Greater Cairo Air Pollution Management and Climate Change Project

Qalyoubia Sanitary Landfill and Shared C&D Treatment Facility (Qalyoubia and Cairo Governorates): Executive Summary

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EXECUTIVE SUMMARY

Introduction

Cairo and Qalyoubia governorates are experiencing air pollution mainly due to inadequate collection and disposal of solid waste and open burning. To address this inadequate solid waste management, the Government of Egypt, through Waste Management Regulatory Authority (WMRA) in Ministry of Environment and Cairo and Qalyoubia governorates in Ministry of Local Development initiated the design of an Integrated Waste Management Facility (IWMF) in 10th of Ramadan under the ongoing Egypt: Greater Cairo Air Pollution and Climate Change Project (GCAPCCP) supported by World Bank (WB).

Component 2 of the Greater Cairo Air Pollution and Climate Change project includes a mix of institutional empowerment and capacity building activities to activate master plans for solid waste management in governorates, as well as developing and modernizing infrastructure for facilities of strategic importance for waste management.

The solid waste management complex at the 10th of Ramadan is one of the interventions of the Greater Cairo Air Pollution and Climate Change project to treat and dispose of various types of waste generated in Cairo and Qalyoubia governorates for a period of 50 years. The complex will include the following components:

- Sanitary landfill in Qalyoubia Governorate for rejects of treated municipal solid waste (227.5 acres)
- Construction and demolition waste treatment facility (23 acres)
- Sanitary landfill in Cairo Governorate for rejects of treated municipal solid waste (447 acres)
- Medical waste treatment and disposal plant in Cairo and Qalyoubia governorates (16.51 acres)
- Urban Communities Authority landfill for rejects of treated municipal solid waste and construction and demolition waste (100 acres)
- Municipal solid waste treatment plant for Cairo Governorate (Organic fertilizer production and recycling plant) (212 acres)
- Municipal solid waste treatment plant in Qalyoubia Governorate (organic fertilizer production and recycling plant) (106 acres)

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. IWMF-10R will be developed in a phased approach using different financing modalities.

The scope of this environmental and social impact assessment covers the following:

- Building the entire infrastructure (external and internal roads, electricity, water, sewage network, etc.) for the solid waste management complex at 10th of Ramadan
- Construction and operation of the first burial cell in the sanitary landfill in Qalyoubia
- Construction and operation of a joint construction and demolition waste treatment facility for the governorates of Cairo and Qalyoubia

To achieve the public-private partnership approach, a private investor will be required to design, build and operate the project foreseen. The current design of the proposed project is conceptual and the Private Investor will develop the full design of the three components financed by the GCAPCCP. Therefore, this ESIA is considered preliminary and a detailed ESIA will have to be developed by the Private Investor once determined.

In accordance with the World Bank's environmental and social framework, the Greater Cairo Air Pollution and Climate Change project is classified as High Risk. According to ESS1, the construction and operation of sanitary landfills (component 2 of the project) requires the preparation of a comprehensive ESIA study. According to the national requirements, and as per the Egyptian Environmental Law 4/1994 which classifies the solid waste management complex as a Category C project, an EIA is also required.

The primary objective of this ESIA is to ensure that potential environmental and social impacts associated with the construction, operation and closure of the proposed project are identified, assessed, reduced by mitigation measures proposed and develop an environmental and social management plan to aid in managing the potential impacts appropriately.

The proposed project is led by the state with funding from the World Bank and the expected participation of the private sector in the various stages of the project. The proposed project will be implemented in partnership between the Ministry of Environment and the Ministry of Local Development. Implementation will be carried out by the Waste Management Regulatory Authority; The Ministry of Local Development, and central and regional solid waste management units of the governorates of Cairo and Qalyubia. The Waste Management Regulatory Authority aims to regulate and monitor all processes related to waste management in order to improve waste management to be environmentally safe.

Study Approach

The preparation of the Environmental and Social Impact Assessment is done according to the following approach:

- Reviewing the available information and documents regarding the project (hydrology, geophysical, geotechnical, socioeconomic conditions, geomorphic and geological studies, traffic study and ambient air quality measurements)
- Reviewing national and international legislations and regulations relevant to the project, including the required governmental permits and WB standards

- Holding a Scoping Session (first public consultation) to engage the community and different stakeholders in the process of identifying the expected impacts
- Assessing the potential environmental and social impacts associated with proposed project activities
- Developing an outline for the environmental and social management plan for the mitigation of the expected negative impacts and the monitoring activities to ensure compliance with the relevant environmental laws
- Developing public consultation and engagement outline

Project overview

The selected site for the proposed solid waste management complex will be located in 10th of Ramadan on about 5 km south of 10th of Ramadan industrial area. It is in a vacant desert area as shown in Figure 1. The nearest residential areas to the project are 10th of Ramadan City, about 9 km away, and Badr city, about 14 km away.

Figure 1 10th of Ramadan Integrated solid waste management facility location

The solid waste management complex project at 10th of Ramadan is 1226 acres. All lands are state-owned. The project land is free from any economic activities or facilities. The project land use history was tracked through satellite maps from 2010 to 2019. The maps did not show any previous use of the proposed project site.

Components of the Proposed Project

The proposed project includes the following components, as shown in Figure 2:

1. Construction of all external and internal infrastructure for the waste management complex in 10th of Ramadan (IWMF-10R) (e.g. roads, electricity, water, sewage, fence...etc.)
2. Construction and operation of the sanitary landfill of Qalyoubia Governorate (Qalyoubia landfill), for the rejects of treated municipal solid waste
3. Construction and operation of the joint (Cairo and Qalyoubia) construction and demolition treatment facility

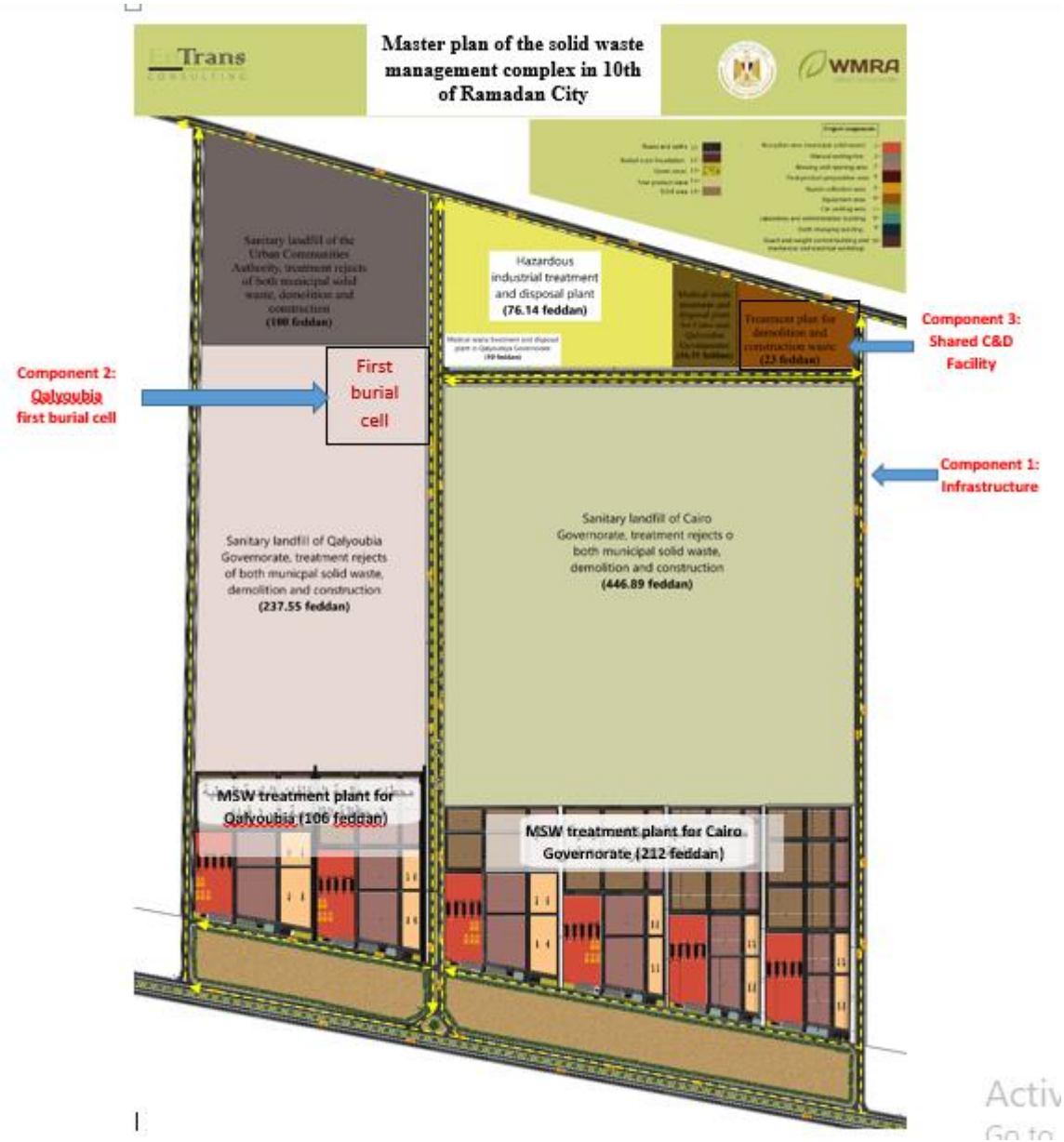

Figure 2 components of the proposed project

Capacity and Age of the Proposed Project

The expected life of the proposed project is 50 years. The conceptual study provided an estimate of the volume of waste during the period 2020-2070, taking into account the increase in the population.

Municipal solid waste generated in Qalyoubia Governorate

Qalyubia is an urban and rural governorate. The average waste generation per capita in urban and rural areas is 0.8 kg / day, 0.5 kg / day, respectively. The average rate of solid municipal waste generation in Qalyoubia Governorate during the project life is 4,860 tons / day.

The treatment site capacity is estimated based on an average reception rate of 5,100 tons / day (daily generation rate in 2053). The Qalyoubia sanitary landfill is expected to receive 1,500 tons / day of treatment rejects.

Municipal solid waste composition

According to the latest report published by the Ministry of Environment, the composition of municipal solid waste is shown in Figure 3.

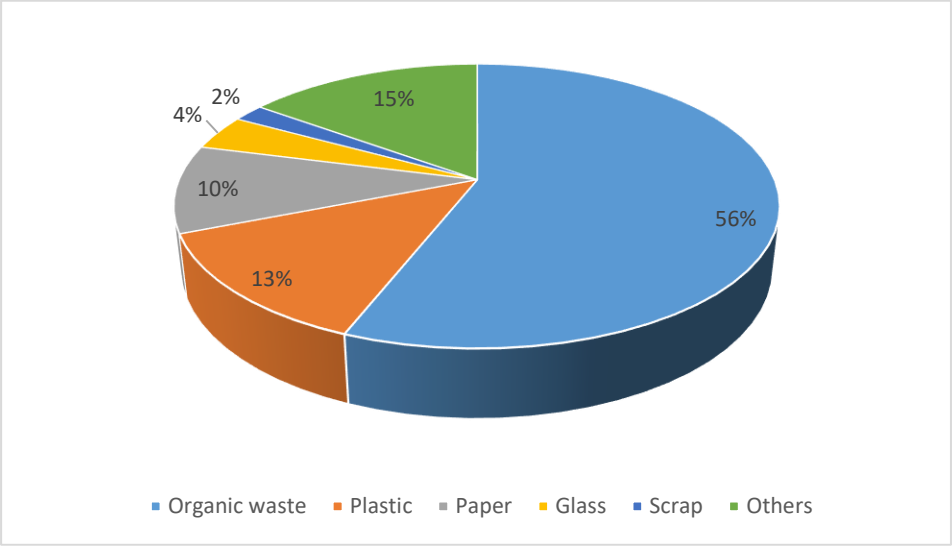

Figure 3 Municipal solid waste composition in Egypt

Construction and demolition waste

Construction and demolition waste generation rate per person is 0.03 kg / day. The average rate of generation of construction and demolition waste in the governorates of Cairo and Qalyoubia during the life of the project is 400 and 230 tons / day, respectively. Construction and demolition waste will be treated in a joint facility (a joint location for the two governorates) at a reception rate of 1,000 tons / day.

Legal and Regulatory Framework

The national framework includes the Egyptian Environmental Law 4/1994 and all its relevant subsequent amendments and executive regulations. The international framework adopted in this study is the World Bank's ESF criteria which cover key areas for environmental and social impacts to be adhered to by any of the Foundation's funded projects.

Egyptian law provides for environmental compliance procedures and emission limits, which are close to the WBG limits, if not more conservative. The proposed project components must comply

with international policies, which stipulate compliance with local laws. If there is a difference between local and WBG standards, the more stringent standards will be adopted.

Table 1 summarizes the legal framework for the project.

Table 1 The legal framework for the project

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
Pollution of the terrestrial environment	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Articles 19, 20, 21, 23, and 33 regarding the performance of environmental impact assessment Articles 22 and 23 regarding the follow-up of the environmental register	Articles 10, 11, 12, 13, 13 bis, 14, 15 and 16 regarding the performance of environmental impact assessment Articles 17 and 18 regarding the follow-up to the environmental register	Appendix 3 of the Executive Regulations of the Law: A Model for the Environmental Register
Hazardous waste management	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Articles 29 and 30 regarding hazardous material and waste handling and management		
Law 38/1967 (Public Cleanliness Law)				
Air pollution	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Substances 34 to 39, 42, 43 and 47 bis of the project site, emissions or leaks of air pollutants, use of engines, dumping or burning of refuse, waste and exhaust of drilling and construction works, noise and internal air quality in order	Articles 34, 35, 36, 37, 38, 41, 44, 45 of the project site and responsibilities, the permissible limits of air pollutants, exhausts of machinery and engines, open burning and disposal of waste, methods of dealing with waste and exhaust of drilling and construction,	Appendix 5: Maximum limits of external air pollutants Appendix 7, Table (3) Maximum noise levels in different areas (rural dwellings, urban dwellings, etc.)

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
			permissible noise limits, indoor air quality in order	
Occupational Health and Safety	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Articles 42, 43, 44, 45, 46 on noise, indoor air quality, temperature and humidity, ventilation and smoking.	Articles 44, 45, 46, 47, 48 on noise, indoor air quality, temperature and humidity, ventilation and smoking respectively	Appendix 7: Permissible limits for indoor and indoor noise levels Appendix 8: Maximum air pollutants within the workplace according to the quality of each industry. Appendix 8, table 4: Quantity of air required to ventilate public areas. Appendix 9: Maximum and minimum temperature and humidity
	Law No. 137 of 1981 (Labor Law) amended by Decree 12 of 2003			
	Law 203 of 2014 concerning the stimulation of electricity production from renewable energy sources	Articles 10,9,8,7,6,5,4,3,2,1 for the establishment of projects for the construction of electricity from renewable sources of energy.		
land acquisition	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	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		

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
	expropriation for public benefit,	estate for the public benefit		
Public Consultation	Law 4/1994 on Environmental Protection EEAA guidelines related to the Public Consultation	Paragraph 6.4.3.1 Paragraph 6.4.3.2 Paragraph 6.4.3.3 Paragraph 7	Scope of Public Consultation Methodology of Public Consultation Documentation of the Consultation Results Requirement and Scope of the Public Disclosure	

The World Bank (WB) has identified 10 environmental and social standards that should be considered in its financed projects. These following six standards are applicable on the proposed project:

- **Environmental and Social Standard 1:** Assessment and Management of Environmental and Social Risks and Impacts
- **Environmental and Social Standard 2:** Labor and Working Conditions
- **Environmental and Social Standard 3:** Resource Efficiency and Pollution Prevention and Management
- **Environmental and Social Standard 4:** Community Health and Safety
- **Environmental and Social Standard 5:** Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- **Environmental and Social Standard 10:** Stakeholder Engagement and Information Disclosure

A gap analysis was conducted between the main requirements of both Egyptian legislation and the World Bank standards, and the gaps between the two entities' requirements and environmental limits were identified as shown in Table 2.

Table 2 Gap analysis between ESSs and national laws

ESS	National Laws	Gap
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	• Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law) 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	• Discrepancies in air quality, water quality and noise limits between the national laws and WB standards • No national e-waste management system developed for the disposal or recycling of

ESS	National Laws	Gap
	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	batteries which may be disposed with MSW directed to the landfill
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	
ESS 3: Resource Efficiency and Pollution Prevention and Management	• Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law) 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	

ESS	National Laws	Gap
	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

ESS	National Laws	Gap
		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 10: Stakeholder Engagement and Information Disclosure	• EEAA EIA guidelines related to the Public Consultation prior to the project construction and implementation	• There are no regulations on committing the project owner to conducting stakeholder engagement activities as well as disclosing information regarding the environmental and social risks and impacts of the project to project-affected parties as well as to community members, throughout the project life cycle • There are no regulations on committing the project owner in establishing a grievance redress mechanism

Environmental and Social Baseline

In order to assess the environmental and social baseline in the project area, six environmental baseline elements were considered:

1. Site location
2. Ecological characteristics
3. Climate and meteorology
4. Natural characteristics (geology and soil, underground water, topography and sesminc activity)
5. Traffic
6. Ambient air quality

Site-specific topographical, geological, geotechnical, hydrological and traffic studies were used in assessing the baseline conditions.

In addition, the following social baseline elements were considered:

1. Socio-economic activities
2. Basic information about the project areas
3. Administrative areas
4. Demographic characteristics
5. Human development profile
6. Infrastructure, utilities and access to basic services
7. Health profile
8. Economic characteristics
9. Transportation
10. NGOs

Potential Environmental and Social Impacts and Mitigation

Main Environmental and Social Risks and Impacts of Construction

The main environmental and social risks and impacts expected during the project construction and mitigation measures were identified as follows:

1. Dust emissions during the construction phase due to the on-site activities (site preparation, excavation, etc.)
2. Noise arising from the construction activities (e.g. civil works and installations)
3. Soil, geology and hydrology
4. Solid and liquid waste arising from the construction activities
5. Labor and working conditions during construction phase
6. COVID-19 pandemic
7. Community health, safety and security
8. Increased traffic volume to and from the plant to transport construction materials and workers
9. Natural disaster risk
10. Risk of Child labor
11. Temporary labor influx
12. Risk of Gender Based Violence (GBV)
13. Culture heritage - chance of finding antiquities during excavation
14. Employment Opportunities (positive impact)

Main Environmental and Social Risks and Impacts of Operation

The main environmental and social risks and impacts expected during the project operation and mitigation measures were identified as follows:

1. Air emissions: vehicle emissions, emissions of dust, bio-aerosols and odors
2. Noise
3. Soil, geology and hydrology: leachate and liquid runoff

4. Labor and working conditions: working in low hygiene conditions
5. Community health and safety: litter, dust, noise, fire
6. Risk of solid waste mixed with potentially hazardous waste
7. Risk of Gender Based Violence (GBV) risk
8. Traffic: Increased traffic flow on roads leading to and from the Qalyoubia landfill and the C&D waste treatment facility
9. Natural disaster risk
10. Employment opportunities (positive impacts)
11. Air quality improvement in Cairo and Qalyoubia (positive impacts)

Project Alternatives

No Action Alternative

The objectives of the Qalyoubia landfill and the C&D waste treatment facility is basically to enhance the quality of air through preventing the uncontrolled burning of municipal waste and also to improve the environmental and public health conditions. Therefore, it can be concluded that the "no project alternative" is not a viable alternative from the environmental and social perspective.

Project Location/land Alternatives

The selected project site is an empty unoccupied land, owned by the state, located near to an industrial area and away from residential areas or sensitive receptors. Hence, the proposed project site is considered the best available location for the construction of the Qalyoubia landfill and C&D waste treatment facility in 10th of Ramadan.

Technology Alternatives

The overall aim for solid waste management is protection of human health and the environment in a manner that is affordable, environmentally friendly and socially acceptable. To achieve that, the adoption of an integrated solid waste management system is recommended. The most important alternatives for the project were assessed:

- Waste avoidance and reduction
- Waste incineration or waste to energy
- Waste open dump sites.

Leachate Treatment and Disposal Alternatives

Leachate treatment and disposal alternatives include recirculation of leachate through the landfill, disposal off-site to sewer for treatment, aerobic biological treatment, anaerobic biological treatment, and evaporation ponds.

From the above presented options for leachate handling it is preferred either to:

1. Send the leachate to an off-site sewage treatment plant in case of small leachate amount and the availability of a near treatment plant. Or,
2. To collect the leachate at an evaporation pond in case of area availability.

Landfill Gas Collection and Disposal Alternatives

The alternatives for gas usage alternatives in the form of Landfill gas to energy or Landfill gas bottling were studied as well as the alternative of landfill gas flaring.

The temperature at the project site throughout the year is high, which leads to the decomposition of any organic matter that may be present in the rejects aerobically in the first phase of the decomposition process and the emission of CO_2 gas of biogenic origin. Thus, the amount of organic matter remaining for the anaerobic decomposition process is very small, which does not result in or may produce a very small amount of methane. Hence, the utilization of the landfill gas in power generation will not be economically feasible and it should be thermally destructed through flaring instead.

Environmental and Social Management Plan (ESMP)

The ESMP provides:

- Evidence of practical and achievable plans for the management of the proposed project
- Framework to confirm compliance with relevant laws, regulations and standards
- Evidence of the management of the project in an environmentally acceptable manner

Qualified and experienced contractors will be responsible for implementation of the detailed design and construction of the proposed project. The private sector management will ensure that all contracts with contractors and sub-contractors stipulate all construction management measures, operational design criteria and environment, health and safety standards. Implementation of these measures will be enforced and supervised by dedicated HSE manager who will have direct responsibility for the Environment, Safety and Quality Assurance program on site during construction and operation.

This social management plan involves a monitoring process that will be the main responsibility of the Social Development Officer. The adherence to the ESSs necessitates the development of some forms/templates in order to be able to process the management and monitoring system appropriately. The monitoring and management will be implemented by the HSE officers under the supervision of the Social Development Officer and HSE manager.

The budget required to implement the environmental and social management plan was determined, including training programs to raise the capabilities of workers in operating the project and the

preparation of specialized environmental and social management plans (for example, firefighting plan, disaster plan, traffic plan, etc.). It is important to take into account that the proposed budget is based on the ESIA preparation team judgment based on field survey in 2020. The budget is subject to future changes based on external economic factors, such as inflation.

The environmental and social management plan was formulated during construction, operation, closure and post-closure activities. The elements included in the environmental and social management plan for each of the positive and negative impacts are: mitigation measures, monitoring methods, frequency of monitoring, performance indicators, monitoring site, identification of the agency responsible for monitoring, and estimated cost.

Table 3 shows the ESMP during the construction phase. Table 4 shows the ESMP during the operational phase. Table 5 also shows the ESMP during the closure and post-closure activities.

Table 3 Environmental management and monitoring plan for the proposed project during construction phase

Risks/Impacts			
Risks & Negative Impacts			
Air Quality - Dust			
Mitigation measures	• Minimizing drop heights for material transfer activities such as unloading of friable materials; • Cover truck beds with tarps during material transport • Spray water regularly when there is possibility of generating dust • Enforcement of vehicle speed limits on site to <35 km/h. • Planting of trees as wind breakers		
Methods of monitoring	Visual inspections and monitoring of dust and exhaust gas releases	Recording and documentation of complaint	Direct measurement using meters or sample analysis
Monitoring frequency	Daily during period of dust generating activities	Monthly	Quarterly
Performance Indicators	• Dust levels ambient PM (TSP, PM10) • Dust complaints		
Monitoring location	Border of construction site		
Responsibility	• Contractor and proponent's • HSE manager (and officers)		
Estimated cost (EGP)	5500/point/hour (three points per visit)		
Air quality – vehicle emissions			
Mitigation measures	• Implement the equipment manufacturers' recommended engine maintenance, along with the mechanical maintenance for the safe operation of the vehicle /equipment, including proper tire pressure. • Any vehicle that has high smoke emissions visibly detected should be promptly repaired. • Optimize waste collection routes to minimize distance travelled and overall fuel consumption		

Risks/Impacts				
Methods of monitoring	Visual inspections monitoring of exhaust gas releases			
Monitoring frequency	Daily			
Performance Indicators	SOx, NOx, and CO and black smoke from vehicles			
Monitoring location	Construction boundaries			
Responsibility	Proponent's HSE manager (and officers)			
Estimated cost (EGP)	(3500/ vehicle) *2 =7000			
Air quality – landfill gas				
Mitigation measures	• Ensure the availability of enough covering material on site and apply covering material and the final cover regularly following the national and World Bank codes • It is recommended to perform trials to collect the gas early during the landfill operation and before the cell is completely filled (i.e. place gas vents progressively) • Provision of a portable devise permanently working to measure the flow rate of the gases on site • Install landfill gas monitoring wells/probes to regularly monitor landfill gas migration • The lining system and final cover of the landfill should be properly maintained to avoid overloading landfill cells and allow regular evacuation/ventilation of leachate and gas. • To control GHG emissions, it is recommended to install landfill gas collection system to collect landfill gas and flare it in enclosed flare as recommended by EU directive (1999/31/EC) for the best practices of enclosed flare operation, maintenance and monitoring. • A maintenance schedule for the landfill ventilation/gas collection system should be prepared and followed by the project operator.			
Methods of monitoring	Portable gas flow meters	Collection of samples and analysis of air samples	Continuous and logged basis of inlet gas to the flare and outlet of the flare	Ground water analysis to make sure lining system is efficient
Monitoring frequency	Continuous monitoring with monthly collection of records	Twice a year	Continuous and logged basis of inlet gas The outlet stream should be measured when there is change in operating conditions of flare or when gas flow rate changes	Once a year
Performance indicators	Amount of landfill gas	Near the gas vents	CH_4, CO_2, O_2 and gas flow	No carbonic acid in groundwater

Risks/Impacts				
			rate and temperature of the inlet stream O_2, CO, CO_2, NOx, trace elements of SO_2 of the outlet stream of flare	
Monitoring location	CH_4, CO_2, NH_3, H_2S and VOCs in ambient air Concentration of methane in the air shouldn't exceed 1.25%	Inside and outside the landfill	Landfill gas flare	Groundwater
Responsibility	Proponent's HSE manager (and officers)			
Estimated cost (EGP)	20,000	5000 * 2 = 10,000	50,000 for continuous monitoring system of inlet stream 4500/ measurement for the outlet stream	10,000/measurement
Air quality – odor emissions from landfill				
Mitigation measures	• Maintain application of cover material (at least 15 cm) and compaction. Upgrade the rates of compaction and application of soil cover in case of receiving complaints. • Control and maintain source of odor: o Leachate generation ▪ Avoid accumulation of leachate without treatment o Landfill gas ▪ Properly vent and regularly maintain gas flare			
Methods of monitoring	Same as landfill gas: collection of samples and analysis of air samples and conducting air dispersion model		General site odor.	Recording and documentation of complaints
Monitoring frequency	Twice a year		Daily	Monthly
Performance indicators	H_2S in ambient air		Complaints	
Monitoring location	Inside and outside the landfill		Near sensitive receptors such as nearby roads and residential area	
Responsibility	Proponent's HSE manager (and officers)			

Risks/Impacts		
Estimated cost (EGP)	Included in the above price	No additional cost
Noise (on worker and public)		
Mitigation measures	• Use of appropriate PPE for all workers • Fitting equipment with silencers or mufflers • Regular maintenance and service of building equipment and vehicles • Plant wind break trees around the site borders to attenuate any possible impact.	
Methods of monitoring	Instrumental measurement	
Monitoring frequency	5 hours of day-time measurements, twice per month	
Performance indicators	Noise level maintained below 50 dB (A) during daytime and 40 dB (A) during night; Regular records and logs are maintained and compliant	
Monitoring location	At the sources; Along perimeter of site; At the sensitive receptors such as the nearest road Cairo-Ismailia desert road	
Responsibility	Proponent's HSE manager (and officers)	
Estimated cost (EGP)	600/point/day (10 -20 points) *2*12 = 14,400	
Soil, geology and hydrology: leachate generation and liquid run off		
Mitigation measures	• Implement preventive maintenance schedule of leachate collection system • Regular maintenance of impermeable layer (liner system in landfill, area of waste receiving area) • Proper leachate treatment and quality measurement according to Egyptian standards and permissible limits • Maintain site drainage that will minimize the inflow of storm water into the site which will minimize leachate generation • Maintain landfill cell compaction, slopes and daily cover materials to reduce infiltration of rainfall into the deposited waste • Maintain covering material even on the side slopes of the landfill cells, as well as on the lateral surface to avoid soil erosion and landfill collapsing	
Method of monitoring	Level measurement of the leachate pond Records of pumping station	
Monitoring frequency	Monthly	
Performance indicators	Depth of the leachate collection pond	
Monitoring location	Leachate collection pond	
Responsibility	Proponent's HSE manager (and officers)	
Estimated cost (EGP)	32,000	
Risk of hazardous waste mixed with solid waste		
Mitigation measures	• Develop waste acceptance criteria, and communicate it with waste collectors and transporters • Wastes are going to be received from collectors at the receiving and sorting area, where the received waste will be sorted according to the	

Risks/Impacts	
	project criteria, to eliminate hazardous waste commingling with the waste rejects to be disposed in the landfill. • The landfill operation manual will include lists of accepted and non-accepted waste types. • The waste acceptance criteria should be well communicated among the site workers to ensure efficient sorting process. • Training of all the workers for easier waste differentiation. • If hazardous waste entered the site it will be sorted out and stored in a specialized container until it is transported to proper hazardous waste management facility • Train landfill workers on waste identification and sorting • Controlled access and tracking • Ensure all workers are aware of the potential risks and use appropriate PPEs at all time.
Method of monitoring	Visual inspection
Monitoring frequency	Daily
Performance indicators	Amount of hazardous waste found Health records about occupational injuries And infectious diseases among workers
Monitoring location	Waste sorting area
Responsibility	Proponent's HSE manager (and officers
Estimated cost (EGP)	No additional cost for visual inspection
Risk of inappropriate labor and working conditions	
Mitigation measures	• Clear, fair hiring procedures should be put in place to ensure fair treatment, nondiscrimination and equal opportunity of project workers: - Information regarding their terms and conditions of employment (including their rights related to hours of work, wages, overtime, compensation and benefits…) should be established and communicated with the workers - Regular payment as per national laws and the LMP - Adequate periods of rest per week, annual holiday and sick, maternity and family leave should be ensured, - In case of termination of contract, project workers will receive written notice of termination of employment and details of severance payments in a timely manner - Employment of project workers will be based on the principle of equal opportunity and fair treatment, and there will be no discrimination with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, or disciplinary practices - The above is a non-exhaustive list of mitigation measures. The different types of project employers, employer will also need to follow the Labor Management Plan (LMP) • Training of all workers on the landfill as regards health and safety

Risks/Impacts	
	• Enforcement on the use of Personal Protective Equipment whilst on site • Recording of all accidents and investigating them for establishing root causes and instigating corrective measures • Training on fire safety and first aid for staff • Restrict unauthorized access to landfill area • Control of vermin, insects and birds by compaction of deposited waste and application of cover materials according to the waste filling plan. • All workers of the landfill should receive adequate training on the types of hazardous waste that could be found, the type of hazards and the appropriate methods of handling. • Coverage with appropriate insurance schemes (health and social insurance coverage) for all the types of workers, including casual workers hired by subcontractors and the contractor • Anyone entering the project site will register in an attendance sheet/logbook - Records of copy of national IDs will be kept for all types of laborers, including casual laborers hired by subcontractor and contractor. • The employer must make arrangements to conduct the periodic medical examination once every six months to ensure the fitness of workers and to uncover possible upcoming risks of occupational diseases in its early stages • Develop emergency plans. • A worker's complaint system must be made available to workers on the facility.
Methods of monitoring	• Inspection of complaints • Inspection of Human Resources Policy • Inspection of employment contracts • Health records about occupational injuries and infectious diseases among workers • Inspection of attendance sheets and ID copies • Inspection of insurance policies • Inspection of Training records
Monitoring frequency	Daily
Performance indicators	• Occupational health and safety Incident reports • Medical reporting on received cases • No accidents • No incidents regarding public health and safety • Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs.
Monitoring location	Workers at the project location
Responsibility	Proponent's HSE manager (and officers)
GBV	

Risks/Impacts	
Mitigation measures	• Preparation of appropriate code of conduct that stipulates the commitment of labor towards community groups and behaviors that should be avoided • All workers should be trained on the code of conduct. • Code of conduct to be developed and signed by operator. It should include prevention of sexual exploitation and abuse and sexual harassment (SEA/SH) at workplace. • Apply the full requirements related to operating the grievance mechanism including anonymous channels • Specified grievance mechanism channels for GBV will be announced and coordination will take place with the appropriate governmental entity (e.g. National Council for Women)1 • 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 • Apply penalties to workers violating the code of conduct • 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
Method of monitoring	• Inspection of training records • The monitoring of workers' compliance to the Code of Conduct when interacting with the surrounding communities to avoid behaviors such as sexual harassment and GBV. • Inspection of complaints • Inspection of training records • Number and documentation of awareness raising activities and stakeholder engagement activities • Interview with community members
Monitoring frequency	Continuously
Performance indicators	• Worker code of conduct Established • No complaints from community • No incident • Community members aware of the activities conducted and the messages shared
Monitoring location	• Landfill • C&D waste treatment facility
Responsibility	Proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in operation cost

1 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).

Risks/Impacts		
Risk related to community Health and safety/ community dissatisfaction with the operation of the landfill and the C&D waste treatment facility due to operation related impacts (e.g. odor)		
Mitigation measures	• Follow the mitigation measures mentioned in sections (Air Quality, Noise) same as mentioned above to reduce the risk of odors, Noise, Fire, and to ensure that operational impacts are minimized and that community satisfaction is maintained, • Provide a complaint mechanism for the community. • Regular consultation as well as information sharing with surrounding communities to ensure the sustainable operation of the project	
Method of monitoring	• Community grievance log • Reviewing community consultation reports • Interview with community members	
Monitoring frequency	Monthly	
Performance indicators	• Number of reported complaints from the community • Community members aware of the activities conducted and the messages shared/discussed (through the beneficiary feedback survey)	
Monitoring location	Site	
Responsibility	Social Development Officer in collaboration with other relevant officers (OHS) and environment)	
Estimated cost (EGP)	Covered in operation cost	
Fire		
Mitigation measures	• Provide sufficient firefighting equipment onsite and train workers on using them • Design the facility for access by firefighting equipment, including clear aisles among windrows and access to an adequate water supply • Post emergency telephone numbers in clearly visible points • Establish fire prevention and control plan • For sanitary landfills: - Maintain the application of cover material and waste compaction - Develop regular maintenance and monitoring of gas venting - The availability of foam and surfactants for firefighting in landfill to avoid having leachate problem in case water is used	
Method of monitoring	Monitor temperature of landfill at depth through monitoring wells in and around suspected fire zones	Monitor gas composition (methane, oxygen and carbon monoxide) at depth through the same monitoring wells for temperature monitoring
Monitoring frequency	Monthly	Monthly
Performance indicators	<55 ºC: Normal landfill temperature 55 – 60 ºC: Elevated biological activity 60 - 70 ºC: Abnormal elevated biological activity >70 ºC: likelihood of landfill fire	CO concentration above 25 ppm indicated possible fire in the area Oxygen percent above 1% indicates oxygen seeping and poor efficiency of cover material Methane percent higher than 40% indicates consumption of oxygen

Risks/Impacts		
		and favorable anaerobic conditions are taking place
Monitoring location	Landfill	
Responsibility	Proponent's HSE manager (and officers)	
Estimated cost (EGP)	250,000 annually for temperature and gas composition monitoring	
Infestation by vermin and flies		
Mitigation measures	• Incoming fresh waste and separated organic should not be stored on site for more than 24 hours • Install wheel washing facility at entry and exit points to the site • Perform daily cleaning for the facility and storage areas • Maintaining the application of daily cover of thickness 10-15 cm has proved to be effective in controlling rats and other vermin such as feral animals	
Method of monitoring	visual inspection	
Monitoring frequency	Daily	
Performance indicators	Absence of flies and vermin	
Monitoring location	Landfill	
Responsibility	Proponent's HSE manager (and officers)	
Estimated cost (EGP)	Covered in operation cost	
Control of litter		
Mitigation action	• Incoming fresh waste and separated organic should not be stored on site for more than 24 hours • Install wheel washing facility at entry and exit points to the site • Perform daily cleaning for the facility and storage areas • Maintaining the application of daily cover of thickness 10-15 cm has proved to be effective in controlling rats and other vermin such as feral animals	
Method of monitoring	Visual inspection	
Monitoring frequency	Daily	
Performance indicator	Absence of litter and tidy site	
Monitoring location	The site	
Responsibility	Proponent's HSE manager (and officers)	
Estimated cost (EGP)	Covered in operation cost	
Traffic		
Mitigation measures	• A traffic plan should be developed to provide the maximum safety to the population. Which should include: - Coordination with traffic department (ministry of interior) for vehicles route and movement. - Time management for vehicles movement; especially avoiding the peak hours and use of the route with less traffic intensity. • Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions. • Use of traffic signs during operations • Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. • Adhere to speed limit (40 km/hr)	

Risks/Impacts	
	Add complaint number on the vehicles back to report any complaints from the driver
Method of monitoring	Vehicle maintenance inspection records Reported complaints
Monitoring frequency	Monthly
Performance indicator	Number of recorded complaints
Monitoring location	The site
Responsibility	Proponent's HSE manager and officers
Estimated cost (EGP)	No additional cost needed

Table 4 Environmental management and monitoring plan for the proposed project during operation phase

Risks/Impacts			
Risks & Negative Impacts			
Air Quality			
Mitigation measures	**<u>Dust:</u>** • Minimizing drop heights for material transfer activities such as unloading of friable materials; • Cover truck beds with tarps during material transport • Spray water regularly when there is possibility of generating dust • Enforcement of vehicle speed limits on site to <35 km/h. • Planting of trees as wind breakers		
Methods of monitoring	Visual inspections and monitoring of dust and exhaust gas releases	Recording and documentation of complaint	Active collection of samples and laboratory analysis
Monitoring frequency	Daily during period of dust generating activities	Monthly	Once during the excavation of each cell
Performance Indicators	• Dust levels ambient PM (TSP, PM10) • Dust complaints		
Monitoring location	Border of construction site		
Responsibility	• Contractor and proponent's • HSE manager (and officers)		
Estimated cost (EGP)	5500/point/hour (three points per visit)		
Noise (on workers and public)			
Mitigation measures	• Use of appropriate PPE • Fitting of construction equipment with silencers or mufflers • Regular maintenance and service of building equipment and vehicles during construction works • Throttling down of noisy equipment • Reduce vehicle speeds (stick to recommended speeds; 20 km/h for heavy trucks) • Optimize transportation management to avoid needless truck drives (as part of a Traffic Management Plan) • Allow truck movements only during daylight, but not between 7 pm and 6 am		

Risks/Impacts	
	• Notify population in nearby residential areas in advance about start date and duration of the overall construction works and of specific operations with high noise level • Noise levels may not exceed the limits stipulated by the Egyptian Environmental Law/94 and its executive regulations (as stated in section 4 of this ESIA study)
Methods of monitoring	• Records and logs inspection (maintenance, permits to work, safety clearances, complaints) • Instrumental measurement
Monitoring frequency	5 hours of day-time measurements, twice per month during construction period (assumed no construction works at night)
Performance Indicators	• Noise level below legal limits during day and night time • Regular records and logs are maintained and compliant with permissible limits
Monitoring location	• At the sources; • Along perimeter of construction site; • At the sensitive receptors such as the nearest road Cairo-Ismailia desert road
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	600/point/day (10 to 20 points) *2*12 = 14,400
Soil, geology and hydrology	
Mitigation measures	• The contractor will put in place measures aimed at minimizing soil erosion and soil contamination - To avoid soil erosion, scheduling to avoid heavy rainfall periods (i.e., during the dry season, which is most of the time of the year in Egypt) to the extent practical. • Activities that involve fueling, lubricating or adding chemicals will not take place on-site unless it is necessary. This is to avoid soil pollution and generation of additional hazardous wastes. If such actions will necessarily take place on-site, they will be conducted over impervious surfaces and a spill kit will be made available on-site. - Containers of used chemicals and oil will be collected in specific labeled drums and disposed in an approved hazardous wastes facility in coordination with the local authorities. • Construction vehicles will be restricted to designated areas to avoid unnecessary soil compaction within the project site • Until Connecting to the public sewage network, to properly store in leak-free septic tanks made of suitable material and to regularly collect and dispose of sewage at the nearest wastewater treatment plant in coordination with the Water and wastewater company. • Completely prohibit uncontrolled washing of concrete mixers and random dumping of concrete remains by implementing regulated concrete washing in washing basins covered by impermeable materials where concrete wash out is left to dry and then recycled/reused or disposed of in authorized dump sites/landfills.
Methods of monitoring	Visual inspection
Monitoring frequency	Daily
Performance indicators	No soil contamination from oil and/or sewage

Risks/Impacts	
	No soil erosion
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Included in the construction cost
Waste management	
Mitigation measures	Prepare and implement a construction waste management plan which includes, but not necessarily limited to the following measures: • Completely prohibit dumping of solid wastes generated in unauthorized dump sites. • Existing waste material at the construction site has to be segregated and stored or disposed of accordingly • Contracting authorized waste handling contractors • Store all hazardous waste in adequate storage sites (lockable, roofed, ventilated, concreted and bunded floor) • Pack all hazardous wastes securely in sealed drums or other suitable containers, clearly identify them by labels, and provide Materials Safety Data Sheets (MSDS) • Provide spill-control kits to handle any spills due to equipment maintenance • Recyclable waste such as scrap metal, wood, paper and cardboard, etc should be stored in a central waste storage area and sold to local recycling companies in order to divert waste from landfill to the extent possible
Methods of monitoring	Documents and records review Site visual inspection
Monitoring frequency	Regularly during construction
Performance indicators	Maintaining valid contracts with authorized waste collection contractors Records of delivery at final disposal sites Records of the types and quantities of waste generated and amounts diverted through salvage and reuse, and/or recycle.
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Risk of inappropriate labor and working conditions	
Mitigation measures	• Clear, fair hiring procedures should be put in place to ensure fair treatment, nondiscrimination and equal opportunity of project workers: • Information regarding terms and conditions of employment (including their rights related to hours of work, wages, overtime, compensation and benefits…) should be established and communicated with the workers as per national laws and the Labor Management Plan (LMP) • Adequate periods of rest per week, annual holiday and sick, maternity and family leave should be ensured, • In case of termination of contract, project workers will receive written notice of termination of employment and details of severance payments in a timely manner

Risks/Impacts	
	• Employment of project workers will be based on the principle of equal opportunity and fair treatment, and there will be no discrimination with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, or disciplinary practices • The above is a non-exhaustive list of mitigation measures. The different types of project employers will need to follow the Labor Management Plan (LMP) • Contractual agreement with the contractor should include rigid commitments to prepare and implement an OHS Plan, which complies with WBG EHS Guidelines and OHSA requirements including but not limited to the following measures: - to appoint an accredited health and safety officer at site; - The use of appropriate PPE at all time; - to ensure, that medical staff, first aid facilities, ambulance services and any other medical services specified are available at all times at the site and at any worker accommodation; - to put in place workplace processes for Contractor's Personnel to report work situations that are not safe or healthy and give them the right to remove themselves from a work situation which they believe (with reasonable justification) to present an imminent and serious danger to their life or health; - To develop and adopt OHS procedures for all construction activities • Coverage with appropriate insurance schemes (social and health insurance coverage) for all the types of workers, including casual workers hired by subcontractors and contractors. In addition, the Insurance should be covering work related accidents (injuries and fatalities), as well as insurance for third party. • Anyone entering the project site will register in an attendance sheet/logbook • Records of copy of national IDs will be kept for all types of laborers, including casual laborers hired by subcontractor and contractor. • 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, should be submitted, reviewed and approved by the MoE/ WEMRA • Develop and Implement a well communicated and accessible grievance mechanism for workers to address any complaints • Develop and implement a Contingency Preparedness and Response Plan
Methods of monitoring	Inspection of training records Inspection of complaints and accident records Inspection of complaints
Monitoring frequency	Continuously during construction

Risks/Impacts	
Performance indicators	
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
COVID-19 pandemic	
Mitigation measures	• 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. • 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 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
Method of monitoring	Site inspection Review of documents and records Medical and routine check-up of staff and workers
Monitoring frequency	Daily

Risks/Impacts	
Performance indicators	Number of trained workers Number on infected persons Number of isolated persons
Monitoring location	Construction Site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	To be estimated based on the number of workers and general context
Community health and safety	
Mitigation measures	• Information related to community health and safety to be shared regularly and systematically as per stakeholder engagement plan (SEP) • Awareness raising campaigns should be tailored in cooperation with the community-based organization • Using caution tapes that help to keep unauthorized persons away of the site • Development and implementation of a Traffic Management Plan (including routes and alternative routes, truck movements, transport of workers, and short-term closure of roads (if necessary) • The construction site to be fenced and guarded by security personnel in order to prevent any unauthorized access to the site • In case of transporting heavy equipment, the nearby population should be notified in advance • Develop and Implement a well communicated and accessible grievance mechanism for community members to address any complaints • Develop and apply a code of conduct (CoC) for workers to regulate worker behavior and penalize any misconduct towards communities including any forms of verbal or physical assaults.
Method of monitoring	• General Implementation/ supervision cost • Number and documentation of awareness raising activities and stakeholder engagement activities • Interview with community members • Inspection of GRM details shared
Monitoring frequency	Annual
Performance indicators	• Number of complaints • number of reported incidents with the community • Community members aware of the activities conducted and the messages shared/discussed
Monitoring location	Surrounding community
Responsibility	Social Development Officer
Estimated cost (EGP)	Covered in construction cost
Traffic	
Mitigation measures	• Approval from the traffic department prior to construction should be obtained by the contractor prior to the construction preparation • Adopting limits for trip duration and arranging driver rosters to avoid overtiredness. • Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions.

Risks/Impacts	
	• In case of transporting heavy equipment, inform local communities in advance. • Development and implementation of a Traffic Management Plan (including regulations for truck movements, transport of workers, road closures, details about road use, and alternative routes in peak hours). • Review any complaints related to traffic and accidents • Clear sign surrounding construction site and the entrance / exit gate.
Methods of monitoring	Maintaining and controlling traffic on and to the site by inspection of Traffic Management Plan or traffic complaints from workers or community
Monitoring frequency	Regularly during construction (especially during transport of equipment and materials)
Performance indicators	• Effectiveness/extent of implementation of traffic management plan • Number of complaints received associated with traffic and time it took to resolve them • Number of unresolved complaints
Monitoring location	Surrounding roads
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Risk of child labor	
Mitigation measures	• Different types of contracts for contractors and sub-contractors should explicitly prohibit and penalize all forms of child labor in all project related activities • The contractor /subcontractor will be obliged to maintain daily attendance sheets in order to verify the attendance of workers not include staff below 18 years' old, • 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 ToR, contracts, and terms of employment for contractor and subcontractors prohibiting hiring minors
Method of monitoring	• Verifying contracts • Inspection of complaints • Inspection of Human Resources Policy • Inspection of employment contracts • Inspection of attendance sheets and ID copies
Monitoring frequency	• During contract preparation • Continuously during construction
Performance indicators	• No complaints from community • No children on site
Monitoring location	• Procurement officer • Construction site • Social Development Officer
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost

Risks/Impacts	
Risk of Gender Based Violence (GBV) Risk	
Mitigation measures	In order to minimize impacts pertaining to labor influx the following should be thoroughly implemented: • Preparation of appropriate code of conduct that stipulates the commitment of labor towards community groups and behaviors that should be avoided • All workers should be trained on 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. • Apply the full requirements related to operating the grievance mechanism including anonymous channels • Dedicated grievance mechanism channels for GBV will be announced and coordination will take place with the appropriate governmental entity (e.g. National Council for Women)2 • 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 • Apply clearly articulated and strict penalization system to workers violating the code of conduct • 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.
Method of monitoring	• Inspection of training records • Code of conduct established, disclosed and workers are trained on • The monitoring of workers' compliance to the Code of Conduct when interacting with the surrounding communities to avoid behaviors such as verbal assault, sexual harassment and other forms of GBV. • Inspection of complaints • Inspection of training records • Number and documentation of awareness raising activities and stakeholder engagement activities • Interview with community members • Inspection of drug tests and alcohol tests conducted • Numbers of penalties applied
Monitoring frequency	Continuously during construction
Performance indicators	• Worker code of conduct • No complaints from community • No accidents • Community members aware of the activities conducted and the messages shared/discussed

2 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).

Risks/Impacts	
Monitoring location	Construction site
Responsibility	Social Development Officer
Estimated cost (EGP)	Covered in construction cost
Infrastructure and underground utilities	
Mitigation measures	• Conduct surveillance activities to detect any available pipelines or networks (water or electricity) • Coordinate with the Local Governmental Units (Tenth of Ramadan City Authority / New Urban Communities) and the water and network companies to repair any damages. The contract should pay for this cost.
Method of monitoring	Documentation of affected infrastructure and corrective procedures taken
Monitoring frequency	Prior to all excavation work
Performance indicators	No complaints received No accidents
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Chance of finding antiquities	
Mitigation measures	• Such chance-finds needs special care in handling so as to keep their condition that will support the cultural value it represents. • In the unlikely event of finding of such objects, construction work should stop at the respective area of the site and the Ministry of Tourism and Antiquities should be informed so as to adequately handle this object.
Method of monitoring	Supervision
Monitoring frequency	During excavation
Performance indicators	Duration Discovery of archaeological sites, historical sites, remains and objects
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Positive Impacts	
Employment opportunity	
Mitigation measures	• Clear, fair hiring procedures should be put in place to ensure fair treatment, nondiscrimination and equal opportunity of project workers including fair opportunity for women and local communities. • As part of potential integration for the informal sector, inventorying workers in the informal sector and offer vocational training programs that could allow them to benefit from the offered jobs. • Activating the role of civil society organizations NGOs in raising awareness of the local communities about the importance of the project and the importance of preserving the environment • Provide a complaint mechanism.
Monitoring method	• Inspection of recruitment strategy • Inspection of employment contracts (also of subcontractors)

	• Inspection of complaints • Interviews with Employees • Community grievance log • Reviewing community consultation reports
Monitoring frequency	• 3 times; prior, during, and after construction
Performance indicators	• Employment contracts according to national and international labor standards • No complaints • Training programs • PAPs lists • Awareness raising programs
Monitoring location	The site
Responsibility	HR manager
Reducing air pollution associated to MSW open burning	
Mitigation measures	• Implementing this project will greatly reduce the uncontrolled open burning of municipal solid waste which is a main contributor to air pollution in greater Cairo. • Open burning usually takes place at relatively low temperatures leading to the emission of incomplete combustion products in the air leading to poor air quality. • This project will provide a safe and environmentally controlled SWM procedures that ensures efficient disposal of MSW and prevent its accumulation. • This project considers as one of the positive steps that the country is taking in order to enhance the air quality in Greater Cairo through reducing air emissions related to the poor SWM.
Monitoring method	Air quality through air quality monitoring stations.
Monitoring frequency	Quarterly
Performance indicators	GHG & PM10 concentration in air
Monitoring location	Greater Cairo
Responsibility	Ministry of Environment

Table 5 Environmental management and monitoring plan for the proposed project during closure phase

Risks/Impacts		
Risk / Negative Impacts		
Air quality – landfill gas		
Mitigation measures	• Assign the responsibility for monitoring landfill gas to the same trained personnel who were responsible during the operation phase • In case the monitoring indicated gas leak the reason for the leak should be identified and adequately handled	
Monitoring method	Gas flow meters	Collection of samples and analysis of air samples
Monitoring frequency	Continuous monitoring with monthly collection of records	Annual
Performance indicators	Amount of landfill gas	CH_4, CO_2, NH_3, H_2S and VOCs in ambient air
Monitoring location	Near the gas vents	Site border

Risks/Impacts			
Responsibility	WMRA under ministry of environment and governorates officials		
Estimated cost (EGP)	33,000	16,500	
Air quality – odor emissions			
Mitigation measures	• Put a final soil top cover and vegetate into a public park • Continue collection of leachates with treatment and discharge Continue collection of landfill gas and flaring		
Monitoring method	Same as landfill gas: collection of samples and analysis of air samples and conducting air dispersion model	Recording and documentation of complaints	
Monitoring frequency	Twice a year	Monthly	
Performance indicators	H_2S in ambient air	Complaints	
Monitoring location	Site border	Near sensitive receptors such as nearby roads and residential area	
Responsibility	WMRA under ministry of environment and governorates officials		
Estimated cost (EGP)	Included in the above price		
Soil, geology and hydrology: leachate generation and liquid run off			
Mitigation measures	• Continue maintaining leachate collection system until no more leachate is generated • Apply final cover according to World bank landfill standards (slope and thickness, etc.)		
Monitoring method	Level measurement of the leachate pond and records of pumping station	Representative sampling and laboratory analysis	Amount of collected sludge
Monitoring frequency	Twice a year	Quarterly for COD, BOD and pH and annually for the rest	Once after de-sludging
Performance indicators	Depth of leachate pond	COD, BOD, pH, TDS, total N, total P and heavy metals, of leachate	Records of sludge pump
Monitoring location	Leachate collection pond		
Responsibility	WMRA under ministry of environment and governorates officials		
Estimated cost (EGP)	53,000	40,000	No additional cost needed
Visual impacts			
Mitigation measures	Plantation of adequate plants over the final cover of the landfill and maintain it		
Monitoring method	Green areas planted over final cover		
Monitoring frequency	Annual		
Performance indicators	Visual estimation of the green cover % of the completed cells		
Monitoring location	Landfill completed cells		
Responsibility	WMRA under ministry of environment and governorates officials		
Estimated cost (EGP)	No additional cost needed		

According to the law 4/1994 and its modifications in 2009 and Article 17 of its Executive Regulations, the proposed project is required to keep up an Environmental Register as outlined in Annex 3 of the Executive Regulations.

The implementation of simple environmental monitoring plan as outlined herein facilitates the upkeep of the Environmental Register, as all information required will be regularly collected and documented as part of the self-monitoring activities.

Public Consultation and Engagement

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)".[3] 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. Accordingly, all potential stakeholders in the project were identified.

Public consultation activities have been implemented during the preparation of the site-specific studies. The public consultation activities scheduled are the following:

- Consultation activities were conducted in February and March 2020 with Relevant government entities
- A public consultation session was conducted on 15th of March 2020 in Cairo Governorate
- A public consultation session will be conducted in Cairo Governorate in April to present the findings of the ESIAs and get the stakeholders feedback to incorporate whatever is relevant to the findings of the ESIA and/or the design of the project. Given the restrictions imposed by the Government in response to the COVID-19 pandemic, the consultation will be conducted using various modalities that would allow for maintain physical distancing.
- Consultation is an ongoing process and further consultations will be conducted all over the life cycle of the project as per the activities suggested for stakeholder engagement and information sharing under the SEP.

Proposed Grievance Mechanism

Institutional Responsibility for Handling Grievances

[3] World Bank ESS 10. Available at: http://documents.worldbank.org/curated/en/476161530217390609/ESF-Guidance-Note-10-Stakeholder-Engagement-and-Information-Disclosure-English.pdf

The entity responsible for handling grievances will mainly be the Environmental Affair Department within the relevant Technical Implementation Unit (MoE/EEAA/WMRA). The Social Development Officer (SDO) in the Technical Implementation Units (TIUs) in cooperation with the contractor should address all grievances raised by community members.

Registration of GRM

All grievances should be registered and acknowledged within 6 working days and responded to within one month. Registration of grievances will be done via a categorization system to be able to analyze complaints received and provide appropriate and timely response. 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.

Grievance Channels

Comments and concerns regarding the project can be submitted verbally or in writing to the relevant TIUs (MoE/ EEAA/WMRA). 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). 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.

Response to Grievances

Responses to grievances will be conducted through the following channels:

- Response should be conducted using the same channel for submitting the grievance. Written grievances must be replied in written format. Grievances submitted via the website should be replied by email. In cases of phone calls call back to inform them of the resolution.
- Grievances should be responded to within the identified time limit, to give the community the sense of responsibility towards their concerns and taking effective measures to solve arising issues.

The complaints are documented and followed up by the Environmental Complaints Department in MoE wwithin a period not exceeding 21 days (Calendar days)

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)

Disclosure of Grievances

All grievances and communications will be registered, and the actions taken/responses given will be disseminated through the MoT/ WMRA website. Considering the anonymity of grievances all disclosed grievances should be kept anonymous and/or only an analysis of the grievance report should be disclosed. Frequently asked questions can be added to the website which would include responses to recurrent grievances and methods for handling them. Disclosure of the mentioned documents will go through the website of the MoT/ WMRA.

Conclusion

Considering the thorough analysis of collected data during the study including through consultation with diverse range of stakeholders, the following main points are concluded:

- The project is vital for the improvement of the sanitary conditions in Cairo and Qalyoubia governorates to give every resident the right of a better quality of life and valorize waste instead of making it a burden.
- The positive environmental impacts outweigh the negative ones; the latter can be contained by adhering to the proposed ESMP.
- The proposed project is located in a desert area complying with the initial plan of 10^{th} of Ramadan city away from sensitive receptors and will not compromise the well-being of the neighboring community, ecology or any other conditions if all the proposed mitigation measures are implemented.
- This component of the project does not have any impacts related to land and assets expropriation nor it will have any negative impact on the livelihoods of any group.