the landfill project will be prepared after the exclusion of the totally prohibited sites. The abovementioned points in Table 5-1 will be used as a checklist to assess the potential sites, where all points have to be met to shortlist the selected site before conducting further studies including a feasibility study.

5.1.2.2 Landfills

During identification of suitable sites for construction of a landfill, the procedure follows a two-phase process, negative mapping and positive mapping. Negative mapping excludes sites that are not suitable for the construction of the landfill.

As per the Egyptian Code of Design Principal and Implementation Conditions for Municipal Solid Waste Management Systems, if any of the exclusion criteria below available in a site, it has to be excluded, without further studies:

- Sites located in high flood risks areas.
- The site is a collection point for rainwater.
- Located in areas with a groundwater level close to the subsurface (≤ 1m).
- The surrounding areas are planned as residential areas.
- The location is less than 500 m from the nearest residential area.
- Located within an area where explosives are used or military activities.
- Located in a landslide area.
- Located in less than 1.5 km from the nearest airport.

Negative mapping is followed by positive mapping, where sites that can be considered as a potential site for the construction of landfill are identified. A checklist to ensure that the site meet the following criteria will be prepared:

- Limited use of groundwater for drinking or agriculture due to its high salinity
- Site is away from populated areas more than 1.5 km, as per Article 38 of the Executive Regulations 1741/2005 amended in Executive Regulations 964/2015 of Law 4/1994. The landfill site in relation to the residential area should be down-wind the prevailing wind direction. Also, the selected site must not affect the future development plan according to the “Urban Development Plan” of this area.
- Area availability compared to the quantity of waste that will be disposed over the lifetime of the landfill

- Clear land ownership
- Main roads leading to the site are facilitated and leveled, commensurable with the traffic movement, and size and number of vehicles arriving daily

As per the Egyptian Code, the evaluation criteria below will be used to select the location. Evaluation criteria will be rated on a scale of 1 to 3, where 1 corresponds to least appropriate and 3 to the most appropriate site. The site with the highest total rank will be selected.

Table 5-2: Criteria for evaluation of landfill sites

S	Evaluation Criteria	Site 1	Site 2	Site 3	Site 4
1.	Land ownership, where ownership papers and the allocation decision are confirmed. Any obstacles in site, including the presence of private properties or houses or any other military or civilian entity				
2.	Site distance to the waste generating area and the impacts of the site on the collection and transport operations (need extra resources as transfer stations)				
3.	Site distance to the main roads				
4.	Existing surface waters next to the site (rivers, streams, lakes)				
5.	The ability of the site to hold rain water or flood				
6.	Groundwater level				
7.	The existence of groundwater wells for drinking or agriculture				
8.	Flood path crossing the site				
9.	Level of ground sealing materials required				
10.	Availability of cover material from low permeability soil				
11.	Land use around the site. The boundaries of the site, the uses of neighboring lands, residents in the vicinity of the site and main potential problems of project construction as the selected site must not affect the				

	future development plan according to the "Urban Development Plan" of this area.				
12.	The existence of power lines near the site, air hanged or underground				
13.	There is a prospect for nearby archaeology or an archaeological area				
14.	Traffic on roads leading to the site the main and sub roads surrounding the site, the effect of constructing and operating the site on these roads, need of access road				
15.	Area available, capacity and lifetime				
16.	Distance between the location and the nearest agricultural or residential activity around the site				
17.	Cost of landfill construction (estimate)				
	Total Site Rating				

Furthermore, as per the Egyptian Code of Design Principal and Implementation Conditions for Municipal Solid Waste Management Systems endorsed by the Ministerial Decree No. 717 for year 2019, the following studies have to be prepared for the preferred shortlisted landfill site Table 5-3**Error! Reference source not found.**:

Table 5-3: A list of necessary studies before starting the design of the landfill

Study/target	Expected Results of the Study
Traffic Study	The main and sub roads surrounding the site are studied and the effect of constructing and operating the site on these roads and suggesting new access roads in case of problems in the current roads
Site Topography	Topographic survey of the site, contour spacing is 1 m and output drawings at scale of 1:500
Site Geology	At least 9 soil investigation boreholes, one with depth 30 m and 8 at depth 8 m. Necessary tests (sieve analysis test, standard penetration test, permeability tests, etc.) to determine the nature of the soil at the surface and sub-surface area. The soil quality available at the site is explored and analyzed to determine its suitability for use as an intermediate or final cover and its quantities compared to daily cover needs.

Site Climate Conditions	Study the climatic conditions of the region, determine the average temperature throughout the year, and determine the intensity of wind and precipitation, evaporation and relative humidity.
Site Hydrological Nature	At least 3 groundwater monitoring wells are used to determine seasonal groundwater surface level within 30 m from ground surface. Groundwater samples are taken and analyzed. Investigate for artesian confined water within 30 m from surface. Determine the geological and hydrogeological characteristics and piezometric level and identify water flow vertical level map showing water each 1 m. provide subsurface water characterization, its source and its depth.
Available water Sources	The sources of water available at or near the project shall be identified for use or for action to be taken to protect them. This should include surface water, irrigation wells, and drinking water wells.
Earthquakes	The seismic zone within which the project site is located is determined according to the map of the earthquake hazard zones determined by the building code and the assessment of the vulnerability of the landfill with earthquakes
Rainfall Drains	The flood cover maps of the area are examined and the landfill after the flooding is checked and the precautions to be taken to avoid the risks of floods are determined.
Soil Investigation	An analysis is carried out to determine the stability of the soil, determine the degree of safe orientation in the static and dynamic position, and what precautions should be taken to prevent landslides of the landfill, the stability of landfill body.
Site Capacity	A field survey and collection of samples are conducted to analyze as needed to determine the quantities and density of solid waste going to landfill.

In addition to the abovementioned site investigation studies and after identifying one preferred location, a feasibility study is required comprising the characteristics of waste generated in the service area, costs of investment, operation and maintenance.

5.1.3 Technology Alternatives

5.1.3.1 Transfer Stations

The type of service offered by the transfer station may include the following options:

- Service to only organized collection vehicles
- Service to residents only
- Service to residents and organized collection vehicles
- Service to commercial collection vehicles included

There are numerous types of transfer stations. However, transfer stations in this project have to be closed, disregarding what their type is since they will be located in Qalyoubia governorate, which is a highly populated area. Open transfer stations are more suitable in remote locations. It is necessary to select the correct type based on the following:

- Sources of wastes to be received
- Types and quality of waste allowed to be received
- Amount of waste
- Additional functions: sorting – separation – storage
- Maximum volume of waste received in peak seasons
- Residential sites nearby
- Transfer distance to the transfer station

Other criteria that can be used to assess the different types of transfer stations are:

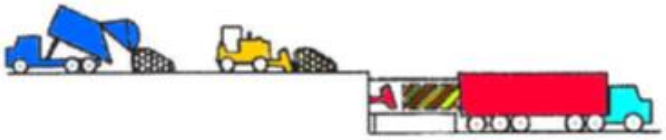
- Capital cost
- Maintenance and housekeeping requirements
- Required area

The following arrangements illustrated in Figure 5-1**Error! Reference source not found.** are commonly used for mixed waste, which is expected in this project:

1. **Direct dump transfer stations**, where the wastes are unloaded from the collection truck directly onto the open top of the transfer vehicle. This type is more suitable for low-volume wastes.
2. **Push-pit transfer stations**, where the wastes are unloaded from the collection truck onto a concrete tipping floor, a loader or bulldozer is used to compact the waste before loading into the transfer vehicle through its open top, increasing the payload. This can allow for materials recovery and waste inspection.
3. **Compactor transfer stations**, where the wastes are unloaded on the tipping floor, pushed by a loader or bulldozer onto the stationary compactors. The wastes are compacted by the hydraulic rams into the transfer vehicles. These rear-loading trailers are made of reinforced steel to resist the compaction force, equipped with onboard unloading ram, the trailer heavy weight reduces the available payload for wastes.
4. **Inverting bin transfer stations**, where the wastes are directly loaded in bins that are emptied in the transfer vehicles.

Direct dump transfer station

Push pit transfer station



Compactor transfer station

Inverter bin transfer station

Figure 5-1: Basic types of transfer stations for mixed wastes

The construction of transfer stations will require feasibility studies (FS). The content of the FS should at a minimum cover the following elements: analysis of technical and technological alternatives for closed pit including Direct dump transfer stations, push-pit transfer stations, compactor transfer stations and Inverting bin transfer stations, associated environmental and social risks and impacts for each option, and economic considerations.

5.1.3.2 Landfill Lining System

There are two types of landfill lining system, which are:

- **Sanitary Landfill** includes composite lining of clay (mineral lining) and geomembrane, leachate collection system and landfill gas collection system in addition to leachate treatment and gas flaring units
- **Controlled Landfill** includes a liner of compacted low permeability soil

The type of landfill will be determined based on-site conditions and feasibility study. However, Selection of the lining system mainly depends on the following:

- **Sanitary Landfill** is more suitable for:
  - Areas with precipitation higher than 8 mm per year
- While, **Controlled Landfill** is for:
  - Arid areas with less than 8 mm precipitation per year
  - Non-hazardous rejected waste after organic extraction for compost

A FS is only required for subsequent cells in the first integrated waste complex at 10th Ramadan (healthcare waste and construction and demolition waste) and for the 2nd planned facility for hazardous waste (location not defined).

The minimum content of the FS for subsequent cells is technological alternatives of lining systems, environmental and social risks and impacts (which include considerations of site selection), and economic considerations.

For the hazardous waste facility, the FS should include technological options for storage, treatment and processing depending on types of waste (which are no defined at this stage) such as physical, chemical, biological, and thermal treatment, , environmental and

social risks and impacts (which include considerations of site selection), and economic considerations.

5.1.4 Alternatives for Dumpsites Rehabilitation

Dumpsite rehabilitation aims at reduction of the risks associated with the accumulated wastes, reduction of nuisance attributed to odor, wind scatter, birds, pests and rodents, and scavengers. The most usual technical problems and challenges of open dumpsites are:

- Widely dispersed uncovered waste
- No application of cover soil or minimal cover that forms access roads
- Open fires and/or waste periodically on fire
- No control of waste placement
- No compaction of waste
- No recording or inspection of incoming waste
- Scavenging at site
- No security fence or check points
- Presence of vermin, dogs, birds and other vectors
- No leachate management or treatment system in-place
- No odor control or landfill gas management system

In order to develop a plan for dumpsite rehabilitation, site assessment is required to identify the existing conditions, the extent of potential contamination and probable pathways of contaminants. In order to assess the adverse impacts and the risk associated with the dumpsite on public health and the environment, study of the following is required:

- Characteristics of the site such as the depth of solid waste and degree of compaction.
- Characteristics of the wastes accepted during the active lifetime of the dumpsite.
- Size of the site as defined by the total amount of solid waste disposed of and the areal extent.
- Rate of release of both waterborne and airborne pollutants.
- A real extent of contamination, persistence and transformation of the pollutants and their transformation products.
- Concentrations and gradients of those pollutants that adversely impact air, water and land resources.
- Identification of community and especially sensitive populations that are influenced by the release of pollutants from the site and duration of exposure.

After reviewing the data regarding the site geology, depth of ground water, maps showing existing and planned land use, site investigations that are needed for the site assessment will include:

- Excavation of trenches/soil borings to retrieve waste samples for characterization. Although trenches exposing a larger continuous area of wastes can produce more information about the type and condition of wastes, evidence of soil/waste layering if any, soil borings can cover a larger area of the dumpsite producing less odors.
- Identification of points of leachate seepage and ponding within and in the areas surrounding the dumpsite.
- Geotechnical investigation to determine depth of dumped wastes as well as stability of slopes.
- Gas Surveys is carried to determine gas leakage within and on the areas surrounding the dumpsite.
- Groundwater and surface water quality sampling

However, it should be taken into consideration that there are a number of health and safety hazards might be encountered on carrying site investigations. These include unstable slopes, hidden voids of gases that can be associated with fires and/or explosions, hidden bodies of water, attack of rodents and vermin and insects' bites, injury from sharp objects, exposure to hazardous chemicals and injury from falling wastes. Therefore, it is necessary to take precautions and comply with the occupational health and safety standards.

As per the Egyptian Code of Design Principal and Implementation Conditions for Municipal Solid Waste Management Systems endorsed by the Ministerial Decree No. 717 for year 2019, the after care and monitoring of closed dumpsite should be performed for a period of 30 years after closure. During this period the following activities should be performed:

- Maintaining and operating the gas monitoring system.
- As long as the gas system is under operation, there should not be any kind of recreation area. Any after use is not allowed before at least 15 years after closure.
- Maintaining the integrity, and effectiveness of any final cover, including making repairs to the cover as necessary to correct any settlement, erosion, or other events and preventing run-on and run-off from eroding or damaging of final cover.
- Walkover inspection should be carried out 3 times per year during and after heavy rain season in arid areas. This will be done once a year after the season of sandstorms.
- Maintaining and operating leachate collection system.

- Monitoring the ground water through 3 sampling wells, one in the upstream of ground water and two in the downstream after the dumpsite. Comparison of water quality is performed once a year.
- Conducting environmental measurements of air quality before and after closure. Measurement will be conducted every 10,000 m^2 for methane.
- Assessing potential contamination in the top soil prior to site reuse

There are three alternatives for dumpsites rehabilitation, which are:

1. Closure by upgrading into a controlled sanitary landfill
2. In-place closure by covering the waste
3. Closure by removing waste from the dump

5.1.4.1 Closure by Upgrading into a Controlled Sanitary Landfill

The following environmental and social criteria should be assessed before making a choice to close a dumpsite by upgrading into a controlled sanitary landfill:

- There is sufficient open space adjacent to the existing dumpsite.
- Existing waste mound is in stable condition.
- It is not a hazardous waste commingled with MSW waste site
- The site is not in close proximity to settlements/residential areas
- The site is not close to surface water streams or shallow aquifers.
- The landfill should be in an area that does not cause a serious problem in groundwater
- The site is not next to a reservoir of water, rivers, lakes, earthquakes area or cracks or in a flood plain.
- The site is distant from airports.

The table below also shows some criteria for risk assessment of dumpsites according to a study by the Centre for Environmental Studies, Anna University, India under The Asian Regional Research Program on Environmental Technology.

Table 5-4: Criteria for risk assessment of dumpsites

Site characteristics	**Area of dumpsite**
	Depth of filling waste (m)
	life of the site for future use (years)
	Groundwater depth (m)
	Groundwater quality
	Type of underlying soil (% clay)
	Permeability of soil ($1*10^{-6}$ cm/s)
Location	Distance from nearest water supply source (m)
	Distance from surface water body (m)

	Distance to critical habitats and reserved areas (km)
	Distance to nearest airport (km)
	Distance to nearest residential area in the predominant wind (m)
	Distance from the city (km)
	Public acceptance
	Flood proneness (years)
	Annual rain fall (cm/yr)
	Ambient air quality (CH_4%)
Waste characteristics	Type of waste (MSW/HW)
	Total quantity of waste in site (ton)
	Quantity of disposed waste (ton/day)
	Hazardous content in waste (%)
	Biodegradable fraction of waste at site (%)
	Moisture of waste at site (%)
	Age of filling (years)
Leachate quality	BOD of leachate (mg/L)
	COD of leachate (mg/L)
	TDS of leachate (mg/L)

Based on the answers to the abovementioned parameters, the hazard potential of the site is then evaluated. Suggested recommended actions according to the site hazard potential classification as adopted from the Dumpsite Rehabilitation Manual is presented in Table 5-5.

Table 5-5: Criteria for dumpsite hazard evaluation based on the risk index

Hazard Potential	Recommended Action
Very high	Close the dump with no more landfilling. Remedial actions to mitigate the negative impacts.
High	Close the dump with no more landfilling. Remediation is optional.
Moderate	Immediate rehabilitation the dumpsite into sustainable landfill.
Low	Rehabilitate the dumpsite into sustainable landfill in a phased manner.
Very low	Potential site for future landfill.

In this case, closure by upgrading of an open dump into a controlled sanitary landfill includes:

- Space adjacent to the existing dumpsite should be available, where new waste can be deposited in properly engineered and lined cells with leachate collection system and long-term environmental controls such as landfill gas management and groundwater monitoring wells.

- Use of a low permeability cap and a topsoil layer over the existing waste mass, which can then be vegetated.
- A basic landfill gas collection system is installed. Although, capping and re-grading the waste piles will reduce the leachate generation potential, leachate seeping on side-slopes should be collected using simple leachate collection points that can be installed to gather leachate and have it pumped onto septic trucks for off-site disposal and treatment.
- Moving and reshaping existing waste in one side of the site and cover it with a layer of natural soil with a thickness of at least 30 cm.
- Remove trees and plants and level the bottom of the remaining area to slope of 2 – 4%, the soil is properly compacted after leveling.
- Drainage channels should be set up around the site to prevent the access of surface water to the landfill, if there is rain.
- A fence should be constructed around the landfill to prevent scavengers and animals.
- A good road should be established to reach the landfill and provide gates, a weigh bridge, and a control and security room.
- If natural soil has high permeability, a layer of mixed clay and natural soil will be placed. The layer will be 50 cm high.
- Cracks in the compact clay layer is not allowed, water must be added during and after compaction to prevent any cracking.

5.1.4.2 In-place Closure by Covering the Waste

In-place closure is the most commonly used method for dumpsites rehabilitation, especially when there is no more space for additional waste placement. In-place dumpsite closure is the easiest and the cheapest closure method, provided that new incoming wastes are diverted to an alternate waste handling facility and a new sanitary landfill. This option can be chosen, if the following can be implemented:

- The existing waste is left in-place and covered with a layer of local soil and re-vegetated. The thickness of the soil layer will depend on the local site and climatic conditions.
- A basic landfill gas collection system, can be installed, depending on the following:
    - Estimated gas generation volume
    - Waste composition
    - Waste age
- Surface drainage systems are installed for collection of accumulated leachates. Leachate from collection points is pumped onto septic trucks for off-site disposal and treatment in order to reduce impact on groundwater.

- Groundwater and landfill gas issues are addressed, and control and monitoring systems are installed.

In-place dumpsite closure will:

- Reduce waste exposure to wind and vectors.
- Minimize the risk of fires.
- Prevent people and animals from scavenging.
- Control infiltration of rainwater/surface water and thus reducing leachate generation.
- Control odor and gas migration.
- The in-place closure cap system will serve as a growth medium for vegetation.

5.1.4.3 Closure by Removing Waste from The Dump

This method involves the removal of the waste mass from the open dump and the disposal of it off-site, typically to a proper sanitary landfill, if:

- The site is located in the vicinity of high-priced real estate district, where the land value can be significantly higher than the costs of waste removal and associated disposal costs
- The removal of waste activities can be combined with sorting the waste for recyclable material recovery and separation of some hazardous waste.

However, a feasibility study should take into consideration:

- Cost of the site clean-up
- Real estate end-use value.

Waste removal and relocation is a costly remediation method. Waste removal will lead to odor problems to the neighborhood as well as transportation issues related to the transfer of the waste to the new landfill. The capacity of the new landfill to take the historical accumulated waste in addition to the current newly generated waste should be assessed.

The closure and rehabilitation of the dumpsite will require a feasibility study (FS). The content of the FS should at a minimum cover the following elements: analysis of technical and technological alternatives including closure by upgrading into a controlled sanitary landfill, in-place closure by covering the waste, and closure by removing waste from the dump, associated environmental and social risks and impacts and economic considerations.

5.1.5 Summary Table

Table 5-6: Summary Table for Waste Sector Interventions

Sub-component	Required studies and assessments	Project phase
Transfer stations	FS: analysis of technical and technological alternatives for closed pit including Direct dump transfer stations, push-pit transfer stations, compactor transfer stations and Inverting bin transfer stations, associated environmental and social risks and impacts for each option, and economic considerations.	Planning
Landfill subsequent cells (HCW and C&D)	FS for subsequent cells: technological alternatives of lining systems, environmental and social risks and impacts (which include considerations of site selection), and economic considerations. For the hazardous waste facility, the FS should include technological options for storage, treatment and processing depending on types of waste (which are no defined at this stage) such as physical, chemical, biological, and thermal treatment, , environmental and social risks and impacts (which include considerations of site selection), and economic considerations.	Planning
Dumpsite rehabilitation	FS should at a minimum cover the following elements: analysis of technical and technological alternatives including closure by upgrading into a controlled sanitary landfill, in-place closure by covering the waste, and closure by removing waste from the dump, associated environmental and social risks and impacts and economic considerations.	Planning

5.2 Public Transport Interventions (E-buses)

5.2.1 No Project Alternative

The project is also considering the introduction of e-buses and retrofitting a number of diesel buses. Large-vehicle emissions are considered the largest contributor to air pollution from the transport sector in Greater Cairo. The following factors will be assessed to evaluate the "No Project" option for this project:

- Emissions from the replaced buses before and after the project
- Social impacts of the project such as impacts on public transport users in the project areas and candidate sites, impacts on buses drivers, and impacts on communities and residents living near these routes

5.2.2 Batteries Alternatives

Battery powered electric vehicles play a significant role in the current automotive industry to reduce the local pollution from diesel buses and cut down greenhouse-gas emissions. Many types of batteries are used in today's electric vehicles, making it difficult to decide which one performs best. Table 5-7: provides technical specifications of the most commonly used battery types for electric vehicle batteries including: Lithium Ion (Li-Ion), Molten Salt (Na-$NiCl_2$), Nickel Metal Hydride (Ni-MH) and Lithium Sulphur (Li-S). All of these batteries have the same electric energy storage capacity [26]

Table 5-7: General parameters of the Electric Battery component [26]

Name	Value for Battery Type				Unit
	Li-Ion	Na-$NiCl_2$	Ni-MH	Li-S	
Maximum Charge	75	84	85	80	Ah
Nominal Voltage	323	289	288	305	V
Stored Energy	24.2	24.2	24.2	24.2	kWh
Maximum Voltage/Minimum Voltage	339/308	275/304	274/302	290/320	V
Initial Charge	100	100	100	100	%
Number of Cells per Cell-Row	12	12	20	26	-
Number of Cell-Row	17	30	20	1	-
Internal Resistance charge/discharge	1/1	1/1	1/1	1/1	Ω
Operating Temperature	33	270	36	30	°C
Specific Heat Transition	0.4	6	0.4	0.08	W/K
Specific Heat Capacity	795	950	677	1650	J/kg*K
Mass of Battery	318	457	534	173	Kg

Battery Cost as of 2017 in Europe	300	500	400	250	€

In general, Na-$NiCl_2$ batteries had the best energy consumption (12.6 kWh/100 km). Also, they proved to have low price, increased lifecycle or great functioning parameters in harsh environments. Disadvantage of these batteries include rising of their temperature during bus operation. High temperatures during electricity discharge can shorten their overall useful life. In addition, charging Nickel-based batteries when hot decreases the charging efficiency as the heat may trick the charger into indicating that the battery is fully charged when it is not. include rising of the battery's temperatures during electricity discharge (bus operation). Li-S batteries had the highest energy consumption (17.2 kWh/100 km). Also, they proved to have light weight, increased energy storage capacity and low price. Ni-MH batteries; although they have a reasonable energy consumption, (15.7 kWh/100 km) they proved to be inefficient due to: 1) having an increased energy density and power, and 2) having heavy weight as well as an outdated technology. Li-Ion batteries have the biggest market segment in equipping electric vehicles due to various issues including: 1) moderate energy consumption (14.7 kWh/100 km), 2) continuous decay of the cost, 3) advanced manufacturing technology, 4) increased cycle life, 5) low weight and 6) high energy storage potential. Yet, disadvantages include high operative temperatures.

In order to select the most appropriate battery type, various factors ought to be considered such as energy storage efficiency, constructive characteristics, cost, safety and useful life [26]. All of which determine the overall performance of electric vehicles

Table 5-8 provides an overall assessment of the essential features of the most commonly used batteries in the mainstream global e-vehicles market, followed by the proposed preliminary screening criteria for choosing the most appropriate battery type, their significance and risk level, as well as tentative risk mitigation measures.

Table 5-8: An overall assessment of the essential features of the most commonly used batteries

	Efficient energy utilization	Constructive characteristics (volume, weight)	Charging frequency	Temperature during operation	Charging speed	Cost	Safety	Useful life
Li-ion	Moderate/high	Low	Low/Moderate	High	Moderate/high	High	High	High
Li-S	High	Low	Moderate	Low	Low	Low	Low/Moderate	Low/moderate
Na-$NiCl_2$	High	Moderate	Moderate/high	Moderate/High	Low/moderate	Low	High	Moderate/high
Na-MH	Low/Moderate	High	High	Moderate/high	High	Moderate	High	Moderate

Table 5-9: Battery Selection criteria and their risk level identification and mitigation

Selection criteria	Significance/risk level	Recommendations for risk mitigation
Distance to be covered by the electric bus	Highly significant High risk	▪ Lower energy density battery ▪ Lower charging frequency ▪ Higher charging speed
Distance covered by the battery per single full charge	Highly significant High risk	Selecting battery with higher energy storage efficiency (low energy density) to reduce charging frequency and the number of charging stations needed along the bus route. This will also reduce costs related to charging infrastructure
Battery charging system and speed	Highly significant Moderate risk	Choosing an appropriate charging system/technology with charging speed that matches the available charging infrastructure and the operational needs of the bus route, and with preventative measures against overcharging as it is a source of health and safety hazard and can lead to explosion of the battery. Choosing battery with inherent overcharge prevention technology to avoid over heating due to fast charging. Charging equipment should be able to terminate the battery charge cycle before overcharging occurs (by monitoring the change of voltage with time). In case a slower charging system was deemed more viable, replacement of batteries in charging stations is an alternative; this reduces the time needed to fully charge the battery, yet increases the costs of buying spare batteries and their maintenance, while also increasing the risks associated with handling and disposal of batteries after their end of life.
Battery operating temperature	Highly significant High risk	Due to high temperatures in Egypt, employing batteries with high operating temperatures can drastically reduce their useful life and can cause health and safety hazards (e.g: explosion and toxic material seepage). flexible power-to-energy ratio and can be cooled to ambient temperatures without component damage
Safety	Highly significant High risk	Overcharging causes hydrogen gas to form, potentially rupturing the cell. Therefore, battery cells must have a vent to release the gas in the event of serious overcharging Choosing battery with the most effective cell management is the most critical factor determining safety of the battery. Other essential safety factors that need to be assessed for the selected battery type include:

Selection criteria	Significance/risk level	Recommendations for risk mitigation
		▪ Mechanical and thermal management ▪ Cell packing and sealing ▪ Fusing and ground fault detection ▪ Battery management system
Useful life **And life cycle**	Moderately significant Moderate risk	Optimization of operation conditions significantly extends the battery lifetime. Using batteries with high useful life can have positive impacts on costs and environmental effects. By improving useful life, the depreciation costs needed decreases, and the costs of battery replacement after end of life are reduced. Subsequently, this would reduce the number of waste batteries requiring safe handling and disposal (hazardous waste).
Cost	Highly significant Low risk	Full cost-Benefit analysis needs to be conducted based on: ▪ Battery design and configuration ▪ Battery life cycle assessment ▪ Battery replacement cost ▪ Costs related to old batteries safe handling and disposal ▪ Number of passengers transported per full charge ▪ Charging infrastructure availability and cost

5.2.3 Batteries Disposal

The use of electric vehicles is projected to increase over the coming years. For better vehicles performance, electric vehicles batteries should be replaced every 7 to 10 years for smaller vehicles and every 3 to 4 years for larger ones such as buses and vans. Otherwise, the performance of electric vehicle declines; evidenced by fewer miles of driving per charge and more plug-ins by users [27]. This frequent battery replacement will lead to increased batteries disposal. For this reason, appropriate disposal options should be well studied. Electric vehicles' batteries disposal options include recycling through smelting, repurposing, return to e-bus manufacturer, and landfilling.

5.2.3.1 Recycling through Smelting

Batteries can be recycled through smelting then direct recovery. Smelting is used to recover materials such as: lithium, cobalt, and nickel inside the battery. Yet, after a battery is smelted, the lithium ends up as a mixed byproduct and extracting it is expensive. For example, the cost of extracting lithium from old batteries is 5 times more expensive than mined lithium.

Also, the recycling process is not an easy process due to the following:

- The complicated chemical procedures involved in the process. For example, the heavy metal contained in the battery, if not properly handled during the recycling process, will lead to soil and water contamination [27].
- The batteries were not designed to be easily disassembled. The adhesives and materials used in the batteries are very strong, making it hard for disassembly.
- A lot of the recycling work needs to be manually performed, risking people to hurt themselves [28].

5.2.3.2 Repurposing

One of the methods to decrease batteries disposal is to reuse them. Electric vehicle batteries can be used for things like home energy storage. In countries, such as Japan, Nissan repurposed batteries for powering streetlights. In Paris, Renault used the batteries for backing up elevators. In the United States, General Motors is backing up its data center with used Chevy Volt batteries [27]. Other use for old batteries includes storing solar energy and backing up traditional electrical grids [27]. Toyota started an initiative to use old electric vehicle batteries along with solar panels for powering 7-Eleven stores in Japan [28].

5.2.3.3 Return To E-bus Manufacturer

As a part of extended producer responsibility, the batteries can be returned to the e-bus manufacturer as per an agreement realized during the procurement and contracting phase. As per the conditions of the Basel convention on the transport of wastes, Basel notification procedures issued by EEAA should be followed for shipping used batteries outside the country.

5.2.3.4 Landfilling

Batteries contain toxic chemicals; they should be disposed into landfills designed to dispose hazardous wastes [29]. Further, landfilling lithium-ion batteries, at the end of their lifecycle, lead to a process called thermal runaway. Thermal runway is defined as a chemical reaction in the battery that can lead it to heat up to the point of burning or exploding [28]. For this reason, countries such as China, are implementing regulations to keep the batteries out of landfills, at the end of their lifecycle [30].

5.2.4 Charging Infrastructure

When implementing charging infrastructure in public spaces, factors such as 1) Design of the charging equipment, and 2) Safety aspects of the charging infrastructure should be taken into consideration. There are two primary modes of electricity transfer from the

charging station: conductive (using electric cables) and inductive (using variable electromagnetic fields, electromagnetic resonance and Faraday law) [31]:

- Conductive systems have the ability to transmit large amount of energy in small amount of time with minor radiation to the environment. Yet, there is a risk of electric arc.
- Inductive systems work without physical contact between the charging stations and vehicles. Yet, there is a problem of strong electromagnetic radiation, which pose health risks for human lives.

Accordingly, to properly select a charging equipment, numerous elements and analysis need to be considered as outlined in Table 5-10.

Table 5-10: Criteria for selecting charging infrastructure

Criteria	Recommended analysis/measures
Land requirements	Most charging stations require large land size (lengths can reach up to 12-15 m). Land-use study is required to determine land availability across the selected e-bus routes, noting that no land acquisition is supposed to happen as part of the charging infrastructure since land for the station's locations are normally selected to be in existing garages and bus terminals.
Technology and operation	Buses have strict operation tasks and their charging demand is much higher than smaller vehicles. The charging demand must be fulfilled timely to maintain the bus service reliability and efficiency, and avoid adding further unplanned traffic congestions into the city.
Power grid capacity and security: Charging system and speed	Charging facilities need to be connected to the national power grid. Fast charging mode requires high current output, which makes the impacts on the power grid more intense. Impacts requiring assessment include: ■ Impacts on the transmission and distribution network: When the charging behavior is concentrated in the peak load period, the grid current demand will overload the power system and reduce the efficiency of power grid. ■ Harmonic pollution to the grid: Harmonics control studies are required. When electric buses charging station is connected to the grid, it produces produce harmonics in the power grid due to non-linear operational load when on-loading and offloading the buses. If a large number of harmonic pollutions is not governed timely and effectively, it will affect the power quality, and may also increase the cost of construction and operation of the charging station. Inductive chargers are recommended for fast charging as they significantly reduce the time required to begin the charge compared to conductive chargers
Construction and operation costs	Due to the high infrastructure requirements of electric bus operations, the choice of the charging system can directly affect the total cost of the electrification of a bus system, as well as bring limitations regarding operation of electric buses.

	Therefore, the charging system has to be carefully selected in order to avoid the costs attributed to undesired lock-ins to inefficient or unsuccessful technologies. Cost-Benefit analysis must be conducted to determine: ■ Construction cost: Includes land cost, demolition cost, equipment acquisition cost, and project investment cost ■ Annual operation and maintenance cost: Include electricity charge, staff wages, and battery maintenance and replacement cost
Environment, health, and safety (including community)	Environmental, Social and health impact assessments must be conducted in order to quantify and mitigate the potential impacts of the chosen charging technology on the receiving environment, neighboring activities and residents including: ■ Potential exposure to electromagnetic fields ■ Potential impacts on pedestrians ■ Potential impacts of electromagnetic fields on local fauna and flora (trees, birds, animals, etc) ■ visual and aesthetic impacts ■ Potential exposure of the charging stations to the external environment since they are installed outdoors, which may cause damage or vandalism (Inductive chargers are advantageous since most of their infrastructure is located underground, reducing significantly the visual impact and protecting the charger against vandalism and weather-related effect) ■ Handling and disposal of waste batteries Depending on the employed battery type and charging technology, batteries will need replacement every 5-12 years. Upon the operation of the envisaged 100 e-buses in Cairo, around 100-120 waste batteries will be produced every 10 years, requiring special handling and disposal since they contain toxic material (hazardous e-waste). Development of special waste management plans for the safe handling, treatment and disposal of the old batteries must be included as an elaborate element of the ESIA to be prepared prior to the project's construction and operation. Waste management plans should include: ■ Choosing the appropriate handling and disposal method chosen based on life-cycle assessment along with CBA ■ Defining waste collection and transport plans and contracts (e.g., returning waste batteries to manufacturer through Extended Producer Responsibility (EPR) agreements) ■ Identifying the landfilling waste volume requirements for the projected produced waste, after deducting amounts going to other handling and treatment methods (e.g., recycling or repurposing) ■ Identifying capacity of dedicated landfills (including potential future expansions) ■ Traffic and routing plans from/to landfills Development of ESMP for construction and operation of the stations to comply with regulations regarding environment, workplace safety, signaling and all applicable technical and legal regulations.

A feasibility study is required for electric bus intervention. The minimum content of the FS should cover technological options, which include type of batteries, disposal options for batteries, and associated environmental and social risks and impacts, which include location consideration, and economic considerations.

5.2.5 Charging Station Location

Choosing the appropriate location for charging stations can facilitate their construction, and also reduce their operation cost. Numerous elements and analysis need to be considered in order to determine the locations that meet the required E&S standards. Table 5-11 provides summary of the key elements and the proposed studies or measures needed during site selection

Table 5-11: Criteria for selection of charging station locations

Criteria	Recommended analysis/measures
Land requirements/availability	Space and grid-capacity availability are some of the biggest issues when installing charging stations in urban environments, considering the land scarcity in cities, including crowded Cairo. Building large-scale charging hubs across long distances is more viable than small charging stations within shorter distances. This reduces land needs/restrictions and simultaneously reduces the environmental and social as well as health and safety hazards associated with the construction and operation of charging facilities. Land-use and hydrological and flood risk analyses must be conducted to mitigate land-use change impacts and ensure chosen locations are not susceptible to flood risks or causing risks to soils or groundwater due to potential seepages from operation and maintenance of the station, the batteries, and the e-buses.
Charging demand	Location must meet the charging demand. E-buses charging is time sensitive. Congestion in the station can affect the bus operation efficiency causing delays to passengers and traffic jams. Therefore, locations must be selected appropriately to cover the number of buses along the route, as well as the frequency of charging required. If locations are chosen in low demand areas or deviated from bus routes, this will cause the charging facilities to be idle, resulting in a great waste of resources and land, and congestion in other charging stations. Charging demand is determined by: ▪ Area attribute: to determine the scale of the station needed based on the covered area, and the type of energy supply system ▪ future potential growth of the charging need (based on the area's residents' projected purchase power) ▪ Number of vehicles to be employed along the route, including future additions.

Climatic conditions	Charging equipment's operation is greatly influenced by the temperature, humidity and other environmental factors that determine its potential failure rate. Depending on the technology adopted, identification, analysis and assessment of the impacts of climate conditions in the potential locations is required to determine the operation efficiency, failure rate, as well as the appropriate measures to mitigate the identified impacts.
Soil and sub-soil	Due to the high infrastructure requirements of the charging stations, including extensive digging and excavation for underground cabling, soil and sub-soil analysis and impact assessment is required prior to construction.
Environment, health, and safety (including community)	Social and health impact assessments must be conducted in order to quantify and mitigate the potential impacts of the chosen charging technology on the neighboring activities and residents such as: ▪ Potential exposure to electromagnetic fields ▪ Potential impacts on pedestrians ▪ Potential impacts of electromagnetic fields on local fauna and flora (trees, birds, animals, etc.) ▪ Visual and aesthetic impacts ▪ Potential exposure of the charging stations to the external environment since they are installed outdoors, which may cause damage or vandalism (Inductive chargers are advantageous since most of their infrastructure is located underground, reducing significantly the visual impact and protecting the charger against vandalism and weather-related effect). ▪
Traffic convenience	Traffic studies and spatial analysis should be conducted to address the impacts of the locations of charging stations. Key elements to be studied include: ▪ The number of street lanes and surrounding activities ▪ Traffic flow: impact on current congestion levels and bottlenecks ▪ Pit stop rate: Pit stop rate is the ratio of the number of buses entering the charging station to charge and the total number of vehicles passing through the charging station.

A feasibility study is required for electric bus intervention. The minimum content of the FS should cover technological options, which include type of batteries, disposal options for batteries, and associated environmental and social risks and impacts, which include location consideration, and economic considerations. The FS should be prepared during the planning phase of the project.

6 ENVIRONMENTAL AND SOCIAL IMPACT FRAMEWORK

6.1 Description of Risks and Impacts and/or Benefits Significance

Significance of an impact will be determined according to the severity and/or risk level of that impact. In this context, severity will address the impact component, while the combined result of severity with probability will address the risk component. This approach will be applicable to all general impacts, however, specific risk considerations related to Community Health Safety and OHS are to be addressed in separate Quantitative Risks Assessment studies. Those specific impacts/incidents are referenced in the preliminary impacts and risks assessment in section 6.3.

- Severity assessment of the impact
- Severity of potential impacts will be assessed according to 4 evaluation criteria: spatial scale, temporal scale/duration, difficulty to avoid, minimize, change and/or reverse the impact, and concerns of interested parties (stakeholders)

- Probability of occurrence of impact
- Probability of occurrence of impact represents the likelihood that the consequence (impact) will occur.

- Risk level assessment of the impact
- Risk level is determined by combining the magnitude of a potential consequence, herein referred to as severity, and the likelihood of the consequence occurring denoted by probability.

Rating and Ranking

Significance will be determined on the basis of severity of the impact and/or risk level determined from severity and probability of the impact.

6.2 Risks and Impacts Assessment Methodology

A rating method is applied to determine the significance of the impacts.

Step 1: Determination of Overall Severity and Probability of Impact

The severity of each impact is determined according to evaluation criteria ranked on a scale of 1 to 5. Evaluation criteria for severity are presented in Table 6-1:

Table 6-1: Scale for ranking of severity level of impacts

Impact evaluation criteria	Rating				
	1	2	3	4	5
	Very low	Low	Medium	High	Very high
Spatial Scale	Immediate vicinity- On-site	Off-site		National	global
Temporal Scale Duration	Extremely short term 1 day	Less than 1 month	1-6 months	Less than 1 year	Long term More than 1 year or continuous
Difficulty in changing and/ or reversing impact	Easy-reversible	Minor level of effort required	Moderate effort required	Major effort required	Impact cannot be changed Only managed
Concerns of interested parties- stakeholders	No concerns	Minor interest at local level Limited number of parties	Moderate interest/manageable at local/ governorate level Limited number of parties	Major interest at national level More widespread > number of parties	Extreme impact

Overall severity for an impact is determined from the average of ratings of applicable evaluation criteria according to Equation 1.

Equation 1- Severity of Impact Overall Rating

$$Severity(S) = AVERAGE\left(R_{spatial\ scale}, R_{Temporal\ scale}, R_{Difficulty\ in\ changing}, R_{Interested\ parties\ concerns}\right)$$

Probability of occurrence (P) level is ranked on a scale of 1 to 5. The definitions for evaluation criteria scale are presented in Table 6-2:.

Table 6-2: Scale for Ranking of Probability of Impacts

	Rating				
Evaluation criteria	**1**	**2**	**3**	**4**	**5**
Probability of occurrence	Rare	Unlikely	Possible	Likely	Certain

Step 2: Determination of Risk Level of Impact

The risk level of each impact is determined from the product of severity of the impact and the probability of its occurrence (determined in Step 1):

$$Risk\ level = Severity \times Probability$$

Step 3: Determination of Significance of Impact

An impact is considered significant if overall severity (S) is > 2 and/or risk level (S * P) > or equal to 5. Measures for avoiding, minimizing, mitigating impacts commensurate with the significance level will have to be developed. The definitions of significance according to overall ranking of severity and risk level are presented in Table 6-3 and Table 6-4, respectively.

Table 6-3: Definition of Significance according to Overall Severity Ranking of Impacts

Severity of impact	Significance
1	Low/minimal impact- no mitigations actions required
2	Low-Medium and localized, but readily containable
3	Medium impact over multiple locations
4	Medium-High and/or regional
5	High impact and/or potential for global impact

Table 6-4: Definition of Significance according Risk Level

Risk level of impact (Probability * Severity)	Significance
[1 -5]	Low
[5-10]	Low-medium
[10-15]	Medium
[15-20]	Medium-high
>20	High- catastrophic

6.3 Risk and Impact Assessment

The following subsections discuss possible positive and negative impacts during construction and operation phases for different project components.

6.3.1 Component 1: Enhancing the Air Quality Decision Support System

Under this component, installation of monitoring stations is planned. However, no physical interventions requiring construction or demolition are expected and no labor influx will happen under this component. Therefore, no negative impacts from the installation of monitoring stations are anticipated on environmental receptors. There are also no negative impacts related to land acquisition of loss of livelihoods anticipated under this component of the project.

When operationalized, the installation of air pollutant monitoring stations at new locations will result in increased covered areas. Improved knowledge and representation of pollution profile across the city is expected. A better representation will inform policy and decision-making on-air pollution matters thereby having positive impact on environment, health, and social development. This becomes effective and more beneficial by depending on information sharing and engagement with stakeholders (ESS10).

Under this component improved air quality forecasting and associated institutional responses are anticipated to result in overall positive impacts on health and environment. Impacts of institutional response to air quality conditions on socio-economic indicators are anticipated to be complex. Further studies on environmental economics are required to assess the impacts.

Negative impacts are presented below.

ESS	Impacts	Significance
Component 1: Installation of Monitoring stations		
Installation-		
ESS1	**No physical interventions involving construction or infrastructural works**	
ESS2	General impacts due to handling machinery and monitoring stations, risks of electrocution during installation, falls from height	**Negative, low-medium**
Operation		
ESS3	General impact due to electricity requirements for operation of monitoring stations	**Negative, low**
ESS10	AQI will allow informed policy decisions, which will influence socio-economic conditions. Policy decisions will require extensive stakeholder engagements on national institutional levels. Communication modalities will need to be established with the local stakeholder on the type of information to be shared, and communities need to be trained on the appropriate associated actions to be taken in response to the information.	**Negative, low**

6.3.2 Component 2: Support the Operationalization of SWM Master Plans in Greater Cairo

During construction: The project will result during both construction and operation in the creation of number of job opportunities. The number of the jobs is unknown at this stage. The local community could benefit from the temporary labor force depending on skills set needed for each function. Job opportunities include direct job opportunities to skilled, semi-skilled labor as well as technical experts. Indirect job opportunities related to the different supply chains will be created too. The impact on job creation is expected to be positive and of medium significance.

Improving the waste management process, through the provision of hygienic transfer and disposal facilities will contribute to a better organized solid waste management cycle. This will then contribute to a cleaner neighbourhood, less random dumping and consequently a higher level of satisfaction about the service from the citizens.

Negative impacts are addressed in detail in the next tables for each sub-component.

Table 6-5: Component 2- Construction of 2 transfer stations

ESS	Receptor/EHS Aspect	Impacts	Significance
	Component 2- : Construction of 2 transfer stations		
Construction			
ESS1	Air quality	Increased gaseous emissions from construction materials, machinery and vehicles and dust emissions from land excavation, movement of construction vehicles	Negative, low
	Noise	Increased noise and vibration levels due to site preparation, construction works etc.	Negative, medium
	Aquatic environment	Degraded water quality and threats to aquatic organisms from improper waste disposal	Negative, low
	Soil, geology and hydrology	▪ Compromised soil integrity due to potential soil erosion and contamination from construction activities e.g., exposure during site excavation and possible oil leaks ▪ Contamination of groundwater due to leaching of hazardous materials	Negative, low
ESS2	Labor and working conditions	▪ Health and safety hazards from exposure to dust, chemicals, and equipment handling and operation ▪ Risks of falls from height and falling objects ▪ Child labor is a common practice in Egypt at large. According to Egyptian Labor Law No.12/2003, child labor should be prohibited especially in dangerous works. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and monitoring should be applied in the contractor obligations. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities, migrant workers and children (of working age in accordance with this ESS). Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or be left unresolved.	Negative, high Child labor impact: Negative, medium,

ESS3	Resource Efficiency and pollution prevention	▪ Increased resources consumption (energy and water) and emissions due to vehicles exhaust, construction activities and equipment, and workers' use ▪ Compromise of integrity of underground utilities (such as sewerage pipes) during excavations or wastewater accumulating in trench	Negative, medium, Infrastructure and underground utilities impacts: Negative, low
ESS4	Community Health, Safety	▪ Exposure of road users to increased air pollutants and noise levels ▪ Exposure of community to improperly disposed waste ▪ Temporary Labor Influx might result in unfavorable impacts on the project candidate areas in terms of: - Influx of additional population, Increased pressure on accommodation and rents - Increased risk of communicable diseases and burden on local health services - Increased risk of illicit behavior and crime - Potential Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA). As per the WB 2016 Labor Influx Guidance Note, the scale of labor influx and the absorptive capacity of the local community indicate the significance of the anticipated risk of GBV. The project can lead to an increased risk of Gender Based Violence, as women are particularly vulnerable within the context of construction projects. Gender based violence can be manifested through multiple behaviors including: Sexual harassment of women and girls or Exploitative sexual relations and unpaid work, or low wages. It is likely that impacts related to labor influx will be relevant in the project candidate areas; in case the contractors do not comply with the different related measures including but not limited to Code of Conduct to all types of labors and sub-contractors.	Negative, medium Waste impact: Negative, low GBV Negative, medium

ESS5	Land Use	**Potential temporary impact related to construction:** The contractor may need storage area in order to store the equipment, materials, and temporary equipment for workers' services. The contractor may use the empty areas within the project site depending on availability in the site or can obtain lease agreement to secure the needed land.	Negative, low
		Land selection for the transfer stations: ▪ The ownership and the uses of the land to be allocated to the two transfer station sites is not specified at the present time. ▪ In case of the land is a vacant State property that is free from any occupations and uses, there will be no impacts related to land acquisition, physical displacement, nor loss oflivelihoods out of the land. If the site selection will entail land expropriation for privately owned land or public land that is used by individuals or groups, there will be impacts that will need to be tackled in light of ESS5.	Negative, high
ESS8	Culture heritage	Excavation works can unearth undiscovered archeological sites	Negative, high
ESS10	Stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of: • The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, w can lead to escalated unresolved complaints that may threaten the project.	Negative, high

		It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	
Operation			
ESS1	Air quality	GHGs and odor emissions from improper waste handling (e.g. waste burning)	Negative, high
	Noise	Increased noise levels due to trucks and other machinery	Negative, high
ESS2	Labor and working conditions	▪ Health and Safety risks due to operation of heavy machinery, and improper waste handling ▪ Child labor risk does not apply to the operation phase. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities and migrant workers. Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or left unresolved.	Negative, medium, Child labor impact: Insignificant
ESS4	Community health and safety	▪ Improper waste handling and disposal leading to odor emissions, disease spread, and creating a source of waste to the surrounding areas ▪ Increased traffic flow due to trucks can cause road congestion, accidents ▪ Possible damage to utilities during Operation ▪ Risk of communities' unacceptability for the SWM infrastructure during operation and the potential associated health impacts if the operation of the facilities is not done in a very hygienic way	Negative, medium, Waste impact: Negative, medium, Traffic impact: Negative, high communities' unacceptability: Negative, high
ESS5	Land Use	Possible impact Related land	Insignificant
ESS8	Culture heritage	Possible impacts on culture heritage	Insignificant

ESS10	Stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of: • The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders' dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	Negative, high

6.3.2.1 Component 2 Construction of Integrated Waste Management Facility (IWMF)

During construction: The project will result during both construction and operation in the creation of number of job opportunities. The number of the jobs is unknown at this stage. The local community could benefit from the temporary labor force depending on skills set needed for each function. Job opportunities include direct job opportunities to skilled, semi-skilled labor as well as technical experts. Indirect job opportunities related to the different supply chains will be created too. The impact on job creation is expected to be positive and of medium significance.

Improving the waste management process, through the provision of hygienic transfer and disposal facilities will contribute to a better organized solid waste management cycle. This will then contribute to a cleaner neighbourhood, less random dumping and consequently a higher level of satisfaction about the service from the citizens.

Negative impacts are addressed in detail in the next tables for each sub-component.

Table 6-6 Component 2 Construction of 2 integrated waste facilities – landfills

ESS	Receptor/EHS Aspect	Impacts	Significance
	Component 2: Integrated Waste Management Facility and Industrial Hazardous Waste Treatment and Disposal Site Construction Phase		
Construction			
ESS1	Air quality	▪ Increased GHG emissions: exhausts of vehicles and operation of equipment ▪ Dust emissions: land excavation, movement of construction vehicles, stockpiled soil ▪ Odor Emissions: from chemicals, oils and paints	Negative, low Negative, high, Negative, low
	Noise	Increased noise and vibration levels due to site preparation, construction works etc.	Negative, medium,
	Soil, geology and hydrology	▪ Compromised soil integrity due to potential soil erosion and contamination from construction activities e.g. movement of heavy trucks and oil spills ▪ Deep excavation can affect topographical features with implications on water drainage ▪ Flood risks in the 'candidate site' of Kuraymat	Negative, medium, Flood risk: Negative, high,
ESS2	Labor and working conditions	▪ Health and safety risks from exposure to dust, chemicals, machinery and equipment operation ▪ Risks of falls from height and falling objects ▪ Child labor is a common practice in Egypt at large. According to Egyptian Labor Law No.12/2003, child labor should be prohibited especially in dangerous works. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and monitoring should be applied in the contractor obligations. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities, migrant workers and children (of working age in accordance with this ESS). Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or left unresolved.	Negative, high, Child labor impact: Negative, medium

ESS3	Resource Efficiency and pollution prevention	▪ Increased resources consumption (energy and water) and emissions due to vehicles exhaust, construction activities and operation of equipment, and workers' use ▪ Compromised integrity of underground utilities	Negative, medium Infrastructure and utilities impacts: Negative, low
ESS4	Community Health, Safety	▪ Improper disposal of solid waste impacting surroundings. ▪ Increased traffic flow on roads leading to road congestions, increased air and noise pollution, and waste ▪ Compromised integrity of underground utilities Mobilization of heavy machinery, construction waste disposal, and backfill activities are bound to limit traffic and accessibility. The impact of works on traffic flow and local access will be dependent on the type of road accessed during project activity. Main roads (highways) only ▪ Temporary Labor Influx might result in unfavorable impacts on the project candidate areas in terms of: - Influx of additional population, Increased pressure on accommodation and rents - Increased risk of communicable diseases and burden on local health services - Increased risk of illicit behavior and crime - Potential Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA). As per the WB 2016 Labor Influx Guidance Note, the scale of labor influx and the absorptive capacity of the local community indicate the significance of the anticipated risk of GBV. The project can lead to an increased risk of Gender Based Violence, as women are particularly vulnerable within the context of construction projects. Gender based violence can be manifested through multiple behaviors including: Sexual harassment of women and girls or Exploitative sexual relations and unpaid work, or low wages. ▪ It is likely that impacts related to labor influx will be relevant in the project candidate areas; in case the contractors do not comply with the different related measures including but not limited to Code of Conduct to all types of labors and sub-contractors. The impact is of medium significance because the labor will be relatively in areas that are far from local communities.	Negative, medium Waste impact: Negative, low Traffic impact: Negative, low, Infrastructure and utility impact: Negative, low Temporary labor impacts: Negative, medium GBV Negative, medium

ESS5	Land Use	The ownership and the uses of the land to be allocated sites is not specified at the present time. In case of the land is a vacant State property that is free from any occupations and uses, there will be no impacts related to land acquisition, physical displacement, nor loss oflivelihoods out of the land. If the site selection will entail land expropriation for privately owned land or public land that is used by individuals or groups, there will be impacts that will need to be tackled in light of ESS5.	Negative, low
ESS8	Culture heritage	Deep excavation works can destroy undiscovered archeological sites	Negative, high
ESS10	Stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of: • The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders' dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	Negative, high
Operation Phase			
ESS1	Air quality	Increased GHGs emissions from vehicle exhaust, landfill gas uncontrolled release Gaseous and odor emissions from improper waste handling (e.g., waste burning) and/or spontaneous combustion, landfill over capacity, landfill gas mixing (ammonia and H_2S)	Negative, high, Negative, medium
	Noise	Increased noise and vibrations levels due to construction activities, equipment operation	Negative, medium
	Soil, geology and hydrology-	▪ Contamination of soil, groundwater and surface water due to leachate, rainwater, natural decomposition of organic material in waste	Negative, low,

		▪ Groundwater acidification from Carbon dioxide accumulation in subsurface area ▪ Flood risks in candidate site of Kuraymat	Flood risk impact: Negative, high,
ESS2	Labor and working conditions	▪ Health hazards due to rodents, pests attracted to the site ▪ Risk of fires, explosions, subsidence, spills and accident ▪ Safety hazards due to operation of machinery (increased noise and vibration levels), handling of hazardous waste (exposure to toxic chemicals) ▪ Child labor risk does not apply to the operation phase. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities and migrant workers. Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or left unresolved.	Negative, high, Child labor and labor influx impacts: insignificant
ESS3	Resource Efficiency and pollution prevention	▪ Increased resources consumption (energy and water) and emissions due to vehicles and trucks exhaust, construction activities and operation of equipment, and workers use	Negative, medium
ESS4	Community Health, Safety, and Security	▪ Health and safety hazards due to possible odor emissions, rodents, pests ▪ Informal access to the landfill site can pose health and safety risks to community: Waste sorters at the recycling and plant could get injured by infectious sharps mixed with municipal and possibly infected by blood transmitted diseases ▪ Negative visual impacts due to litter dispersion by wind associated with composting/recycling plants ▪ Safety hazards associated with the nature of waste at the landfill: Co-mixing hazardous waste with MSW and/or disposing of hazardous waste at the landfill site and end product of the composting plant may have some hazardous components, such as broken glass, can cause risks to workers on the site, or anyone coming into contact with the waste ▪ Increased traffic flow due to trucks transferring waste can cause road congestion, accidents	Negative, high Traffic impacts: Negative, high
ESS5	Land Use	No land related impacts are anticipated in the operation phase	Insignificant

ESS10	Stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of: • The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders' dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	Negative, very high
Component 2: Decommissioning of the landfill			
ESS1	Assessment and Management of Environmental and Social Risks and Impacts	Impacts due landfill gas generation and possible leakage Soil, groundwater contamination due to leachate	Negative, medium,
ESS3	Resource Efficiency and Pollution Prevention and Management	Pollution due to potential soil instability resulting in waste	Negative, medium,
ESS4	Community health and safety	Visual impact of landfill to nearby community Health and safety risks due to odor emissions, rodents, pests	Negative, low

6.3.2.2 Closure of Dumpsite – Abu Zaabal

Positive impacts

The closure of the dumpsite is expected to reduce impacts from uncontrolled waste accumulation and improve environmental quality in the surrounding area. The improved environmental conditions are expected to increase value of lands and houses in the surrounding area benefitting surrounding community. **Overall impacts due to the closure of the dumpsite is expected to be positive and of high significance.**

Negative impacts are addressed in detail in the next tables.

Table 6-7 Component 2-Closure of dumpsite – Abu Zaabal

ESS	Receptor/EHS Aspect and relevant ESS	Impacts	Significance
	Component 2-Subcomponent 2.3: Closure of dumpsite – Abu Zaabal		
ESS1	Air Quality	Pollution and GHG emissions: exhausts of vehicles, construction materials and operation of equipment, release of landfill gas	Negative, high
	Noise	Increased noise and vibration due to earthworks, transportation, wastes sieving	Negative, high
	Soil, geology and hydrology	Soil Contamination due to leakage of lubricants and leachate, fuels of machinery Soil instability if closure method involves covering and site reuse	Negative, high Negative, medium
	Risk of informal sector loss of livelihoods	It is not very clear at this stage how the closure of the dumpsite will take place in terms of phasing of work, technology and closure options…etc. and accordingly the nature of the impacts on the livelihoods of the informal sector groups engaged in the dumpsite is very much unknown, In case of any loss of livelihoods will be encountered, this will be tackled either under the social impacts of the site specific ESIA that will be prepared when the design is ready or through a livelihoods restoration plan that will prepared as per the requirements of Resettlement Framework (RF) that has been prepared for the entire project.	Negative, medium
ESS2	Labor and working conditions	▪ Risk of ignitions and fire during handling of waste (e.g., during excavation and dozing of waste) ▪ Injury and contamination due to exposure to sharp objects and biohazards, leachate during profiling and excavation of trenches for drainpipes ▪ Health and safety risks due to noise and dust from heavy equipment	Negative, high, long-term

		▪ Child labor is a common practice in Egypt at large. According to Egyptian Labor Law No.12/2003, child labor should be prohibited especially in dangerous works. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and monitoring should be applied in the contractor obligations. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities, migrant workers and children (of working age in accordance with this ESS). Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or left unresolved.	
ESS4	Community Health, Safety, and Security	▪ Health risks due to exposure to leachate uncovered during rehabilitation, uncontrolled dumping of waste ▪ Increased noise levels, and air emissions ▪ Health and safety risks from workers in contact with local community, and access to work site ▪ Explosion risks due to pockets of CH_4 ▪ Improper disposal of mixed wastes removed from the dumpsite ▪ Increased traffic flow from waste trucks can cause road congestion, accidents, and road safety risks	Negative, high Traffic impact: negative, medium

6.3.2.3 Upgrading of Akrasha Recycling and Industrial Zone (**Technical Assistance)**

Positive impacts

The upgrading of the Akrasha recycling and industrial zone is expected to reduce impacts from uncontrolled waste accumulation and improve environmental quality in the surrounding area. The improved environmental conditions are expected to increase value of lands and houses in the surrounding area benefitting surrounding community. **Overall impacts due to upgrading of the Akrasha recycling zone are expected to be positive and of high significance.** The offered advice under the TA will follow the ESF and the different relevant ESSs.

In case there will be physical interventions within the scope of the GCAPCCP that requires civil works and construction activities, the potential negative impacts are linked to the construction phase which are addressed in detail in the next tables.

Table 6-8 Component 2- Upgrading of Akrasha

ESS	Receptor/EHS Aspect and relevant ESS	Impacts	Significance
	Component 2- Upgrading of Akrasha Recycling and Industrial Area		
ESS1	Air Quality	Pollution and GHG emissions: exhausts of vehicles, construction materials and operation of equipment, release of odors, release of methane from municipal waste, emissions from burning of waste	Negative, high
	Noise and vibrations	Increased noise and vibration due to earthworks, transportation, sieving of wastes	Negative, high
	Soil, geology and hydrology	Soil contamination due to leakage of lubricants, landfill leachate, fuels of machinery	Negative, high
	Potential impact on the livelihoods of workers in the industrial area	It is not known at this stage if any negative impacts on livelihoods could be encountered as a result of the upgrade process. Principles of ESS1 and ESS5 will be shared as part of the offered TA.	Negative, medium,
ESS2	Labor and working conditions	▪ Risk of ignitions and fire during handling of waste, or explosion from CH_4 pockets ▪ Injury and contamination due to exposure to waste including sharp objects and biohazards ▪ Health risks due to noise and dust from heavy equipment, diseases and pests ▪ Safety hazards from working at height, falling objects, electrocution, etc.	Negative, medium to high

ESS4	Community Health, Safety, and Security	▪ Increased noise levels, and air emissions ▪ Health risks to community due to uncontrolled dumping of waste ▪ Health and safety risks from workers in contact with local community, and access to work site ▪ Explosion risks due to pockets of CH_4 ▪ Possible damage to utilities during construction ▪ Improper disposal of large amounts of mixed wastes removed from unofficial accumulated waste sites ▪ Increased traffic flow from waste trucks can cause road congestion, accidents, and road safety risks	Negative, high, long-term
ESS5	Land Use	There will be no need for land	Insignificant
ESS8	Culture heritage	Possible impacts on culture heritage	Insignificant
ESS10	Stakeholder engagement and Information Disclosure	Unless if the upgrade process is done following an engaging process with stakeholders, there is a high risk that the local stakeholders in the area will be rejecting the change and will not be accepting the upgrade process. The principles of the ESS10 and the SEP will need to apply to this component.	Negative, high

6.3.3 Component 3: Electric Buses

Positive impacts

Deployment of e-buses is expected to result in reduced in vehicle emissions (CO_2 and NOx) due to diesel buses replacement. Indirect emissions reductions are dependent on electricity source:

- For electricity sourced from solar sources, reductions in emissions from e-buses could reach 80 to 90% [23] [24],
- For fossil-fueled electricity sourced from natural gas, reduction in emissions from e-buses could reach 25 to 50% [23] [24].

Deployment of e-buses is expected to reduce in noise levels to 5 dB along the e-buses routes compared to diesel-run buses (9 dB).

Overall impacts on emissions of (CO_2 and NOx) and noise levels due to deployment of e-buses having electrical source (solar or natural gas) is to be positive and of medium to high significance.

The operation of this component is also anticipated to result in positive impact on the passengers of women through availing a less crowded, modern and clean means of transport. The e-buses component is planned to promote for harassment-free means of transport through number of introduced measures (CCTV, awareness messages, feedback survey…etc.) and this will in turn help in tackling one of the most serious challenges that women in Egypt encounter in public transport.

Negative impacts are addressed in detail in the next tables.

Table 6-9 Component 3: Subcomponent: e-buses

ESS	Receptor/EHS Aspect and relevant ESS	Impacts	Significance
Component 3: Subcomponent: e-buses			
Construction:			
ESS1	Air Quality	General construction works will involve installation of charging stations, excavation for cabling, equipment installation and sealing leading to dust and GHG emissions Pollution, GHG emissions, dust emissions: exhausts of vehicles, open excavation and digging for underground cabling and charging equipment installation and sealing	Negative, high, short-term
	Noise	Increased noise and vibration due to earthworks, transportation	Negative, high, short-term
ESS2	Labor and working conditions	▪ Risk of electrocution associated with charging station establishing etc. ▪ Health and safety risks due to noise and dust from use of heavy equipment ▪ Child labor is a common practice in Egypt at large. According to Egyptian Labor Law No.12/2003, child labor should be prohibited especially in dangerous works. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and monitoring should be applied in the contractor obligations. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities, migrant workers and children (of working age in accordance with this ESS). Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or left unresolved.	Negative, high, short-term

ESS3	Resource efficiency and pollution prevention	Infrastructure and utilities: Risk of damage to such utilities during excavations is possible, but minimal. ▪ Compromise of integrity of sewerage pipes due to possible wastewater accumulating in trench	Negative, low to medium
ESS4	Community Health, Safety, and Security	▪ Safety risks due to electrical works ▪ Increased traffic flow due to trucks can cause road congestion or accidents	Negative, low, short-term
Operation			
ESS1	Air Quality	Increased emissions of NOx, SOx, and PM from using fossil-fueled source of electricity for charging the batteries at the charging stations Possible increased emissions in CO_2 if electricity source is coal-based	Charging Stations: Negative, low, long-term
	Soil, geology and hydrology	Leakage of toxic chemicals from batteries such as lithium and Cobalt into the environment and groundwater.	Negative, low, long term
ESS2	Labor and working conditions	▪ Risk of electrocution associated with charging station ▪ Improper disposal of used batteries leading to health hazards	Negative, high, long term
ESS3	Resource Efficiency and pollution prevention	Increased energy consumption due to charging station infrastructure	Negative, medium, long-term
ESS4	Community health and Safety	Waste generation and handling: ▪ Improper disposal of used batteries causing hazardous waste generation, and health hazards ▪ Safety hazards due to improper operation of charging stations Storage and disposal of old batteries in landfills due to lack of adequate recycling policies/facilities for battery materials, causing toxic contamination of other waste streams	Negative, high, long-term

ESS10	Stakeholder engagement and Information Disclosure	The principles of the ESS10 and the SEP will need to apply to this component.	Negative, high

6.3.4 Risks related to COVID-19 Pandemic and Proposed Mitigation Measures

In case the COVID-19 pandemic situation is still a concern during the project implementation activities, the following mitigation measures and monitoring activities are proposed.

Table 6-10: Risks and Mitigation measures related to Covid-19 Pandemic

Risks/Impacts	Mitigation measures	Methods of monitoring (How)	Frequency of monitoring (When)	Performance Indicators (What)	Monitoring location (Where)	Responsibility (Who)	Estimated cost (EGP)
COVID-19 pandemic	• Identify a senior person acting as a focal point to deal with COVID-19 issues, and to designate at least one back-up person, in case the focal point becomes ill • Develop and implement procedures to avoid or minimize the transmission and spread of COVID-19 that may be associated with the influx of temporary or permanent contract-related labor.	Site inspection Review of documents and records	Daily	Number of trained workers Number on infected persons	Construction Site	Contractor and proponent's HSE manager (and officers)	To be estimated based on the number of workers and general context

	• Develop COVID-19 risk-based procedures tailored to site conditions and workers characteristics, and based on guidance issued by relevant authorities, both national and international (e.g. WHO). These shall include but not limited to the following measures: - *Control the entry/exit to the work site;* - *Identify any workers with underlying health issues* - *Conduct temperature checks for all workers and record details of any worker that is denied entry;* - *Ensuring general hygiene (hand washing facilities, soap, disposable paper towels and closed waste bins) are present in all key areas on site;* - *Take all necessary measures for proper isolation of affected areas and workers who have been in contact with infected persons (and infected persons) for 14 days* - *Review worker accommodation and assess suitability in light of the above;* - *Conduct regular and thorough cleaning of all site facilities, including offices, accommodation, canteens, common spaces and review cleaning*	Medical and routine checkup of staff and workers		Number of isolated persons			

	protocols for key construction equipment; - *Safely dispose of any medical waste produced during the care of ill workers in designated containers or bags and treated and disposed according to relevant requirements.* • The Contractor is required to convene regular meetings with the project health and safety specialists and medical staff (and where appropriate the local health authorities), and to take their advice in designing and implementing the agreed measures • Clearly communicate the measures taken to the workers, those entering the site and the local community and provide daily (or weekly) briefings focusing on COVI-19 specific considerations including cough etiquette, hand hygiene and distancing measures, using demonstrations and participatory methods. • Encourage workers should to use the project grievance mechanism to report concerns relating to COVID-19						

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING FRAMEWORK (ESMMF)

The following subsections discuss the framework for the environmental and social mitigation measures.

7.1 Environmental and Social Management: Mitigation Hierarchy

The ESMF presents a mitigation framework consisting of relevant plans required to mitigate potential impacts identified from the preliminary assessment. The methodology to select mitigation measures constituting the plans outlined herein should be based on consideration of costs, manpower, local availability of equipment and technology needs and timing to ensure implementation. The plans outlined, herein, including EMP will be part of the required ESS instruments (studies and assessment), specifically ESIA and scoped ESIAs, identified to comply with ESF. The PMU at the MoE is responsible for the preparation of ESS instruments including the aforementioned plans. The list of studies and assessment is presented in Chapter 10Environmental And Social Instruments REQUIRED BY THE ESF.

7.1.1 Component 2

7.1.1.1 Construction of Transfer Stations

Table 7-1 Mitigation measures for Component 2- Construction of 2 Transfer Stations

ESS	Receptor/ EHS Aspect	Impacts	Mitigation Hierarchy Framework
Component 2- Construction of transfer stations			
Construction			
ESS1	Air quality GHG emissions	Gaseous emissions-pollutants and GHGs: machinery used for construction, exhausts of vehicles used to transport workers, construction materials and basic equipment Dust emissions: land preparation and excavation, movement of construction vehicles	Develop and implement **Environmental Management Plan to minimize emissions of pollutant gases, GHGs and dust and noise**; plan should include procedures for: ▪ Emissions control onsite and offsite for dust, air pollutants and GHGs ▪ Efficient use of machinery/equipment, ▪ Site housekeeping and maintenance, Developing **waste management plan to prevent pollution from mishandled waste** including procedure for storage, collection, segregation, recycling and/or proper disposal, quality testing of generated waste water, hazardous waste, construction and demolition waste, used oil etc.
	Noise	Increased noise and vibration levels due to site preparation, construction works etc.	
	Aquatic environment	Degraded water quality and threats to aquatic organisms from improper disposal of waste	
	Soil, geology and hydrology	▪ Soil contamination due to oil leaks from machinery ▪ Soil erosion due to exposure of surfaces to rain or wind during site clearing, excavation etc. ▪ Groundwater contamination from Leaching of hazardous materials	
	Socio-economic impacts	▪ Project operation may affect informal sector that operates in waste management	Carry out full related assessment once the details of the project location become clearer and examine different

		Influx of additional population, increased pressure on accommodation and rents	option to minimize and mitigate the impacts through the application of Raising awareness of the local populations about the project commitment towards communities' and the measures taken for that through consultations and focus group discussions Apply the full requirements related to operating the grievance mechanism including anonymous channels
ESS2	Labor and Working Conditions	▪ Health risks from construction activities exposure to dust, chemicals etc. ▪ Safety hazards and accidents due to machinery and equipment operation ▪ Risks of falls from height and falling objects ▪ Child labor is a common practice in Egypt at large and can be a risk in this project. Children below 18 are favorable labor as they receive low salaries and they are less demanding. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities and migrant workers. Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or left unresolved.	**All previous mitigation hierarchy measures in addition to: Labor and Working conditions plan including a Code of Conduct** to minimize health and safety hazards and injuries and accidents and conflicts due to incompliance with Good Practice Guidelines and OHS standards ▪ Develop and implement a well communicated and accessible grievance mechanism for workers ▪ Establish accidents reporting and documentation system ▪ Develop and implement a Contingency Preparedness and Response Plan. ▪ Developing and implementing onsite HSE procedures for safety onsite (proper traffic signage, use of PPE etc.) ▪ The Government (MoE) will prepare Labor management procedures (LMP) that should be complied and should include mandatory insurance for all types of labor involved in the construction and operation. In addition, the Insurance should be covering work related accidents (injuries and fatalities), as well as

			insurance for third party. The LMP include all the other requirements as per the principles of ESS2 (prohibiting child and forced labor, dedicated GRM for labor …etc) ▪ Develop ToR, contracts, and terms of employment for contractor and subcontractors prohibiting hiring minors ▪ Develop a monitoring plan including record keeping system for copies of IDs of laborers, daily attendance sheets in order to verify the attendance of workers not include staff below 18 ▪ Develop HSE training plan for all workers regarding work at heights, electrical and vehicular safety, handling of hazardous materials, use of PPE, hazard avoidance and reduction measures, use of first aid and rescue techniques, emergency response, and firefighting ▪ In the contractual agreement, clear definition of child should be inserted. The child should be defined as all persons less than 18 years old. ▪ Rigid terms should be written in the contractor agreement to prohibit recruitment of children below 18 ▪ The contractor should maintain labor registry log that contains the age of recruited person and his/her ID.
ESS3	Resource Efficiency and pollution prevention	Increased energy consumption due to transportation and use of materials and equipment	**Mitigation hierarchy measures pertinent to air quality and GHG emissions,**

		Increased consumption of water (for construction activities, and due to temporary influx of workers' consumption), Pollution due to: ▪ Increased emissions due to fuel combustion and exhaust emissions from vehicles and construction equipment ▪ Improper disposal of solid waste impacting surroundings (soils, water bodies, air). Anticipated waste types include used oils, empty containers, construction debris (concrete, bricks, sand and gravel), packaging materials, metal scrap, wood, municipal waste from workers on site ▪ Compromised utilities infrastructure such as sewerage pipes resulting in pollution by waste water potentially accumulating in trenches	▪ Developing Waste management plan to prevent pollution from mishandled waste ▪ Perform assessment of available resources and utilities (water and energy) consumption to avoid pressure and stress on local community access ▪ Obtaining maps and routes for infrastructural works relevant to potable water, wastewater, electricity, and telecom ▪ Implement good practice procedures to avoid incurring damages to underground utilities and infrastructure ▪ Developing response strategy for accidental compromise of underground utility and infrastructure and maintain records of any accident
ESS4	Community Health, Safety	▪ Exposure of community to increased air pollutants and noise levels and waste, disease spread ▪ Uncontrolled dumping of construction waste, ▪ Accidents related to accessibility to construction site ▪ Increased traffic flow to and from site causing road congestions ▪ Safety hazards resulting from compromised underground utilities and infrastructure	**All mitigation hierarchy measures relevant ESS1 and ESS3**, in addition to: Developing and implementing CHS procedures to prevent access to site, manage use of equipment and machinery in compliance with permissible emissions, noise limits ▪ Develop and implement traffic management plan to inform surrounding communities of re-routing schedules/road closures, restrict movement of large vehicles during off-peak hours (while compliant with national requirements), delineate

		▪ Health and safety risks on surrounding community due to temporary workers' influx in the project candidate areas ▪ Temporary Labor Influx might result in unfavorable impacts on the project candidate areas in terms of: - Influx of additional population, Increased pressure on accommodation and rents - Increased risk of communicable diseases and burden on local health services - Increased risk of illicit behavior and crime - Potential Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA). As per the WB 2016 Labor Influx Guidance Note, the scale of labor influx and the absorptive capacity of the local community indicate the significance of the anticipated risk of GBV. The project can lead to an increased risk of Gender Based Violence, as women are particularly vulnerable within the context of construction projects. Gender based violence can be manifested through multiple behaviors including: Sexual harassment of women and girls or Exploitative sexual relations and unpaid work, or low wages.	truck routes, and address complaints related to traffic ▪ Develop, implement, and provide induction courses to all workers on code of conduct stipulating workers' commitment towards community groups and defining behaviors to be avoided, and applicable penalties in case of violations, schedules for induction courses. ▪ Implement health and safety standards to test workers' health conditions before project commencement, and perform check-up every 6 months ▪ Establish and maintain a complaints system accessible to community- Apply the full requirements related to operating the grievance mechanism including anonymous channels ▪ Apply penalties to workers violating the code of conduct ▪ **Code of conduct** to be developed and signed by sub-contractor. It should include prevention of sexual exploitation and abuse and sexual harassment (SEA/SH) at workplace, and accommodation of workers in the case of presence with local communities In order to minimize impacts pertaining to labor influx the following should be thoroughly implemented: ▪ Apply the full requirements related to operating the grievance mechanism including anonymous channels

		▪ It is likely that impacts related to labor influx will be relevant in the project candidate areas; in case the contractors do not comply with the different related measures including but not limited to Code of Conduct to all types of labors and sub-contractors.	▪ Raising awareness of the local community about the project commitment towards communities' and the measures taken for that through public consultation and focus group discussions ▪ Random drug and alcohol tests to be conducted. If workers will be staying in rented apartments by contractor or sub-contractor, in labor camps or in any other accommodation facilities, the developed code of conduct should be complied to.
ESS5	Land Use	**Potential temporary impact related to construction:** The contractor may need storage area in order to store the equipment, materials, and temporary equipment for workers' services. The contractor may use the empty areas within the project site depending on availability in the site or can obtain lease agreement to secure the needed land.	Based on the principles of the prepared RF, resettlement plan (RP) of livelihoods restoration plan should be prepared in case the selected site for the sub-project will result in involuntary resettlement, loss of private assets of livelihoods.

		Land selection for the transfer stations: ▪ The ownership and the uses of the land to be allocated to the two transfer station sites is not specified at the present time. ▪ In case of the land is a vacant State property that is free from any occupations and uses, there will be no impacts related to land acquisition, physical displacement, nor loss oflivelihoods out of the land. If the site selection will entail land expropriation for privately owned land or public land that is used by individuals or groups, there will be impacts that will need to be tackled in light of ESS5.	
ESS8	Culture heritage -	Excavation works can unearth undiscovered archeological sites	Chance find procedures should be applied
ESS10	Lack of stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of: • The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders	▪ It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) including the different stages of the project life reduces the risks of Lack commitment to good application of the ESS10. ▪ Project disclosure in compliance with all national regulations relevant to public consultation as well as World Bank policies relevant to disclosure and public consultation ▪ Identify the different stakeholders, both project-affected parties and other interested parties, individuals or groups that are affected or likely to be affected by the project

		dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	▪ Identify those project-affected parties (individuals or groups) who, because of their particular circumstances, may be disadvantaged or vulnerable. ▪ A clear grievance mechanism must be developed for workers or local communities, that is available and easy to deal with
Operation			
ESS1	Air quality GHGs	Gaseous and odor emissions from trucks and other machinery and improper waste handling (e.g., waste burning)	Develop and implement **Environmental Management Plan to minimize emissions of pollutant gases, GHGs and dust and noise** Developing **waste management plan to prevent pollution from mishandled waste** **Develop and operationalize a robust GRM**
	Noise	Increased noise levels due to trucks and other machinery	
ESS2	Labor and Working Conditions	• Safety risks due to operation of heavy machinery, trucks etc. • Health risks due to improper handling of waste	**Labor and Working Conditions Plan including Code of Conduct** to minimize health and safety hazards and injuries and accidents and conflicts due to incompliance with Good Practice Guidelines and OHS standards ▪ Develop and implement a well communicated and accessible grievance mechanism for workers ▪ Establish accidents reporting and documentation system ▪ Develop and implement a Contingency Preparedness and Response Plan.

			▪ Developing and implementing onsite HSE procedures for safety onsite (proper traffic signage, use of PPE etc.) The project HR policy must be in accordance with the Egyptian Labor Law, which results in the prevention of child labor (employment of workers under 18 years is not permitted) Develop a monitoring plan including record keeping system for copies of IDs of laborers, daily attendance sheets in order to verify the attendance of workers not include staff below 18 **Develop HSE training plan** for all workers regarding work at heights, electrical and vehicular safety, handling of hazardous materials, use of PPE, hazard avoidance and reduction measures, use of first aid and rescue techniques, emergency response, and firefighting The Government (MoE) will prepare Labor management procedures (LMP) that should be complied and should include mandatory insurance for all types of labor involved in the construction and operation. In addition, the Insurance should be covering work related accidents (injuries and fatalities), as well as insurance for third party. The LMP include all the other requirements as per the principles of ESS2 (prohibiting child and forced labor, dedicated GRM for labor …etc) ▪
ESS3	Resource Efficiency and pollution prevention	Improper waste handling and disposal can generate a source of waste in surrounding. Anticipated waste types include used oils, empty containers,	**Mitigation hierarchy measures pertinent to air quality and GHG emissions (ESS1), in addition to:**

		construction debris (concrete, bricks, sand and gravel), packaging materials, metal scrap, wood, municipal waste from workers on site etc.	Developing Waste management plan to prevent pollution from mishandled waste
ESS4	Community health and safety	▪ Improper waste handling can cause odor emissions, disease spread, pests etc. ▪ Safety hazard associated to accessibility to the site ▪ Increased traffic flow due to trucks transferring waste can cause road congestion, accidents ▪ Communities' unacceptability for the SWM infrastructure during operation and also the potential associated health impacts if the operation of the facilities is not done in a very hygienic way	**All mitigation hierarchy measures relevant ESS1 and ESS3**, in addition to: ▪ Developing and implementing CHS procedures to prevent access to site, manage use of equipment and machinery in compliance with permissible emissions, noise limits ▪ Develop pest management plan and rodent control systems ▪ Establishing a grievance redress mechanism (GRM) accessible to community ▪ Launching awareness raising campaigns for community ▪ Develop a communication strategy to raise awareness of the community members on health and safety measures. ▪ Develop traffic plan off site to ensure CHS ▪ Speed limit on the road, and Proper lighting ▪ Using trucks to transport the waste ▪ Drivers should be recruited based on criteria (experience, drug use, etc.) ▪ Random drug tests should be required

7.1.1.2 Construction of Integrated Waste Facilities

Table 7-2 Mitigation measures for Component 2- Construction of 2 Integrated Waste Facilities

ESS	Receptor/ EHS Aspect	Impacts	Mitigation Hierarchy Framework
Component 2: Construction of IWMF-10R and Industrial Hazardous Waste Treatment and Disposal Sites			
Construction			
ESS1	Air quality GHG	All elements applicable to sub-component 1: transfer stations in addition to: ▪ Deep excavation implications on water drainage ▪ Flood risks in candidate site of Kuraymat	All elements applicable to Component 2-Construction of transfer stations
	Noise		All elements applicable to Component 2- Construction of transfer stations
	Soil, geology and hydrology		All elements applicable to Component 2- Construction of transfer stations Perform study to assess flood risks at all proposed project location and implement location screening criteria for site selection
	Socio-economic impacts	Project operation may affect informal sector that operates in waste, which will lead to a loss of livelihoods in the long run.	All elements applicable to Component 2- Construction of transfer stations
ESS2	Labor and Working Conditions	All elements applicable to sub-component 1: transfer stations	All elements applicable to Component 2- Construction of transfer stations
ESS3	Resource Efficiency and pollution prevention	All elements applicable to sub-component 1: transfer stations	All elements applicable to Component 2- Construction of transfer stations
ESS4	Community Health, Safety	All elements applicable to sub-component 1: transfer stations	All elements applicable to Component 2- Construction of transfer stations
ESS5	Land Use	<u>Land needed</u> With regard to the land needed, the contractor will need site storage area in order to store the	• Temporary land acquisition • RAP document prepared

		equipment and materials, in addition, temporary equipment for workers' services; the contractor may use the empty areas within the project site depending on availability in the site. The contractor should coordinate with the local unit in order to provision sanitation and potable water services.	• Providing fair compensation to the land owners for the loss of crops.
		<u>Land acquisition</u> ▪ The ownership of the land allocated to the two project sites belong to the state (state property - Sharqiyah and Giza Governorates) there will be no impacts related to land acquisition or impacts related to the physical displacement. ▪ The construction work may affect the lands adjacent to the project site; the impact will depend on the nature of the uses of the surrounding lands. For example, damages to crops may result on agricultural lands	
ESS8	Culture heritage	Deep excavation works can destroy undiscovered archeological sites	All elements applicable to Component 2- Construction of 2 transfer stations
ESS10	Lack of stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of:	▪ It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) including the different stages of the project life reduces the risks of Lack commitment to good application of the ESS10.

		• The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	▪ Project disclosure in compliance with all national regulations relevant to public consultation as well as World Bank policies relevant to disclosure and public consultation ▪ Identify the different stakeholders, both project-affected parties and other interested parties, individuals or groups that are affected or likely to be affected by the project ▪ Identify those project-affected parties (individuals or groups) who, because of their particular circumstances, may be disadvantaged or vulnerable. ▪ A clear grievance mechanism must be developed for workers or local communities, that is available and easy to deal with
Operation			
ESS1	Air quality GHGs	All elements applicable to sub-component 1: transfer stations in addition to: ▪ Uncontrolled release of landfill gas resulting in increased GHG emissions	All elements applicable to Component 2- Construction of 2 transfer stations. in addition to:

		and explosion hazards resulting in further emissions ▪ Flaring/combustion of landfill gas resulting in increase in gaseous emissions (CO_2, CO, NOx, trace gases), and PM ▪ Release of ammonia and hydrogen sulphide from landfill resulting in pungent odor emissions ▪ Gaseous and odor emissions from improper waste handling (e.g., waste burning)	▪ Developing Project Operations Manual including standard operating procedures and monitoring plan for landfill operation and monitoring ▪ Develop and implement landfill gas control system/technology
	Noise	Increased noise and vibrations levels due to vehicle transporting waste on the site, operation of equipment such as stand-by generator, convey belts in the recycling plants, loaders and windrows moving machine in the composting plant, and compaction and application of daily cover material on waste.	All elements applicable to Component 2- Construction of 2 transfer stations
	Soil, geology and hydrology	▪ Contamination of soil, groundwater and surface water due leachate ▪ Accumulation of Carbon dioxide in subsurface area can cause groundwater acidification	Implement leachate control system/technology
	Socio-economic impacts	▪ Project operation may affect informal sector that operates in waste, which will lead to a loss of livelihoods in the long run.	All elements applicable to Component 2- Construction of 2 transfer stations

ESS2	Labor and Working Conditions	▪ Health hazards due to vermin attracted to the site (birds, rodents and insects) which can act as disease vectors and low hygiene conditions ▪ Risk of fires, explosions, subsidence, spills and accident ▪ Safety hazards associated with high noise and vibration levels, exposure to toxic chemicals, operation of machinery, handling of hazardous waste. ▪ Safety hazards associated waste at the landfill	All elements applicable to Component 2- Construction of 2 transfer stations ▪ Perform risk hazard assessment to identify risks of explosion
ESS3	Resource Efficiency and pollution prevention	▪ Increased energy consumption due to landfill operation, transportation and use of materials and equipment ▪ Increased consumption of water (onsite consumption), ▪ Increased emissions due to fuel combustion and exhaust emissions from waste trucks ▪ Pollution due to improper waste disposal	All elements applicable Component 2- Construction of 2 transfer stations in addition to: Perform study to determine impact of resource consumption on surrounding (electricity, water)
ESS4	Community Health, Safety, and Security	▪ Improper operation of landfill can result in explosion hazards, release of pungent odors, harboring of pests and diseases threatening community health, safety and security ▪ Informal access to landfill site can pose health and safety risks to community:	All elements applicable to Component 2- Construction of 2 transfer stations

		Waste sorters at the recycling and plant could get injured by infectious sharps mixed with municipal and possibly infected by blood transmitted diseases ▪ Negative visual impacts due to litter dispersion by wind associated with composting/recycling plants ▪ Increased traffic flow due to trucks transferring waste can cause road congestion, accidents	
Closure of landfill			
ESS1	Soil, geology and hydrology	▪ Impacts due landfill gas generation and possible leakage ▪ Soil, groundwater contamination due to leachate	• Monitor gas leakage • Monitor groundwater quality, implement leachate control system (e.g., pumping)
ESS4	Community Health, Safety, and Security	▪ Visual impact of landfill to nearby community ▪ Odor emissions ▪ Health and safety risks due to rodents, pests	• Implement final cover • Monitor odor emissions • Pest management plan

7.1.1.3 Closure and Rehabilitation of Abu Zaabal Dumpsite

Table 7-3 Mitigation measures for Component 2- Closure and Rehabilitation of Abu Zaabal Dumpsite

ESS	Receptor/EHS Aspect	Impacts	Mitigation
Component 2- Closure and rehabilitation of dumpsite – Abu Zaabal			
ESS1	Air Quality GHG	Pollution and GHG emissions: machinery used for construction, exhausts of vehicles used to transport workers, construction materials and basic equipment, release of landfill gas, emissions from burning of waste	All elements applicable to Component 2- Construction of transfer stations Ensure proper treatment and disposal of leachate
	Noise	Increased noise and vibration due to earthworks, transportation, sieving of wastes	All elements applicable to Component 2- Construction of transfer stations
	Soil, geology and hydrology	Contamination of soils due to leakage of lubricants, fuels of machinery, leakage of leachate Soil instability if closure method involves covering and site reuse	Collect runoff and leachate via proper drainage system and treat leachate to meet applicable environmental standards before discharge to the municipal sewage system
	Socio-economic impacts	Project operation may affect informal sector that operates in waste, which will lead to a loss of livelihoods in the long run.	All elements applicable to Component 2- Construction of transfer stations In case of any loss of livelihoods there will be compensation in place as per the requirements of Resettlement Framework (RF) prepared for the project.
ESS2	Labor and Working Conditions	▪ Risk of ignitions and fire during handling of waste (in particular during excavation and dozing of waste) ▪ Injury and contamination due to exposure to waste including sharp objects and biohazards	All elements applicable to Component 2- Construction of transfer stations. In addition to: ▪ Performing QRA to assess risk hazard due to illegal waste accumulated

		▪ Health and safety risks due to noise and dust from use of heavy equipment ▪ Health risks due to exposure of workers to leachate during profiling and excavation of trenches for drain pipes	▪ Develop emergency response and preparedness plan in case of fire or explosions ▪ Provide specialized training to all workers involved with handling waste
ESS3	Resource Efficiency and pollution prevention	▪ Pollution of surrounding due to improper disposal of large amounts of mixed wastes removed from the dumpsite	All elements applicable to Component 2- Construction of transfer stations
ESS4	Community Health, Safety, and Security-	▪ Health risks due to exposure to leachate uncovered during rehabilitation ▪ Increased noise levels, ▪ Degraded air quality due to increased emissions resulting from use of machinery and equipment and trucks, ▪ Road safety risks caused by large trucks circulation, ▪ Uncontrolled dumping of waste in areas accessible to community, ▪ Falls and other safety risks due to access to work site, ▪ Health and safety risks from workers in contact with local community ▪ Explosion risks due to pockets of CH4 ▪ Increased traffic flow due to trucks transferring waste can cause road congestion, accidents	All elements applicable to Component 2- Construction of transfer stations. In addition to: ▪ Launching awareness programs on Health and Safety to prevent surrounding community from accessing the site ▪ Perform a QRA to assess risk of fires and explosions ▪ Develop pest management plan
ESS10	Lack of stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can	▪ It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) including the different stages of the project life reduces the risks of Lack

		entail many risks, and result in unfavourable impacts on the project candidate areas in terms of: • The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders' dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	commitment to good application of the ESS10. ■ Project disclosure in compliance with all national regulations relevant to public consultation as well as World Bank policies relevant to disclosure and public consultation ■ Identify the different stakeholders, both project-affected parties and other interested parties, individuals or groups that are affected or likely to be affected by the project ■ Identify those project-affected parties (individuals or groups) who, because of their particular circumstances, may be disadvantaged or vulnerable. ■ A clear grievance mechanism must be developed for workers or local communities, that is available and easy to deal with

7.1.1.4 Technical Assistance for Upgrading to Akrasha Recycling and Industrial Zone

Table 7-4 Mitigation measures for Component 2- Upgrading of Akrasha Recycling and Industrial Zone

ESS	Receptor/EHS Aspect	Impacts	Mitigation
Component 2- Upgrading of Akrasha Recycling and Industrial Zone			
ESS1	Air Quality	Pollution and GHG emissions: machinery used for construction, exhausts of vehicles used to transport workers, construction materials and basic equipment, release of odors from accumulated waste movement, release of methane if municipal waste is part of the accumulated wastes, emissions from burning of waste	All elements applicable to Component 2- Construction of 2 transfer stations and Closure and rehabilitation of dumpsite in Abu Zaabal
	Noise and vibrations -	Increased noise and vibration due to earthworks, transportation, sieving of wastes	All elements applicable to Component 2- Construction of 2 transfer stations and Closure and rehabilitation of dumpsite in Abu Zaabal
	Soil, geology and hydrology-ESS	Contamination of soils due to leakage of lubricants, fuels of machinery, leakage of leachate to the underground	All elements applicable to Component 2- Construction of 2 transfer stations and Closure and rehabilitation of dumpsite in Abu Zaabal
	Socio-economic impacts- Impact on livelihood	Project operation may affect the informal sector that operates in waste, which will lead to a loss of livelihoods in the long run.	All elements applicable to Component 2- Construction of 2 transfer stations and Closure and rehabilitation of dumpsite in Abu Zaabal
ESS2	Labor and Working Conditions	▪ Risk of ignitions and fire during handling of waste ▪ Injury and contamination due to exposure to waste including sharp objects and biohazards ▪ Health and safety risks due to noise and dust from use of heavy equipment	All elements applicable to Component 2- Construction of 2 transfer stations and Closure and rehabilitation of dumpsite in Abu Zaabal

		▪ Safety hazards and injuries linked to falling from heights, falling objects, handling of heavy machinery, electrocution, heat stress/dehydration, exposure to exhaust, exposure to chemicals and hazardous materials, exposure to noise and vibrations ▪ Explosion risks due to pockets of CH_4 ▪ Health hazards from diseases and pests	
ESS3	Resource Efficiency and pollution prevention	▪ Pollution of surrounding due to improper disposal of large amounts of mixed wastes removed from unofficial accumulated waste sites	All elements applicable to Component 2- Construction of 2 transfer stations and Closure and rehabilitation of dumpsite in Abu Zaabal
ESS4	Community Health, Safety, and Security	▪ Increased noise levels, ▪ Degraded air quality due to increased emissions resulting from use of machinery and equipment and trucks, ▪ Road safety risks caused by large trucks circulation, ▪ Uncontrolled dumping of waste in areas accessible to community, ▪ Falls and other safety risks due to access to work site, ▪ Health and safety risks from workers in contact with local community ▪ Explosion risks due to pockets of CH_4 ▪ Increased traffic flow to and from site causing road congestions	All elements applicable to Component 2- Construction of 2 transfer stations and Closure and rehabilitation of dumpsite in Abu Zaabal
ESS10	Lack of stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of:	▪ It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) including the different stages of the project life reduces the risks of

		• The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders' dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	Lack commitment to good application of the ESS10. ■ Project disclosure in compliance with all national regulations relevant to public consultation as well as World Bank policies relevant to disclosure and public consultation ■ Identify the different stakeholders, both project-affected parties and other interested parties, individuals or groups that are affected or likely to be affected by the project ■ Identify those project-affected parties (individuals or groups) who, because of their particular circumstances, may be disadvantaged or vulnerable. ■ A clear grievance mechanism must be developed for workers or local communities, that is available and easy to deal with

7.1.2 Component 3

Table 7-5 Mitigation measures for Component 3-Electric Buses

ESS	Receptor/EHS Aspect	Impacts	Mitigation
	Component 3: Subcomponent: e-buses		
Construction			
ESS1	Air Quality GHG	Pollution, GHG emissions, dust emissions: machinery used for construction, open excavation, material transport, movement of vehicles	All elements applicable to sub-component 1
	Noise	Increased noise and vibration due to earthworks, transportation	All elements applicable to sub-component 1
ESS2	Labor and Working Conditions	▪ Risk of electrocution associated with charging station establishing etc. ▪ Health and safety risks due to noise and dust from use of heavy equipment ▪ Child labor is a common practice in Egypt at large and can be a risk in this project. Children below 18 are favorable labor as they receive low salaries and they are less demanding. ▪ Discrimination, unequal opportunity and inappropriate hiring procedures could be relevant risks on specific groups of workers, such as women, people with disabilities and migrant workers. Risk of harassment, intimidation and/or sexual exploitation and abuse (SEA) could be also relevant among different categories of project labor unless if	▪ All elements applicable to sub-component 1 in addition to: ▪ Identify special PPE for electrical works (charging station infrastructure) ▪ Provide special training on proper operation and maintenance of charging stations and handling of batteries ▪ The Government (MoE) will prepare Labor management procedures (LMP) that should be complied and should include mandatory insurance for all types of labor involved in the construction and operation. In addition, the Insurance should be covering work related accidents (injuries and fatalities), as well as insurance for third party. The LMP include all the other requirments as per the principles of

		appropriate measures are in place to tackle those risks. ▪ There is also risk that workers may have complaints that could escalate or left unresolved.	ESS2 (prohibiting child and forced labor, dedicated GRM for labor …etc) ▪ Develop ToR, contracts, and terms of employment for contractor and subcontractors prohibiting hiring minors ▪ Develop a monitoring plan including record keeping system for copies of IDs of laborers, daily attendance sheets in order to verify the attendance of workers not include staff below 18 ▪ Develop HSE training plan for all workers regarding work at heights, electrical and vehicular safety, handling of hazardous materials, use of PPE, hazard avoidance and reduction measures, use of first aid and rescue techniques, emergency response, and firefighting ▪ In the contractual agreement, clear definition of child should be inserted. The child should be defined as all persons less than 18 years old. ▪ Rigid terms should be written in the contractor agreement to prohibit recruitment of children below 18 ▪ The contractor should maintain labor registry log that contains the age of recruited person and his/her ID.
ESS4	CHS, and Security	Health risks due to electrical works Increased traffic flow due to trucks can cause road congestion, accidents	All elements applicable to sub-component 1

		Health and safety risks on surrounding community due to temporary workers' influx in project candidate area	
ESS10	Lack of stakeholder engagement and Information Disclosure	Stakeholder engagement is an inclusive process conducted throughout the project life cycle; Lack of commitment to good application of this standard can entail many risks, and result in unfavourable impacts on the project candidate areas in terms of: • The risk of poor communication with the public, can affect constructive and responsive relationships that are important for successful management of a project's environmental and social risks. • Failure to disclose the project and publish clear information may lead to stakeholders' dissatisfaction and losing trust in the project. • The weakness of the grievance mechanism GRM used in the project or the lack of clarity in the mechanism of application and solution, can lead to escalated unresolved complaints that may threaten the project. It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) reduces the risks of Lack commitment to good application of the ESS10. The risks should be carefully handled in the SEP.	▪ It is important to underline that the early preparation of a Stakeholder Engagement Plan (SEP) including the different stages of the project life reduces the risks of Lack commitment to good application of the ESS10. ▪ Project disclosure in compliance with all national regulations relevant to public consultation as well as World Bank policies relevant to disclosure and public consultation ▪ Identify the different stakeholders, both project-affected parties and other interested parties, individuals or groups that are affected or likely to be affected by the project ▪ Identify those project-affected parties (individuals or groups) who, because of their particular circumstances, may be disadvantaged or vulnerable. ▪ A clear grievance mechanism must be developed for workers or local communities, that is available and easy to deal with
Operation			
ESS1	Air Quality GHG	Indirect contribution to emissions NOx, SOx, and PM emissions from charging stations	Monitor proper functioning of charging stations use of cleaner fuels or renewable energy during electricity generation.
	Soil, geology and hydrology	Leakage of toxic chemicals from batteries such as lithium and Cobalt into the environment and groundwater.	Develop and implement hazardous waste management plan

ESS2	Labor and Working Conditions	▪ Risk of electrocution associated with charging station ▪ Health hazards due to handling of used batteries	All elements applicable to sub-component 1 in addition to: Identify special PPE for electrical works (charging station infrastructure) Provide special training on proper operation and maintenance of charging stations and handling of batteries
ESS3	Resource Efficiency and pollution prevention	▪ Increased energy consumption due to charging station infrastructure ▪ Generation of hazardous waste (used batteries) ▪ Improper disposal of used batteries causing pollution ▪ Storage and disposal of old batteries in landfills due to lack of adequate recycling policies/facilities for battery materials, causing toxic contamination of other waste streams	Develop Monitoring plan for proper functioning of charging stations Implement energy efficient technologies Perform assessment for resource consumption requirements Perform assessment studies to select batteries with extended battery lifetime and increased energy density in order to minimize waste generated from operation Develop a hazardous waste management plan considering options for secondary uses for batteries
ESS4	CHS	▪ Health hazards due to improper disposal of used batteries ▪ Safety hazards due to improper operation of charging stations ▪ Gender Based Violence (GBV). The project can lead to an increased risk of Gender Based Violence, as women are particularly vulnerable within the context of public transportation. Gender based violence can be manifested through the behavior of Sexual harassment of women and girls. However, The project operation may limit these behaviours due to the operating criteria that prevent overcrowding and commitment to the capacity of	All elements applicable to sub-component 1 identifying mechanisms for good monitoring which can include: - setting up surveillance cameras with buses, - Apply penalties to drivers in case of violating the instructions for the number of passengers, - A grievance mechanism should be available to the Passengers

		the bus; this could make it a safe public transportation for women and girls, in the case of identifying mechanisms for good monitoring	

7.2 Environmental and Social Management and Monitoring Framework

The purpose of the Environmental and Social Management and Monitoring Framework is to provide guidance and principles on measures and plans including the need for additional instruments (ESIA, feasibility studies, environmental audits etc.) to safeguard ESS for the project using the Mitigation Hierarchy approach to avoid, minimize, mitigate and/or offset adverse risks and impacts. The ESMMF defines responsibilities, requirements (measure and plans), frequency, and associated estimated costs.

Table 7-6 Environmental and Social Management and Monitoring Plan

Impact	Avoidance, minimizing, mitigation measures	Monitoring		
		Requirements	Responsibility	Estimated Cost
Component 1: Strengthening AQM				
ESS1	Study on impact of air quality advisory policies on socio-economic aspects	Assessment study	TIU	
Component 2: construction of transfer stations				
ESS1, ESS3	Construction **Assessment of existing underground utilities and infrastructure** Construction and Operation Phases **Environmental Management Plan** Minimum mitigation measures: minimizing emissions of pollutant gases, GHGs, dust, and noise ▪ Emissions control onsite and offsite for dust, air pollutants and GHGs, odors ▪ Efficient use of machinery/equipment, ▪ Site housekeeping and maintenance, **Waste Management Plan** Minimum mitigation measures: prevention of pollution from mishandled waste including procedure for storage, collection, segregation, recycling and/or proper disposal, quality testing of generated waste water, hazardous waste, construction and demolition waste, used oil etc.	Field reports Measurement devices (air quality, dust, CH_4), Odor Modelling Incident reports Receipts, contracts for waste pick-ups, Site and surrounding inspection	Private operator (Environment specialist) And accredited Third Party for field measurements during the Operation phase.	
Labor and Working Conditions	Construction and Operation Phases **Labor and Working Conditions Plan including Code of Conduct**	PPE usage and no child labor	Private operator (Health and Safety	

ESS2	Minimum mitigation measures: minimize health and safety hazards and injuries and accidents and conflicts due to incompliance with Good Practice Guidelines and OHS standards, a well communicated and accessible grievance mechanism for workers, preventing child labor	monitoring by inspections Field reports Incident reports Monitor workers' registration records and ID cards	specialist) (social development specialists)	
CHS **ESS4**	<u>Construction</u> **Labor and working conditions plan**: defining code of conduct, health conditions check-ups for workers <u>Construction and Operation Phases</u> **Environmental Management Plan** Minimum mitigation measures: minimizing emissions of pollutant gases, GHGs, dust, and noise **Waste Management Plan** Minimum mitigation measures: prevention of health and safety risks from improper disposal of waste **HSE plan** Mimium mitigation measures: avoiding health and safety risks to surrounding community, preventing access to site, **Traffic Management Plan** Minimum mitigation measures: define routes and alternative routes, truck movements, transport of workers, and short-term closure of roads (if	Field reports Measurement devices (air quality, noise levels) Site inspection visits Periodic reports Grievance log	Private operator (Environment and social development specialists)	

	necessary), communication strategy to community, safety guidelines for drivers **Communication strategy** Scope: raise awareness of the community members on health and safety measures. **Grievance mechanism** Mitigation measure: addressing complaints of community, grievance mechanism including anonymous channels			
Land Use-ESS5	▪ In the case of the land is owned by individuals (private property) ▪ Permanent land acquisition for the project sites ▪ Selection of the location of land plots to be purchased for the project site should be conducted in consultation with the local community. ▪ should select different plots according to technical criteria. ▪ Different plots should be considered with landowners who are willing to sell their land voluntarily. ▪ It is important to ensure that no one seller will be forced to sell their land and that there are other alternative plots in case the owner is not willing to sell. ▪ Land valuation process should be based on realistic market prices, after consulting	Land ownership documents Consultation documentation	Private operator (social development specialists)	

	with different actors at the local level, and the full replacement cost ▪ Documentation of the negotiation process ▪ Establishing a grievance redress mechanism (GRM) is one of the most fundamental procedures that warrantee smooth and amicable implementation for the project activities. ▪ Compensation documents (if any)			
ESS8 Culture heritage	<u>Construction phase</u> Apply Chance find procedures	Site inspection visits	Private operator (Environment and social development specialists)	
Component 2: establishing of integrated waste facilities				
Pollution of surrounding environment –ESS1, ESS3	<u>Construction and Operation</u> ESIA including ESMP Minimum mitigation measures: minimizing emissions of pollutant gases, GHGs, dust, and noise, improper disposal of waste, control technologies for leachate and landfill gas, management of gradually excavated landfill cells, estimation of anticipated waste <u>Decommissioning</u> Landfill assessment Closure plan	Full ESIA-ESMP study required for each facility Risk assessment associated with excavated cells	Private operator team (Environmental specialist)	
ESS2	<u>Construction and Operation Phases</u> **Labor and Working Conditions Plan including Code of Conduct**	PPE usage monitoring by inspections	Private operator (environmental and	

	Minimum mitigation measures: minimize health and safety hazards and injuries and accidents and conflicts due to incompliance with Good Practice Guidelines and OHS standards, a well communicated and accessible grievance mechanism for workers, preventing child labor	Field reports Incident reports Monitor workers' registration records and ID cards	social development specialists)	
ESS4 CHS	<u>Construction</u> **Labor and working conditions plan**: defining code of conduct, health conditions check-ups for workers <u>Construction and Operation Phases</u> **HSE plan** Minimum mitigation measures: avoiding health and safety risks to surrounding community, preventing access to site, **Traffic Management Plan** Minimum mitigation measures: define routes and alternative routes, truck movements, transport of workers, and short-term closure of roads (if necessary), communication strategy to community, safety guidelines for drivers **Communication strategy** Scope: raise awareness of the community members on health and safety measures. **Grievance mechanism** Mitigation measure: addressing complaints of community, grievance mechanism including anonymous channels <u>Decommissioning</u>	Field reports Measurement devices (air quality, noise levels), grievance logs	Private operator (social development specialist)	

	Pest control plan			
Land Use-ESS5	• Temporary land acquisition • RAP document prepared • Providing fair compensation to the landowners for the loss of crops.	Consultation documentation Land ownership documents	MoE (social development Officer)	
Culture heritage-ESS8	All elements applicable to sub-component 1	Site inspection visits	Private operator (Environment and social development specialists)	
Socio-economic impacts-ESS1, ESS2, ESS4, ESS10	<u>Prior to construction, construction and operation</u> Consultation with the informal sector involved in waste ▪ Coordination with NGOs ▪ Training programs to qualify and integrate workers in the informal sector (especially women) into the new waste management system to reduce impacts from losing livelihoods	Consultation documentation	MoE (Social Development Officer)	
Component 2: rehabilitation of Abu Zaabal dumpsite				
Pollution of surrounding environment-ESS1, ESS3	<u>Pre-closure:</u> **Dumpsite assessment** Scope: geology, types of waste disposed, contamination levels of surrounding area (soil, water bodies), historical records, incidents <u>Construction and Operation</u> **Closure plan:**	Dumpsite assessment Closure plan Full ESIA-ESMP	Private operator	

	Scope: methods for rehabilitation, identification of unstable slopes, drainage control systems, leachate management, gas management, soil coverage material **ESIA including ESMP** Minimum mitigation measures: minimizing emissions of pollutant gases, GHGs, dust, and noise, improper disposal of waste, control technologies for leachate and landfill gas, soil stability assessment			
ESS2	All elements applicable to the other elements of component 2 in addition to: <u>Prior to works on closure</u> ▪ Risk assessment: Mitigation measures: minimize fire, explosion hazards due to accumulated waste and gas leakage, slope stability,	QRA	Private operator	
CHS-ESS4	All elements applicable to the other elements of component 2 <u>Prior to works on closure</u> ▪ Risk assessment: Mitigation measures: minimize fire, explosion hazards due to accumulated waste and gas leakage Pest management plan	Field reports Measurement devices (air quality, noise levels)	Private operator	
ESS2	All elements applicable to the other elements of component 2 in addition to: <u>Prior to works on closure</u>	QRA	Private operator	

	▪ Risk assessment: Mitigation measures: minimize fire, explosion hazards due to accumulated waste			
Socio-economic impacts ESS1, ESS2, ESS4, ESS10	▪ Consultation with the informal sector involved in waste ▪ Coordination with NGOs ▪ Training programs to qualify and integrate workers in the informal sector (especially women) into the new waste management system to reduce impacts from losing livelihoods	Consultation documentation	MoE (Social Development Officer)	
Component 2: Upgrading of Akrasha Recycling and Industrial Zone (Technical Assistance)				
Pollution of surrounding environment ESS1, ESS3	<u>Construction and Operation</u> ESIA including ESMP Minimum mitigation measures: minimizing emissions of pollutant gases, GHGs, dust, and noise, improper disposal of waste ▪ Risk assessment: Mitigation measures: minimize fire, explosion hazards due to informal operations involving hazardous materials	Field reports Measurement devices (air quality, dust, CH4) Incident reports Receipts, contracts for waste pick-ups, Site and surrounding inspection Odor modeling	Private operator (Environment specialist)	
CHS-ESS4	All elements applicable to the other elements of component 2	Field reports Measurement devices (air quality, noise levels)	Private operator	

ESS2	All elements applicable to the other elements of component 2	PPE usage monitoring by inspections Field reports Incident reports	Private operator	
Component 3: Charging stations and e-buses				
Pollution of surrounding environment ESS1, ESS3	<u>Prior to construction</u> **Life cycle assessment** Scope: electricity supply mix options, electricity production sources, emissions of GHG (gCO_2eq/kWh) and other toxic pollutants <u>Construction and operation phases</u> **Environmental Management Plan** Minimum mitigation measures: minimizing emissions of pollutant gases, GHGs, dust, and noise ▪ Emissions control onsite and offsite for dust, air pollutants and GHGs, odors ▪ Efficient use of machinery/equipment, ▪ Site housekeeping and maintenance, **Waste Management Plan** Scope: Identify disposal opportunities for spent batteries constituting hazardous waste, storage of hazardous waste	EMP Contracts for battery disposal Energy consumption records	Private operator	
ESS2	All elements applicable to the other elements of component 2 in addition to: ▪ Risk assessment minimize health and safety risks due to charging station infrastructure and electrical works	QRA Incident reports	Private operator	

CHS--ESS4	All elements applicable to the other elements of component 2	Field reports Measurement devices (air quality, noise levels) Traffic impact grievance log	Private operator	

8 PUBLIC CONSULTATION AND ENGAGEMENT

The public consultation chapter aims to highlight the key consultation and community engagement activities and their outcomes, in addition to outlining the key aspects to be addressed when holding the consultation activities of the site-specific ESIAs upon final project detailing. In addition to the procedures that must be taken into consideration when preparing the stakeholder engagement plan (SEP). In this chapter, results from the initial steps of the process, scoping session with stakeholder defined thus far on the ESMF, are presented. The ESMF determines the requirement of an SEP, which is prepared separately.

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.

8.1 Stakeholder Consultation

The purpose of stakeholder engagement and public consultation process is to ensure that all relevant stakeholders are aware of the project and have the opportunity to comment on issues of relevance to them. The objective is to develop and maintain avenues of communication between the Project owner and stakeholders in order to avoid and/or reduce negative impacts and enhancing benefits from the project. Consequently, consultations will be conducted with the local community and other relevant stakeholders to ascertain their priorities and recognize the effects associated with the project which may require management.

Stakeholder engagement is an inclusive process conducted throughout the project life cycle. Where properly designed and implemented, it supports the development of strong, constructive and responsive relationships that are important for successful management of a project's environmental and social risks. Stakeholder engagement is most effective when initiated at an early stage of the project development process, and is an integral part of early project decisions and the assessment, management and monitoring of the project's environmental and social risks and impacts.

Accordingly, this chapter describes the stakeholder engagement and consultation activities that have be undertaken in the current stage. For those planned for the future they are listed in more detailed in the SEP. It aims to focus on key stakeholder interactions and on the analysis of their outcomes.

8.1.1 Methodology

In terms of methodology, consultation activities have been conducted in a Public consultation session and interviews with concerned authorities. These activities will be performed in compliance with all national regulations relevant to public consultation as well as World Bank policies relevant to disclosure and public consultation.

- WB policies relevant to disclosure and public consultation, namely,
- WB ESS10 stakeholder engagement and Information Disclosure.
- Egyptian regulations relevant to public consultation
- Law 4/1994 modified by Law 9/2009/2009 modified with ministerial decrees no. 1095/2011 and no. 710/2012

As a result, the key principles of effective engagement that guide stakeholder consultations and SEP include:

- Ensuring that all interactions are free of intimidation or coercion.
- Providing meaningful information in a format and language that is understandable and tailored to the needs of the target stakeholder group(s).
- Being inclusive in the representation of views, i.e. including different ages, genders, and incorporating vulnerable and/or minority groups.
- Respecting local traditions in the decision-making processes.
- Information should be easily accessible for stakeholders and be culturally appropriate; to allow the effective participation of those identified as minorities, disadvantaged or vulnerable groups.

To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.

8.1.2 ES Impact Rating by Public Consultations

The information and findings of these consultations will be integrated into the contents of the final report. The feedback will be an important component to the formulation of mitigation measures and outcomes presented in this report.

8.2 Stakeholders' Participation

8.2.1 Identification of Stakeholders

The first step in the process of stakeholder engagement is stakeholder identification; that is, determining who the project stakeholders are and what they should be grouped under. According to the World Bank's Standard 10, a stakeholder refers to "individuals or groups

who: (a) are affected or likely to be affected by the project (project-affected parties); and (b) may have an interest in the project (other interested parties)". Most importantly, identifying stakeholder representatives is key to carrying out consultations seamlessly. These representatives do not only inform the project with their valuable information, but they also serve as a communication channel to disseminate information to large numbers of stakeholders and receive information from them.

Table 8-1 presents all potential project stakeholders:

Table 8-1: Detailed list of stakeholders

Stakeholder Groups		Role
Project affected parties		
Environmental Sector	Ministry of Environment - Egyptian Environmental Affairs Agency (EEAA)	▪ Responsible for developing public policies related to the protection of environment and improving its quality. In addition, it is responsible for issuing regulations for environmental determinants and monitoring their implementation. ▪ EEAA is one of the main stakeholders that work closely with the Project in order to warrantee their level of environmental commitment; through reviewing and approving EIAs, and monitoring implementation of the Environmental Management Plan ▪ In addition, EEAA is the owner of the project
	Waste Management Regulatory Authority (WMRA)	▪ Responsible for regulating, following-up and overseeing all waste management processes at both central and local levels, in a manner improving the environmentally safe management. ▪ Providing information and data available about the waste sector in Egypt. ▪ Provide technical support to raise public awareness and community commitment. ▪ Responsible for managing some project components
	Environmental Office within the Governorates	Responsible for monitoring the compliance to environmental requirements
Governmental sector	Ministry of Environment (MoE)	MoE is the main implementing agency for the project. For each component separate agencies and ministries will be involved in the implementation of various project components from a sectoral perspective
	Ministry of Local Development (MoLD)	Responsible for implementing the national strategy for solid waste management and the specific master plans that have been put in place by the waste management body in the concerned governorates

	Ministry of Transportation (MoT)	▪ It is responsible for meeting the transportation needs of the country and is aligned with Egyptian national development plans. ▪ Project management at the operational stage
Other Governmental Entities	Governorates, Cairo Giza Qalyoubia	▪ Responsible for collecting and transporting waste through the concerned departments in each governorate ▪ Supporting the project by providing requested services such as various permits required, and infrastructure maps, when requested.
	Cairo Transport Authority (CTA)	▪ CTA Is the operator of mass transit within Cairo, and the largest operator in Egypt. ▪ CTA operates buses, a surface metro, ferries and river buses. Through its subsidiary Greater Cairo Bus Company (GCBC) it operates buses and minibuses. ▪ Project management at the operational stage
	Local units in the Governorate LGU Khankah Markaz Banha City Abu Zaabal village Kuraymat Tenth of Ramadan	▪ The main role of the Local Units authority is the provision of support to the project through giving permits for electricity installation and water supply and mobilizing people to gain information about the project. ▪ Permits for the lands needed for the project, should be prepared by the Governorate and approved by the LGU.
	Army Intelligence force	They provide the project with permissions and approvals.
The informal sector	The informal sector for waste management includes the following types: Garbage collectors waste pickers including: 1) Street Containers Waste Pickers (Al Nabashin), 2) Donkey-carts and Tricycle Operators, and 3) disposal Sites Full-timer Waste Pickers	*Please see the baseline chapter for more details* ▪

Potential Affected Communities in the project candidate areas	Khankah Markaz Banha City Abu Zaabal village Kuraymat Tenth of Ramadan	▪ They will be affected by the impacts of the project. ▪ Vulnerable status may cause them to be severely affected by positive or negative impacts ▪ Constitute interest group as potential candidates for job opportunities They have interests in the project as they might get a job opportunity
Private Sector Factories Companies	waste recycling waste management	▪ Potential participants in project activities ▪ Cooperation with the implementing agencies
Contractors	Not yet defined	Responsible for the implementation of project management plans
Financial Institutes	The World Bank (WB)	Financiers and regulators
Other interested parties		
Civil Society	NGOs (International, regional, local) Grassroots Community-Based Organizations (CBO) Recyclobicia Association (Mustafa Hamdan) Youth Spirit Association (Izzat Naeem)	▪ Organizations with direct interest in the project and which may have useful data or insight into local issues of relevance to the project. These organizations can also influence the views of others regarding the project, nationally and internationally. ▪ Responsible of sharing information with the community
Media	Television Newspaper Websites editors Online journalism	▪ Disclosure of information about the project on the website of the Ministries. ▪ Disclosure of information about the project on the Facebook pages of the local government.
Suppliers and Traders	Private companies	Mainly potential tenderers for the construction works.
	Traders (small-scale stores) (unofficial suppliers)	▪ Provide construction materials. ▪ Provide fuels to cars and machineries. ▪ Provide workers with food and amenities.

8.2.2 Stakeholder Analysis

Once stakeholders are identified, a primary analysis is applied to identify their respective level of engagement. The stakeholder analysis tool (shown in Figure 8-1) is used to group stakeholders according to their effect and support pertaining to the project.

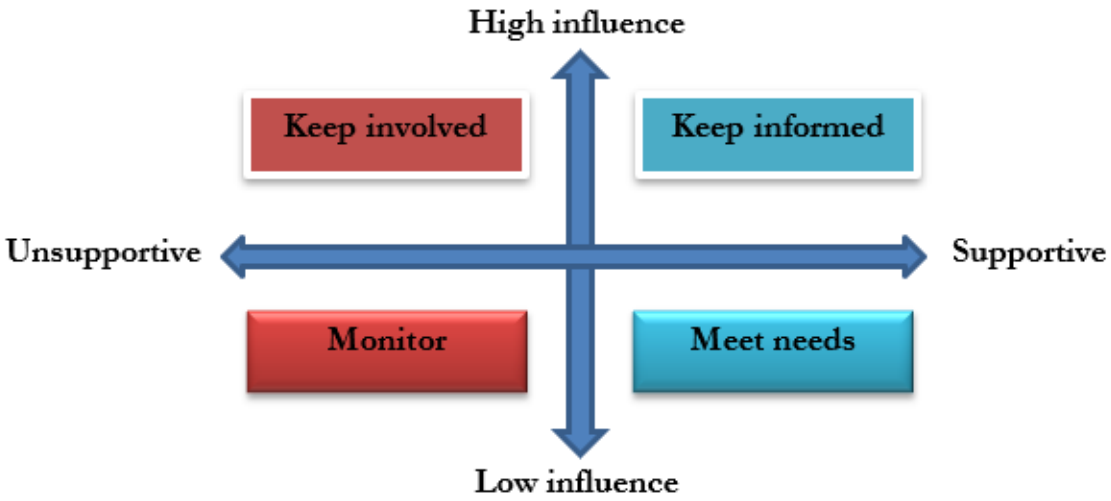


Figure 8-1: Stakeholder Mapping Tool

As per the WB Guidance Notes, when working to determine representatives, however, there are a number of factors worth considering:

- Stakeholder representatives have to faithfully communicate the results of engagement with the project company back to their constituents. Therefore, they should be well-respected individuals of their communities.
- After consulting with stakeholder representatives, a sample of project-affected people should be addressed and engaged with directly. This acts as a means to highlight any inconsistencies in how stakeholder views are being represented. If no inconsistencies are found, then the identified representative is credible and an asset to the project.

A Stakeholder Analysis Matrix should be used to help determine where to focus resources by concentrating on those stakeholders that are most impacted, interested or influential. The stakeholder analysis also helps determine the most suitable approach for communication, and how stakeholders relate to one another and the company, including identifying common concerns.

8.3 Stakeholder Engagement Plan

Stakeholder Engagement is an on-going process that involves: stakeholder analysis & planning, disclosure & dissemination of information, consultation & participation, grievance mechanism, and on-going reporting to Affected Communities.

8.3.1 Engagement during Project Preparation: Scoping Consultation Session

A scoping consultation session was conducted, as part of the process of preparing the ESMF in line with the national legislative requirements and the World Bank standards. This session was held prior to finalizing the ESMF and RF drafts. The session was held in Cairo House in Cairo, which is affiliated to the Ministry of Environment on 15th March 2020.

The list of invitees included:

- Ministry of Environment
  - EEAA
  - Central Department of Air Quality and Noise Protection
  - Climate Change Central Department
  - Environmental Impact Assessment Central Department
- Waste Management Regulatory Authority (WMRA)
- Ministry of Health and Population
- Ministry of Transportation
- Ministry of Local Development (local authorities in the governorates concerned with waste management)
- Ministry of Electricity and Renewable Energy
- Ministry of Trade and Industry (MOTI) and the Egyptian Organization for Standardization (EOS)
- Cairo Public Transport Authority (CTA)
- Customs Department, Ministry of Finance
- General Administration of Traffic at the Ministry of Interior
- Cairo, Giza, and Qalyoubia governorate (Cleanliness and Beautification Agencies in the governorates)
- The local units of Cairo, Giza, and Qalyoubia governorate (Al Khankah, Abu Zaabal, Banha, Karimat, 10th of Ramadan)
- Academic and Research Entities
  - Cairo University (Soil, Water and Environment Research Institute)
  - Institute of Environmental Studies and Research, Ain Shams University
  - Environmental Research Center, Banha University, Qalyoubia
  - Land, Water and Environmental Research Institute in Banha, Qalyoubia
  - Faculty of Engineering, El-Mataria, Helwan University
  - The Higher Technological Institute in the 10th of Ramadan
  - The National Research Center
  - The Institute for Sustainable Environment Research and the Center for Sustainable Development of the American University in Cairo

- National Population Council (NPC)
- Contractors and workers in the field of waste collection, sorting and use
- Waste collectors (scavengers)
- Sheikh Al-Zaabalin and Al-Nabashin in the areas concerned with the project (in particular: Abu Zaabal, Al Khankah, and 10th of Ramadan
- The private sector (consultants, factories, companies, suppliers and traders working in the field of waste recycling)
    - Chemonics Environmental Consultancy
    - Out Greens Egypt for Waste Management
    - The Egyptian Company for Solid Waste Recycling "ECARU"
    - Recyclobekia for e-waste recycling (Mustafa Hamdan)
    - Transport planning expert, Dr. Ahmed Moussa, former Minister of Transport Planning and founder of “Masarat Misr for Consultations” in the field of transport and communications
    - SETS for Engineering Consultancy (in Transport and Infrastructure)
- Possible affected communities in Al Khankah, Abu Zaabal, Banha, Al Kuraymat, and Tenth of Ramadan.
- Communities that use public transportation in the project areas (East Cairo, Nasr City, Al Zaytun, Stadium, Salah Salem)
- Local and international civil society organizations concerned with the project areas
- Association for the Protection of the Environment from Pollution A.P.E
    - The Egyptian Women's Health Association
    - New Woman Foundation
    - Association for the Advancement and Development of Women
    - National Council for Women
    - Egyptian Center for Women's Rights
    - Harassment Map Initiative
    - Youth Spirit Foundation for Zabbalin Empowerment (Ezzat Naeem
    - Alashanak Ya Baladi Foundation
    - Arab Bureau for Youth and Environment
    - CEDARE
    - German Friedrich-Ebert-Stiftung Foundation
    - International Society of City and Regional Planners (ISOCARP)
- Various media

Participants were invited through mails, faxes, emails, and phone calls.
A total of 25 persons attended the scoping session in addition to the WB observer and the ESMF consultant staff. About 20% of the attendees were females and 80% were males. The distribution of attendees from different entities, excluding the WB observer and the ESMF consultant staff, was as follows (Table **8-2**):

Table 8-2: Distribution of attendees according to their affiliation

Distribution of participants according to their affiliation	Numbers	Percentage (%)
Administrative official's governorate level (8 WMRA, 3 MoE, EEAA, ...)	11	44
Administrative officials' local level (Giza, Cairo and Qalyoubia governorates)	4	16
Consultants (experts)	2	8
Community members (representatives)	1	4
Civil society	1	4
Academic Institutions	1	4
Private sector (factories, companies, suppliers and traders working in the waste field)	5	20
Total	25	100

The following topics were presented during the scoping consultation session:

- Introduction about the project
- Objective of the project
- Project partners
- Project description
- Rationale of the ESMF and RF
- Methodology of ESMF preparation
- Methodology of RF preparation


Figure 8-2: The consultants presenting the project


Figure 8-3: Attendees of the scoping session

Throughout the session, the project was generally well received. Most attendees participated actively in the session and brought up fruitful ideas for discussion. Table 8-3 provides a summary of the key comments and concerns raised during the scoping session.






Figure 8-4: Discussions during the scoping session

Table 8-3: Key comments and concerns raised during the scoping session

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF
Dr. Hossam AbdelGawad **Director of transport and infrastructure division,** **SETS International consulting** **(private sector)**	**Relevance to project components: 2 (SWM infrastructure) and 3.1 (e-buses)** 1. Study of pollution emissions 2012-2017 should be used to inform route selection for E-buses 2. CTA has a fleet of more than 3300 vehicles, 1500 of which are buses 3. Public transport modal share are 65% microbuses and 25% minibuses and 10% other smaller motorized vehicles 4. Calculations of emissions and their reductions should be based on baseline emissions calculations of current transport fleet, depending on factors including age of vehicles and type of fuel used 5. Consideration of the impacts of long-distance transport of waste due to the closure of Arab Al Olayqat dumpsite (Abu Zaabal dumpsite) which shall increase the distance travelled for waste disposal from Qalyoubia to 10th Ramadan City in Sharqiyah 6. Consider phasing out old buses (some are running since 1982) in parallel to employing new buses, even if they are E-buses to mitigate traffic impacts in high traffic areas in Cairo. 7. Air Quality measurements should be taken along the proposed routes for E-buses 8. Traffic studies are needed for the proposed routes as part of the E&S framework 9. Full life cycle assessment should be conducted to consider impacts from electricity generation technologies and fuels used (emissions) and the battery disposal, and not just the operation of e-buses on the streets	Points 1, 2, and 3: Consider studying pollution from 2012-2017 conducted by SETS, as well as the statistical data provided on CTA's current fleet as a primary source of information for the project's baseline Remarks made shall inform many aspects of the ESMF including: ▪ The development of the Impacts assessment framework of the ESMF: remarks 4 and 5 ▪ Analysis of the project's alternatives: remark 6 ▪ Mitigation, management, and monitoring of potential impacts form the project component 3.1: remarks 7, 8, and 9.
Mr. Hossam Mustafa, Regional manager,	**Relevance to project components: 3.1 (e-buses)** 1. There is no formal procedure for disposal or recycling of batteries (lead, cobalt, and lithium-ion) since they contain toxic materials	In response to remark no. 3, it was explained that as of current agreement with the Egyptian Government, the proposed

Recyclobekia for E-waste management (private sector)	2. The Nasiriya waste management facility in Alexandria currently does not accept E-waste into the complex, despite it being a hazardous waste management facility 3. Urged the inclusion of E-waste to the accepted waste types in the newly developed landfill in 10th of Ramadan 4. CBA should be conducted, as E-buses could be more costly than gas-operated buses. Determine selection criteria and justification for deployment of e-buses in light of CBA results. 5. 50% of total waste produced in Cairo and Giza are handled by the informal sector (collectors and scavengers). 6. Suggested the re-evaluation of financing of the proposed integrated waste facility (10th of Ramadan) to a more inclusive model for the informal sector, which is responsible for 80% of recycling of e-waste and constitute about 1000 small private MSMEs (workshops) for sorting and recycling activities 7. Urged the commitment towards the integration of the informal sector by building capacity and improve the operations of the small private MSMEs and workshops. This will lift up burden on the government 8. Recommended the consideration of lessons-learned from previous experiences with foreign solid waste management companies on handling waste such as FCC and AMA Arab companies.	landfill in the 10th of Ramadan is designed for municipal solid waste and shall not be handling hazardous waste, and hence e-waste will not be accepted into this particular landfill. However, there are studies to determine if Kuraymat site will be dedicated for hazardous waste. Therefore, there will be a dedicated stakeholder engagement session where all involved stakeholders will be invited to share their concerns. In response to remark no. 6: the ESMF is based on the project components specified at earlier stages of the project development. However, the impacts assessment framework and the management and monitoring of the ESMF, as well as the Resettlement Framework shall consider the social impacts on the current informal waste collectors and scavengers, with the objective to ensure their inclusion and integration within the formal sector. Remarks made shall inform many aspects of the ESMF including:

		▪ Baseline information on the current formal e-waste management procedures: remarks 1, 2, 5, and 8 ▪ Impacts assessment framework and particularly social impacts: remarks 7, and 8 ▪ Stakeholder engagement and impacts management for the informal waste sector: remarks 6 and 7 ▪ Remark no. 4 regarding alternatives to the component 3.1 of the project (employment of e-buses) was identified as out of scope of this study (CBA is out of scope of the ESMF).
Dr. Khaled Farra **Advisor to the Minister of Environment**	**Relevance to project components: 2 (SWM infrastructure)** 1. The proposed $250m project is not a fund, but rather a soft loan. This means that benefiting governorates shall need to repay back investment returns. 2. The project component on developing SWM infrastructure does not only consist of establishing landfills, but rather integrated waste management complexes for handling, treatment, and disposal to encourage the private sector engagement in the waste management sector and to reduce the amount of landfilled inert solid waste.	Highlighting the project objectives and elaborating on its components. The comments shall inform the language and approach used to describe the project in the ESMF and its objectives. The comments also provided a general context to the SWM situation, which shall

	3. One of the main objectives of the project is ensuring the integration of the informal sector into the SWM sector by establishing larger companies/entities from the small independent workshops and MSMEs currently in place. 4. In response to Hossam Mostafa about the lessons learned from the foreign contracts with FCC and AMA Arab: the government are now preparing tenders for private sector within all Governorates to promote and enhance the SWM sector 5. There is currently a strong political will towards improving SWM in Egypt, with opportunities available for the private sector to partake in recycling, treatment, RDF, etc.	inform the approach towards the baseline analysis for the ESMF.
Dr. Mahmoud Mansour **Cairo Cleaning and Beautification Authority**	**Relevance to project components: 2** 1. Traffic studies needed to be included in the ESMF in order to determine waste transfer routes to the proposed new landfills 2. The social impacts due to the diversion of waste from the informal dumpsite or landfills located within the cities to the newly developed sanitary landfills, which are located further away: Ensure the manshiyet Naser community (both waste collectors and scavengers) are compensated for losing their livelihood after the opening of 10th of Ramadan landfill, which will replace the dumps they currently operate in. What will be their situation? And will they be transferred to work in the new sites?	There is no direct linkage between the 10th Ramadan landfill and the waste collection and sorting in Manshiyet Naser district. However, the informal sector groups that could be affected in relevance to the project interventions are identified as part of the potentially affected stakeholders and all the further detailed assessment will propose measures to integrate them and minimize negative impacts on them.
Mr. Ezzat Naim **Deputy head of Waste**	**Relevance to project components: 2** 1. Provided factual information on the current SWM practices by the informal sector in GCA: 28,000 tons of waste are generated daily in Cairo and Giza. 17,000 of them are collected by the informal sector (>50%): 6,000 tons from	To answer the question raised about the involvement of the Giza Governorate in the project: Dr. Amr Osama explained the different stages of the project

collectors Syndicate	Cairo, and 4,000 tons from Giza. Waste is then transported to various locations in GCA to informal landfilling open dumps including Manshiyet Naser, Ard El Lewa, Alkhosous, Barageel, Abu Zaabal, Ain Shams, almatareya, Tora, and 15th May. 2. Provided further Data on informal sector's waste handling capacity in Manshiyet Naser (6000 tons/day), Ard El Lewa including Barageel amounting to 4000 tons/day, Khosous and Matareya and other Qalyoubia sites collecting 5000 tons/day, Tora 700 tons/day, and 15th May site collecting 1700 tons/day. Total amounting to 17,000 of total 28,000 tons/day generated in the GCA 3. 60% of the collected household waste is food waste, most of which is sent to pig breeding barns owned by the informal waste collectors and scavengers to feed the pigs. 4. Suggested that waste segregation at source measures would be beneficial for the SWM system in Egypt 5. Waste collectors and Scavengers are willing, upon incentives, to be involved in segregation activities to provide raw material (organic waste) for biogas units to produce energy and organic fertilizer facilities (potential positive economic gains) 6. Informal waste collectors do not scavenge in dumpsites, but rather provide door to door waste collection service 7. Scavengers operate inside the dumpsites and do not deal firsthand with the waste producers (households) 8. social impacts on scavengers are more concerning than on informal collectors 9. Distinction was made between informal waste collectors and scavengers. Scavengers make up 1% of Egyptian population as referenced from a UNDP report. 10. Stakeholder engagement should be done at grassroots level and early on in the decision-making process in order to reduce resistance from involved stakeholders.	development phase and the role of Integral in this stage, which is preparing the ESMF, after the components had been determined at an earlier stage. Dr. Farra explained that the components were identified based on previously conducted feasibility studies and consultation and stakeholder engagement activities Remarks made shall inform many aspects of the ESMF including: ▪ Baseline information: points 1, 2, 3, and 11 ▪ Impacts assessment framework and particularly social impacts: comments 4 to 9 and 12 ▪ Stakeholder engagement and public consultation: comments 10, 12, 14, and 16 ▪ Remark no. 13 regarding alternatives analysis was identified as out of scope of this study. .

	11. There are more than 5,700 MSMEs responsible for the recycling of 90% of the collected waste, and supply around 10,000 industrial plant or factory across all Egypt. 12. There could be adverse effects on livelihood of current waste collectors due to their exclusions from the SWM system. It is crucial to include them in consultation early on in the project and involve them in the decision-making process. 13. E-vehicles as alternatives for waste transfer 14. Micro model (engagement of small-scale private sector including the informal sector) for SWM rather than macro model (e.g.: FCC and AMA Arab large companies previously contracted in Cairo for SWM) in order to capacitate and support the current informal waste collector community which has been working in the waste sector since 1949. 15. Why is Giza not addressed sufficiently in the project components? He further referenced Arab Abu Said brick factories that produce significant pollutants (heavy metals) and Carbon emissions due to burning of very low-quality fuels. 16. He elaborated that he is available for further consultation on the informal sector, and stated that he represented his community and syndicate in various conferences and occasions nationally and internationally.	

Mr. Ahmed Badawi **Project implementation manager at WMRA**	**Relevance to project components: 2 (SWM infrastructure) and 3.1 (e-buses)** 1. Consideration of the impacts of proposed bus routes on traffic (conduction of traffic studies) since buses are planned to operate along with existing micro-mini buses 2. defining selection criteria for bus routes is essential, with justification for the routes proposed to operate on the same routes as the existing metro lines 3. Consideration of other routes in order to extend the public transit system to areas where no metro or buses are operating (Qalyoubia), rather than employing additional buses to routes that are currently being served (Nasr City) 4. Defining the contractual agreements model and technical framework for waste handling across all governorates 5. Approximately 5,000 tons of waste will need to be transported from Qalyoubia to 10th of Ramadan daily. So impacts need to be addressed. 6. proposed landfill sites are not located near Zaabaleen communities, therefore consider the feasibility of developing recycling facilities within Qalyoubia to reduce landfilled waste	Remarks made shall inform many aspects of the ESMF including: ▪ Impacts assessment and management framework: comments 1, 2, 4, and 5 by proposing traffic studies for the proposed routes, and analysis of all environmental and social impacts along those routes ▪ Analysis of project alternatives: comments 3 and 6 were identified as out of scope of this particular project, yet could be used to inform the development of future projects.
Mr. Mohamed Hussein **Head of Municipal solid waste department at WMRA**	**Relevance to project components: 2** Social impacts on scavengers are more concerning than on informal collectors since they are much larger in number	Remarks made shall inform analyzing the baseline and the impacts assessment framework for the ESMF

Mr. Emad Aldin Adly **Civil Society**	**Relevance to project components: 2** 1. Capacity building and integration of the informal sector is crucial to ensure the overall advancement of the SWM system in Egypt. It is also essential to ensure positive engagement and acceptance on the project 2. Incentives are encouraged to be put in place for waste segregation from source, and incentives for private contractors to promote private sector engagement in segregation and sorting 3. Expressed concerns over the extent of public disclosure of information and transparency regarding the newly developed state programs, plans, and projects regarding SWM	Remarks made shall inform analyzing the baseline and the impacts assessment and management framework for the ESMF, and particularly social impacts on the informal waste collectors and scavengers. Remark no. 3 shall be considered in the stakeholder engagement and public disclosure activities conducted during the development of the ESMF.

8.3.2 Engagement post Project Preparation: First Public Consultation Session

In view of the current conditions of the spread of the Corona virus and the commitment to social divergence, the public consultation session was held on June 11th through a video call using the Zoom program, to ensure easy and safe participation from home or workplace and it was a fruitful experience as about 55 participants attended and the following table shows the distribution of participants according to the specialty. Annex 6 to the study shows the registered attendees and their affiliations.

Table 8-4 Distribution of attendees according to their affiliation

Distribution of participants according to their affiliation	Number	Percentage (%)
Administrative official's governorate level (WMRA, MoE, EEAA, ...)	18	33
Administrative officials' local level (Giza, Cairo and Qalyoubia governorates)	11	20
Consultants and experts	11	20
World Bank	4	7
Civil society	2	4
Academic Institutions	4	7
Private sector (factories, companies, suppliers and traders working in the waste field)	5	9
Total	55	100

Guests were informed of the date and venue of the public consultation session at least two weeks prior to the meeting date. Invitations were sent by the WMRA Solid Waste Management Regulatory Authority in cooperation with the consulting office via mail, fax, and e-mail. Annex 7 to the study shows a list of invitees to participate in the public consultation session.

The aim of the session is to present the results of the ESMF, with a focus on the environmental impacts resulting from the project, methods of mitigating negative impacts, maximizing the benefit from the positive effects, and ensuring that the parties involved are satisfied with the measures to reduce environmental impacts and management plan.

The following topics were presented during the public consultation session:

- Introduction about the project
- Objective of the project
- Project partners
- Project description
- Methodology of ESMF preparation
- Methodology of RF preparation

- Environmental laws applicable to the project
- Description of the environmental and social baseline
- Project's environmental and social impact assessment results
- Environmental and Social Management and Monitoring Plan

Most of the attendees actively participated in the session and came up with fruitful ideas for discussion. The figure below shows a screenshot of the meeting. Table 8-5 provides a summary of the main comments and concerns raised during the session.

Figure 8-5 A screenshot during the public consultation session

Table 8-5 Key questions and comments raised during the first public consultation session

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
Dr. Ahmed Elawady **Institute of Environmental Studies and Research, Ain Shams University**	What kind of hazardous waste will be disposed of in the landfill and how is it classified? And if it is addressed, how do they choose alternatives? Will the nuclear waste be dealt within the waste component? Will there be any handling of hazardous waste before disposal?	Hazardous waste defined by environmental law will be disposed not including nuclear waste (not included in the scope of 10th of Ramadan waste facility) Yes, there will be treatment for medical waste before burial in the burial cells, either by incineration or autoclaving. A limited number of companies in Cairo work in the management of medical waste and this project will contribute to solving this problem because it focuses on an urgent issue and links between waste management and reducing its pollutants and problems in general. Detailed studies will be carried out for each component of the project, before starting implementation.	While the ESMF project's general framework study recommends that detailed environmental studies be made for the components of the project, which includes the Medical Waste Safe Disposal Unit.
Dr. Mohamed Saad Abdallah **EEAA - Central Department**	During construction and operation phases, was an air dispersion model conducted or measurements of dust and gaseous emissions' concentrations?	This study represents the general framework of the impacts of dust and gaseous emissions on air quality and the community and workers health, while there will be detailed studies upon completion of the detailed design stage of the project that will address air quality and prepare an air dispersion model to obtain more specific information regarding the air quality impacts.	The terms of reference for environmental impact assessment studies for the private sector responsible for the construction and operation of the project are described in Annex No. 8 of the ESMF, which include the obligation to make measurements

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
for Air Quality and Noise Protection			of air quality as well as dispersion models for landfill gas.
Dr. Walid Darwish **Ministry of Trade and Industry**	Suggested to take into consideration previous studies or existing implemented projects, such as a study carried out by the MoTI in cooperation with the MoE regarding waste-to-energy facilities and tenders for private sector companies and how to benefit from the experience before implementation. There is also a project with UNDP on electric vehicles for sustainable transportation and how to dispose of batteries for the replacement process	Meetings with HE Minister of Environment have already recommended the use and benefit from the experiences of other projects and have a head start in this project. The studies will highlight objectives, explain its components, and private sector participation.	This proposal was examined in Chapter 5 "Analysis of Alternatives"
Dr. Eman Rayyan **Deputy Governor of Qalubiya**	What are the technical, institutional and financial studies that will be carried out for El-Akrasha, what's the difference between them?	El-Akrasha area is a region with large percentage of pollution. In order to start rehabilitation activities, studies must be conducted to determine required activities to improve environmental conditions in the region and financial costs and analyze alternatives by feasibility studies and assessing the environmental impact at an early stage. So far, World Bank specific interventions have not been identified yet for El-Akrasha. This study represents the general framework, but upon completion of the detailed design stage, there will be further analysis and enabling investors role for private	Chapter 2 "Project Description" of the ESMF study

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
		sector participation. The project is in the stage of preparing technical studies to determine the project implementation interventions in general, such as preparing the study in question, and appointing consultants to prepare an economic feasibility study. the institutional setup for project implementation will be determined including capacity building activities, strengthening the infrastructure to rehabilitate the area.	
Eng. Rania Badr **National Communication project**	▪ Explain the climate change and air quality component in the detailed study. ▪ Defining the MRV monitoring, reporting and verification system for the transportation sector, such as the electric bus operation project in Alexandria	One of the main objectives of the project is to reduce greenhouse gas emissions and there will be indications for determining the reduction rates resulting from the proposed project	Study of the ESMF Environmental and Social Management Framework A recommendation has been added to Part No. 2.2.2. The second component: Supporting the activation of solid waste management plans in Greater Cairo. To study the possibility of separating and sorting solid waste at intermediate stations.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
Dr. Ahmed Gaber **Chemonics Consulting Firm**	1. The project area is 1,200 feddan for solid waste treatment. The project will also receive mixed solid waste from Cairo and Qalyubia governorates. This is considered a fundamental mistake; executing a project on a large area and receiving mixed waste in a large quantity 2. The study includes a small part of 1200 feddan, which is the sanitary landfill cell of Qalyubia Governorate and the facility for construction and demolition waste treatment, wehreas the rest of 1200 acres does not appear in the study 3. The study is considered general and can be applied to any project, as it does not reflect the specificity of the project for the complex governorates of Cairo and Qalyubia 4. The study is a strategy for transferring mixed solid waste to	Regarding notes 1 and 2: The current first design study focuses on the component that will be financed by the World Bank and that serves the larger vision of the project, focusing on the infrastructure and preparation of 10R Complex in order to create a market for private sector participation. With regard to transporting mixed waste, the project recommends studying the possibility of separating and sorting waste at intermediate transport stations, especially since the meetings with representatives of the informal sector of waste collectors indicated their willingness to continue sorting waste at their current sites and not the site of the waste complex under study. It was agreed on 1200 feddan within the national plan, and studies were carried out in a broader framework, where this site was chosen after thorough studies of all financial indicators and the feasibility of exploiting this site for the purpose of establishing an integrated complex for waste management and safe disposal. In order to encourage the participation of the private sector, the price of medical waste management will be modified to have an economic feasibility from 4 pounds to about 17 pounds, which will be approved so	1. Chapter 2 of the EIA study "Project Description" explains the components of the entire project and what is within the scope of this study. 2. ESMF: a recommendation has been added in *Section 2.2.2, Component 2: Support the Operationalization of SWM Master Plans in GC*, to study the possibility of separating and sorting solid waste in intermediate stations.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	an integrated solid waste management complex, and there is no analysis of the impact of the source on the downstream 5. The program implementation unit management model presented in the study includes policies - laws and regulations for a complex and large project, but the role of the Ministry of Environment and the Ministry of Transport is not clear. Will a steering committee be formed or how the model will be implemented? 6. Who will be responsible for paying the gate fees for medical waste? The Cleaning Agency in two large governorates such as Cairo and Qalyubia. The institutional development part should be clearly explained.	that it is a fair price for managing the medical waste system. Regarding notes 3 and 4: The project framework is based on the national plan for solid waste in general, including 10th of Ramadan site. Assigning solid waste management in the Cairo governorate to the private sector was a successful model, as it showed an increase in efficiency in Al-Salam and Al-Obour area and demonstrated the need for a fair financial compensation to solve the solid waste problem in Cairo and Qalyubia. The ESMF and RF already cover general aspects such as the national legal framework and the World Bank standards section, but the impacts section is a project-specific section. However, at this stage of the project, there is no accurate information about the project's land requirements, except for the project to be established in 10R. Moreover, it became clear that the components of the project would not result in loss of livelihood or resettlement resulting from the implementation of the project under study, which is a sub-component under the components of the project of the 10th of Ramadan 1200 feddan.	

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
		In response to Note 5 and 6: The program implementation unit serves the framework of one of the project components, but the detailed studies will take into account the specificities of Cairo and Qalyubia.	
Eng. Salaheldin Ahmed **Cairo Governorate - Environmental Manager**	▪ The Public Cleanliness authority administers and delivers medical waste. And it was agreed that the project area is sufficient and ready for future expansion. ▪ The Ministry of Industry, the Ministry of Health, and the Ministry of Agriculture must be included in project management. ▪ Local Development legislations are necessary to determine the cost of solid waste collection ▪ Take all aspects and ministries into consideration, such as transportation, prices and problems ▪ A suggestion: adding other plots of land and constructing a similar project in Upper Egypt after the	The legislation necessary for solid waste management falls within the national plan and is not a component of the project. There is a list of detailed studies that will be prepared after the detailed design of the project, such as environmental and social studies. This comment serves to define the institutional framework for project management.	In the ESMF study, a recommendation was added to Part No. 2.2.2. The second component: Supporting the activation of solid waste management plans in Greater Cairo. To study the possibility of conducting separation and sorting of solid waste at intermediate stations.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	successful implementation of this project		
Dr. Ahmed Gaber **Chemonics CEO**	1. The question was directed to the officials in the WMRA: Was the master plan for the project approved, which includes the transfer of mixed solid waste generated from Qalyubia Governorate to 10th of Ramadan, which is a large distance for transporting mixed solid waste? 2. It was also suggested that the treatment plants be located near the source of waste generation, not in 10th of Ramadan, so as not to transport a large amount of mixed waste over a long distance, and only transfer the treatment refuse to 10th of Ramadan (i.e., separating the location of the treatment plants from the landfills for disposal of refuse in 10R). 3. He suggested to reduce the percentage of treatment rejections from 30% to 20%, which means	Regarding notes 1 and 2: Dr. Khaled Al-Farra, Advisor to the Minister of Environment: The advisory office worked for a year and a half to study the possibility of implementing the 10R project, and planning was done on the basis of the amount of waste generated and the possibility of access to the site. In addition, Qalyubia Governorate is facing a severe crisis due to the lack of space for the final disposal of waste, so they were included in this project. During the year and a half, there were many discussions between the advisory office, the WMRA and the experts of the World Bank to study all aspects, which ended with the approval of the general plan of the proposed project, taking into account all the feasibility studies of the project and studies of the various transport hubs for the project site. With regard to transporting mixed waste, it has been recommended to study the possibility of conducting waste separation and sorting operations at intermediate transport stations, especially since the meetings with representatives of the informal sector of waste collectors indicated their desire to continue sorting waste at their current sites and not the site of the waste complex under study.	1. The question was directed to the officials in the WMRA: Was the master plan for the project approved, which includes the transfer of mixed solid waste generated from Qalyubia Governorate to 10th of Ramadan, which is a large distance for transporting mixed solid waste? 2. It was also suggested that the treatment plants be located near the source of waste generation, not in 10th of Ramadan, so as not to transport a large amount of mixed waste over a long distance, and only transfer the treatment refuse to 10th of Ramadan (i.e., separating the location of the treatment plants from the landfills for disposal of refuse in 10R).

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	raising the efficiency of treatment. This percentage was suggested based on his experience in the field of solid waste and the Belgium model, which reached 100% treatment efficiency, meaning zero rejections. 4. He referred to the state's plan to use 20% of the waste generated in Egypt, led by the governorates of Cairo and Qalyubia, in generating waste to energy, which issued the WMRA to implement the qualification list for the private sector, so the existence of mechanical and biological treatment technology for waste should not be implemented in the proposed project. He suggested replacing the project with waste-to-energy stations, which will be reflected in not transporting mixed solid waste over a long distance, as he referred to the model of transporting waste from Mahalla	Based on the experience of the type of waste that reaches 15th of May site, it became clear that the site could not be sustainable for more than a maximum of 4-5 years. Indeed, the impact of transporting to the 10th of Ramadan site on the roads was studied and compared to the Kuraimat site. However, the comparison showed that the 10th of Ramadan site will be more cost effective as a result of its distinguished geographical nature, infrastructure, location and access roads, taking into account the limited availability of lands that are provided by the government for such purposes (as there is no land within the governorates of Cairo and Qalyubia to reduce transportation distances). This study is part of the procedures for obtaining approval for financing from the World Bank based on the project concept note submitted to the World Bank to obtain the final approval for the financing necessary to prepare the infrastructure of the project, which must be equipped to ensure attracting private-sector investments in the field of integrated waste management. Regarding note 3, 4 and 5: There is a considerable lack of land in the governorates of Cairo and Qalyubia	3. He suggested to reduce the percentage of treatment rejections from 30% to 20%, which means raising the efficiency of treatment. This percentage was suggested based on his experience in the field of solid waste and the Belgium model, which reached 100% treatment efficiency, meaning zero rejections. 4. He referred to the state's plan to use 20% of the waste generated in Egypt, led by the governorates of Cairo and Qalyubia, in generating waste to energy, which issued the WMRA to implement the qualification list for the private sector, so the existence of mechanical and biological treatment technology for waste should not be implemented in the proposed project. He suggested replacing the project

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	Al-Kubra to Al-Salam landfill as a cost-benefit analysis experiment and the principle of close solid waste transport. He clarified that converting waste into energy will result in ash that must be treated as hazardous waste, and suggested treating it at the 10th of Ramadan site. 5. He explained that the cost of transportation will be more than double the cost of converting waste into energy near the source of the waste. He also made it clear that the feasibility of implementing a facility for treating demolition, construction and medical waste within the proposed project is acceptable, while the feasibility of implementing MBT technology for waste is not acceptable due to the difficulty of conforming the	(near the source) in some areas. By reviewing the site and planning for the governorates of Cairo and Qalyubia, it became clear that there is only the 10th of Ramadan or Al-Kuraimat, as the solid waste problem is quite urgent and cannot bear more waiting and must be resolved. Therefore, intermediate stations will be established to save the transportation cost to the site, knowing that the cost of transportation from the sites of the intermediate stations to the site The 10th falls on the cost of the collection and transportation service for service providers. WMRA is working on a detailed roadmap for converting waste into energy and evaluating and defining projects to work in coordination with the governorates to make available the lands required for this type of waste treatment and implementation by the private sector on the principle of design, installation and operation in exchange for the electrical feed tariff for converting waste into energy, for which decree 41/2019 was issued. However, the exploitation of waste to generate energy through incinerators still needs to be studied for its application in Egypt, as the quality of waste in Egypt shows that its organic matter contains a large proportion of dust. Strict requirements	with waste-to-energy stations, which will be reflected in not transporting mixed solid waste over a long distance, as he referred to the model of transporting waste from Mahalla Al-Kubra to Al-Salam landfill as a cost-benefit analysis experiment and the principle of close solid waste transport. He clarified that converting waste into energy will result in ash that must be treated as hazardous waste, and suggested treating it at the 10th of Ramadan site 5. He explained that the cost of transportation will be more than double the cost of converting waste into energy near the source of the waste. He also made it clear that the feasibility of implementing a facility for treating demolition, construction and medical waste

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	product with national standards and the difficulty of marketing it.	for incinerators must be set, and this will not be completed before 3 years. Obstacles to MBT technology were identified before applying this technology, and the quality of solid waste generated in Egypt was analyzed so that the private sector would not object. One of the conditions for assigning the implementation of the project to the private sector is that the private sector will submit an expression of interest and a prequalification list that prove that it has the ability to invest and be sustainable. Among the project components with the Urban Communities Authority will be one of the largest projects to convert waste to energy, but this is not the scope of the study as the study focuses on components funded by the World Bank only (the sanitary landfill cell of Qalyubia Governorate and the facility for the treatment of demolition, construction waste and infrastructure of the project) After a thorough study from the consulting office, it became clear that reducing percentage of treatment rejects from 30% to 20% is very difficult and it is possible to produce organic fertilizer that meets the specifications and the investor will be responsible for marketing based on market needs. There are many	within the proposed project is acceptable, while the feasibility of implementing MBT technology for waste is not acceptable due to the difficulty of conforming the product with national standards and the difficulty of marketing it.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
		ways to segregate and process to reach a lower percentage of rejects, but the problem is with the price, which is up to the investor.	
Dr. Laila Eskandar **Former Minister of Environment and Environmental Consultant**	Regarding the technology to convert waste into energy, the incinerator requires a lot of energy and in the context of the lack of efficiency in the current collection system, the incinerator requires constant feed of waste so that the investor does not lose and will create a problem between the investor and the government, therefore there should be a focus on raising the efficiency of collection system and encouraging the idea of circular economy	From studying the analysis of alternatives, it became clear that the technology of burning waste to generate energy still needs more research to be applied in Egypt based on the quality of Egyptian waste, in which the organic matter contains a large percentage of dust. Strict requirements for the incinerator must be established and the conditions will not be completed for 3 more years. Therefore, in view of the dangers of current condition of solid waste, the infrastructure for the solid waste treatment system represented by the proposed project must be established.	This proposal was studied in Chapter 5 "Analysis of alternatives" of the ESMF study.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
Eng. Mostafa Badawi **Public Transportation Authority**	Electric buses pollute air as a result of burning fuel to generate electricity, but they are more centralized in terms of pollution regions.	Studies have proven that burning fuel to generate electricity needed to operate electric buses efficiently reduces greenhouse gas emissions	Chapter 5 "Analysis of Alternatives" from the ESMF Study.
Eng. Mahmoud Mansour Cairo Cleaning and Beautification Authority	Comment on the project location: Greater Cairo does not have any similar desert location, so the location of the 10th of Ramadan was compulsory. He explained that the waste recycling facility in Al-Salam City and Obour will be closed and transferred to the 10th of Ramadan. The project will be beneficial to the medical waste management system.	The note is reflected in the environmental impact assessment in the study of traffic impacts and analysis of project site alternatives	Chapter 3 "Legal and Institutional Framework" of the ESMF study clarifies all laws applicable to the project. Chapter 6 "Potential Environmental and Social Impacts and Mitigation" of the ESMF Study.
Dr. Nevine Ebeid **Civil Society**	She commented that the session revolved around the technical issues of the project and no clarification of the role of community participation & what will be done in terms of the human rights, for example, is there a plan for urban sprawl in the desert that	For workers, all their concerns in the study were addressed in detail in accordance with Egyptian laws and the World Bank, and a description of the differences among them was made so that there are no gaps. Regarding the role of women and the percentage of their participation in employment, there are many measures that protect women's rights to employment in both phases.	Chapter 2 "Project Description" clarifies the components of the entire project and what is within the scope of the ESMF study.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	does not affect the site? Will women have a role in employment by sorting and cleaning? Will there be an awareness of people involved in sorting hazardous waste? Would there be targeting of specific groups? What is the economic and social protection of workers according to the World Bank criteria? What is the health status of the community near the waste site in 10th of Ramadan City, and how much is its participation and monitoring?	The strategic planning for the 10th of Ramadan city was addressed in the baseline study, where it was made clear that the proposed project site will not be in the way of implementing the strategic plan for the city, and the site is about 9 km from the 10th of Ramadan City.	The terms of reference for environmental impact assessment studies for the private sector responsible for the establishment and operation of the project are set out in Annex No. 8 of the ESMF, which include the obligation to estimate the quantities of the expected leachate
Dr. Ahmed Gaber **Chemonics Consulting Firm**	▪ The study methodology for a large project that included only part of it, which is the infrastructure and the Qalyubia landfill cell, and did not address the full scope of the project. The environmental impact assessment of the project as a whole, not small parts, should be studied. The study seems to overlooked a fundamental step, given that the study deals with the	Due to the project conditions, the study was had to proceed based on the initial design of the project and the private sector will be responsible for preparing the studies after completing the detailed design. Therefore, the initial design was used in order not to impose on the private sector a specific design. However, a study was done to assess the environmental impact of the project concept to obtain initial approval on World Bank funding, and the World Bank will not agree to supplement the financing until after the commitment of the private sector to prepare	Chapter 2 "Project Description" clarifies the components of the entire project and what is within the scope of the ESIA study. The terms of reference for environmental impact assessment studies for the private sector responsible for the establishment and operation of the project are set out in Annex No. 11 of the ESIA, which include the obligation to

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	impacts on infrastructure without a detailed design. ▪ Explained that the percentage of organic waste in treatment rejections may reach 10 -15%, which will result in the generation of a leaching liquid in a small amount, for which a collection system must be designed. From the experience of 15th of May and Al-Wafaa Wa Al-Amal landfills, the leachate can be recycled to the landfill cell and used to generate methane gas, which can be collected for energy use.	an environmental and social impact assessment study for the detailed design of the project components. The quantities of leachate liquid expected to be generated during the detailed design phase of the project, which will be carried out by the private sector, will be studied and estimated according to the terms of reference established with this regard. Moreover, methane gas generation will be studied in terms of cost and the amount of gas generated, not on a hypothetical basis, and the private sector responsible for implementation will conduct this study.	estimate the quantities of the expected leachate
Dr. Walid Darwish **Ministry of Trade and Industry**	Will the Ministry of Industry have a role in terms of licenses and approvals for the site, or not? Will its role in inspection and monitoring after the recently signed protocol between the Ministry of Industry and the Ministry of Environment be in line with Law 15 of 2017 and Law 4 of 1994? The role of MSMEDA to support the waste collection system should be considered, by providing loans to	Waste treatment plants are classified as industrial facilities and will need coordination between EEAA in the matter of inspection and control The role of the Ministry of Industry will be bigger in the process of replacing solar-powered vehicles.	The third chapter of the ESMF study defines the legal and institutional framework for the project to reduce air pollution and climate change in Greater Cairo.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	small projects and awareness programs in the project area, training, etc.		
Dr. Laila Eskandar **Former Minister of Environment and Environmental Consultant**	1. There are about 250,000 waste processing workshops that will be affected by project implementation 2. The transportation cost must be included in the project 3. Waste transfer stations are not considered a successful model, such as the waste transfer station existing in Al-Basatin, which have become operating in ways that contradict the ideal system. 4. Sorting, pressing operations, and some polluted industrial stages are carried out in unlicensed workshops 5. There are small and medium companies stationed in 6 districts that	Dr. Khaled Al-Farra: The transfer stations will be established in accordance with the strategic plan for solid waste across the governorates and specify specific places for waste collection in them. From there, transport will be made to the final destination for disposal. Some works and budget from the Ministry of Planning were allocated within the infrastructure funds to construct waste transfer stations With regard to Al-Basatin station, it is currently operating temporarily until it is transferred to the new station in Muqattam, 1 km away, and it will be under surveillance over an area of more than 5000 square meters, equipped with the latest equipment and technology. All comments and opinions are welcome and the decision is taken in partnership with the Center of Excellence in Ain Shams, consultancies, Cairo University and Ministry of Local Development and Ministries of Industry, Investment, Planning and Finance are all partners in decision-making. **Dr. Ali Abu Sennah:** The project took into consideration not to close any workshops, as a	A second consultative session was held with stakeholders from the informal sector, which is shown in Table 2 of this study. While the transfer stations were covered by studying the general framework of the ESMF project, which provides for the conduct of detailed environmental studies for the handling stations.

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
	must be developed in place of the transfer stations 6. In terms of transportation cost, the resident will not bear it and the state does not have enough budget to bear it	decision based on a series of meetings will be issued within days to transfer the workshops located in Mansheyet Nasser to a safe place. The Ministry of Environment, through the EPAP project, has allocated a budget to transfer these industries and they are officially registered and provide modern technology to her Through the Ministry of Solidarity, the job title of workers for waste treatment workshops will be changed. Continuous consultations are held with El-Zabaleen in Qalyubia to move them to better places, in cooperation with the ministries.	
Dr. Omaima Sawan **National Research Center**	▪ Stated the importance of recording questions and responses and send them to the participants in the session ▪ • There's a need to involve the industrial community located near the project within the stakeholders	This comment is addressed in the eighth chapter of the study.	Chapter 8 "Public Consultation and Engagement" of this study.

8.3.3 Engagement post Project Preparation: Second Public Consultation Session

In view of the current conditions of the spread of the Corona virus and the commitment to social distancing, the public consultation session was held on July 22nd through a video conference using the Zoom program, to ensure easy and safe participation from home or workplace. It was a fruitful experience as about 44 participants attended and the following table shows the distribution of participants according to their affiliation. Annex 6 shows the registered attendees and their affiliations.

Table 8-6 Distribution of attendees according to their affiliation

Distribution of participants according to their affiliation	Numbers	Percentage (%)
Administrative officials from governorate level (WMRA, MoE, EEAA, ...)	٢	٤,٥
Administrative officials on local level (Qalyoubia governorate)	٤	٩
Consultants and experts	٨	١٨
World Bank	٥	١١
Waste sector (garbage collectors, waste contractors, yards owners, companies, suppliers and traders working in the waste sector)	٢٥	٥٧
Total	44	100

The invitees were informed of the date and method of holding the general consultative session at least two weeks prior to the meeting date. Qalyubia governorate invited the community and workers in Al Khusus district in the waste and garbage collection sector and invited them to the governorate center to attend the virtual meeting on Zoom application to facilitate the communication process with them.

The aim of the session is to present the results of the ESMF, with a focus on the environmental impacts resulting from the project, methods of mitigating negative impacts, maximizing the benefit from the positive effects, ensuring that the parties involved are satisfied with the measures to reduce environmental impacts and management plan, and targeting stakeholders from workers in the informal waste sector in Qalyubia Governorate, especially the district of Al-Khusus, due to their proximity to the site, their work activity, and the possibility of their direct impact by the sanitary landfill project in 10th of Ramadan and its other components.
In addition, this sector represents one of the main stakeholders in the project according to the Stakeholder Engagement Plan (SEP) that has been prepared for the project; this plan was developed to enable the participation of all parties and to ensure the implementation of the project and its activities in a participatory and inclusive manner, in ways that reduce potential environmental and social risks.

The following topics were presented during the public consultation session:

- Introduction about the project
- Objective of the project
- Project partners
- Project description
- Methodology of ESMF preparation
- Methodology of RF preparation
- Environmental laws applicable to the project
- Description of the environmental and social baseline
- Project's environmental and social impact assessment results
- Environmental and Social Management and Monitoring Plan

Most of the attendees actively participated in the session and came up with fruitful ideas for discussion. The figures below show screenshots of the meeting. Table 8-7 provides a summary of the main comments and concerns raised during the session.

Figure 8-6 A screenshot during the public consultation session from the Governorate center

Figure 8-7 A screenshot during the public consultation session

Table 8-7 Key questions and comments raised during the second public consultation session

Participant/ affiliation	Questions/Remarks	Response or approach in ESMF	Reflection in the Study
Mr. Hassan Shabeeb **One of the waste collectors and Head of (Friends of Environment Organization) in Al-Khusus District**	1. He mentioned that they had participated in several previous projects to improve the cleaning system and expressed his admiration and encouragement for the project under study. 2. He mentioned Qalyubia's need for an actual dumpsite / handling station and the importance of allocating a cleaning authority that would act as a regulatory body such as Cairo and Giza cases, that would coordinate between the contractors and give them a fee in return to offering door-to-door services. 3. He stressed on the importance of including Qalyubia in particular in the state's strategic plans for waste management, giving it priority and distributing funds equally for implementing waste management projects, due to the importance of its location, its high population and the increase in the number of informal settlements in it such as Al-Khusus.	**Dr. Amr Osama:** The state gives Qalyubia equal attention to all governorates, and as a start the sanitary landfill for the Qalyubia governorate is being implemented and the Abu Zaabal dumpsite is closed, and the comments on the handling station will be considered. **Dr. Khaled Al-Farra:** There is a general strategic plan on the national scale to improve the waste collection and transportation system in all governorates of Egypt equally, with the same fee categories that will be disbursed to cover the costs of collection from the source and transportation to the handling stations or the safe sanitary landfill. There will be no marginalization or discrimination for any governorate at the expense of another in terms of budget or funding. In consistency with these points, the Governor of Qalyubia and his deputy, Dr. Iman Rayan, are working on the ground level on the collection system from the source (the initial activity), and a general strategic plan to eliminate all internal problems of Qalyubia Governorate, and providing the available resources and mobilizing all the necessary funds for the infrastructure of the 10th of Ramadan Complex, as same as the funds	Outside the scope of the study of the ESIA of the 10th of Ramadan landfill for the Qalyubia governorate and the Shared C&D Treatment Facility for Cairo and Qalyubia Governorates, while it was covered the ESMF study, which recommends detailed studies to organize and raise the efficiency of collection and transfer stations.

	4. The problem of garbage accumulations in al-Khosas city must be solved, addressed and given priority because it directly affects livelihoods, and financial and human resources should be provided to address the problem of garbage collection and accumulation and the importance of dealing with contractors properly.	allocated to any other governorate without any discrimination.	
Ragab Hussein Salama **Garbage Yard Owner and Waste contracting Company**	1. The work in Al-Khusus must be paid to cover the expenses of labor, transportation, vehicles, and various activities. 2. After implementing the intermediate handling stations and contracting with private companies to manage and organize the collection and transportation for the stations, the work will be divided between these companies and the current workers in the informal sector, which will lead to a decrease in the number of housing units from which the collection is made, thus the revenue and fees collected will decrease, which will negatively affect their work and their source of income.	**Dr. Amr Osama:** The current project concerns the final treatment and the 10th of Ramadan complex, while the components related to contracts with the governorate and collection or intermediate transportation are considered and discussed with the governorate through numerous sessions and meetings with workers in the waste collection sector in the governorate. In addition to that, a consultation session will be held with all stakeholders in the future before any component is implemented and this is a separate core component of the World Bank framework as mentioned and detailed in the study. **Dr. Iman Rayan, Deputy Governor of Qalyubia:** in response to points 1 and 2, the project under study concerns the components that the World Bank finances, such as closing the Abu Zaabal dumpsite, establishing a sanitary landfill in 10thof Ramadan, a waste recycling plant, and so on.	Outside the scope of the study of the ESIA of the 10th of Ramadan landfill for the Qalyubia governorate and the Shared C&D Treatment Facility for Cairo and Qalyubia Governorates, while it was covered the ESMF study, which recommends detailed studies to organize and raise the efficiency of collection and transfer stations. The Resettlement Framework includes an illustration of the project impacts, the project impacts section 2.3.2 Negative Impacts; does not include yard owners as an affected category.

	3. Waste collection and separation yards should be developed and rehabilitated as they are an important component; Instead of imposing fines on garbage trucks and hindering their work. Whereas, no development work has been made, no grant allocated to them, or acknowledging the importance of their role in cleaning the governorate and collecting waste. 4. The owners of the garbage yards should be viewed from a development perspective, because they are official owners of the property, and their presence in the area is legal and not by force. Therefore, they should be involved in developing the collection and transportation system, put into focus in any plan, and not disregarded.	She also stressed that no activity would be carried out that would harm the owners of the yards and the people of Al-Khusus. As for employment contracts in the following stages, there are requirements in the terms & conditions booklet related to the necessity of including and coordinating with the owners of the yards, garbage collectors and any workers in the informal sector, and to also take their opinion into account in any component or scheme by consulting with them like the current session, as they are an essential part of the governorate. **Dr. Khaled Al-Farra:** The governorate works on a daily basis to coordinate all the problems related to the development of the collection and transportation system, and it also works with all the concerned parties, but all these points are outside the scope of the World Bank project under study and its financing, and what pertains to Qalyubia in this project. As for any activity related to collection and transportation, or when it is required to sign operating contracts with the private sector; all development partners such as yard owners and workers in the informal sector of waste collection and transportation are included in the terms and conditions booklet in detail, as well as any details related to their vehicles, needs are formulated in the form of a formal sector. **In response to point 3:** Dr. Iman Rayan emphasized the integrity and transparency of the governorate's work	The SEP developed for the project includes a clear program. The stakeholders will be informed and consulted about the project at various levels according to the Stakeholder Engagement Activities Program.

		with all available resources to solve the problem of Al-Khusus, Al-Akrasha and the yards' owners, provided that development takes place with and by them. Moreover, the governorate will work to register informal employees according to the procedures of the Ministry of Environment so that they are included and not affected in any negative way.	
Major General Nader Said **President of Al-Khusus District**	He expressed that as a citizen of the city, he is not preoccupied with large strategic projects, which certainly have a positive impact on Greater Cairo, but he is affected by what he sees daily in terms of accumulations of garbage in the streets and in front of homes, which causes health, visual and environmental impacts. This requires work to make the collection system efficient and successful, so that people feel the impact of the project in a	**Dr. Khaled Al-Farra:** With regard to the collection, transportation and cleaning plan, it has already been addressed in the national strategic plan for the management of the integrated system of municipal solid waste, which was approved by His Excellency the Prime Minister in 2018, and approved the financial resources required for improvement and development, and there were periodic follow-ups between The ministries concerned with the municipal solid waste management system represented by the Ministry of Environment as the coordinating entity, and the	Outside the scope of the study of the environmental and social impact assessment of the 10th of Ramadan landfill for Qalyubia governorate and the Shared C&D Treatment Facility for Cairo and Qalyubia Governorates ESIA, while it was covered the ESMF study, which recommends detailed studies to organize and

	tangible and effective way which encourages them to work and collaborate.	Ministry of Local Development as the implementing entity on the ground in cooperation with the various administrative authorities, whether at the governorate level or local councils. The infrastructure of some transfer stations and some landfills has begun in some governorates that need quick solutions to solve the waste problem in them, as well as the formulation of some guidelines for transportation and collection from the source to allow work for all parties on the ground, and the Ministry of Environment and the Ministry of Local Development are monitored since 2018-2019 from the Council of Ministers as a monitoring entity, while HE the President supervises at the ministerial level regarding the security, safety and health of the citizen during work performance, and ensuring all resources for the required infrastructure and development are provided. With regard to contracts, Cairo governorate started including the informal sector in the formal sector through private sector companies. In order to avoid all fears of marginalizing the informal sector and its workers, the waste authorities will be restructured in Greater Cairo to ensure the inclusion and participation of the private sector in the system, and the state will provide all resources and fees to the contractors so that they do not collect fees from more than one party, and unify the source of contracting and financing.	raise the efficiency of collection and transfer stations.
Dr Dahlia Lotayef	The consultant posed questions for discussion with the attendees:	**1- In response to the first question, Major General Nader Saeed:** There have been garbage contractors for more than 50 years in Al-Khusus district and yard	The transfer stations are outside the scope of the study of the environmental and social impact

Environmental Consultant – World Bank	1- It is planned to close and cover the Abu Zaabal dump, as it is considered a pollution hotspot that negatively affects the buildings and surrounding areas, and the presence of a landfill in 10th of Ramadan will reduce the accumulated waste directly due to its transportation and collection there, but will this indirectly have a negative effect on any activity in the area, and was there any benefit from the Abu Zaabal dump, and is there any proposal regarding the mechanism of transportation and collection? 2- If the system was regulated, operating contracts and terms were made with the bidding company, and it contracted with the sub-owners of the garbage yards to sort the waste in the intermediate transfer stations, what is the benefit that this company achieved from transporting the unsorted waste to the handling stations and sorting there instead of only transferring the waste left over from sorting to the transfer/handling station?	owners have been collecting, sorting the waste from Al-Khusus and Cairo Governorate, then take recyclable materials (i.e. fabrics or plastics) and return the remaining surplus waste to the intermediate transfer stations and finally to the landfill. But if a collection system is created directly from homes without allowing collection and sorting to the yard owners and their workers, the source of their income will be cut off and their activity will be negatively affected. However, it is better to allocate an intermediate transfer station with a sorting area for the waste collected by informal waste collectors and then leave the surplus at the intermediate stations (transfer) before transporting it to 10th of Ramadan through transport companies / contractors. **2- Hassan Shabib**: the waste will not be sorted at an intermediate transfer station, but it will be sorted from the source, then transfer or collect the remaining surplus to the transfer station free of recyclable materials. He noted that they want to feel included, involved, and communicated with directly to implement an up-to-date integrated system in which fees are collected in a formal and clear manner. **Dr. Amr Osama:** The intermediate stations and all their details and components will be discussed before implementing them through several community consultation sessions, with the participation of all groups and stakeholders transparently, taking all their	assessment of the 10th of Ramadan landfill for Qalyubia governorate and the Shared C&D Treatment Facility for Cairo and Qalyubia Governorates ESIA, while they were covered by the study of the general framework of the ESMF project, which provides for detailed environmental studies of the transfer stations. Section 4.3.4 of the informal sector for solid waste collection in Greater Cairo from the ESMF study includes statistical data on garbage collectors in Qalyubia Governorate, in addition to the number of workers currently employed in Abu Zaabal dump. The SEP developed for the project includes a clear program. The stakeholders will be informed and consulted about the project at various levels according to the Stakeholder Engagement Activities Program.

		opinions into consideration and ensuring their satisfaction.	
Dr Khaled Elfarra **WMRA Consultant**	The consultant asked a question for discussion with the attendees: What are the residues of the sorting because it is very important information and many technical and financing decisions are based on it, such as determining the size of the landfill and designing it by knowing the size and average amount of waste that will be disposed of, and the amount of waste that is sorted and taken before reaching the transfer station?	**Mrs. Iman Khalaf (Qalyubia Governorate Authority):** About 400-500 tons per day reach the city center after sorting and it consists of solid waste such as demolition and construction waste and things that cannot be recycled left after screening.	Section 1.1.2.2 Municipal Solid Waste Generation in Qalyubia Governorate, Chapter Two of the Environmental and Social Impact Assessment Study for the 10th of Ramadan landfill for Qalyubia governorate and the Shared C&D Treatment Facility for Cairo and Qalyubia Governorates includes statistical data on waste in Qalyubia Governorate.

8.3.4 Future Engagement Activities

The objectives of the future engagement activities are to provide continuous engagement with targeted stakeholder groups to inform about the activities, performance, development and implementation plans for all project components, that are important for successful management of a project's environmental and social risks. The stakeholder engagement plan SEP will include future consultation activities with different stakeholders.

Communication records will be maintained by MoE clearly logging the key information provided to stakeholders and also the key incoming communications into MoE (i.e. general questions, complaints, and queries via its main feedback channels http://www.eeaa.gov.eg/) along with a summary of the actions taken. For all MoE's stakeholder engagement activities the following information will be recorded on an on-going basis:

- Type of information disclosed, in what forms (e.g. oral, reports, newspapers etc.), and how it was released or distributed
- Locations and dates of meetings undertaken
- Individuals, groups, and / or organizations consulted
- Key issues discussed and key concerns raised
- Response to issues raised, including any commitments or follow-up actions
- Process undertaken for documenting these activities and reporting back to stakeholders.
- Implementation of the Stakeholder Engagement Plan (SEP) by the MoE.

This includes all public consultation sessions that will be conducted for all environmental and social impact studies that will be conducted for all project components. In addition to any other meetings or consultation activities with local communities or government stakeholders.

8.4 Grievance Mechanism

This section aims to highlight on the importance of the Grievance Mechanism and the main contents that should be included in the project's Grievance Mechanism during the different project life stages.

8.4.1 Grievance Mechanism Objectives

Grievance Mechanism is important to ensure that complaints are properly handled immediately and to ensure that information is shared transparently and that they are accountable to the hosting communities. A functioning Grievance Redress Mechanisms

(GRM) is considered to be a good feedback mechanism from the project affected persons and one tool of the citizen engagement.

The project should operate a comprehensive GRM procedure: leaflets, posters and brochures are prepared and distributed to the NGOs, local governmental units, mosques and churches. Thus, sufficient and appropriate information about the GRM should be shared with the communities prior to the construction phase.

Additionally, the World Bank's Grievance Redress Service (GRS) provides an additional, accessible way for individuals and communities to complain directly to the World Bank if they believe that a World Bank-financed project had or is likely to have adverse effects on them or their community. The GRS enhances the World Bank's responsiveness and accountability by ensuring that grievances are promptly reviewed and responded to, and problems and solutions are identified by working together. The GRS ensures that complaints are being promptly reviewed and addressed by the responsible units in the World Bank.

The objective of the Grievance Redress Service is to make the Bank more accessible for project-affected communities and to help ensure faster and better resolution of project-related complaints through the following link (http://www.worldbank.org/grs) and e-mail (grievances@worldbank.org).

8.4.2 Institutional Responsibility for Grievances

The entity responsible for handling grievances will mainly be the Environmental Affair Department within the relevant Technical Implementation Unit (MoE/EEAA/WMRA/CTA). The Social Development Officer (SDO) in the TIU in cooperation with the contractor should address all grievances raised by community members, particularly the ones related to resettlement activities. The main tasks related to grievances of the SDO are:

- Raise awareness about channels and procedures of grievance redress mechanisms
- Collect the grievances received through different communication channels
- Document all received grievances
- Transfer the grievance to the responsible entity
- Follow up on how the problem was addressed and solved
- Document, report and disseminate the outcome of received grievances
- Ensure that each legitimate complaint and grievance is satisfactorily resolved by the responsible entity
- Identify specific community leaders, organizations and citizen groups required to enhance the dialogue and communication through a public liaison office to avoid or limit friction and respond effectively to general concerns of the community
- Monitoring grievance redress activities.

During construction the contractor should accept all comments and complaints associated with the project from any stakeholder. Comments can be made via email, post, fax, on the telephone or in person. The comments and complaints will be summarized and listed in a Complaints/Comments Log Book, containing the name/group of commenter/complainant, date the comment was received, brief description of issues, information on proposed corrective actions to be implemented (if appropriate) and the date of response sent to the commenter/complainant. A telephone number should be available for the community people to tell their complaints.

8.4.3 Registration of GRM

All grievances should be registered and acknowledged within 6 working days and responded to within one month. The project management will keep a grievance log and report on grievance management, as part of annual project progress reports, which will be available for the purposes of monitoring and follow-up.

If the grievances or other disputes cannot be resolved through administrative action, and the appeal process (that takes place through the same grievance channels) for unresolved grievances; the aggrieved people can initiate legal proceedings in accordance with the provincial and the national law and have may recourse to the Appellate Courts and the Supreme Court but this should be maintained as a last option. The grievance mechanism should be set up and maintain in line with the WB ESS10.

8.4.4 Grievance Channels

Comments and concerns regarding the project can be submitted verbally or in writing to the relevant TIUs (MoE/ EEAA/WMRA/CTA) through the following channels:

- Hot line: 19808
- Telephone: 0225256470
- By post or hand delivered to: 30 Misr Helwan Agricultural Road - Maadi
- E-Mail: citiserv.eeaa@gmail.com
- WhatsApp: 01222693333

In addition to the complaint's channels of the Ministry of Environment, complaints can be submitted through the unified government Complaints portal in the Council of Ministers (E-Government Portal):

- Hot line: 16528
- Website: https://www.shakwa.eg

Specified grievance channels for GBV: The National Council for Women is running a dedicated grievance system for dealing with GBV cases. The system ensures anonymity of the complaints and ensures that specialized professional responses are offered as well as referral to existent support systems (e.g. women shelter)

- Complaints Office of National Council for Women: 15115

Confidentiality: Individuals have the right to submit their grievance anonymously if they wish to do so, and in case they agree to include their name they have the right for their names to be kept confidential.

8.4.5 Monitoring of Grievances

All grievance activities should be monitored in order to verify the process. The following indicators should guide the monitoring process:

- Number of received grievances per month (Channel, gender, age, basic economic status of the complainants should be included)
- Type of grievance received (according to the topic of the complaint)
- Number of grievances solved
- Level of satisfaction with grievance resolutions
- Documentation efficiency
- Dissemination activities done
- Efficiency of response to grievance provided (efficiency in time and action taken)

A Grievance Monitoring Report should be developed on a quarterly basis in order to keep track of all grievances developed. A separate grievance mechanism should be available in the same manner for workers, including employees of both the project-employed and contractors.

9 ESF IMPLEMENTATION AND MONITORING

9.1 Overall Project Implementation

The implementing agencies for the project are the Ministry of Environment and the Ministry of Local Development (MoLD). Other ministries to be involved in the implementation, executing agencies, are the Ministry of Health and Population, the Ministry of Transport and the Ministry of Electricity. The main executing departments will be the EEAA (the executive branch of the MoE), WMRA; the Central and Regional SWM Units of the MoLD; Cairo, Giza, Qalyoubia Governorates and Cairo Transport Authority.

With respect to capacity assessment, details on the available institutional arrangement with respect to structure (positions-levels-hierarchy) and experience and skills (e.g., ESF requirements) had not been defined at this stage. For this reason, with respect to structure, staffing requirements for PMU, TIU, and contractor team were defined in Tables 9-1 through 9-6; the present structure is currently under consideration by MoE to identify needs. With respect to experience and skills, ESF being a relatively novel set of standards, it is highly anticipated that capacity building will be required at all levels of the project.

Overall project management and implementation will be performed by one **Project Management Unit (PMU)** that will be established at the MoE.

The PMU will be responsible for:

Table 9-1 Responsibilities of the PMU

MoE/MoLD-PMUs Staffing Requirements	Overall project mandates	Capacity Requirements
Project manager	▪ Preparation of annual work plans and budgets for project implementation ▪ Contract external consultant, where needed- (e.g., appraisal of proposals submitted by private contractors for large scale infrastructural works to ensure compliance with ESMF) ▪ Holding the fiduciary responsibility for the entire project, including disbursal of loan/grant per project component financial management procurement, ▪ Communicating progress of project to the National Steering Committee ▪ Contract external third party for the verification of annual progress report and compliance with ESMF ▪ Revision, approval, and submission of progress reports every 3 months to the Bank	ESSs, ESMF

	▪ Performing all contractual agreements for Project. ▪ Drafting bidding documents (or call for proposals) accounting for ESMF compliance requirements for each sub-component	
Team leader **M&E specialist**	▪ Managing preparation of ESS instruments outlined in the ESMF for all components ▪ Approval of progress indicators for project components (defined by TIUs) for evaluation of progress ▪ Supervising Technical Implement Units for all components of the project including submission, evaluation and approvals of ESS instruments specified in ESMF ▪ Monitor and evaluate (M&E) compliance of project with environmental and social risk management plans based on progress reports submitted by TIUs against project progress indicators (quarterly) ▪ Preparation of progress reports every 3 months for submission to Bank	ESSs, ESMF
Social development officer	▪ Implementation of grievance mechanisms for workers and the community	ESSs, ESMF
Communications expert	▪ Implement SEP ▪ Communicate with identified stakeholders	ESSs, ESMF
Senior environmental specialist	▪ Reviewing progress reports on project implementation ▪ Providing suggestions for improvement on performance ▪ Performing ad-hoc site inspections to monitor compliance with ESS ▪ Preparation of ESS instruments	ESSs, ESMF

The organizational chart for PMUs is presented in

Figure 9-1

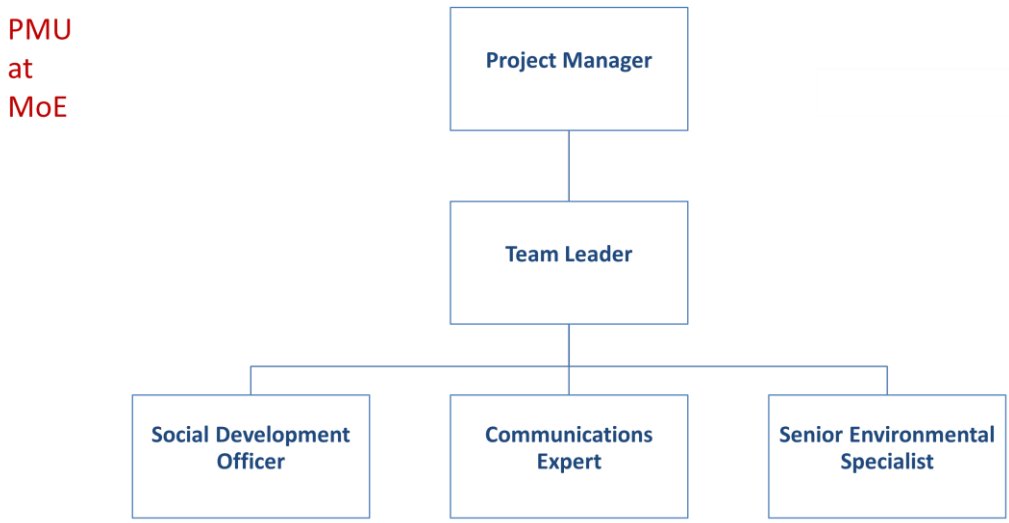


Figure 9-1 Organizational chart for PMU

A Joint Task Force (JTF) will be created to coordinate with PMU.

For components 1, 2, and 3 of the projects, **Technical Implementation Units (TIUs)** or Working Groups (WG) will be established and chaired by the relevant institution. For components with cross sectoral activities, the TIU or WG will be co-chaired by relevant institutions.

A high-level national steering committee (SC) chaired by the MoE and consisting of ministers and/or representatives from MoT, MoLD, MoERE, Ministry of Health and Population and local authorities from Governorates of Qalyoubia, Cairo, Giza will be established. The SC will be responsible for:

- Supervising project implementation progress against project indicators,
- Providing policy guidance to facilitate implementation of project (introducing tariffs, costs)
- Reviewing progress reported by PMU
- Approving work and budget plans prepared by PMU
- Taking corrective actions to sustain project implementation progress
- Approve mandates for implementing entities for project components
- Approval of site locations for waste component related activities

A Technical Secretariat (TS) composed of the head of the PMU and heads of TIUs will support the SC. The TS will be responsible for:

- Overseeing appraisal and approval of proposals/tenders of technologies for project sub-component implementation (landfill gas recovery technology, leachate collection system and lining);
- Liaise between TIUs and SC and PMU to communicate technical and financing needs reported by TIUs to SC and PMU
- Provide update on project implementation to SC to inform policy making, waste management plan of spent batteries
- Defining progress indicators, targets and milestones for each project component for progress evaluation

Third Party Review and Verification for compliance with ESMF

Annual progress reports will be subject to verification for compliance of associated project activities with ESMF. The external consultant should have experience with ESMF and ESS WB compliance. The consultant team should have an environmental management specialist and social development officers.

The organizational arrangement for project implementation is illustrated in the following figure.

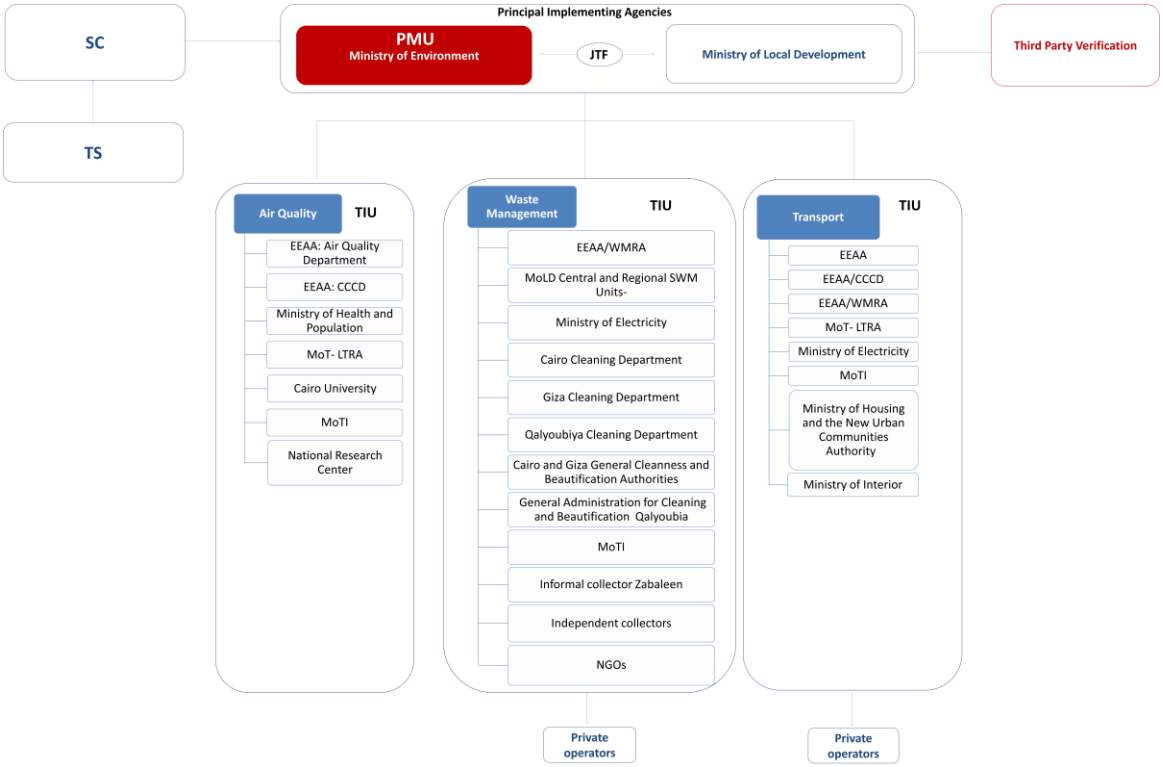


Figure 9-2: Organizational arrangement for implementation of the Project

9.2 Implementation Arrangements for compliance With WB ESSs

The implementation arrangements, staffing requirements, mandates, and capacity development needs for compliance with WB EESs relevant to each project component are described. Training topics associated with identified developing capacity needs are presented in Table 9-7 in section 9.5.

The general guidelines for the preparation of the environmental social integration plan for the project consist of including ESMPs in tendering documents, environmental and social risk and impacts assessments in feasibility studies, preparing all ESS instruments, monitoring and reporting on compliance with ESS and project implementation progress via systematic reporting. The private operator will implement the ESMP and prepare monthly reports submitted to the TIUs. TIUs will monitor and supervise implementation of ESMP and report to the PMU. PMU will report on progress and implementation of ESMP via progress reports submitted to the Bank every 3 months.

9.2.1 Component 1

Component 1 pertains to air quality information systems including installation of monitoring stations, developing emissions inventory, and assessing socio-economic impacts related to improved knowledge on air quality. This sub-component is relevant to

the ESS1, ESS3 (Resource efficiency and pollution prevention management.) The project component is anticipated to generate positive environmental impacts (relevant to pollution prevention management (via informed decision-making)

Institutions having responsibilities within the scope of Component 1 consist of the EEAA (under MoE) and departments within it, namely, Central Department of Air Quality and Noise Protection Environment Quality Sector, the Central Climate Change Department, the Ministry of Health and Population, Ministry of Transport, Cairo University, and National Research Center.

The TIU will be co-chaired and consist of staff from all aforementioned institutions.

Responsibilities of the TIU for Air Quality are presented in Table 9-2.

Table 9-2 Responsibilities of TIU for Air Quality

TIU Air Quality	Staffing Requirements	Component 1 Mandates	Capacity Requirements
MoE/EEAA	Project manager-	▪ Overseeing overall project implementation ▪ Monitor external consultants/technicians to support implementation of project including installation/operation of monitoring stations, upgrade of AQM, development of emissions inventory ▪ Revision and submission of monthly progress reports to PMU	Air quality policy, AQM systems
MoE/EEAA	Team leader (senior environmental specialist)	▪ Approval of monthly reports prepared by each department/entity in TIU (CCCD, Air Quality) and submission to PMU ▪ Define project sub-component progress indicators	Air Quality Index system development and operation- knowledge on existing methodologies, measured data analysis and treatment for forecasting,
MoE/EEAA	Environmental specialist	▪ Overseeing day-to-day implementation of project ▪ Review bi-monthly progress reports prepared by Air quality expert and GHG accounting expert ▪ Prepare monthly progress report for submission to Team Lead and then PMU	AQM systems
MoE/EEAA	Project coordinator- general staff	Coordinate between CCDD, Air Quality departments, MoHP, MoT, CU, NRC for data exchange (e.g., data for GHG emissions estimations)	-
EEAA: Central Department of Air Quality and Noise Protection Environment Quality Sector	Air quality expert	▪ Monitoring proper functioning of monitoring stations in new locations/zones ▪ Managing operation of monitoring system: monitoring data acquisition, data base, and associated data processing and forecasting, server and database administration, ▪ Defining requirements of website to website developer ▪ Prepare bi-monthly report on progress of installation and operation of monitoring stations	Air Quality Index system development and operation- knowledge on existing methodologies, measured data analysis and treatment for forecasting,
	Air quality systems technicians	▪ Installation of monitoring stations,	

	Website developer/IT support	Website Development and launching of upgraded AQM system: website upgrade AQI website operation and maintenance	Website development, handling large data sets, AQI development
EEAA: Central Climate Change Department,	GHG accounting expert	▪ Developing the calculation sheets for estimation of mobile source emissions in the emissions inventory ▪ Prepare bi-monthly report on progress of emissions inventory development	Emissions estimates methodology
Ministry of Health and Population,	Environmental Health Specialist	Determine and lead preparation of required studies relating to health, socio-economic impacts of air quality policies Coordinate and collaborate with Cairo University and NRC for preparation of studies	Health messages and advice formulation
Ministry of Transport, LTRA	TBD	Provision of relevant data for studies (e.g., bus routes, traffic information)	-
Cairo University (CU)	Researcher	Collaborate with Ministry of Health and Population for preparation of studies Provision, analysis of relevant data	-
National Research Center (NRC)	Researcher	Collaborate with Ministry of Health and Population for preparation of studies	-

9.2.2 Component 2

Component 2 pertains to solid waste management and involves construction works and operation of the new landfill facilities, construction of transfer stations, closing and rehabilitation of Abu Zaabal dumpsite. Institutions having responsibilities within the scope of Component 2 consist of the EEAA (under MoE), WMRA, MoLD, and Cairo, Giza, Qalyoubia governorates and Ministry of Trade and Industry. The TIU/WG for waste will include representatives from aforementioned institutions.

Responsibilities of the TIU for SWM are presented in Table 9-3.

Table 9-3 Responsibilities of TIU for SWM

TIU Waste	Staffing Requirements	Component 2 Mandates	Capacity Requirements
MoLD/EEAA	Project manager-Senior Environmental Management Expert	▪ Overseeing overall project implementation by private operator engaged for construction and operation of new integrated waste facilities, and transfer stations, and closure and upgrading of Abu Zaabal and Akrasha recycling and industrial zone, respectively ▪ Submission of recommendations for evaluated proposals/project documents (prepared by bidding contractors) to PMU for discussion and approval from SC	ESMF, ESIA (including ESMP) evaluation criteria ESS
MoLD/EEAA	Team leader Senior Environmental Management Expert	▪ Overseeing day-to-day project activities ▪ Monitoring progress of each sub-component by reviewing progress reports prepared by each department/entity in TIU ▪ Reporting to project manager on project implementation ▪ Supervising all contracted entities ▪ Monitor compliance with ESMF and update as needed ▪ Defining project sub-component progress indicators	ESMF, ESIA (including ESMP) evaluation criteria ESS
EEAA-WMRA	Risk assessment expert Senior SW and hazardous waste management specialist	▪ Evaluation of project documents such as feasibility and engineering design studies and proposals to be prepared by private contractors for all components where design options are open ▪ Conduct environmental and social internal audits to verify compliance with ESMF	Appraisal of project documents, hazardous waste management
	Mid-Level Solid Waste Management Specialist Health and safety specialist Environmental Field officers	▪ Reviewing progress reports submitted by: ○ Private contractors engaged for each sub-component and ensuring compliance with ESMF ○ Cleaning and Beautification agencies for each governorate (responsible for managing collection, transport and disposal at final location) ▪ Monitoring of proper collection, transport, disposal performed by contracted entities	HSE guidelines for SWM, ESMF compliance

		○ IWF: site and surrounding supervision ○ Transfer stations: monitoring issued licenses for acceptance of waste ▪ Prepare monthly progress report for submission to Team Leader and then PMU	
EEAA	General staff	▪ Verifying all project document such as permits, approvals, clearances are submitted by private contractor ▪ Maintain records for all documents relevant to ESMF (e.g., submitted reports, accident reports/corrective actions)	Record keeping and documentation systems
MoTI	Procurement specialist	▪ Performing (or coordinating with MoE) procurement contracts for machinery and equipment required for project	ESS and requirements for machinery specifications
M o Electricity	Senior Approving Authority	▪ Granting approvals for Energy requirements for operation of IWF	-
	Senior level engineer	▪ Reviewing and approving proposal for electricity needs-connection to power grid ▪ Overseeing infrastructural works for connection to grid (if IWF will be connected to grid)	-
MoLD- Central and Regional SWM Units-	Senior official (contractual authority)	▪ Performing local contractual agreements for waste transport and disposal across GCA with contracted private companies, ▪ Issuing permits for private companies for waste management activities ▪ Issuing of licenses for waste acceptance (in transfer stations and landfills)	ESS, ESMF
Cleaning Department (for each governorate)	Senior official (contractual authority)	▪ Contracting NGOs, informal sector for collection, transport, and disposal of waste for respective governorate ▪ Issuing permits for NGOs, Informal sector for waste management activities	
Cairo and Giza General Cleanness and Beautification Authorities, General	Waste management expert Social development officer	▪ Manage proper collection, transport, disposal at governorate level of transport vehicles ▪ Compile and address community related grievances ▪ Maintain grievance database ▪ Prepare progress report submitted to WMRA (during operation phase) on collection, transport and disposal in designated sites/facilities	ESS, ESMF, industry specific HSE

Administration for Cleaning and Beautification in Qalyoubiya-			
NGOs	Waste management specialist	▪ Responsible for the provision of waste collection services	Awareness raising on ESS, ESMF, industry specific HSE
Independent collectors	Waste management specialist	▪ Responsible for the provision of waste collection services	Awareness raising on ESS, ESMF, industry specific HSE
Informal collector	Waste management specialist	▪ Responsible for the provision of waste collection services	Awareness raising on ESS, ESMF, industry specific HSE

The private contractors will be responsible for:

Table 9-4 Responsibilities of the private contractors

Project manager – Senior level Waste Management Expert	▪ **Supervising and coordinating all components of the project during its lifetime** ▪ **Complying with all ES impact and risks management plan outlined in the ESMF** ▪ **Obtaining all required permits and clearances prior to construction**
Waste Management specialists	Performing *or contracting external consulting firm for preparatio*n of all project preparation studies including feasibility studies and engineering design studies for relevant sub-components where detailed engineering design were open at the time of the ESMF preparation, i.e., Integrated waste facilities, dumpsite rehabilitation
Senior Environmental Management Specialist **Senior Social Development Officer** **QRA Specialist**	Preparing *or contracting external consulting firm for preparation* of all ES instruments as per ESMF for relevant sub-component including: ESIAs, QRAs, air dispersion modeling, odor modeling, waste management plan, labor management plans and all other studies identified in the ESMP
Monitoring and evaluation specialist	Supervising compliance with ESS as per ESMF Preparing and submitting progress reports to TIU
Senior HSE specialist	Developing and complying with labor management plan including provision of HSE training, emergency preparedness and response plan for all phases of the project under their control

Social development and communication experts	Complying with grievance mechanism system in the ESMF including reporting and documenting any grievances

9.2.3 Component 3

Component 3 involves procurement, deployment, and management of electric buses in GCA. The CTA is the main implementing institution. The WMRA is also relevant since the project activities will result in generation of hazardous waste requiring proper disposal. The Ministry of Electricity is also involved since the project will require power supply from the national grid.

The TIU WG will include representatives from CTA, MoT, MoE/EEAA, WRMA, Ministry of Electricity, and Cairo Governorate. Responsibilities of each entity are outlined below.

Responsibilities of the TIU for e-buses are presented in Table 9-5.

Table 9-5 Responsibilities of TIU for E-buses

TIU E-Buses	Staffing Requirements	Component 3 Mandates	Capacity Requirements
MoE/EEAA	Project manager	▪ Reporting to the PMU on project implementation and submission of monthly progress report ▪ Reviewing progress reports submitted by private contractors engaged for each sub-component ▪ Supervising private contractors to ensure compliance with ESMF ▪ Contracting operators for all infrastructural works including charging stations, upgrades of existing bus depot to support operation and maintenance of e-buses, and for the operation and maintenance of the new fleet of electric buses ▪ Define project sub-component progress indicators ▪ Approval of waste management plan for spent batteries	ESS, ESMF, hazardous waste management options
	Senior Environnemental management expert	▪ Supervising and monitoring compliance of private operators with ESMF ▪ Perform ad-hoc site inspection of charging stations and electric bus fleet ▪ Reviewing monthly progress reports by private contractor	
EEAA/CCCD	GHG accounting expert	▪ Quantifying GHG reductions from e-buses	GHG accounting
EEAA-WMRA	Hazardous waste management expert	▪ Appraising/evaluating proposals from private bidding companies including waste management plan for spent batteries	ESS, ESMF, hazardous waste management options
MoT- Land Transport Regulatory Authority (LTRA)	Traffic/transport planning experts	Defining bus routes Coordinating with MoHNUCA for evaluation and selection of bus routes	ESS, ESMF
Ministry of Interior	General administrative staff	▪ Issuing of new e-buses vehicle licensing and registration	-

Ministry of Housing and the New Urban Communities Authority (MoHNUCA)	High level approval authority	▪ Approval of bus routes	ESS, ESMF
MoTI	Procurement specialists	▪ Defining specifications for e-buses and associated charging equipment to be procured ▪ Procuring e-buses and all equipment relevant to operation and maintenance ▪ Contract drafting including Extended Producer Responsibility, if applicable	ESS, ESMF, hazardous waste management
MoElectricity	Engineer/specialist for power supply infrastructure	Provide the required electricity and infrastructure for charging stations of the e-buses Provide approvals for electricity supply to operate charging stations	ESS, ESMF, HSE

The private contractor for operation and maintenance of new electric bus fleet will be responsible for:

Table 9-6 Responsibilities of the private contractor for operation and maintenance of new electric bus fleet

Project manager	**Prepare progress reports submitted to the TIU/WG**
E-waste management experts	Evaluating options and developing a waste management plan for disposal of spent batteries (recycling, through Extended Producer Responsibilities)
Environmental expert Social development expert	▪ Complying with ESMP referenced in this ESMF ▪ Preparation of ESS instruments and submission to TIU for approval ▪ Complying with grievance mechanism system in the ESMF including reporting and documenting any grievances To be further elaborated
Health and safety expert	▪ Developing and ensuring compliance with labor management plan

Monitoring and evaluation specialist-Engineer (regular monitoring of maintenance and operation of charging stations and e-buses)	▪ Monitoring operation and maintenance of charging stations and e-buses including proper handling of hazardous waste
Technician/engineer	▪ Perform routine maintenance of charging infrastructure and e-buses

9.3 Implementation Arrangements for Environmental and Social Monitoring

The PMUs will be responsible for overall monitoring of implementation of the project in compliance with ES safeguards according to defined indicators in the ESMP. The PMU will report monitoring results to the SC. Each TIU will be responsible for monitoring of its respective component.

9.3.1 Component 1

Component 1 is an analytical component, implications on environmental and social safeguards relate to proper/accurate functioning of systems. Monitoring activities will include ensuring regulation maintenance of monitoring stations and QA/verification of systems to allow accurate measurements.

9.3.2 Component 2

Component 2 consists of high-risk construction works and operation. Monitoring of environmental and social safeguards will consist of complying with site specific ESMP. The private contractor team will be responsible for monitoring the compliance with ESMP. The TIU/WG will also conduct site supervision.

9.3.3 Component 3

Component 3 involves minor construction works (charging station infrastructure and warehouses). ES impacts and risks to be monitored relate to the operation and maintenance of the new busses and generation of hazardous waste. The TIU/WG will be responsible for conducting site visits (warehouses, bus depot containing the charging stations), and verifying register accuracy.

9.4 Reporting

The PMU will prepare bi-annual progress reports covering all project components to be submitted to the SC prior to bi-annual meetings and to the WB. Reporting on incidents should be immediate to the PMU and within 24-48 hours in case of serious or severe accidents.

TIUs will prepare monthly progress reports to be submitted to the PMU. Private contractors will provide monthly reports on progress of relevant project activities to the TIU. The progress reports will contain monitoring results against specific project target indicators for each component and compliance with ES safeguards.

9.5 Training and Capacity Building Needs for Compliance with WB ESSs, National Requirements, and Environmental and Social Standards Implementation, Supervision and Reporting

ESF being a relatively novel set of standards, it is highly anticipated that capacity building will be required at all levels of the project.

Capacity development needs for implementing entities to ensure compliance with WB ESSs, national requirements, and environmental and social standards Implementation, Supervision and Reporting during the life cycle of the project were identified in section 9.2. Training topics associated with developing capacity needs are presented in Table 9-7.

Table 9-7 Training and Capacity Needs for compliance with ESF

Training topic	Targeted Entity	Trainer	Estimated cost of training (EGP)
ESMF overview	PMU, TIUs	External consultant	20 000/ 1 day
ESIA-ESMP	Operators (for all activities under component 2)	External consultants (EHS and Social development) MoE/ EEAA	60 000/3 days
SWM Operation and monitoring of new SWM units and compliance with relevant ESSs	TIU Private operator	External consultants	60 000/3 days
SWM: Developing of bidding document (collection, transportation, and disposal) accounting for relevant ESSs	TIU Private operator	External consultants	20 000/1 day
SWM: Capacity assessment of local waste management entities	TIU	External consultants	40 000/2 days
SWM: EHS compliance Code of conduct Labor management plan Special risk and hazard management/ERP and compliance with relevant ESSs	Private Operators	External consultants (EHS and Social development) MoE/EEAA	60 000/3 days
Procurement of e-buses (tendering, proposal evaluation, contract drafting to ensure compliance with ESSs)	TIU: MoT CTA	External consultants	20 000/1 day
New technologies operation and maintenance including EHS of handling chargers and e-buses and	LTRA or private operator	External consultants MoE/EEAA/WMRA	60 000/3 days

e-waste management- and compliance with relevant ESSs			

10 ENVIRONMENTAL AND SOCIAL INSTRUMENTS REQUIRED BY THE ESF

The Project consists of components requiring physical interventions (Components 2 and 3) and technical assistance (Components 1, 4, and 5). Physical interventions associated with components 2 and 3 will consist of construction and operation of large infrastructures involving general activities such as excavation, use of equipment and machinery etc., and more specific ones, such as handling various types of wastes and associated hazards such as fire and explosions. Impacts and risks on sensitive receptors were preliminarily identified and assessed and relevant ESSs defined for construction, operation, and decommissioning phases (where applicable).

The Project will require development and implementation of Environmental and Social (ES) Assessment instruments to comply with the ESF requirements against preliminarily identified risks and impacts. ES instruments, sub-management plans and other studies required for the Project were identified. The general description of each identified instrument is provided in Table 10-1 and the applicability of relevant instrument by project component and sub-component including additional specific details is presented in Table 10-2.

Table 10-1: Description of scope and applicability of environmental and social instruments, sub-management plans, and studies for project components

Environmental and Social Instrument, Sub-management Plans and other Studies	Description of Objectives, Scope, and Applicability	Relevant Component(s)
Site specific ESIA including ESMP	For sub-components resulting in high-very high environmental and social impacts. The ESIA determines and assesses impacts and risks on environmental and social receptors, describes alternative options to the project and related impacts. The ESIA includes an ESMP consisting of tailored measures for prevention, minimizing, and mitigation of identified risks and impacts, and monitoring plan of measures to safeguard environmental and social receptors including parameters to be monitored, frequency of monitoring and responsible entity. The ESIA covers all phases of the project components: construction, operation, and decommissioning phases. The spatial scope includes activities within the project boundaries and external infrastructural works such as public networks, underground utilities etc. The ESIA will addresses, at a minimum, all preliminary negative impacts and risks of project activities on sensitive receptors identified in ESS2-ESS3-ESS4-ESS5 in the ESMF. The ESIA will include sub-management plans such as waste management plans, SEP, labor management procedures, risk assessment, where applicable. A full ESIA should include Public Consultation activities. Details provided in Table 10-2. A template for ESIA and ESMP outlines are presented in Annex 2: ESIA Outline and Annex 3: Site-Specific ESMP Outline, respectively.	Components 2.
Site specific ESMP	For sub-components resulting in medium-high environmental and social impacts. The ESMP defines measures and associated actions to be implemented to eliminate or minimize (to acceptable levels) negative impacts on environmental and social receptors, defines monitoring measures including parameters and indicators for monitoring, frequency and responsible entities, requirements for third party verifications. The site specific ESMP will addresses, at a minimum, all preliminary negative impacts and risks of project activities on sensitive receptors identified in ESS2-ESS3-ESS4-ESS5 in the ESMF. Details provided in Table 10-2.	Component 2 Component 3
ARP/RP	For sub-component requiring acquisition of land resulting in temporary or permanent displacement of livelihoods and/or resettlements Details provided in Table 10-2.	Component 2

Environmental and Social Instrument, Sub-management Plans and other Studies	Description of Objectives, Scope, and Applicability	Relevant Component(s)
Risk Assessment	For sub-components involving dangerous materials resulting in high-risks (environmental or social) . The risk assessment identifies types and quantities of materials generated and/or present at the site and analyzes associated risks and hazards on environmental and social receptors, and defines measures to control identified risks and hazards. Details provided in Table 10-2.	Component 2
Baseline Site Assesssment (BSA)	For sub-components requiring site selection and for which activities result in high risks and impacts on environmental and social receptors. The Baseline Site Assessment assesses suitability of proposed locations for the project to be developed in compliance with ESSs. The baseline site assessment addresses factors that may impact compliance with ESSs including site characteristics such as contamination levels, topography, geological, and hydrological characteristics, climate and weather characteristics such as wind speeds and direction, seasonal temperatures, and precipitation, vulnerability to natural disasters, regulatory compliance issues, land property issues. Details provided in Table 10-2	Component 2
Waste management plans (WMP)	For sub-components resulting in generation of waste. The waste management plan identifies types and quantities of waste from project activities, defines management and monitoring plan for minimizing, avoiding risks and impacts of generated waste on relevant receptors, defines procedures for collection, storage, handling, and disposal of waste and associated monitoring procedures such as site inspections, parameters to be monitored such odor and other gaseous emissions and other requirements (e.g., disposal contracts) Details provided in Table 10-2.	Component 2 Component 3
Traffic impact assessment studies (TIA)	For sub-components resulting in traffic impacts on public roads. The traffic impact assessment includes description of existing traffic conditions (descriptions of the surrounding road network structure, traffic volumes, road safety issues, type of transport utilizing the roads etc.) likely to be impacted by the project during all phases, description of traffic to be generated by the project, e.g., estimated volume of traffic and types of vehicles (procurement of additional trucks and/or use of existing fleet etc.) and associated assumptions for estimations, measures to minimize or avoid traffic impacts such as temporary re-routing, use of traffic safety signs etc. and permanent measures such as construction of additional roads (extensions of public network etc.), traffic management plan Details provided in Table 10-2.	Component 2 Component 3

Environmental and Social Instrument, Sub-management Plans and other Studies	Description of Objectives, Scope, and Applicability	Relevant Component(s)
Labor management procedure (LMP)	For sub-components involving labor. The labor management procedures cover working conditions and management of worker relationships including code of conduct, terms and conditions of employment for all types of workers involved in the project, measures for protecting the work force including prevention of child and forced labor, defines grievance mechanism for workers, assesses potential risks, defines policies and procedures and measures to manage occupational health and safety risks (e.g., Good Practice Guidelines), state guidelines on child labor and GBV prevention, special training plan beyond regular OHS practices such as use of PPE etc. The LMP are required for the whole project and the OHS plan is required for components 2 and 3. The latter will cover the following themes: • Identification of all potential hazards affecting the physical, mental and social well-being of project workers in all occupations, with focus on life threatening hazards • Provision of appropriate measures to prevent and protect against the potential hazards, including modifying, substituting, or eliminating the hazard sources • Training plan for all project workers in all occupations, including general OHS trainings, as well as job-specific trainings. A training log will be developed and regularly updated, and the plan shall be regularly updated to ensure all workers are well capacitated with the project's OHS requirements • Development of a transparent grievance mechanism that is proportionate to the nature and scale of the potential risks and impacts of the project • Formal reporting and documentation mechanisms for all work-related accidents, illnesses, and all other incidents • Emergency response plan including prevention and preparedness procedures • Providing appropriate remedial action and compensation for adverse impacts including work-related accidents, illness, disability, and deaths. **Error! Reference source not found.** provides further description to the s tructure and components of the OHS plan, with specific elements relevant to each of the two components. Details provided in Table 10-2	Component 2 Component 3

Environmental and Social Instrument, Sub-management Plans and other Studies	Description of Objectives, Scope, and Applicability	Relevant Component(s)
Pest Management Plan (PMP)	For sub-components involving waste that can result in attraction of pests and spread of diseases. The PMP defines measures and practices to manage pests including rodents Details provided in Table 10-2.	Component 2
Stakeholder Engagement Plan	For sub-components involving activities impacting stakeholders, which include interest group	Component 2 Component 3

ES instruments and other required studies per component and project phase are presented in Table 10-2. Sub-project phases consist of 1) Concept, 2) Planning 3) Construction 5) Operation and 6) Decommissioning. Key components described in Table 10-1 are applicable in addition to the specific elements listed in Table 10-2.

Table 10-2: Environmental and social instruments and other required studies per project component

Component 2: Construction of transfer stations						
Relevant ESSs	**Data Availability**	**E&S instruments and other studies**	**Key components (in addition to description in Table 10-2)**	**Project phase**	**Entity**	**Notes**
ESS1, ESS3	Site location not selected	BSA		Concept	PMU	Approvals: WMRA/MoLD
	Potential environmental and social impacts not identified	Site specific ESIA-ESMP WMP, TIA, PMP		Planning	PMU	Coordination and approvals by LTRA for traffic issues Include ESMP as compliance requirement in bidding documents and contracts
ESS2	LMP developed for the GCAPCCP project	Adopt, and implement the LMP including workers GRM and the development of project-specific OHS plans		Planning	PMU	Include as commitments in the bidding documents and as a commitment in the ESCP
ESS4		Communication strategy Grievance mechanism	Awareness raising on Health and safety	Planning, Construction Operation	PMU	*Addressed by implementation of measures and compliance with guidelines defined* in: ESIA-ESMP, LMP, WMP, TIA including Traffic Management Plan, and SEP
ESS5	Site location not selected	ARP/RP may be required		Planning	PMU	
ESS8		Chance find procedures		Construction	PMU	
ESS10	SEP developed for the whole project	Adopt, implement and update the SEP		Planning, Construction, Operation	PMU	

Component 2: Establishing of IWMF-10R and Hazardous Waste Facility)						
Relevant ESSs	Data Availability	E&S instruments and other studies	**Key components (in addition to description in table)**	**Project phase**	Entity	Notes
ESS1, ESS3	**Data available** 10R: 1- Geological study 2- Geophysical study 3- Geotechnical study 4- Hydrological study 5- Air measurements 6- Traffic study 7- Siting plan Hazardous waste facility: ESIA for candidate site of Kuraymat, and a Gap analysis against the WB ESF for the developed ESIA) **Data unavailable** 10R: detailed design for the landfill and project design for Combined/shared healthcare waste (HCW) facility; and	**BSA** • 10R: Shared HCW facility: • 10R Shared C&D waste facility • Hazardous waste facility (if decided to be in IWMF-10R)	**BSA:** Geological, groundwater profile and direction, wind speed and direction, precipitation	Concept	PMU	Hazardous waste facility: ESIA requiring updates and revisions due project scope change including SWM to hazardous waste and potential site change, where the previously planned location, Kuraymat, is just a 'candidate site' at this stage.
		Cumulative Impact Assessment (CIA), TIA, PMP for 10R (entire IWMF) **Scoped ESIAs including ESMP, TIA, PMP for**: 10R • MSW cell, • Shared HCW facility; • Shared C&D waste facility, • Hazardous Waste Treatment facility	**10R (MSW, HCW) and Hazardous waste facility:** Control technologies for leachate and landfill gas **10R (HCW) and hazardous waste facility:** Waste Acceptance Criteria procedures: characterization, compliance testing, on-site verification	Planning	PMU for the CIA Private operator for scoped ESIAs/ESMPs	Include ESIA as compliance requirement in bidding documents and contracts Include national guidelines for SWM ESIA in bidding documents WAC procedure to be defined once types of hazardous wastes to be disposed are determined

	combined construction and demolition (C&D) waste facility <u>Hazardous waste facility:</u> - Site selection - Project design - Types of hazardous waste to be accepted <u>10R and hazardous waste facility</u>: Impacts and mitigation of project activities Description of additional plans for external infrastructure works	**Decommissioning plan**: Landfill assessment and closure plan	Methods for rehabilitation, identification of unstable slopes, drainage control systems, leachate management, gas management, soil coverage material	Operation		
ESS2	LMP *developed for the whole project*	Adopt, and implement the LMP including workers GRM and the development of project-specific OHS plan		Planning	Private operator (develop and implement)	Include as commitments in the bidding documents
ESS4		Communication strategy, Grievance mechanism		Planning	PMU	*Addressed by implementation of measures and compliance with guidelines defined in*:

						ESIA-ESMP, LMP, WMP, PMP, TIA including Traffic Management Plan,
ESS5	Hazardous waste facility: Site not determined	Hazardous waste facility: RP may be required		Planning	PMU	
ESS8		Chance find procedures		Construction	PMU	
ESS10	SEP developed for the whole project	Adopt, implement and update SEP	Strategy on coordination with NGOs, Training programs to qualify and integrate workers in the informal sector (especially women) into the new waste management system Continuous consultation with stakeholders involved in waste management	Planning, Construction, Operation	PMU	
Component 2: Closure of Abu Zaabal dumpsite						
Relevant ESSs	**Data Availability**	**E&S instruments and other studies**	**Key components (in addition to description in table)**	**Project phase**	**Entity**	**Notes**
ESS1, ESS3	No closure method determined No site contamination level and risk assessment	ESIA	Control technologies for leachate and landfill gas, soil stability and decontamination assessment	Concept	PMU	
			Dumpsite assessment: geology, types of waste disposed, contamination levels of surrounding area (soil,	Concept	PMU	

			water bodies), historical records, incidents			
		Closure plan	Methods for rehabilitation, identification of unstable slopes, drainage control systems, leachate management, gas management, soil coverage material	Concept	PMU	
ESS2	LMP *developed for the whole project*	Adopt, and implement the LMP including workers GRM and the development of project-specific OHS plan	Health and safety guidelines for handling landfill gas, and dealing with hazards related to gas leakage, slope stability,	Planning	PMU	Include in bidding documents as commitments
ESS4		Communication strategy, Grievance mechanism		Planning	PMU	*Addressed by implementation of measures and compliance with guidelines defined in*: ESIA-ESMP, LMP, WMP, PMP, TIA including Traffic Management Plan,
ESS10		SEP: Continuous consultation with stakeholders involved in waste management	Strategy on coordination with NGOs, Training programs to qualify and integrate workers in the informal sector (especially women) into the new waste management system to reduce impacts from potential loss of livelihoods	Planning, Construction, Operation	PMU	Continuous consultation with stakeholders involved in waste management
Component 2: Sub-component 2.4 Upgrading of Akrasha Recycling and Industrial Zone (Technical Assistance)						

Relevant ESSs	Data Availability	E&S instruments and other studies	Key components (in addition to description in table)	Project phase	Entity	Notes
ESS1, ESS3	No project description, boundaries defined	Site specific ESIA including ESM		Concept and planning	PMU	
ESS2	LMP *developed for the whole project*	Adopt, and implement the LMP including workers GRM and the development of project-specific OHS plan		Planning	PMU	
Component 3: Charging stations and e-buses						
Relevant ESSs	**Data Availability**	**E&S instruments and other studies**	**Key components (in addition to description in table)**	**Project phase**	**Entity**	**Notes**
ESS1, ESS3	Preliminary impacts and mitigation measures defined	Site specific ESMP WMP,	Scope: Identify disposal opportunities for spent batteries constituting hazardous waste, storage of hazardous waste	Planning	PMU	
ESS2	LMP *developed for the whole project*	Adopt, and implement the LMP including workers GRM and the development of project-specific OHS plan	guidelines for health and safety risks due to charging station infrastructure and electrical works	Planning	PMU	
ESS4					Private operator	*Addressed by implementation of measures and compliance with guidelines defined in*: Site specific ESMP

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12 ANNEXES

12.1 Annex 1: Egyptian Code of Design and Implementation Requirements of Sanitary Landfill Systems

Chapter Nine: Requirements for Sanitary Landfill System

9.1 Scope

This chapter includes requirements for the design, construction and operation of landfills and the closure of landfills and dumpsites, as well as the steps of landfills site selection. This chapter addresses consultants, the governorates, the city agencies and the local unit officials concerned with the disposal of waste and the closure of the dumps and private sector companies operating in the construction and operation of landfills.

9.2 Locating the landfill

The location of the landfill site should be determined by following 4 steps as follows:

Step 1: Collect maps and exclude sites having any of the following exclusion criteria:

- Located in floods area
- The site is a collection point for rainwater
- Located in areas with a groundwater level close to the subsurface (≤ 1 m)
- The surrounding areas are planned as residential areas.
- The location is less than 500 m from the nearest residential area
- Located within an area where explosives are used or military activities
- Located in a landslide area
- Located in less than 1.5 km from the nearest airport

Step 2: Identify a list of potential sites taking into account the following:

- Limited use of groundwater for drinking or agriculture due to its high salinity.
- Sites away from populated areas more than 1.5 km
- Area availability compared to the quantity of waste that will be disposed over the lifetime of the landfill and the size of these wastes and the extent of the site's accommodation of the volume of waste in terms of depth and height of waste.
- Geological factors such as high soil permeability or low soil bearing capacity, which reduces waste height.
- Groundwater aquifer direction of flow determine the probability of contaminants moving to nearby and descending receptors such as wells and springs. The potential health impact of pollutants is reduced if the flow of groundwater exposed to the pollutants is away from the receiving locations

Step 3: Review and evaluate the proposed sites

A field survey of all potential sites is carried out and evaluated according to Table (19). Rating system based on grading (1, 2, 3) according to the nature of the site most suitable for each criterion, the appropriate sites will take the highest score (3) and the non-appropriate one will take a low score (1). The site with the accumulative highest grade is selected.

Table (19): Criteria for Evaluation of landfill Sites

S	Evaluation Cirteria	Site 1	Site 2	Site 3	Site 4
1	Land ownership. Where ownership papers and the allocation decision are confirmed. Any obstacles in site, including the presence of private properties or houses or any other military or civilian entity.				
2	Site distance to the waste generating area and the impacts of the site on the collection and transport operations (need extra resources as transfer stations)				
3	Site distance to the main roads				
4	Existing surface waters next to the site (rivers, streams, lakes)				
5	The ability of the site to hold rain water or flood				
6	Groundwater level				
7	The existence of groundwater wells for drinking or agriculture				
8	Flood path crossing the site				
9	Level of ground sealing materials required				
10	Availability of cover material from low permeability soil				
11	Land use around the site. The boundaries of the site, the uses of neighbouring lands, residents in the vicinity of the site and main potential problems of project construction				
12	The existence of power lines near the site, air hanged or underground				
13	There is a prospect for nearby archaeology or an archaeological area				
14	Traffic on roads leading to the site the main and sub roads surrounding the site, the effect of constructing and operating the site on these roads, need of access road				
15	Area available, capacity and lifetime				
16	Distance between the location and the nearest agricultural or residential activity around the site				
17	Cost of landfill construction (estimate)				
	Total Site Rating				

Step 4 :The lifetime of the landfill can be estimated in planning phase using the following formula:

$$LS = (A \times D \times 2 \times 0.9) / \{(Wgr \times P \times 365 \times dv) / \rho\}$$

Where:
LS = life time in years
A = Site Area (m^2)
D= depth of landfill
Wgr = Waste Generation Rate (kg/person/day)
P= population served by the landfill
dv=diversion rate from landfill due to treatment and recycling activities
ρ = density of collected waste (kg/m^3)

- In the absence of waste generation field data, a rate of 0.7 kg/person/day is used.
- Density of landfilled waste is considered twice of density of fresh waste
- The formula is based on 10 cm daily cover each 1 m, and 1 m final cover.
- The density of generated waste can be used within 350 kg/m^3 for arid and semi-arid areas (upper Egypt) while density of 400 kg/m^3 will be used for Delta and north coastal areas.
- The formula is based on over ground and underground slope of 1:3, exact life time to be calculated according to final slopes of the side walls.

9.3 Conduct field studies on preferred site

The following studies has to be prepared, according to table (20):

Table (20): A list of the necessary studies before starting the design of the landfill

S	Study/target	Expected Results of the study
1	Traffic study	The main and sub roads surrounding the site are studied and the effect of constructing and operating the site on these roads and suggesting new access roads in case of problem in the current roads
2	Site topography	Topographic survey of the site, contour spacing is 1 m and output drawings at scale of 1:500
3	Site geology	At least 9soil investigation boreholes, one with depth 30 m and 8 at depth 8 m. necessary tests (sieve analysis test, standard penetration test, permeability tests, etc.) to determine the nature of the soil at the surface and sub-surface area. The soil quality available at the site is explored and analysed to determine its suitability for use as an intermediate or final cover and its quantities compared to daily cover needs
4	Site Climate Conditions	Study the climatic conditions of the region, determine the average temperature throughout the year, and determine the intensity of wind and precipitation, evaporation and relative humidity.

S	Study/target	Expected Results of the study
5	Site Hydrologic nature	At least 3 groundwater monitoring wells are used to determine seasonal groundwater surface level within 30 m from ground surface. Groundwater samples are taken and analysed for parameters mentioned in table 20. Investigate for artesian confined water within 30m from surface. Determine the geological and hydrogeological characteristics and piezometric level and identify water flow direction. Prepare a map showing underground water aquifers at a scale of 1:500, vertical level map showing water each 1 m. Provide subsurface water characterization, its source and its depth
6	Available water sources	The sources of water available at or near the project shall be identified for use or for action to be taken to protect them. They include surface water, irrigation wells and drinking water wells
7	Earthquakes	The seismic zone within which the project site is located is determined according to the map of the earthquake hazard zones determined by the building code of the republic areas and the assessment of the vulnerability of the landfill with earthquakes
8	Rainfall drains	The flood cover maps of the area are examined and the landfill after the flooding is checked and the precautions to be taken to avoid the risks of floods are determined.
9	Soil investigation	An analysis is carried out to determine the stability of the soil, determine the degree of safe orientation in the static and dynamic position, and what precautions should be taken to prevent landslides of the landfill, the stability of landfill body,
10	Site Capacity	A field survey and collection of samples are conducted to analyse as needed to determine the quantities and density of solid waste going to landfill

9.4 selection of Landfill lining system

The type of landfill depends on site conditions and the feasibility study, one of the following types is selected:

1. Sanitary Landfill includes composite lining of clay (mineral lining) and geomembrane, leachate collection system and landfill gas collection system in addition to leachate treatment and gas flaring units. This type is used for areas with precipitation higher than 8 mm per year.
2. Controlled Landfill includes a liner of compacted low permeability soil. This type is used for arid areas with less than 8 mm precipitation per year. This type is also used in case of non-hazardous rejected waste after organic extraction for compost.

9.5 Preparation of feasibility studies and environmental impact assessment

After identifying one preferred location, and type of landfill, environmental impact assessment study and feasibility study should be prepared, Site studies and EIAs should be presented as shown in Table (20) before the design process begins. The EIA should be prepared according to EEAA guidelines.

Environmental assessment should cover:

1. Impact of landfill gas migration from the landfill site to the surrounding areas, considering the uses of the surrounding lands. Define precautions to be followed to reduce this impact.
2. Impact of leachate migration from landfill to groundwater or surface water and the precautions to be taken to reduce this impact.
3. Impact of site's visibility and how to reduce this impact.
4. Impact of noise during construction and operation of landfill.
5. Impact on fauna and flora in the landfill area.
6. Feasibility study should cover cost of investment, operation and maintenance. The own of the landfill must ensure that the necessary funding and permits before start of construction.

9.6 Criteria for Landfill design

Landfills should be designed according to the following criteria:

- The site is divided into cells. Each cell will have a lifetime of minimum 5 years.
- Access roads to the cells and access ramps with suitable inclination for waste trucks.
- The main services are provided to employees including administrative offices and toilets.
- A wire mesh fence around the site to prevent illegal access to the site
- Weigh bridge, capacity not less than 70 tons and length not less than 15 m equipped with s cells shall be provided for operation 24 hours a day.
- In the case of shallow groundwater minimum distance of 1 meter between the higher (seaso groundwater level and the bottom sealing of the landfill is maintained.
- The design elements of the landfill are:
  1) Dimension, depth and inclinations
  2) Lining system.
  3) Leachate collection and treatment system
  4) Gas collection and treatment system
  5) Surface water management

The design should consider the conditions in sections 9.6.1 to 9.6.9

9.6.1. Criteria for Design of Landfill Dimensions

The following criteria should be considered for the slopes of the landfill and when closing the landfill:

1) The slope of the cell sides with lining should not exceed 3 (horizontal): 1 (vertical)
2) Final cover slope should not exceed 3 horizontal: 1 vertical for the sides and 6% for cappir
3) The slope of the cell base should not be less than 3% inclinations in direction to the landfil drainage pipe.
4) The stability of the slopes and ability of base slopes to discharge the leachate must be guaranteed through stability and levelling calculations according to Egyptian Code of Geotechnical Engineering and Foundations.

5) An anchor trench must be designed to fix the geomembranes on top of the lining slope in order to achieve the stability of the sealing layer under loads and prevent it from sliding down the slope.

.6.2. Criteria for Choosing the Lining System

The lining design depends on the type of waste and level of groundwater protection required. The level of protection required shall be determined according to the following:

- Minimum protection required (controlled Landfill) is applied in any of the following conditions:
  1. when the level of the groundwater is more than 30 m deep
  2. Ground water quality is not suitable for human or agricultural use
  3. The site is located in arid climate where minimum leachate is generated due to absence of rain water.
  4. Type of waste is not including or including very limited organic matter.
  5. The hydrologic site prevents the spread of any leakage to the depth of the groundwater
  6. impermeable layer of rock exists

  The requirements of controlled landfill are limited to a layer of compacted natural soil of low permeability according to section 9.6.3.

- Protection required (Sanitary Landfill): is applied in all cases not only other the six conditions listed above. The sanitary landfill has complete containment design to protect groundwater. The landfill includes collection and treatment of leachate and the lining should consist of successive layers from bottom up according to sections 9.6.3 to 9.6.7

9.6.3. The primary protective layer of clay

- The first layer consists of clay or low-permeable silt with a thickness of not less than 75cm with a hydraulic conductivity of not more than $1x10^{-9}$ m/s. Soil compaction is applied to layers of thickness of not more than 20 cm in order to ensure the reduction of water leakage.
- In the absence of clay lining soil, it can be replaced by a layer of natural soil /sand mixed with a percentage of bentonite. The percentage is determined by laboratory tests so that the mixture reaches a hydraulic permeability not exceeding $1x10^{-9}$ m/s. With height according to lab test
- Other Alternative is artificial clay lining consists of a thin layer of bentonite located between layers of ground fabric with hydraulic conductivity not exceeding 5×10^{-10} m/s.

9.6.4. Secondary protection layer specification of the geomembrane

- The geomembrane layer consists of a thin plastic membrane of a thickness of at least 1.5 mm placed directly above the compact clay layer and must be equivalent to its insulation performance.
- The geomembrane must be covered either with the geotextile for protection or with a layer of sand with a minimum thickness of 10 cm or a composite containing both. The thickness of the protective layer depends on the designed waste height.
- Geomembrane is defined as $k \leq 1x10^{-12}$. Any type of mineral liner would meet this permeability can be used.

9.6.5. Specification of the drainage layer

The drainage layer must comply with the following specifications:

- System design (drainage layer, leachate pipes, sumps and pumps) should not allow more than 30 cm of leachate height above base/geomembrane layer
- A saturated hydraulic conductivity greater than 1×10^{-3} m /s
- Relatively uniform in particle size, with a minimum grain size greater than 20 mm and a maximum size of 60 mm, not more than 10% of particles smaller than 20 mm in diameter and not more than 3% smaller than 0.075 mm
- To be non-reactive in moderate acidic medium and chemically resistant to leachate, with calcium carbonate content less than 10% of weight
- To have circular edges and are free of sharp edges that will damage the lining of the underlying geomembrane (the best type of gravel is the circular with smooth surface (river gravel)
- A drainage layer covering the entire bottom of the cell shall be placed of thickness not less than 30 cm
- If no drainage layer is available, an alternative geocomposite textile layer can be used with the same hydraulic conductivity properties

9.6.6. Protective layer specifications

- A protective layer of the geotextile or sand or recycled construction waste 0.3-0.5 cm should be placed above the drainage layer in order to ensure long-term efficient drainage by preventing small particles from blocking the gravel layer.
- The hydraulic conductivity of the protective layer shall be more than 1×10^{-5} m/s in order to prevent the retention of effluents in the waste mass.
- A protective layer of sand or soil with good permeability should be placed above the geotextile to act as a filter for leachate and protection of the geotextile. The thickness of this layer is not less than 15 cm.
- Nonwoven geotextile should be placed between drainage gravel layer and the geomembrane to protect the geomembrane from puncture.

9.6.7. Specification for the design of the leachate collection system

A leachate collection system should be constructed above the base lining the collection system works with the drainage layer so that all liquids collected at the bottom of the cell are channelled to a piping network that discharges the leachate out of the landfill body figure (5). The minimum design requirements for leachate collection system are:

- Diameter of the drainage pipe not less than 200 mm, and inclination of 1%
- All collection pipes are made of high-density polyethylene and shall be perforated with 10 mm diameter holes or slots.
- The pipes are placed above the geomembrane protective layer, covered with 15 cm minimum drainage media (9.6.5)
- The distance between pipes does not exceed 30 m and the length of the pipe does not exceed 200 m.
- The leachate should be removed not to exceed 30 cm at any time and at any point on the lining.
- The pipes should have backwash system to repair any blockage.
- The amount of leachate generated annually is calculated according to HELP computer software.

  Preliminary investigation of the potential quantity of leachate as the amount of moisture within the landfill in excess of the landfill field capacity can be calculated at any given time as:

$$L_t = \Delta S_t - W_t$$

Where

L_t =*leachate volume per occupied unit volume of landfill (kg/m3)*

ΔS_t = change in the amount of water stored in solid waste in landfill, kg/m^3

W_t= moisture holding capacity in kg/m3

(if a negative value is obtained from the equation, this means no leachate collected as it will all be held into landfill body)

Where $\Delta S_t = W_{SW} + W_P - W_G - W_{RO}$

- W_{SW} = water (moisture) in incoming solid waste, kg/m^3, W_{sw} is calculated as 30% to 40% of weight of received waste, depending on the season and area
- W_P = precipitation rate in kg/m^3
- W_G = water lost in the formation of landfill gas, 0.22 kg/m^3.
- W_{RO} = Run off water to out of the landfill area in kg/m^3. calculated as 0.05 – 0.75 of precipitation (P) depending on slopes, surface water system and operation conditions, in areas where the cell is open and only daily cover exist with no slop to direct rainfall out of the landfill body, the higher factor is applied. On closed cells where final cover is applied the lowest factor is applied.

$$W_t(t) = FC(t) * D(t)$$

Where

- **t** denotes the time from disposal of MSW,

- **W** is the mass of water held in waste (kg), (see Ch.3 of the code)
- **D** is dry weight of MSW (kg).
- **FC**: The field capacity, which varies with the overburden weight, and time, for waste with 45-55% organic, FC start at 0.55 and reach 0.2 within 12 months in case of effective compaction up to 600-700 kg/m^3 Leachate should be treated and treated effluent to be used in irrigation of final cover vegetation layer.

  The following precautionary measures should be taken into consideration:
  - Preventing surface water from reaching the waste with a set of drainage channels around the landfill
  - Ensure that the water is not accumulating in the disposal area by maintaining slopes to drainage channels
  - Keep the daily disposal area as small as possible
  - Daily coverage of waste
  - Make sure that the cover is placed with the right slope
  - The final cover layer to be placed upon any area reaches design height.

In case no treatment plant is constructed , the collected leachate should be directed to treatment bonds where 3 bonds exist, first anaerobic bond have a holding time of 20 days and depth not less than 4.5m , the second perception bond is 1.5 m deep with holding time 3 days and the third is maturation bond with holding time 20 days and depth 1.5 m

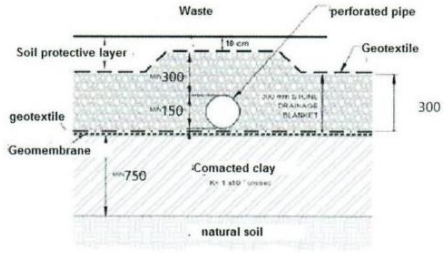

Figure (5): Typical Lining and Drainage Layers of a sanitary Landfill

9.6.8. Design Criteria for a Landfill Gas Collection System

The following design criteria is considered in vertical gas collection system

1) **Gas collection wells for active cells**
   - Every well has an extraction area of 40 to 50 m diameter. The gas extraction wells should be placed with the corresponding distance. The gas extraction pipe should be PE 100, SDR 11, perforated.

- The pipe should be placed in the middle of a well having 800 mm in diameter and fille with gravel of low calcium carbonate around the pipe.
- Perforated gas pipes with 20 mm hole diameter per 200 mm spacing at 90 degrees.
- Gas extraction starts with cell operation and the gas pipes will be extended together with the waste height during operation.
- A metal case is used to fix the well, and will be lifted every time the well is being extended.
- For both wells in active or closed cells the pipe should start 3 m above the drainage layer. Any connection of the gas pipe with the drainage layer must be avoided.

2) Gas collection network for closed cells

- The last 3 m of vertical gas pipe is not perforated
- Stop the gravel with the end of the perforated pipe
- Apply 30 cm of sand over gravel
- Apply 1 m layer of bentonite over the sand layer for each gas well as final fixation.

3) Collection and utilization of gas: figure (6)

Landfill gas generation can be calculated by the following equation [Ehrig, 1996]:

$$Ge = 1.868\ C\ (0.014\ T+0.28)$$

Where:

Ge is total gas generated in cubic meters per ton of MSW

C is the Total Organic Content (TOC) in (kg/ton of MSW)

T is temperature in degrees of Centigrade.

-The gas collection network depends on the rate of gas generation.

the technology used for collection to be selected according to the following criteria:

- If the gas generation is low, there won't be gas wells constructed and just a gas window in combination with a biofilter
- If a large amount of gas is generated, the energy recovery technique including gas collection pipes, gas collections substation, compressor station, gas flare and/or gas utilization is used
- The quantity of gas is calculated using Gem software or IPCC software, with the following factors affecting the amount of gas generated:
  - Waste composition and density.
  - Temperature and humidity.
  - landfill cover
  - Waste lifetime.

Gas quantity can be calculated using US Land GEM calculation tool or German EPER model

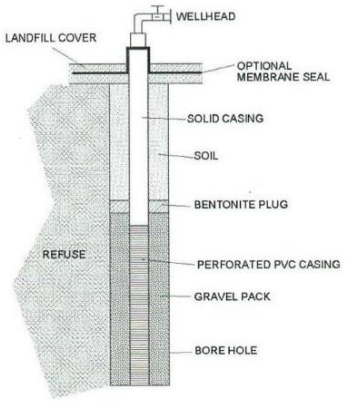

Figure (6): Gas Collection Well Cross-Section at Closure

9.6.9. Standards for surface water management system design

- Surface water resulting from precipitation should be diverted away fr the landfill.
- Drainage channels surrounding the landfill should be designed to coll descends from the sides of the landfill and prevent it from moving ho site and in contact with the waste.
- Collected rainwater should be stored and used to irrigate the vegetati
- The design of the landfill should leave the exposed area as small as p cells reaching design height and intermediate cover of inactive cells

9.7 Conditions for the Constructing of Landfill

When constructing a landfill, the following should be considered:

- Clearing the site of landfill from any structure, bushes, trees, waste et
- Construction of the boundary along the outer perimeter of the cell.
- Levelling and compacting the bottom level and construction access ra
- Excavation soil to be kept in the site for later use as daily cover.
- The required moisture content shall be monitored, and water shall be mixed properly when the moisture content is low according to the soi Water is added using mechanical sprayers to ensure uniformity of dis

under sufficient pressure to penetrate the compacted soil. It shall be accompanied by a good mixing process every time water is added. When water content reaches the moisture, level indicated in the soil report it will be compacted.

- Use Sheep foot rollers for compaction of the lower layer and smooth roller for the final layer. Weights ranging from 8-10 tons; to achieve the final soil form required.
- The soil compaction is tested according to (Proctor Modified Test) and should achieve 95% of required value.
- A specialized and experienced geomembrane installation team.
- Surrounding the landfill by a fence at least 2.25 m height.
- Provision of mechanical equipment such as Soil compactor, track loader, dump truck, excavator and trucks for soil and water transportation
- Provision of. Weigh bridge, and service building.

9.8 Conditions for the operation of controlled or sanitary landfills

When operating the controlled or sanitary landfill, the following conditions must be considered:

9.8.1 Operation plan preparation and availability

The person responsible for the operation of the landfill and plans for the operation and maintenance of the landfill in addition to an emergency plan. This include:

- The plan covers the period from the start of operation until the final closure of the landfill.
- The plan is reviewed and updated at least once a year or when required.
- The plan is available to the workers in the landfill.
- The plan should at least include the following topics:
  - The total time schedule for filling the landfill cells.
  - The main tasks to be completed by the Landfill Operations Team.
  - The organizational structure of the workers in the landfill and the matrix of the distribution of tasks to the team.
  - Control quantities and quality of waste in the landfill.
  - Self-inspection of the operation of the landfill.
  - Waste compaction and managing the cover materials.
  - Maintenance of mechanical equipment.
  - Surface water control.
  - Fire control.
  - Control of scattered waste, littering, insects and vermin
  - Monitoring and control of leachate.
  - Monitoring and control of landfill gas
  - Records keeping, reporting and data management system.

9.8.2 Receiving and inspecting the solid waste delivered to the landfill site

- Solid waste should be inspected at the entrance gate of the landfill site and after solid waste transport vehicles are unloaded
- Working hours are compatible with the working hours of collection vehicles.
- Waste trucks to use only the road designated to them.
- Keep one entry point to the landfill.
- The loads are inspected and weighed before being directed to the working area. The number and load of each truck, hour, date of entry.
- Trucks to be directed to active cell through clear and limited routes.
- All unauthorized waste detected during the examination will be recorded, and included in the monthly landfill report.

9.8.3 Entry and exit control standards

Measures should be taken to control the entry and exit of individuals and vehicles from the landfill through:

- Ensure the quality of the walls, gates, points of control of the site and the barriers that prevent any unauthorized individuals and trucks to enter, as well as prevent animals from entering the landfill.
- All individuals and vehicles entering and leaving the site are registered.
- Vehicles loaded with waste shall be allowed to enter the landfill site only during the official working hours of the site specified in the landfill operation plan.
- The working and closing hours of the landfill are clearly stated at the gate and at the main roads leading to the landfill.

9.8.4 Unloading and Compacting the waste

As per figure (7):

- Waste is placed from the back to the front along the back wall of the cell
- After accumulating sufficient quantity, mechanical equipment is used to distribute and compact these piles
- Other quantities are added in the same way
- Waste is compacted in thin layers of maximum 30 cm. At the end of the day the top of the "lift" and the open tipping face shall be covered with daily cover and consisting of a layer of sand or clay at a height of not more than 10 cm.
- In the absence of natural soil, fine construction and demolition waste can be used

Figure (7): Covering Waste with Soil Cover followed by Compaction

9.8.5 Performance Criteria for surface water control

The following requirements must be met for controlling surface water:

- Make necessary precautions to prevent the mixing of any surfac from rain or other sources with the waste in the landfill.
- Cleaning the surface water trenches on a daily basis from any re present in it.
- Prevent any surface water contaminated with waste or leachate f the landfill, and direct it to leachate treatment unit.

9.8.6 Performance Criteria for Fire control

To control fires in landfills, the following should be taken into account:

- Hot loads shall not be disposed on the landfill
- Proper compaction of the waste to keep the landfill anaerobic.
- Place proper daily cover layer
- Keeping the daily cover material piled close to disposal area.
- Using firefighting units
- The fire is extinguished using sand or materials used as a daily or
- The data for each fire incident shall be recorded in a special recor accident, its duration, location, size of the burned waste, and the used.

9.8.7 Vermin Resistance

- Precautions shall be taken to prevent the presence, entry or propagation of vermin in the landfill and in the surrounding area within 100 m outside the landfill.
- Pest control system is only used by trained and competent personnel, who are knowledgeable with the nature of the materials they deal with and wear appropriate personal protection equipment (PPE).
- The methods used to combat pests must be chemically compatible with every component of the landfill, in particular the final coverage system, its cultivation plan, and the germination that is adopted at the site.
- The use of pest control methods is carefully monitored to ensure that side effects do not occur, so as not to cause pollution of groundwater, adjacent surface watercourses and leachate.

9.8.8 Scattered Waste, littering Control

The following should be followed to control waste littering

- Placing mobile wire mesh fence or frame at least 2.5 m high around the working and dumping area. The barrier should not affect the entry and exit of waste trucks. These barriers must be cleaned from littered waste and plastic bags once a day.
- Provide workers for waste picking from outside the working area and provide the necessary labour to work inside and outside the boundaries of the landfill for a distance of not less than 100 m to collect any littered waste.

9.8.9 Dust control

The necessary measures shall be taken to prevent the spread of dust as a result of operation, movement of trucks or wind, and shall include the provision of water spray on the roads and in working area.

9.8.10 Monitoring and control of leachate

- Regular inspection of landfill surfaces and make sure it is free of leachate spots,
- Regular inspection of quantities of leachate collected for any unusual drop that indicates leakage from the system
- Regular tests of ground water quality and unregularly pollutants that indicates leakage.

9.8.11 Monitoring and control landfill gas

- Methane gas in the air is not allowed to exceed 1.25%.
- The concentration of methane gas and carbon dioxide is measured at inside and outside the landfill site
- Provision of a portable device permanently working to measure the concentration of gases in the site to give a warning in case of increasing the concentration of gases

above the limit. In this case, the work stops and the labour is transferred to a safe place until the concentration of gases is reduced

9.9 Converting an Open dump into a Controlled Landfill

Working at existing dumps can be continued for a limited period if the following conditions are met:

Availability of space in the same site that can accommodate the incoming waste for at least three years or until the establishment of landfill and treatment plants

- The landfill should be in an area that does not cause a serious problem in groundwater
- The landfill should not be in a residential area, next to a reservoir of water, rivers, lakes, flood pathways, earthquakes area or cracks.

In case the site fulfils the previous requirements, the practices shall be changed immediately, and the following procedures shall be taken:

- Moving and reshaping existing waste in one side of the site and cover it with a layer of natural soil with a thickness of at least 30cm.
- Remove trees and plants and level the bottom of the remaining area to slope of 2-4%, the soil is properly compacted after levelling.
- Drainage channels should be set up around the site to prevent the access of surface water to the landfill, if there is rain
- A fence should be constructed around the landfill to prevent scavengers and animals. A good road should be established to reach the landfill and provide gates, a weigh bridge, a control and security room.
- If natural soil has high permeability, a layer of mixed clay and natural soil will be placed. The layer will be 50cm high.
- Cracks in the compact clay layer is not allowed, water must be added during and after compaction to prevent any cracking.
- The operation shall be carried out as per section 9.8

9.10 Requirements for the design of the final cover layer for sanitary and controlled landfills

The final cover shall be designed to include the following layers (from landfill top):

First: For arid areas (Fig. 8)

- Gas pipes shall be installed only when waste is being filled in or, alternatively, when the design height of a cell has been reached. Gas collection wells shall not go all the way down to the liner but leave at least 5 meters between liner and bottom of the gas well in order to avoid the risk of oxygen entering the well. This is especially important when gas is pumped up by vacuum.
- Protective layer of sand, soil or clay at thickness not less than 50 cm.

- A porous layer to collect gas made of gravel or coarse sand similar to the and at a height of not less than 30 cm.
- Waste cover of natural soil 20 cm high

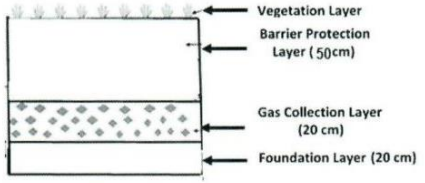

Figure (8): Layers of Landfill Cover in Dry Areas

Second: For rainy areas (Fig. 9)

- Layer of erosion prevention of not less than 70 cm of soil capable of mai growth of local plants. It includes an irrigation network to preserve the v source of irrigation water is collected rainwater or treated leachate or bot
- A surface drainage layer of consisting of either gravel layer 15 cm or goe permeability coefficient of more than 10^{-3}m/sec and slope of not less tha
- protection layer of thickness of 15 cm
- Insulation layer of geomembrane or soil mixed with bentonite, or low pe not less than 40 cm and well compacted.
- Gas collection aggregate layer of gravel or construction waste with a thic than 30 cm
- Waste cover of natural soil 20 cm high

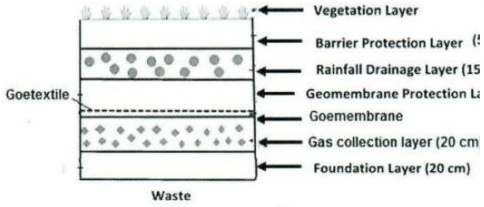

Figure (9): Layers of Landfill Cover in Wet Areas

Third: Green cover layer requirements

A green cover layer of local plants that has the following criteria:

- locally adapted durable plants, drought resistant and extreme temperatures;
- Roots that will not disrupt the discharge layer
- The ability to thrive in low nutrient soil with minimal additional nutrients
- Plant density sufficient to reduce soil erosion
- Ability to survive and work with little or no maintenance (i.e., self-support)
- A sufficient range of plants to continue to meet these characteristics over time.
- Deep-rooted shrubs and trees are not allowed because root systems may penetrate the layer of erosion and isolation and create pathways of surface water into the landfill.
- Plant species with horizontal and flexible root systems are best suited for use in landfills

9.11 Closure of Open Dumps

When the open dumps are closed, the closing layers shall be taken into account in section 9.10 in addition to the following:

1) Shaping of waste on the sides geometrically to make slopes of 1:3 as shown in figure (10)
2) Shaping of waste on the top to have a slope of 4% for arid areas and 7% for rainy areas as per figure (10)
3) Put the final cover and include layers of insulation and agricultural soil
4) Control drainage by installing surface water collection network
5) Gas control system
6) Fire Control
7) Preventing unauthorized dumping.
8) Resettlement of the informal collectors.
9) Security and guarding.
10) Establish clear guidelines stating that the site is not used in heavy construction projects

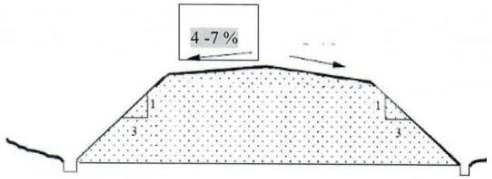

***Figure** (10): Shaping dumpsites geometrically*

Conditions for use of the landfill or dumpsite after the closure

The after care and monitoring of closed landfill or dump should be performed for a period of 30 years after closure. During this period the following activities should be performed:

1) Maintaining the integrity, and effectiveness of any final cover, including making repairs to the cover as necessary to correct any settlement, erosion, or other events, and preventing run-on and run-off from eroding or other damaging of final cover. Walkover inspection should be carried out 3 time per year during and after heavy rain season, in arid areas it will be done once a year after the season of sand storms.
2) Maintaining and operating leachate collection system, quantities to be compared with design capacity once a year to detect any leakage. Analysis of treated effluent is done once per year to analyse (BOD, COD, and heavy metals)
3) Monitoring the ground water through 3 sampling wells, one in the upstream of ground water and 2 in the downstream after the landfill. Comparison of water quality is performed once a year
4) Maintaining and operating the gas monitoring system. Gases should be collected and flared in a safe manner if calculated quantity exceeds….
5) Conduct environmental measurements of air quality before and after closure. Measurement will be conducted every 10,000 m^2 for methane, and SH4.
6) As long as the gas system is under operation, there should not be any kind of recreation area on the landfill. Any after use is not allowed before at least 15 years after closure.

9.12 Tests

During construction or closure, the material should be tested table (21) as follows:

1) Quality of clay lining soil and any other materials used in the cover should be ensured through conducting tests necessary to describe the soil in accordance with the Egyptian Code for Geotechnical Engineering and Foundations. It is also necessary to determine its conformity with the above-mentioned requirements and incorporate all necessary requirements stated in the monitoring plan for the quality of executing the final cover
2) Soil specifications and tests for geomembrane should be specified in accordance with the Egyptian Code for Geotechnical Engineering and Foundations.
3) Quality of liner welds is inspected by conducting pressure test of double welds and (destructive) weld test performed on welds above the embankment taken near the anchor trench that will keep the liner in place.
4) Groundwater to be tested every 3 months.

Table (21): Maximum limit parameters for water quality measured in downstream well

	Parameter	Unit	Limit
1	Temperature	C°	25
2	PH		6.5-8.5
3	Total suspended solids	Milligram/Litre	3.0
4	Electric conductivity	(µScm-1)	1000
5	Chloride	Milligram/Litre	250
6	Nitrate	Milligram/Litre	10
7	Dissolved Oxygen	Milligram/Litre	2.0
8	Iron	Milligram/Litre	0.03
9	Lead	Milligram/Litre	0.01
10	Sodium	Milligram/Litre	1200
11	Phosphate	Milligram/Litre	5
12	Sulphate	Milligram/Litre	250
13	Copper	Milligram/Litre	0.5
14	Calcium	Milligram/Litre	200
15	Total alkalinity	Milligram/Litre	200

12.2 Annex 2: ESIA Outline

The ESIA studies needed for the project components (particularly 2 and 3) should follow the following proposed outline:

1. **Executive summary:** concisely summarizes the study's findings and recommendations
2. **Table of contents:** presents the report's sections, headings, and sub-headings
3. **List of tables and list of Figures:** for all tables and figures included in the report
4. **Introduction:** provides background and context for the project, including general information on the relevant sector(s), the scope of the study, its objectives, as well as the Terms of Reference (ToR).
5. **Project description:** provides concise description of the project under study including its geographic location and its surroundings, technical and non-technical components, and construction and operation activities relevant to all components of the project.
6. **Legal and institutional framework:** Examines the basis for the project including relevant national legislations, policies, and sector-specific regulations (i.e: waste management regulations on design, operation and OHS of facilities, waste and wastewater treatment regulations, traffic and transport laws). It also examines enforcement mechanisms and institutions. In addition, it discusses all relevant international standards and guidelines applicable to the project, particularly the World Bank requirements on Environmental and Social, and occupational health and safety aspects. A gap analysis between national and international (WB) legal frameworks should also be conducted.
7. **Environmental and Social baseline:** provides description of all environmental and social dimensions of the study area and sector. It includes relevant elements of the natural environment such as climate, geology, topography and soil, seismic activity, ecology, air quality, as well as flood risks. This section also includes description of relevant elements of the built environment such as infrastructure and utilities related to the project construction or operation. The section presents the socio-economic baseline conditions within the project's area(s) of influence.
8. **Potential Environmental and Social Impacts and Mitigation:** Predicts and assesses the potential positive and adverse impacts arising from all activities related to the project's construction, operation, closure or decommissioning, and post closure if applicable. It also provides appropriate mitigation measures for the significant potential adverse impacts.
9. **Project alternatives:** Systematically compares the feasible alternatives to the proposed project location, technology, design, or operation, including a 'no project" alternative. For waste management facilities (landfills, transfer stations, etc), common technology alternatives include waste avoidance and reduction, and waste incineration. Common design and operation alternatives include medical waste treatment alternatives, leachate treatment alternatives, and landfill gas collection and disposal alternatives

10. **Environmental and Social Management Plan (ESMP):** provides the needed measures and procedures to implement the proposed mitigation measures, and provides framework for management, monitoring, and institutional capacity building.
11. **Stakeholder Consultation and engagement:** Describes all stakeholder engagement activities planned and conducted for all the project phases
12. **Conclusion and recommendations:** Conclude the study and presents final recommendations
13. **References**
14. **List of Annexes:** includes supplementary technical studies, measurements, and reports such as geotechnical, traffic, seismic, or hydrological studies, and ambient air quality measurements. Specific studies relevant to waste management facilities can also include leachate generation analysis, and land GEM analysis for landfill gas estimation.

12.3 Annex 3: Site-Specific ESMP Outline

Site-specific ESMP will be developed for the different project components (particularly 2 and 3) following the proposed outline:

1. **Executive summary:** concisely highlights the plan's key components and recommendations
2. **Table of contents:** presents the report's sections, headings, and sub-headings
3. **List of tables and list of Figures:** for all tables and figures included in the report
4. **Introduction:** provides background and context for the project, the scope of the ESMP and its purpose and objectives. It also sets out the national and international (WB) legal basis for the ESMP
5. **Project description:** provides concise description of the project/site under study including its geographic location and its surroundings, technical and non-technical components, and construction and operation activities relevant to all components of the project
6. **Environmental and Social Baseline:** provides basis for the natural and built environment features, as well as socio-economic conditions relevant to the project's direct and indirect areas of influence
7. **Environmental and Social Impacts and mitigation:** Predicts and assesses the potential positive and adverse impacts arising from all activities related to the project's construction, operation, closure or decommissioning, and post closure if applicable. It also provides appropriate mitigation measures for the significant potential adverse impacts.
8. **Environmental and Social Management:** provides the needed measures and procedures to implement the proposed mitigation measures for all project phases including their estimated costs, and provides framework for their management and institutional capacity building.
9. **ESMP implementation:** Provides the required institutional arrangement for effective implementation of the ESMP including the responsibilities of all involved stakeholders.
10. **ESMP monitoring and reporting:** provides environmental and social monitoring plan/program including its objectives, monitoring parameters, monitoring methods, frequency, estimated costs, as well as capacity building needs for implementation of the monitoring plan. ESMP reporting arrangements will also be included.
11. **Capacity building and training:** provide all needed technical assistance for the implementation of the ESMP, and outline training programs needed for all phases of the project (construction, operation, closure, and post closure)
12. **ESMP Cost estimation:** provides an estimate for the total cost needed for the implementation of the ESMP including the mitigation measures, the monitoring activities, as well as training and capacity building costs
13. **Grievance Redress Mechanism (GRM):** provides formal procedures made available for project workers and for affected or interested stakeholders to submit their concerns during

all phases of the project. The grievance mechanism should include the methods of reporting grievances, procedures to handle and resolve grievances promptly and efficiently, as well as communication and archival of grievances.

14. **Public consultation and information disclosure:** provide the objectives and planning of public and stakeholder engagement activities, and summary, results and feedback of conducted sessions. It also includes methods and formal procedures on public disclosure of information related to the project and the ESMP
15. **Annexes**

12.4 Annex 4: Occupational Health and Safety (OHS) Plan

The OHS plan aims to foster a safe environment and working conditions for all project workers and employees (including direct, contracted, community, and primary supply workers). The plan will include general and industry-specific OHS considerations for waste management and electric mobility sectors. In accordance with the World Bank's ESF and OHS guidelines, the OHS plan will provide the appropriate framework for construction and operation of project components 2 and 3. The primary components of the OHS plan include the following elements:

1. **Identification of potential hazards**

Hazard identification involves categorizing all potential hazards. The process includes analyses of all elements of the workplace and the job tasks that may have adverse effects on the physical, mental, and social well-being of the project workers. According to the WB's OHS Guidelines, the following hazard sources and types should be considered in the plan:

- General facility design and operation: which includes general OHS considerations such as integrity of workplace architecture and structure, severe weather and facility shutdown, workspace and exit, fire precautions, areas signage and labeling, utilities and potable water supply, workplace well-being facilities (rest areas, eating areas, First Aid clinic, etc).
- Physical hazards: represent potential for accident or injury or illness due to repetitive exposure to mechanical action or work activity
- Chemical hazards: represent potential for illness or injury due to exposure to toxic, corrosive, sensitizing or oxidative substances. They also include risks of uncontrolled reactions, fires and explosions.
- Biological hazards: represent potential for illness or injury due to exposure to biological agents that can cause human disease or may present a risk of spreading to the community.
- Radiological hazards: represent radiation exposure that can lead to potential discomfort, injury or serious illness to workers.
- Special Hazard Environments: represent work situations where all of the previously described hazards may exist under unique or especially hazardous circumstances such as confined spaces.

The most significant OHS hazards typically associated with workers at waste management facilities occur during the operational phase and include accidents and injuries (physical hazards), chemical exposure (chemical hazards), and exposure to pathogens and vectors (biological hazards).

The most significant OHS hazards typically associated with workers at EV charging stations during the construction stage include all general WB's OHS Guidelines, in addition to electrical safety requirements. During operation, the most significant hazards include exposure to hazardous materials when handling batteries during charging and replacement (chemical hazards), and electrical and magnetic field hazards when handling and operating the charging equipment (physical hazards).

2. **Provision of appropriate measures to prevent and protect against the potential hazards**

The OHS plan should provide reasonable preventive and protective measures to address all the identified potential hazards. Preventive and protective measures should be introduced according to the following order of priority as per the WB's OHS Guidelines:

- Eliminating the hazard by removing the activity from the work process
- Controlling or managing the hazard at its source using engineering control (technical) procedures
- Minimizing the hazard through design of safe work systems and administrative or institutional control (non-technical) measures
- Providing appropriate personal protective equipment (PPE), and providing training on their use and maintenance.

3. **Development of training plan for all project workers in all occupations**

The OHS plan should include a comprehensive training plan in order to ensure all project workers are able to perform their work safely and effectively. The training plan need to include the following elements:

- OHS induction/orientation: to introduce the OHS policy, and inform the workers on basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate.
- Site-specific induction: to ensure site workers are suitably inducted to their work area. This includes job-specific hazards and controls, the location of firefighting and first aid equipment on-site, emergency response and evacuation procedures, on-site grievance mechanism, and all other OHS elements relevant to the site activities. the training should cover:
    - Knowledge of all materials, equipment, and tools existing on site
    - Known site hazard sources and potential health risks, and their control measures
    - Precautions to prevent hazard exposure and improve overall hygiene

- Adequate use of protective equipment and clothing
- Appropriate response to extreme situations and operations, incidents and accidents

- Training needs analysis: A Training Needs Analysis shall be conducted for each worker or employee to identify additional training requirements based on their specific Job Description.
- Training records: A training register which includes the mandatory training required for each position, as well as a record of training undertaken/planned for each employee and the expiration dates of any licenses and competencies.

4. **Development of a transparent grievance mechanism:**

The OHS plan will include a grievance mechanism that is accessible, transparent, and available for all workers to raise workplace concerns. The grievance mechanism should include the methods of reporting grievances, procedures to handle and resolve grievances promptly and efficiently, as well as communication and archival of grievances.

5. **Formal reporting and documentation mechanisms for all work-related accidents, illnesses, and all other incidents**

The OHS plan should include all procedures put in place for reporting and documenting work-related incidents, management approach and measures, as well as communication to involved internal or external stakeholders.

6. **Emergency response plan including prevention and preparedness procedures**

The OHS plan will include appropriate measures and procedures specific to handling un-anticipated incidents.

7. **Providing appropriate remedial action and compensation for adverse impacts**

The OHS will put in place appropriate compensation schemes to remedy the potential adverse impacts including work-related accidents, illness, disability, and deaths.

12.5 Annex 5: Brief Description of the World Bank's Environmental and Social Standards (ESS)

The World Bank (WB) has identified 10 environmental and social standards that should be complied with in its financed projects. These standards are:

- **Environmental and Social Standard 1:** Assessment and Management of Environmental and Social Risks and Impacts:

This ESS highlights the importance of managing environmental and social performance, including the ESIA studies. There are some main objectives of this performance standard, which target the high standard of performing the ESIA in order to comply with the international standards. These main objectives are:

- To identify and evaluate environmental and social risks and impacts of the project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, affected communities, and the environment.
- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from affected communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

- **Environmental and Social Standard 2:** Labor and Working Conditions:

This ESS discusses the worker-management relationship. It aims to promote the fair treatment and equal opportunities of workers without any discrimination in order to comply with the national employment and labor laws to protect workers (including vulnerable categories such as children, workers engaged via third party and workers in the supply chain) and to avoid the use of forced labor in order to promote safe working conditions.

- **Environmental and Social Standard 3:** Resource Efficiency and Pollution Prevention and Management:

This ESS aims to protect the human health and protect the environment by minimizing the pollution that occurs from different project activities. This can be achieved by

promoting the use of sustainable resources of energy and water; and also reducing the air pollutants and GHG emissions.

- **Environmental and Social Standard 4:** Community Health and Safety:

This ESS aims at avoiding the negative impacts on health and safety of the affected communities throughout the whole project cycle. This has to be done in accordance with relevant human rights principles in order to avoid or minimize any harmful effects or risks that may occur affecting the affected communities.

- **Environmental and Social Standard 5:** Land Acquisition, Restrictions on Land Use and Involuntary Resettlement:

This ESS discusses the resettlement techniques (physical or economic) that cannot be avoided and need to be done as a result of any land acquisition or restrictions on land use that occur during the project life cycle. The standard aims to avoid, or minimize if avoidance is not possible, the adverse social and economic impact of land acquisition but providing compensation for loss of assets at replacement cost and ensure the resettlement activities are implemented with appropriate information, consultation and informed participation of the affected personnel.

- **Environmental and Social Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources:

This ESS discusses the importance of protecting and conserving biodiversity and sustainably managing living natural resources to sustainable development. It aims to protect and conserve biodiversity and habitats, apply the mitigation hierarchy and precautionary approach in the design and implementation of projects that could have adverse impacts on biodiversity, promote the sustainable management of living natural resources, and support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development by adopting practices that integrate conservation needs and development priorities.

This ESS is not applicable to GCAPCCP.

- **Environmental and Social Standard 7:** Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities:

This ESS applies to a distinct social and cultural group identified in accordance with paragraphs 8 and 9 of this ESS[8]. The terminology used for such groups varies from country to country, and often reflects national considerations. This ESS recognizes that Indigenous

[8] http://pubdocs.worldbank.org/en/837721522762050108/Environmental-and-Social-Framework.pdf#page=89&zoom=80

Peoples/SubSaharan African Historically Underserved Traditional Local Communities have identities and aspirations that are distinct from mainstream groups in national societies and often are disadvantaged by traditional models of development. Therefore, this ESS aims to ensure that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous Peoples/ Sub-Saharan African Historically Underserved Traditional Local Communities. It also aims to avoid adverse impacts of projects on these groups, or when avoidance is not possible, to minimize, mitigate and/or compensate for such impacts.

This ESS is not applicable to GCAPCCP.

- **Environmental and Social Standard 8:** Cultural Heritage:

This ESS aims to protect the cultural heritage from any impacts that may occur during the project life cycle. It promotes the equal sharing of benefits from use of cultural heritage.

- **Environmental and Social Standard 9:** Financial Intermediaries (FI):

This ESS recognizes that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction. By applying this ESS, it aims to set out how the FI will assess and manage environmental and social risks and impacts associated with the subprojects it finances, promote good environmental and social management practices in the subprojects the FI finances, and promote good environmental and sound human resources management within the FI.

This ESS is not applicable to GCAPCCP.

- **Environmental and Social Standard 10:** Stakeholder Engagement and Information Disclosure:

This ESS discusses the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective engagement of stakeholders can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

12.6 Annex 6: List of Public Consultation Session Attendees

Name	Entity	Occupation
Abdelrahman Mostafa	Bioenergy Corporation for Rural Development,MoE	Environmental Specialist
Ahmad Kotaem	Masarat Misr (Transportation Planning and Technology)	Operations Director
Ahmed AbdelRassoul	Ministry of Local Development	Waste Sector Management Unit
Ahmed Elawady	Institute of Environmental Studies and Research, Ain Shams University	Lecturer, Department of Environmental Engineering
Ahmed Gaber	Chemonics Egypt	CEO
Ahmed Refaat Hussein	Cairo University Faculty of Engineering	Lecturer in Chemical Engineering Department
Ahmed shokry	10th of Ramadan City Council	HSE Manager
Ali Abo Sena	WMRA	Consultant
Amr Osama Abdelaziz	Integral Consult	President and advisor to Ministry of Environment
Amal Faltas	World Bank	Senior Social Development Specialist
Anan Mohamed Ali	Integral Consult	Social Expert
Basma Sobhi Khalil	Integral Consult	Senior Environmental Specialist
Cathie Wissa	World Bank	social development consultant
Dahlia Lotayef	World Bank	Task Team Leader of ESMF Project
Djihan Hassan	Waste Management Department, Chemonics Egypt Consultants	Environmental Services Unit Manager
Ahmed Farouk Elberri	WMRA	CEO

Ehab Shaalan	World Bank	Environmental Consultant
Emad Hefny	Seeders Capital for Property and Trade Services	CEO
Eman Atef Zahran	EEAA - Central Department for Air Quality and Noise Protection	Supervisor of Air Quality Management
Eman Rayan	Qalyubia Governorate	Deputy Governor of Qalubiya
George Boushra Mikhail	Alarabia Waste Recycling Co	Executive Director
Hagar Metwally	WMRA	Technical Specialist
Hisham Sherif	Chief Executive officer	Egyptian Company for Solid waste recycling (ECARU)
Hussein Bakry	CID Consulting	Consulting Manager
Khaled Elfarra	WMRA	National Consultant
Laila Eskandar	CID Consulting	Founder, Ex-minister of environment
Mahmoud Mansour	Cairo Governorate	Cairo Cleaning and Beautification Authority
Menna Samir	WMRA	Technical Specialist
Mohamed Elsaid	Egyptian Company for Solid waste recycling (ECARU)	Finance Manager
Mohamed Saad Abdallah	EEAA-Central Department for Air Quality and Noise Protection	Manager
Mostafa Badawi	Public Transportation Authority	Head of the Central Department for transport Affairs
Mostafa Elkhedr	Entrans Consulting	Managing Director

Nabil Mohamed Nagib	Ministry of Local Development	Waste Sector Management Unit
Nermin Eltouny	Integral Consult	Technical Team lead
Nevine Ebeid	New Women Foundation	Researcher in development and gender studies
Noha Donia	Ain Shams University	Deputy of the Institute of Environment
Omaima Ezz Mohamed	Ministry of Health	General Manager of Environmental Health
Rania Bassiouni Badr	Central Department for Climate Change	Researcher
Salah AbdelHAMID	Public Transportation Authority	Planning General Manager
Salah Eldin Ahmed	Cairo Governorate	Environmental Manager
Walid Darwish	Ministry of Trade and Industry	Environmental Advisor to Minister
Eslam Ragab		
Fatma Ashour	Cairo University – Disaster Risk Reduction Center	Manager
Hoda Metwally		
Mahmoud Zaher		
Mohamed Abdelhalim		
Omaima Sawan	National Research Center	Researcher
Shafik galal	Cairo Cleaning and Beautification Authority	Employee
Shereen Fadl	Cairo Transportation Authority	Employee
Sobhy Gaeed		

List of Attendees of 2nd Public Consultation

Name	Occupation
Ahmed Elhadary	Garbage Yard Owner
Sayed Sedki Shamroukh	Garbage Yard Owner
Shenouda El Abd Fakhry	Garbage Yard Owner
Ali AbdelMaaboud Ahmed	Worker
Ahmed Elsayed Elsayed Azab	Waste Contractor
Elsayed Gomaa Megahed	Waste Contractor
Abdelazim Abdelhady	Waste Contractor
Mahmoud Ahmed Zaghroub	Waste Contractor
Saad tantawi	Storage Area Owner
Ragab Hussein Salama	Garbage Yard Owner
Youssef Samir Sayed	Worker
Abdallah Habib	Worker
Romany Samir Wanas	Storage Area Owner
Hassan Shabib mahmoud	Waste Contractor
Sameeh Habib	Waste Contractor
Mohamed Mokhtar Mohamed	Transfer Station Manager
Emad Samih Zaki	Worker
Mina Abdallah Habib	Worker
Gamil Gad Tawfik	Worker
Eid Farouk Mahmoud	Worker
Ramadan Ahmed Abdalla	Worker
Mohamed Helmy	Storage Area Owner
Tarek Faissal Kenawy	Wahed Men Elnas Organization
Mahmoud Hassan Hussein	Wahed Men Elnas Organization

12.7 Annex 7: List of Invitees for Public Consultation Session

Entity	Sub. Entity	Contact person name	Contact No.	Contact email	Follow up
Ministry of Environment	EEAA	Dr Enas Abdelmoteleb		ceo.eeaa@eeaa.gov.eg	by Email
	Central Department for Air Quality and Noise Protection	Dr Mostafa Morad		moustafa_mourad@hotmail.com	by Email
	Climate Change Central Department	Eng Sherif Abdelrehim		sherif_a2z@yahoo.com	by Email
	Environmental Impact Assessment Department	Dr Kawthar helmy		kawtharh@hotmail.com	by Email
		Dr Heba Shaarawi		heba_shrawy@yahoo.com	by Email
	WMRA	Dr Ahmed Farouk	01223277954	el_berri@yahoo.com	CEO -WMRA
Ministry of Health and Population		Dr Maisa	01019461700	dr_maysahamza@yahoo.com	by Email
Ministry of Transport		Dr Mona Qotb	01225525517		
		Mr. Nagy Elwakil	01111119746		by mobile
Ministry of Local development	Waste Sector Management Unit	Eng Ahmed Saeed	01006494835	as_afify@hotmail.com	by Email
Ministry of Trade and Industry	General Organization for Export & Import Control Egyptian Organization for Standardization and Quality (EOS)	Counselor Mohamed Ibrahim		mahmed@mti.gov.eg minister-office@mti.gov.eg	by Email
Cairo Public Transport Authority		Eng Salah Abdelhamid		alden6196@gmail.com	

Entity	Sub. Entity	Contact person name	Contact No.	Contact email	Follow up
		Eng Mostafa Badawi		mostafabadawi@gmail.com	
		Eng Shereen Fadl	0 111 126 5103	-	by fax: 23429656
Relevant Governorates	Cairo Governorate – Public Council			cba_cba23@yahoo.com cba_cba23&hotmail.com	by Email
	Qalyubia Governorate – Public Council	Dr Eman Rayyan		emanomer214@hotmail.com	by Email
		Dr M Abdelnasser	01225257570		by phone
	Giza Governorate – Public Council				by Fax:0237796061
Cleaning and Beautification Authority	Cairo Cleaning and Beautification Authority	Eng Mahmoud Mansour	01000509287	mahmoudeng411@gmail.com	by Email
	Giza Cleaning and Beautification Authority	Eng Ahmed Khaled	01211116203	ahmedkhaled2429@gmail.com	
		Eng Shafik Galal	01111545421		by phone
١٠th of Ramadan City Council					by Fax: 0554410438 / 055441075
Academic and Research Institutions	Soil, Water & Environment Research Institute – Cairo Uni	Dr Alaa Elbably	02 35720608	sweri@sweri-eg.com	by Fax:0235720608
	Institute of Environmental Studies and Research, Ain Shams University	Dr Noha Donia	012/28301999	ndonia@gmail.com	by Email
		Dr Ahmed Elawady	+2(010)-971-192-33,	ahmed.tarek.awady@gmail.com	

Entity	Sub. Entity	Contact person name	Contact No.	Contact email	Follow up
		Dr Mahmoud Hewehy	86 010119535	hewehy1@yahoo.com	
	National research Center	Dr Omaima Sawan	01006499891	omimasawan@yahoo.com	by Email
	Soil, Water & Environment Research Institute - Qalyubia		01069686202		
	Disaster Risk Reduction Center – Cairo University	Prof. Fatma Ashour	12227327022	fhashour@yahoo.com	by Email
	Sustainable Environment Research center - AUC				not reached
	Higher Technological Institute of 10th of Ramadan	Dr Mahmoud Malek	1279715141	mmmolwan@gmail.com	by Email
		Dr Ahmed Refaat	1222277897	ahmed.refaat@eng1.cu.edu.eg	
Private sector (consultants, factories, companies, suppliers and traders working in the field of waste recycling)	Chemonics Consultancy	Dr. Djihan Hassan	+2(02) 3336 0918	djihan.hassan@gmail.com	by Email
	Outgreens for Waste Management	Mr. Ahmed Abdel Razeq	012010947777	Ahmed@outgreens.net	by Email
		Engineer Sarah	01210999950	Sara@outgreens.net	by Email
	ECARU for Solid Waste Management	Abdelhamid Abdelsalam	010 00029240	info@entag.net hisham@entag.net pasant@entag.net	by email
	Recyclopekia for e-waste	Hosam Mostafa	010 23456180	hosam.mostafa@recyclobekia.com	by email
	Masarat Misr Consultancy	Ahmed Kotaem	012 77587778	a.kotaem@masarat-misr.com	by email
	Sets International	Nermin Ali	010 05828000	Nali@setsintl.net	by email

Entity	Sub. Entity	Contact person name	Contact No.	Contact email	Follow up
		Dr Hossam Abdelgawad			
Civil Society Organizations concerned with the project areas	A.P.E				not reached
	Abnaa Horus Organization	Sobhy Abd-Elmasih	01227900568		by phone
	New Women Foundation	Nevine Ebeid	1283633396	Nevineebeid72@gmail.com	by phone
	National Women Council	Mr/ Sameh	010 93111301	say88813@yahoo.com	by Email
	Egyptian Center for Women Rights	Hany Abu ElQomsan	010 03447999		apologize forattending the meeting
	Harassment Map Initiative	Enas Hamdy	010 02426961	enas.hamdy@harrassmap.org	by Email
	Youth Spirit Foundation	Ezzat Naeem Gendy	012 72231537		by phone
	Alashanak ya Balady	Heba Mohamed	010 67776905	heba.mohamed@ayb-sd.org	by email
	Arab Office for Youth and Environment	Dr Emad Adly		eadly@hotmail.com	by email
	CEDARE	Dr Hossam Allam	010 05840814	hallam@cedare.int	by Email
	Friedrich-Ebert-Stiftung Organization	Waleed Mansour	012 01871118	waleed.mansour@fes-egypt.org	by Email
	Arab Federation for Youth and Environment	Dr Mamdouh Rashwan	01227175425		by phone
	Masria for Human Development (Qalyubia)	Dr Karam Mahmoud	01159667740		by phone

Entity	Sub. Entity	Contact person name	Contact No.	Contact email	Follow up
	Masr Baladna for community Service and development (Qalyubia)	Essam Amin	01222862338		
	Masr Balady Org. (Qalyubia)	Mohamed Abdelfatah	01012089672	gamalhagar2013@gmail.com	by Email
Consultants	Entrans Consultiing	Dr Mostafa Elkhedr	1118444828	elkhedr@gmail.com	by phone
	WMRA National Consultant	Dr Khaled Elfarra	1222176823	drkhaled.elfarra@gmail.com	by phone
	CID consultancy	Dr Laila Eskandar		laila@cidconsulting.com	by Email