The ERI ITA is funded by the European Investment Bank

Tetra Tech International Development

Economic Resilience Initiative - Infrastructure Technical Assistance TA2017141 R0 ERI

REPORT

Environmental and social Impact assessment (ESIA) for upgrading Tanta-El Mansoura-Damietta railway line (including the doubling of El Mansoura-Damietta single track section)

04.10.2021

TETRA TECH International Development

A project implemented by the TTID ERI-ITA Consortium

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This technical assistance operation is financed under the EIB's Economic Resilience Initiative (ERI). The ERI is EIB's response to the European Council's call to intensify its support for the EU's neighbourhood, in pursuit of economic growth and the achievement of the sustainable development goals (SDGs). The objective of this initiative is to rapidly mobilise additional financing in support of sustainable growth, vital infrastructure and social cohesion in Southern neighbourhood and Western Balkans countries. The Economic Resilience Initiative focuses on both the public and the private sectors, in support of EIB activities during different stages of the project cycle. The EIB is contributing to the ERI TA window with an envelope amounting to EUR 90 million from its own budget resources.

Report Issue Record

Project Title:	Economic Resilience Initiative - Infrastructure Technical Assistance
Project Number:	TA2017141 R0 ERI
Report Title:	REPORT "Environmental and social Impact assessment (ESIA) for upgrading Tanta-El Mansoura-Damietta railway line (including the doubling of El Mansoura-Damietta single track section)"
Issue Number:	4

Revision	**1**	**2**	**3**	**4**	**5**
Date	22 January 2021	10 May 2021	29 June 2021	30 Augsut 2021	04 October 2021
Detail	Draft ESIA Report	Draft ESIA Report	ESIA Report	ESIA Report	ESIA Report
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Glossary of Terms and Abbreviations

Abbreviation	Full Word
AFD	AGENCE FRANÇAISE DE DÉVELOPPEMENT
ARAP	Abbreviated Resettlement Action Plan
ATP	Automatic Train Protection
BB	Blocking Building
BoD	Board of Directorate (BoD)
CAA	Competent Administrative Authorities
CAPMAS	Environmental and Social Standard
CCN	Core Communication Network
CCTV	Closed Circuit Television
CTC	Centralized Traffic Control
CWR	Continuous Welded Rails
EandS	Environmental and Social
EEAA	Egyptian Environmental Affairs Agency
EHS	Environmental, Health and Safety
EIB	European Investment Bank
EMU	Environmental Management Unit at Governorate
ENR	Egyptian National Railways
ER	Executive Regulation
ERTMS	European Railway Traffic Management System
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
ETCS	European Train Control System
FGD	Focus Group Discussion
FRS	Functional Requirements Specification
GAC	World Bank's Governance and Anticorruption (GAC)
GRM	Grievance and Redress Mechanism
HandS	Health and Safety
IR	Involuntary Resettlement
Km	Kilo meter
LAN	Local Area Network
LGU	Local Governmental Unit

LX	Level Crossing
MoT	Ministry of Transport
MTB	Main Technical Buildings
OHS	Occupational Health and Safety
PAP	Project affected person
PC	Public Consultation
PIU	Project Implementation Unit
PM	Particulate Matter
RAP	Resettlement Action Plan
RoW	Right of Way
RPF	Resettlement Policy Framework
SCADA	Supervisory Control and Data Acquisition
SRS	System Requirement Specifications
STB	Secondary Technical Buildings
TA	Technical Assistance
TOR	Terms of Reference
VHF	Very High Frequency
WAN	Wide Area Network
WB	World Bank

Executive summary

Introduction

For many reasons, including serious safety concerns, the declining level of service provided and the burden imposed by the sector on the public budget, railway operations have become a matter of deep concern to the Government of Egypt.

ENR has adopted a wide-ranging strategic plan to improve and upgrade all railway infrastructure in Egypt using state-of-the-art technological solutions that have been proven in other railway networks around the world for their efficiency and reliability.

In line with this strategic plan, ENR envisages upgrading the railway line between Tanta, El Mansoura and Damietta. The Tanta-Damietta corridor is located in the Delta region, on the Mediterranean façade of Egypt. This railway line has a total length of 119 km and is divided into two sections:

1. Between **Tanta and El Mansoura**: a non-electrified **double-track** line, length: 54 Km with 16 stations.
2. Between **El Mansoura and Damietta**: a non-electrified **single-track** line, length: 65 Km with 19 stations.

The objective of this project is to improve the reliability, efficiency and safety of this railway line, through two components:

- **Component (A):** Modernization of the Signalling System between Tanta and Damietta
- **Component (B):** Doubling of the single-track between El Mansoura and Damietta.

There are 83 level crossings on the line, and 23 interlockings. It passes through three Governorates (Gharbia, Dakahlia and Damietta). The following figure shows the railway line between Tanta – El Mansoura – Damietta.

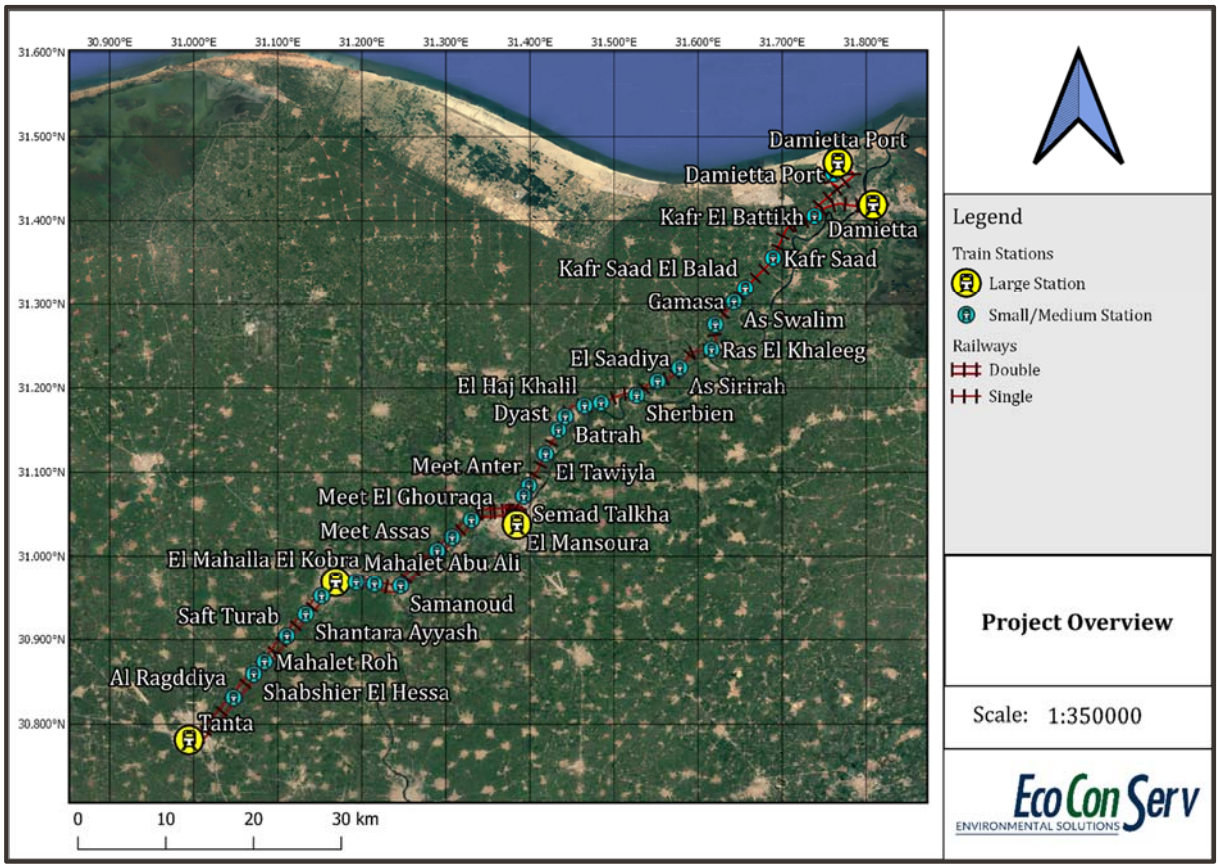

Figure 0-1: Tanta – El Mansoura – Damietta Railway Corridor Railway Corridor

Project description

Main Project Components

The project aims to upgrade and modernize the existing line's infrastructure. The proposed project consists of two main components:

- **Component (A):** Modernization of the existing mechanical signalling system of Tanta – El Mansoura – Damietta railway line (along the whole line, 119 km).
- **Component (B):** Doubling of the single-track between El Mansoura and Damietta (along 65 km).

Component (A): Modernization of the existing mechanical signalling system of Tanta – El Mansoura – Damietta railway line

The main works associated with upgrading the signalling system include:

- Replacement of mechanical interlockings with a new electronic interlocking system.
- Replacement of mechanical switches with point machines.
- Renewal of all signalling ground installations, including civil works (trenches and buried pipes), required for connecting cables to the field elements.

- Installation of a train detection system using traditional track-circuit technology and its associated infrastructure.
- Construction of new technical buildings along the line to house the new signalling, telecommunications and energy equipment.
- Installation of new conduits, with four spare pipes, installed at each side of the track.
- Introduction of a new power supply system managed by a SCADA system. The power supply will be connected to two different sources: the national electricity grid and an emergency generator (fixed and mobile).
- Establishment of a Centralized Traffic Control Center (CTC).
- Implementation of a new transmission system to establish communication between all equipment along the tracks, and inside the technical buildings, with the CTC.
- Installation of a new protection and automation system for level crossings.
- Setting up of a fibre optic cable network along the tracks to connect the transmission network and signalling devices. The network consists of two cables of 48 optical fibres laid on each side of the track (a total of four main cables).
- Training of operation and maintenance staff.

All new buildings will have fire alarm, anti-intrusion, and access control systems, fire protection and firefighting measures, in addition to a CCTV-based monitoring system, in order to increase security.

Centralized Traffic Control (CTC) Building

In order to enhance a remote control of traffic, the line will be controlled from a Centralized Traffic Control (CTC), which will provide the following functions:

- Automatic vehicle supervision and regulation;
- Management and interface with communication subsystems;
- Operation management functions;
- Maintenance management functions
- Maintenance management for optimization of maintenance activities to enhance productivity and system availability.
- Instantaneous overall view of all events and alarms occurring within the system, made available at the CTC traffic room on corresponding control desk according to line and function responsibilities,
- Storage for archiving all events and alarms to assist in incident and fault diagnostic investigations and statistics.

The CTC building will be located at El Mansoura main station; the building will be built entirely within the property of ENR, as shown in the following figure.

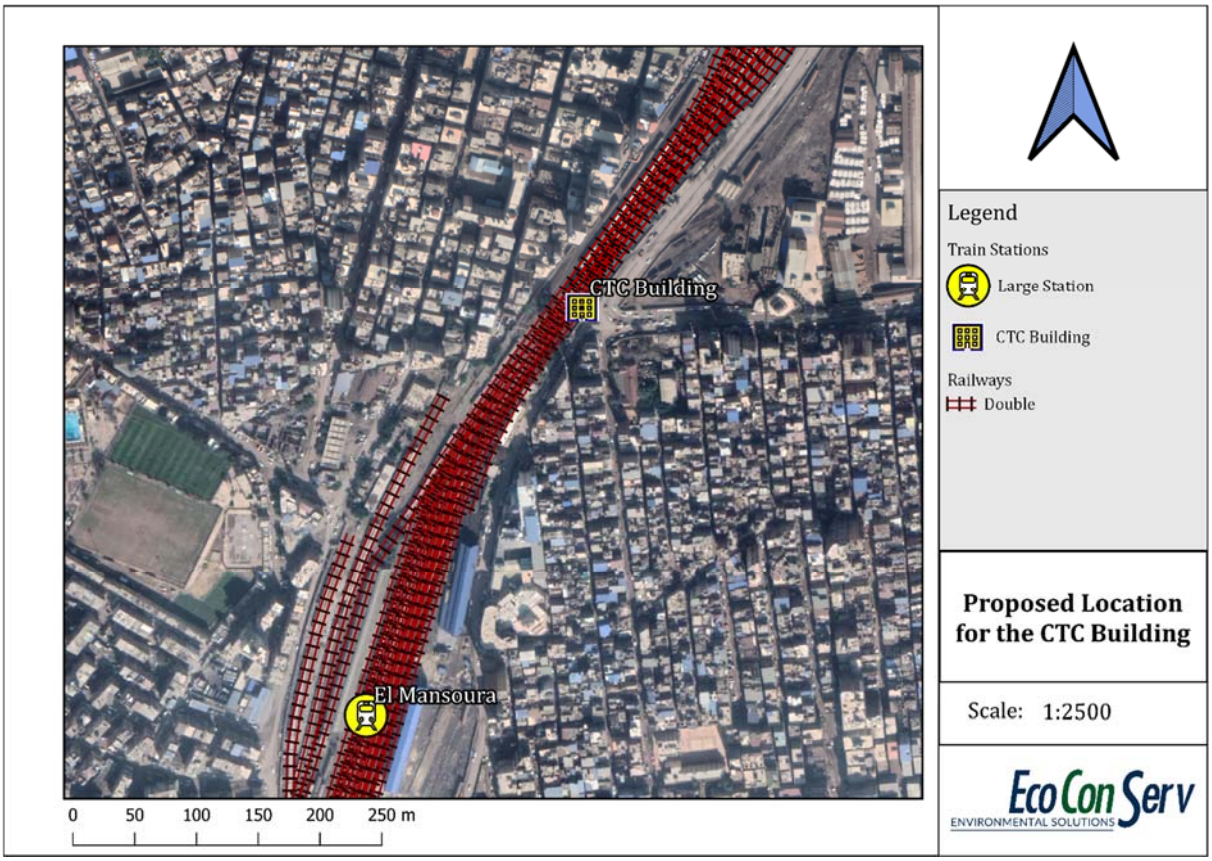

Figure 0-2: Map showing the location of the Centralized Traffic Control (CTC) Building

The CTC will utilize modern technologies to maintain high standards for safety, reliability and efficiency. The CTC will be designed to operate 24 hours a day, seven days a week.

The CTC functionality is to ensure the complete management of train traffic and allows for swift decision-making in the event of accident or deficiencies.

Technical Buildings

The technical buildings will be built along the line to house the new signalling, telecommunications and energy equipment. There will be no fence protection along the line; therefore, the buildings will be secured with safety locks and heavy materials. The buildings will have several independent rooms for signalling, telecommunications, power supply, offices, etc.

The buildings will contain a floating floor and/or false ceiling to allow a clean distribution of equipment, in order to avoid cables from being visible. The buildings will be equipped with lighting, air conditioning, and other basic utilities. The buildings will be built on-site and will not be prefabricated.

The buildings will be electrically protected by means of a grounding grid composed of bare copper and rods, such that contact voltage and contact step remain lower than the maximum admissible voltage. Besides, the technical buildings will include a fire-fighting system for extinguishing any fires that accidentally break out.

The Tanta – El Mansoura – Damietta line has 45 Local Block Buildings to control all level crossings, small stations and switch points located along the corridor. For the upgrading project, around **14 Main Technical Buildings (MTB)** will be constructed.

According to the latest update received from ENR on 4th of March 2021 , about 12 locations out of 14 Main TB have been identified, and during the coming period the remaining sites of Mahalet Rawh and Sherbin will be determined. Regarding the **Secondary Technical Buildings (STB)**, there is no information on the location of the STBs or their expected number so that the exact location of the construction works is not identified yet. The only information made available by ENR is that the expected building area is around 50 m^2, each building consists of one floor and will be constructed within ENR's property.

Component (B): Doubling of the single-track Railway Line between El-Mansoura and Damietta

ENR envisages the El Mansoura – Damietta railway line's doubling as part of a critical renewal and development program of the Egyptian railway network.

The line is a part of the Damietta – Cairo line, which starts at El Mansoura City and extends northeast through Nile Delta until it reaches Damietta City. Currently, it is a 65-km, single-track line, used by both passengers and freight trains.

As it is a single-track line, passing loops are required to allow trains to cross or pass each other. The average spacing between passing loops is around 4.5 km, but that spacing is irregular as the loops are located at stations and currently vary from 2 to 5.7 km. Generally, the track's condition is good, but in some areas, renewal is needed.

The doubling of El Mansoura – Damietta railway line will include the following construction activities:

Installing the new second track and its components:

Generally, the double track will be installed on the **eastern side of the existing railway line** as El Sahel Canal is extending along its total length on the western side.

In some segments, there is an old track already in place, as shown in the following figure or at least there is a space for the construction of the new double line. However, in other segments, earthworks, and other civil works will be required for the new track. As per ENR, in areas where there is already an old track, the doubling will be done by removing the old track and installing a new one.

Figure 0-3: Railway Tracks ready for doubling

The doubling will end at Damietta Station, as after this station the line is divided into two single-track lines: The first (around 7 km) goes to Damietta City and the second (about 12 km) to Damietta Port. Only freight trains go to Damietta Port, whereas only passenger trains go to Damietta City Station.

Characteristics of the new double track

As per the SYSTRA study[1] and the "*Track Alignment Report*" elaborated by the TA Consultant, all line sections of the doubling line will have the following characteristics:

- Line category: class 1.
- Nominal train speed: 120 km/h
- Maximum axle load: 24 tons
- Track gauge: 1.435 mm.
- Welding Type: Continuous welded rails (CWR).
- Distance between running tracks: 4.0 m between track centers.
- The line shall be designed future electrification

Components of the new double track

As per the SYSTRA study and the "*Track Alignment Report*" elaborated by the TA Consultant, the new double track will consist of the following components:

- Rails;
- Sleepers: pre-stressed mono-block sleepers, including fastening system;
- Ballast;
- Arrangements to prevent derailment or to limit the consequences of derailment on bridges and level crossings;
- Check rails if any;
- Components for switches and crossings; and
- Train stops (Buffer stops).

Studying the possibility of increasing the train speed and increasing the curve radii:

The SYSTRA study examined, the feasibility of increasing the speed on the present curves by increasing the super elevation values or the radii without modifying the present location of the track embankment. SYSTRA recommends increasing the maximum speed to 120 km/h, which can be realized on all curves of the line excluding the curve in the vicinity of Sherbin station with a radius of 500m.

The horizontal alignment between the Talkha Triangle and Damietta City station consists of fifty-nine (59) curves. There are twenty-one (21) curves with radii more than 20,000m and twenty-six (26) curves with radii between (5,000m - 739m). According to ENR guidelines, the minimum horizontal radius for speed 120 Km/hr and cant 130mm is 739m. The remaining 12 curves allowing speed <120 km/h.

Sherbin railway station zone is exempted as the curve radius is 500m only, while increasing its radii would impact existing residential buildings of Sherbin city. Accordingly, it was studied that the line doubling is to be carried out by transferring the line and Sherbin station to be near the road, outside the residential area of Sherbin city. The line extends between El Sahel Canal and Mansoura/Damietta road. The distance of the part that will be relocated outside the city of Sherbin is about 3.5 Kilometers (From

[1] "Duplication of the El Mansoura - Damietta Railway Line" (Systra, ACE Consulting Engineers and El Maktab)

Km 73.9 to Km 77.5) as stated in the SYSTRA study (Alignment report dated April 2015). However, this proposal will not be considered by ENR.

Level crossings, bridges, overpasses and underpasses:

Some of the most dangerous facilities are railway level crossings, where many accidents occur mainly due to the lack of automated barriers, protective pedestrian gates, warning signs, bells and flashing lights or other deficiencies, such as poor sightlines for drivers, confusing road signs and overgrown bush.

There are 1,332 level crossings throughout the ENR Network. ENR has a large project for improving the level crossings along its network to increase their safety level.

The Tanta – Damietta line section has 83 level crossings. Five of them have been developed (all required civil works and railway traffic control systems completed); El Shorouk W El Sabaa Banat level crossing in kilometre 26+780 has been eliminated, and an overpass was constructed in its place. In addition, there are 30 bridges. Among the 30 bridges, there are 8 pedestrian overpasses located at stations and 6 road underpasses between Zefta and El Mansoura.

Line doubling at the stations and halts:

There are 20 railway stations between El-Mansoura and Damietta. The "*Track Alignment Report*" elaborated by the TA Consultant presents the condition of the stations.

Most of the existing stations along the railway line between El Mansoura and Damietta are already double-track. According to the SYSTRA study, five stations are single track and need to be expanded to accommodate the second track. This expansion process will require demolition of some of the existing buildings in those stations in addition to modifying the platforms and the turnouts (see also "*Track Alignment Report*").

Line doubling near irrigation drains

Nearly 10 irrigation drains are parallel to the existing railway line and require coverage to enable the execution of the railway doubling between El-Mansoura and Damietta.

In addition, there are nine culverts crossing the railway line from El-Mansoura to Damietta. Seven culverts have been improved and soil replacement has been performed. The first five culverts are not in need of extension. These culverts are for:

1. El Tawila Drain.
2. Donshwai Drain.
3. El Daherya Drain.
4. Apo El Nom Drain.
5. El Mashalib el omomy Drain.

The other two culverts shall be extended with an inspection room 4mx4m each. These two culverts are:

1. End of el Sanannya drain at Kafr El Batikh.
2. Ganabyt Kafr EL Batikh Drain.

There are two culverts which have not been renewed and where soil replacement has not been performed yet. These two culverts are for Batra El Qibly and Kafr El Dabousy drains, each 110 meters long, and they shall use hydraulic jacking method of diameter 1.5 meters.

The hydraulic study recommended that:

- Inspection rooms have to be made at the intersection of the covered drains with the drains which shall be covered; and
- Inspection rooms have to be made at the ends of the private drains with the drains which shall be covered.

Construction steps of the new double track

As reported in the Cost estimate study prepared by SYSTRA[2], the construction steps of the new double track will be implemented in the following sequence:

- Removal of Existing Track
- Removal of Existing Turnouts
- Renewal of existing track
- Installation of new Track
- Installation of new Turnouts

Institutional and legal framework

The project will adhere to Egyptian legislation and to international standards and guidelines as mentioned below:

Egyptian legislation including:

- Law number 4/1994, and its amendments by Law number 9/2009 and 105/2015 about environmental protection;
- Decrees number 1095/2011, 710/2012, 964/2015, 544/2016, 75/2017, 618/2017 and 1963/2017 for the amendment of the executive regulations of the environmental Law number 4/1994.
- Law number 38 /1967 concerning the general cleanliness and its executive regulations.
- Solid Waste Management Regulation No. 202 /2020
- Labour Law number 12/2003
- Law number 48/1982 regulating the discharge of liquid waste on the protection of the Nile River and the waterways from pollution.
- Law 93/1962 regulating the discharge of liquid waste to sewerage networks.
- Nature Protection Law no. 102/1983
- Traffic law 66/1973 amended by law 121/2008 and updated in 2018
- Relevant conventions and agreements to which Egypt is a Signatory
- Law 144/ 2020 on the amendment of some provisions of Law No. 152 of 1980 establishing the Egyptian National Railways Authority ENR.
- Law 187/2020 on the amendment of some provisions of Law No. 10 of 1990 on the land acquisition for the public benefit
- Law 24/2018 on the amendment of some provisions of Law No. 10 of 1990 on the land acquisition

2 Cost Estimate Study, Systra, November 2016

- Law 1/2015 on the amendment of some provisions of Law No. 10 of 1990 on the land acquisition
- Law 10/1990 on Property Expropriation for Public Benefit identifies
- Law 577of year 1954 and Law 27 of year 1956 for land acquisition
- Law 27 of year 1956
- The new Egyptian Constitution
- Civil code 131 of year 1948

European Investment Bank (EIB) Environmental and Social Standards

EIB Environmental and Social Standards issued 2018, in particular:

- EIB Standard 1: Assessment and Management of Environmental and Social Impacts and Risks.
- EIB Standard 2: Pollution Prevention and Abatement.
- EIB Standard 3: Biodiversity and ecosystems.
- EIB Standard 4: Climate-Related Standards
- EIB Standard 5: Cultural heritage.
- EIB Standard 6: Involuntary Resettlement.
- EIB Standard 7: Rights and Interests of Vulnerable Groups.
- EIB Standard 8: Labour standards.
- EIB Standards 9: Occupational and Public Health, Safety and Security.
- EIB Standard 10: Stakeholder engagement.

World Bank Safeguard Policies and Standards (applied by AFD)

- Environmental and Social Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Environmental and Social Standard 2: Labour 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 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Environmental and Social Standard 8: Cultural Heritage;
- Environmental and Social Standard 10: Stakeholder Engagement and Information Disclosure

International Finance Corporation (IFC) Performance Standards

- Performance Standard 1: Social and Environmental Assessment and Management System
- Performance Standard 2: Labour and Working conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety and Security
- Performance Standard 5: Land Acquisition
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

- Performance Standard 8 - Cultural Heritage

IFC General Environmental, Health and Safety guidelines

IFC Specific Environmental, Health and Safety Guidelines for Railways

Environmental and social impacts

Potential positive impacts during the construction phase

The project is expected to result in the creation of job opportunities, both directly and indirectly. Several variables influence the number and type of workers required during the construction process. The local community could provide a proportion of this temporary labour force dependent on skills needed and the strategies of the individual contractors in sourcing their workforce.

Creation of indirect job opportunities

As part of the construction process, due to the need for more support services to the workers and contractors who will work in the different places, many indirect benefits are likely to be sensed in the targeted areas.

Potential positive impacts during operation and maintenance phase

The project will result in several positive impacts during the operation and maintenance phase, such as:

Reduction of Carbon Footprint *(Component B)*

The assessment of carbon footprint resulted in a high reduction percentage of carbon emissions. The project will have a beneficial impact on climate change (Nearly 28%).

Traffic Diversion and Emissions from Fuel Consumption *(Component B)*

The diversion of traffic (from private cars and heavy goods vehicles to rail, thanks to the improved level of service) will generate environmental benefits due to the decrease in mileage travelled by gas or diesel motor vehicles, the reduction of air pollution and greenhouse gas effects (see above), as well as a positive social impact in the reduction in the number of accidents. These benefits are additional to the economic benefits from potential time savings and the reduction of operating costs, in particular fuel consumption.

Social and Economic Benefits

- The project will result in
  - A limited number of job opportunities during the operation phase, limited to maintenance staff recruited by the ENR *(Components A and B)*;
  - Improved train operation safety and reduction of accidents caused by human error or failure of the existing outdated signalling system now in use on the line *(Component A)*;
  - Improved operation safety of a large number of level crossings along this line (Component A);
  - Improved railway service to the low-income public as well as freights *(Components A and B)*;

- Potential activity growth of freight transportation in the area is a clear opportunity as the El-Mansoura / Damietta railway line is the only rail route serving Damietta port. Doubling this line will increase the line capacity, for both passenger and freight services *(Component B)*; doubling will provide passengers with a faster, safer and more comfortable train service *(Component B)*; and
- Time-saving is usually the main economic benefit of public transport projects. Private car users may be diverted from roads due to railway services' improvement *(Component B)*.
- Safety of railway operations is one of the motivations of this project. One particular dimension of this issue is the transportation of hazardous materials on rail in the corridor.

Climate change

The SYSTRA study[3] did not consider scenarios of increased flood risk due to climate change. At present, there is no actionable information in our possession that would allow a quantitative analysis of the impacts through hydraulic modelling. It is suggested that a separate Climate Risk Vulnerability Assessment be carried out to check whether the additional costs of raising the track could be justified, or whether there are other solutions to increase the resilience of the line to climate change.

During the design phase, the following aspects should be considered as obligations to the designers.

- The Climate Risk Vulnerability Assessment (CRVA) should be prepared and the adaptation measures which will result from it should be part of the final design documents;
- Vibration measurements and vibration modelling should be conducted and based on the results of the modelling; mitigation measures will be included in the design of the superstructure. Possible mitigation measures are under sleeper pads or under the ballast mats.

Once the measures are identified, an updated ESMP will be prepared corresponding the design stage.

[3] Phase 2: Feasibility Study Report, The duplication of El Mansoura – Damietta Railway line, SYSTRA, Ace Consulting Engineers, August 2015.

Negative Impacts during Construction and Operation Phases

The potential negative impacts assessed during all phases of the project are summarized in the following table:

Receptor/ EHS Aspect	Potential Impacts	Impact Significance
Impact During Construction Phase		
Gaseous and Dust Emissions	Air Emissions: The following air pollutants are foreseeable for most of the construction activities: ▪ Particulate matter and suspended solids; ▪ Possible dispersion from stockpiles of soil and sand used for backfilling. ▪ Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO_x, NO_x, CO, VOCs, etc. ▪ Exhaust of power generators and vehicles transferring raw materials and/or those disposing of excavated soil and construction waste. ▪ Fugitive dust emissions (PM_{10}, $PM_{2.5}$).	**Medium**
Noise and Vibration	Noise will mainly result from the following activities: ▪ Equipment mobilization, site preparation, excavation and trenching works needed to install the new signalling system; ▪ Dismantlement activities of the existing signalling system; ▪ Lifting the damaged rails and concrete sleepers; ▪ Construction activities needed for the CTC, main and secondary technical buildings, doubling of the single-track and enlarging of the single railway stations; ▪ Operation and movement of construction machines/equipment; ▪ Construction works of culverts nearby the water canals; ▪ Loading and installing the new rails, concrete sleepers as well as wooden sleepers in the intersections; ▪ Unloading the ballast for the new double track; and ▪ Rail welding as well as other activities.	**Medium**
Water Resources	**Surface Water:** Covering the agriculture drains and upgrading the culverts crossing the railway line will have an impact on surface water quality. In addition, there will be potential to introduce pollutants into surface waters including sediment, oil and lubricants. These compounds directly affect the physical and chemical quality of the water, and indirectly affect living organisms.	**Medium**
	Ground Water: There could be minor leakage from wastewater holding tanks. Consequently, domestic sewage could be highly significant if not well managed and controlled, and could possibly pollute the groundwater.	**Low**
Energy Efficiency and GHGs	The project activities do not generally involve consumption of electricity or fuel since it adopts manual digging, except for the following: ▪ Fuel consumed by vehicles transporting raw materials and/or collecting waste for disposal; ▪ Fuel consumed by diesel generators; ▪ Electricity consumed by the temporary site offices; ▪ track laying activities; for those activities small and heavy machines will be used; and ▪ Fuel consumed by staff and workers commuting to the site.	**Low**

Soil	The construction activities will result in disturbance of the soil and geological characteristics causing a physical breakdown of soil particles potentially destabilizing the soil structure, especially in the doubling area between El Mansoura and Damietta. Inappropriate management and disposal of hazardous and non-hazardous waste (uncontrolled management system) will cause soil contamination.	**Medium**
Hazardous and Non-Hazardous Waste	**Non-Hazardous Solid Waste** The following are the types of solid non-hazardous waste expected to be generated on-site during the construction phase: ▪ Excavated soil due to trenching activities; ▪ Construction and Demolition waste (concrete, debris, bricks, sand and gravel); ▪ Damaged concrete sleepers, old rails, fastenings, turnouts and old un-contaminated ballast; ▪ Steel, metals, wood, empty cement sacks, wires, cables and all materials from the old signalling system that will be replaced; and ▪ Domestic waste resulting from workers' accommodation (food remains, paper, plastics, and glass). **Solid Hazardous Waste** Solid hazardous waste expected to be generated include waste electrical and electronic equipment (WEEE), empty containers of chemicals, spent lubricating oils, and paint used for construction machinery, leakages from temporary petrol tanks, contaminated (ballast, sleepers and soil), spent welding materials, etc. **Liquid Waste** Liquid waste expected to be generated from domestic wastewater of construction workers.	**Medium**
Biodiversity (Flora and Fauna)	Important species are not expected to occur within the project route, and its close hinterland as the project is mainly located in intensely populated urban areas. Flora is mainly introduced and fauna is almost entirely composed of commensal species, able to tolerate the presence of man and his activities. Plants and animals can be affected by the upgrading of the signaling system between Tanta – El Mansoura – Damietta and the construction works for the doubling of the single-track railway between El Mansoura and Damietta which will result in the destruction of the vegetation cover along the land strip to be occupied by the new railway track. Some animals become accustomed to noise, including rats and many commensal birds. Clearance, levelling and excavation works pose the main source of direct impacts to floral and faunal species as these activities involve physical destruction of habitats. Although 'fauna is almost entirely composed of commensal species', there might be impacts on fauna such as construction during nesting and spawning seasons and increase in turbidity of water in canals and ditches.	**Medium**
Cultural Heritage	Many of the construction activities will be carried out on the railway land on the same site as the old buildings, and the trenching activities will be carried out parallel to the railway line. In addition, no deep excavations will be carried out, so there is no possibility of finding artefacts. Cultural heritage will be impacted in a minor way in cases where construction activities take place near some mosques and a cemetery at	**Medium**

	the level crossings, as a result of the project, they are spiritual and/or religious significance as buildings of great value to community members.	
Occupational Health and safety	Construction phase of the project will encompass different activities, which are expected to affect occupational health and safety for workers. Train/ worker accidents are generated from railway workers being in the vicinity of rail lines as they are exposed to moving trains is one of the major risks. Also listed in the report are the main construction site hazards identified by the Occupational Safety and Health Administration (OSHA), all of which will be encountered during the construction of the different components of the project	**High**
Community Health and safety	Impacts on community health and safety are expected to result from emissions of gaseous pollutants and dust, increased background noise levels, and uncontrolled dumping of construction waste, in addition to: ▪ Safety risks to the public at or near the construction sites. ▪ Accidents, loss of lives and properties.	**High**
Reduced accessibility to various facilities around the	Level crossings represent high-risk accident locations for railways. Also, construction activities at level crossings will lead to the complete or partial closure of the crossings to pedestrian and vehicles, causing increased traffic congestion and reduced accessibility to various facilities around the construction sites.	**High**
Traffic	▪ Increased traffic flow on roads leading to and from the construction site ▪ Traffic jams and increased exposure of travelers and road users to exhaust and associated noise and possible accidents. ▪ Blocked roads as a result of the construction works, inadequate storage of excavated soil, trenching activities, etc…	**Medium**
Visual Impacts	Project activities will entail the piling up of sand and movement of vehicles in various construction sites. Moreover, temporary storage areas will be used to store construction materials, which will result in a significant visual intrusion impact. However, the duration of visual intrusion impacts will be limited.	**Low**
Child Labour	Child labour is a common practice in Egypt at large and is a risk for the project in particular, considering construction activities, primary supply and service provision around stations. According to Egyptian Labour Law No.12/2003, child labour should be prohibited, especially in dangerous works. Children below 18 are a favoured labour force, particularly in the informal sector, as they receive low salaries and they are less demanding in general.	**Medium**
Labour influx GBV	The project shall recruit a number of workers and technicians during the construction phase. If not managed properly, the recruited workers' interactions with the local community may result in inconvenient, inappropriate and unappreciated acts, negative impacts on privacy or may even result in serious misconduct (e.g., harassment) or inappropriate behaviours that could affect different groups, including women. Although it is not much expected in the project, the increase in the number of workers might engender in some areas an influx of additional population and put increased pressure on local resources, prices of commodities, accommodation and rents.	**Medium**
Land use Impacts	The Resettlement Action Plan (RAP) data will include all impacts on lands and livelihoods (formal and informal) as a result of the project's construction activities.	**High**

	The affected land users that will be impacted by the construction of: ▪ The doubling of El Mansoura – Damietta single-track and the storage areas needed for equipment and construction materials; and ▪ The new technical buildings along the railway line MTB and STB; are likely to include informal economic activities that are located on the ENR RoW.	
Impacts of Natural Environmental Disaster Risks on the project	**Seismic Risk:** Seismic activity can pose potentially negative impacts on the time schedule of the construction activities in addition to possible injuries or fatalities to the workers during the construction phase. **Flood Risk:** • Flooding of man holes for accessing cable ducts: cables will resist a couple of days but can be damaged if they are in water for more than a week; • Water seepage into the trackway structure: during flooding the natural water drainage is hampered, there is a risk of structural deformation for the infrastructure.	**Medium**
Impact During Operation Phase		
Air Quality	The main and only atmospheric pollution during the operating phase will result from: • The operation of more locomotives on the new double track between El-Mansoura and Damietta. • Increase in the traffic density on Tanta-El Mansoura as a result of the signalling improvements. The emissions produced by the railway arise from the combustion of fuel inside an internal combustion engine. However, the emissions from the railway operations are not expected to exceed the regulatory law limits. In addition, the considerable fuel saving resulting from the diversion of road traffic to rail will help to improve air quality conditions overall.	**Low**
Noise and Vibration	The most important source of noise is rolling noise caused by wheel and rail vibrations induced at the wheel/rail contact. Irregularities on the wheels and rail running surfaces induces vertical vibration of the wheel and rail systems according to their dynamic properties. The poor maintenance of the railway tracks could cause rough rails, thereby further increasing the noise level. Other sources of railway noise include warning signals from trains (horns) and fixed installations (level crossings), track maintenance equipment, and shunting noise (noise from impacts between vehicles).	**Medium**
Surface Water	Maintenance activities of the elements of the railway line involve the use of lubricants and other hazardous substances, which may also reach nearby surface water bodies. The various types of freight that will be transported along the line could also become a source of water contamination, due to potential leaks or accidental spills of hazardous substances. Wastewater generated by train passengers, freight trains, workers and visitors at train stations, as well as railway office and administration buildings, would be another potential source of adverse impacts for surface water.	**Low**
Soil	Soil may be subject to contamination from the diffuse release of inorganic and organic substances due to leaks of lubricants and greases from passing wagons and locomotives, and other hazardous substances used for railway maintenance.	**Medium**

Hazardous and non-Hazardous Waste	Solid (Non-Hazardous) waste including steel scrap, wood scrap and domestic waste. Passenger-generated waste (leftover food, paper, plastics, and glass) is expected to be generated on-site during the operation phase. Liquid waste: Wash water for the train wagons after finishing the trips as well as the sewage generated from the passengers. Hazardous waste including Waste Electrical and Electronic Equipment (WEEE), empty containers of chemicals, spent lubricating oils, and paint used for maintenance works, ballast and sleepers if contaminated with oil.	**Medium**
Occupational Health and safety	Possible impacts on health and safety during operations include accidental injury to workers who maintain the crossings and the railways. Health and safety issues also encompass working around energized equipment and possible contact with natural hazards. However, during the operation and maintenance phase, the impacts on workers tend to be of Medium Significance.	**Medium**
Community Health and safety	It is expected that more trains will operate at increased travel speeds, which in turn is expected to increase the risk of accidents at level crossings. The line is also unprotected on most of the alignment, including in settlements and agricultural areas. It is likely that there are quite a few crossings by pedestrians and animals outside of level crossings currently; with increased traffic this could become a problem. In addition to a full array of safety and emergency precautions to be undertaken by ENR and the contractor, passenger and crossing users' safety is to be prioritized by stating emergency precautions. Impacts on user health and safety may occur through improper management of the crossing and the signalling system, which can result from lack of awareness, illiteracy, or failure of the signalling system.	**Medium**
Visual Impacts	The alteration of landscape scenery will be affected by the presence of the new CTC building and the new double railway track objects between El Mansoura and Damietta. However, the visual evidence of these facilities cannot be completely avoided, reduced, nor concealed. The impact should be considered of Low Significance. The impact of visual intrusion is expected to be fully controlled by implementing appropriate mitigation measures.	**Low**
Impacts of Natural Environmental Disaster Risks on the project	**Seismic Risks:** Such events may cause health hazards to the workers, community. **Flood Risks:** • Submersion of stations platforms: some stations cannot be served and/or accessed by passengers; the line may not work on its entire itinerary; • The trackway covering, depending on its type, can be damaged by flooding. The rails themselves will resist to water for a couple of days, only cleaning will be required before restarting operations; • Devices for manoeuvring switches (motors and command devices) are particularly vulnerable to water, if they are out of order, the whole line might have to be stopped or operate with higher headways; • Signaling and train control are vulnerable to flooding, if they are out of order, the whole line might have to be stopped or operate with higher headways; • The flooding of the main and secondary technical buildings will impact the railway operation; and • The rolling stock can operate with a water level up to 10 cm; above this the rolling stock should be withdrawn from operation.	**Medium**

Environmental, Social Management and and Monitoring Plan

The objective of the Environmental and Social Management and Monitoring Plan (ESMMoP), is to outline actions for minimizing or eliminating potential negative impacts and for monitoring the application and performance of mitigation measures. Chapter 7 of this report discusses the ESMMoP for different receptors, identifies roles and responsibilities for implementation and monitoring of mitigation measures during the Construction and Operation phases of the project. Special emphasis was put on the Grievance Redress Mechanism. The report presents an assessment of the current GRM applied with proposed actions for effectiveness.

Stakeholder engagement and public consultation

Stakeholder engagement is an integral part of ESIA good practice and is a statutory requirement of the national EIA legal framework in Egypt and within a good international practice, including IFC/EIB/WB requirements. The project owner is committed to a technically and culturally-appropriate approach to consultation and engagement with all stakeholders affected either directly or indirectly by the project. The consultation program for the project is based on informed consultation and participation in line with good international practice requirements with affected people and is designed to be both fair and inclusive. Consultation activities have been an ongoing process since the commencement of the ESIA study in August – November 2020.

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.

In terms of methodology, the consultation activities were conducted through the following methods:

Scoping Consultation Activities in August - November 2020

The Consultant carried out stakeholder engagement activities through the community engagement plan that has been developed for different Stakeholders which is presented in the section of this report devoted to consultation activities. The consultation activities started in August 2020 and ended in November 2020.

The Consultant conducted consultation activities with the local communities close to the project site:

- The residents in the surrounding project areas
- Railway users
- Informal Economic Activities
- Governmental Authorities including:
  - Local units in the three Governorates Gharbia, Dakahlia, Damietta.
  - Environmental departments in the three Governorates

The study team conducted multiple site visits to the project area. In addition, field observations were organized at relevant points, in particular informal crossing points, to define various stakeholders, and the potential impacts of the project. Stakeholder engagement activities were carried out through both Focus Group Discussions (FGDs) and Semi-Structured Interviews.

The aims of the consultation activities were:

- To conduct multiple site visits to the railway route. In addition, field observations were organized at informal crossing points to define various stakeholders, and the potential impacts of the project.
- To publish comprehensive information on the project, in order to enable the competent stakeholders to determine the concerns, requirements, and recommendations.
- To conduct interviews with railway users and local communities to receive feedback about the project as well as concerns, requirements, and recommendations.

A Public Consultation Session

A public disclosure and consultation session was held online, according to EIB Guidance note to promoters on environmental and social performance, in EIB-financed operations in response to the COVID-19 outbreak crisis Annex 4 – Stakeholders engagement May 2020.

The objective of the session is to:

- Introduce the project to stakeholders;
- Identify the key anticipated impacts;
- Present the methodology for the ESIA study;
- Present key outcomes and conclusions; and
- Allow interested stakeholders to comment on the scope of work undertaken, key issues identified, and any other issues of concern they might have; and
- Take note of those comments so they can be addressed as the project develops.

Grievance Redressal Mechanism (GRM)

The objective of a grievance procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner.

Both ENR and contractors must be committed to avoiding, reducing, limiting and, if necessary, remedying any adverse impacts caused by their activities on local populations and on their social and physical environment. One of the tools for identifying, preventing and managing unanticipated impacts is a Grievance Mechanism (GRM).

The current grievance mechanism in ENR is implemented through two levels:

1. **The project-level GRM at the local level**

   ENR has developed a mechanism for handling grievance to ensure that all complaints that may be related to project activities are addressed in a timely and transparent manner. The project GRM is designed to accept grievances and feedback from all project stakeholders. The project has a separate, additional, GRM that is for project workers, including any civil servants assigned to the project.

2. **Grievance Channels at the central level for all railway lines and sectors**

   The management and operation of the Grievance Mechanism is the responsibility of the Complaints and Customer Service Directorate, which is affiliated to the Presidential Affairs Central Directorate. Complaints can be submitted by multiple intake points, including submission by hand, telephone, or by email. The petitioner, through the use of the complaint tracking number, can follow up on his/her complaints through a range of methods including postal mail, e-mail, and phone or, by visiting the person in charge, as indicated below. The petitioner is free to submit his/her complaint to one or more tiers. A grievance form will be made available to complainants.

1 Introduction

1.1 Background

The Arab Republic of Egypt is considered the largest railway network in the Middle East and Africa. The railway sector plays a pivotal role in the Egyptian economy, as it represents an essential mode of transportation for low-income citizens and freight.

In the Egyptian railway sector, significant investments for improving the national railway network and services for both passengers and freight are under implementation. The Egyptian National Railway (ENR), is currently carrying out a wide-scale rehabilitation and restructuring programme, which includes technological upgrading of the existing lines by means of modernization of the signalling systems, construction of new lines and rehabilitation/upgrading of the existing lines, extensive purchases of locomotives and wagons as well as depot upgrading.

The ENR operates and maintains more than 5,000 Km of railways tracks, supporting around 35% of Egypt's commuter traffic[4]. Egypt's railway network, which transports around 1.4 million passengers every day, has been struggling with an outdated system for many years. In addition, it is unprofitable and always needs substantial state subsidization.

The existing railway network in the study area connects major cities in the Nile Delta. There is also a line along the Nile River up to the southernmost station at the Aswan High Dam. All railways are standard gauge and not electrified. The Tanta-El Mansoura-Damietta railway project is the first EIB operation with ENR. The ESIA including the Carbon Foot Print Assessment (CFP) is one of the project prerequisites and has to be prepared in compliance with the requirements of the European Investment Bank (EIB) and World Bank (WB)'s environmental and social standards, which are applied by Agence Française de Développement (AFD).

1.2 Need for the project

The total length of the Tanta – El Mansoura – Damietta railway line is around 119 km and is used for transporting both freight and passengers. The Tanta – El-Mansoura section comprises a 54-km, double-track railway line, while the El Mansoura – Damietta section comprises a 65-km, single-track railway line. The line includes a 5-km branch that accesses Damietta Port from Kafr El Batikh.

The project scope includes two components:

- **Component (A):** Modernization of the Signalling System between Tanta and Damietta.
- **Component (B):** Doubling of the Single Track between El Mansoura and Damietta.

The objective of Component (A) is to improve the reliability, efficiency and operational safety of the Tanta – El Mansoura – Damietta railway line through modernizing the existing mechanical signalling, power supply, and telecommunication systems along the line, and implementing the European Train Control System Level 1. This would result in an enhanced level of customer service and help improve competitiveness with other modes of transport. Moreover, it is expected to reduce accidents caused by human error or failure of the existing, outdated signalling system.

On the other hand, the El Mansoura – Damietta railway line is the only rail route linking Damietta City and serving Damietta Port, i.e. all the freight traffic whose origin or destination is Damietta Port must run over this section, sharing the track with passenger traffic.

The railway line between El Mansoura and Damietta is currently operating very close to full capacity for passenger services, but there remains room for increased capacity for freight trains.

The doubling of the El Mansoura – Damietta line (Component B) will positively affect both passengers and freight services. For passengers, the doubling provides a two-pronged benefit: better travel times and a densified service in terms of frequencies. For freight, the doubling will allow for an increase in capacity and the possibility of improving the operation of freight trains, which would subsequently improve the freight service to and from Damietta Port. The doubling will connect important population centres with Damietta port, one of the major Egyptian ports.

As reported by SYSTRA[4] and according to the interviews and discussions at the Damietta Port Authority, the project will improve the railway freight service's reliability to and from the port.

1.3 Rationale for the ESIA

The Environmental and Social Impact Assessment (ESIA) is prepared in compliance with the requirements of the European Investment Bank (EIB) and World Bank (WB)'s environmental and social standards, which are applied by AFD.

The purpose of the ESIA is to consider and develop proper measures and controls to decrease the potential for environmental degradation as well as provide clearly defined action plans to account for human and environmental health and safety. This ESIA establishes a framework for identifying environmental and social protection, mitigation, and monitoring measures to be taken during all phases of the Upgrading of the Tanta - El Mansoura - Damietta railway line including the doubling of the El Mansoura – Damietta single-track section.

The key objectives of the ESIA are the following:

- Describe the project's components and activities of relevance to the environmental and social assessments;
- Identify relevant national and international legal requirements and guidelines;
- Assess the baseline status of environmental and social conditions;
- Analyse the different alternative of the project from the environmental and social perspectives;
- Evaluate potential environmental and social impacts of the project;
- Develop environmental and social management and monitoring plans in compliance with the relevant national and international laws and standards;
- Establish the roles and responsibilities of all parties involved in the project's environmental and social management;
- Document key environmental and social concerns raised by stakeholders during public consultation activities; and
- Ensure the existence of a Grievance Redressal Mechanism (GRM) for the lodging and handling of complaints.

[4] Phase 2: Feasibility Study Report, The duplication of El Mansoura – Damietta Railway line, SYSTRA, Ace Consulting Engineers, August 2015.

1.4 ESIA Methodology

The Consultant has adopted the following approach and methodology in preparing the ESIA study:

- Reviewing the available feasibility studies provided by ENR regarding the project to describe the project components and activities;
- Reviewing national and international legislation and regulations relevant to the project;
- Conducting several site visits to collect baseline data regarding the current environmental and social situation in the project assessment area;
- Conducting organized field observations at informal crossing points to define various stakeholders and the potential impacts of the project;
- Conducting interviews with residents of houses along the railway line, and owners of the informal economic activities along the railway route;
- Assessing the potential environmental and social impacts associated with the proposed project activities;
- Assessing the project's alternatives;
- Outline the proposed mitigation measures needed to reduce/eliminate the negative impacts of the project activities; and
- Develop the environmental and social management and monitoring plans in compliance with the relevant national and international laws and standards.

The ESIA is designed in such a way as to form a binding document to the contractors who will then hold the responsibility for integrating the included ESMP in their daily work. However, the contractors and the Promoter are also required to monitor environmental and social parameters and ensure the full adherence to the ESMP. Hence, the prepared monitoring plan provides information for periodic review to ensure that environmental and social protection is optimized in all project phases through early detection and effective remediation of unwanted environmental and social impacts.

The ESIA outlines the environmental and social management processes and procedures applicable to the project. Accordingly, the structure of this document is as follows:

- Chapter Two: Institutional and Legal Framework
- Chapter Three: Project Description
- Chapter Four: Environmental and Social Baseline Conditions
- Chapter Five: Project Alternatives
- Chapter Six: Environmental and Social Impact Assessment and Mitigation Measures
- Chapter Seven: Environmental and Social Management and Monitoring Plan
- Chapter Eight: Public Consultation and Participation
- Chapter Nine: Existing Grievance Section

1.5 Contributors

The Consultant's team members and the ENR team who participated in the preparation of the ESIA study are listed in the below table:

#	Name	Position
ESIA Team of the TA Consultant		
1	Eng. Fatma El Kassas	Senior Environmental Impact Assessment Expert
2	Dr. Anan Mohamed Ali	Social Expert
3	Dr. Ibrahim El Garf	Biodiversity Expert
4	Dr. Sayed Sabry	Climate Change Expert
5	Eng. Nagwa Monsef Mohamed	Junior Environmental Impact Assessment Expert
6	Eng. Mohamed Serag El Din	GIS Expert
7	Eng. Cherif Chokeir	Junior Environmental Impact Assessment Expert
Egyptian National Railway (ENR)		
1	Eng. Mostafa Shaheen	Projects Department
2	Eng. Ghada Hamed	Projects Department
3	Eng. Mahmoud Abdel Rahman	Projects Department
4	Dr. Mahmoud Kamar	Environmental Affairs Department
5	Chemist. Hamam Abo Sedera	Environmental Affairs Department
6	Eng. Mohsen Al-Khayat	Permanent way Department
7	Eng. Alaa Mesilhy	Property Department

2 Institutional and Legal Framework

The project is under consideration for funding by the European Investment Bank ("EIB") and the Agence Française de Développement (AFD), therefore, this chapter describes the legislation, regulations and guidelines that are expected to govern the implementation of the proposed project. It lists all the national and international laws and regulations as well as the international conventions pertinent to the project. Following an overview of the Egyptian legislation, it is compared to the international safeguard policies and guidelines related to the project, including:

- The European Investment Bank (EIB) Environmental and Social Standards;
- The World Bank (WB) Standards "Environmental and Social Framework" issued in 2018, followed by AFD; and
- The International Finance Cooperation (IFC) Standards.

2.1 National Regulations

This section summarizes the Egyptian environmental and social legislation, regulations and guidelines relevant to the proposed project in addition to the legal and regulatory requirements of the Egyptian Environmental Affairs Agency (EEAA).

2.1.1 Law No. 4/1994 amended by Law 9/2009 for the protection of the Environment:

The main legal instruments dealing with environmental issues in Egypt are Law No. 4/1994, amended by Law No. 9/2009 and 105/2015, its Executive Regulation (ER) 338/1995 amended by ER No. 1741/2005, its ministerial decrees No. 1095/2011, 710/2012, 964/2015, 544/2016, 75/2017, 618/2017 and finally No. 1963/2017 commonly known as the Law on Protection of the Environment. The law deals mostly with the protection of the environment against pollution. Prime Ministerial Decree No. 631/1982 established the EEAA as the competent body for environmental matters in Egypt. Law No. 4/1994 also stipulates the role of the EEAA as the main regulatory agency for environmental matters.

According to Article 1 of Law No. 4/1994, the legal entity responsible for a given project is required to carry out an assessment of the project's potential impacts on the natural and socio-cultural environment before implementing that project. The findings of the assessment are submitted to the EEAA for review and approval before other relevant governmental authorities can issue their permits for implementing the project.

2.1.2 Project Categorization according to EEAA

According to the Egyptian Guidelines of Principles and Procedures for EIAs (2nd edition – October 2010), the projects are categorized into three categories based on the magnitude of impacts on the environment, as follows:

- **Category A –** Projects with minimal or no environmental or social impacts.
- **Category B and B Scoped –** Projects with potential limited adverse environmental or social impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and

- **Category C –** Projects with potential significant adverse environmental or social impacts that are diverse.

There is a template issued by EEAA for each project category to be followed during the preparation phase of the study.

In terms of EEAA classifications and following consultation with EEAA representatives, it was concluded that the project is classified as a Category B Scoped Project. For Category B Scoped projects, it is not compulsory to conduct a public consultation session.

2.1.3 ESIA Procedures[5]

The national procedures for environmental permitting are illustrated as follow:

- The Competent Administrative Authority (CAA) directs the project proponent (i.e. the Promoter, in this case ENR), on his request, to the correct project category using the illustrative lists and informs him/her of the related requirements. EEAA will have the final decision regarding the classification and should provide the proponent with its opinion in writing via the CAA.
- The project proponent (or whom he delegates to) applies to the CAA, before any construction works are initiated, with a letter of intent and attaches four copies of the required study in Arabic, the official language for the review. A CD of the study is also attached for category C projects. It is preferred to submit one English copy of the ESIA if it exists.
- The CAA evaluates the ESIA documents through checking the study to ensure:
    - That the selected category is correct and that the project is compatible with the general plans for the CAA and
    - That the information submitted is compliant and complete.
- If the project was not correctly categorized, the CAA directs the proponent to the right category and requests the resubmittal of the required documentation.
- The CAA formally forwards 3 copies of the documents to EEAA for review and evaluation. Such forwarding of the ESIA documents is considered as a non-objection on the project according to criteria other than environmental ones.
- EEAA reviews and evaluates the documents and provides its remarks and conditions needed for mitigation and minimizing negative impacts.
- EEAA notifies the CAA of its decision (approval, objection or information requests, etc.) within 30 days of EEAA's receipt of completed documents; otherwise it is considered an implicit approval. For projects deemed of high impact by EEAA, an independent advisory entity will be considered by EEAA for additional advice. The review could require site inspection or meetings with the proponent or its delegate to discuss specific points of the study.
- EEAA registers the documents, its opinion and recommendations in the ESIA register at EEAA and notifies the CAA of its decision. The CAA officially notifies the project proponent of the results via a registered letter with an acknowledgment of receipt and communicates the final result of the review. The result can be:
    - An approval of the ESIA study, while indicating the environmental requirements (specified in the approval), with which the project proponent should comply.

[5] http://www.eeaa.gov.eg/portals/0/eeaaReports/N-EIA/English_EIA_guidelines.pdf

- An objection to the ESIA and a recommendation to refuse the project. Reasons for objection are included and are usually related to environmental reasons related to the project and the maximum carrying capacity for pollution in the project area.
- Further requests from the proponent such as:
  - Additional information or clarifications; the date of the receipt of the needed information by EEAA via the CAA is considered the beginning of a new review process with a 30 day period.
  - For some category B projects, EEAA might request a scoped EIA study for certain components, impacts or processes of the project in accordance with the Terms of Reference prepared by EEAA.
  - For some category C projects, EEAA could request additional studies such as risk assessment or cumulative pollution load (information to be provided through EEAA) to ensure compliance with allowable limits.

- The CAA follows-up and ensures the implementation of EEAA decision and related conditions.

Each of the three categories has specific requirements for impact assessment yet have similar processing procedures as shown in the following figure.

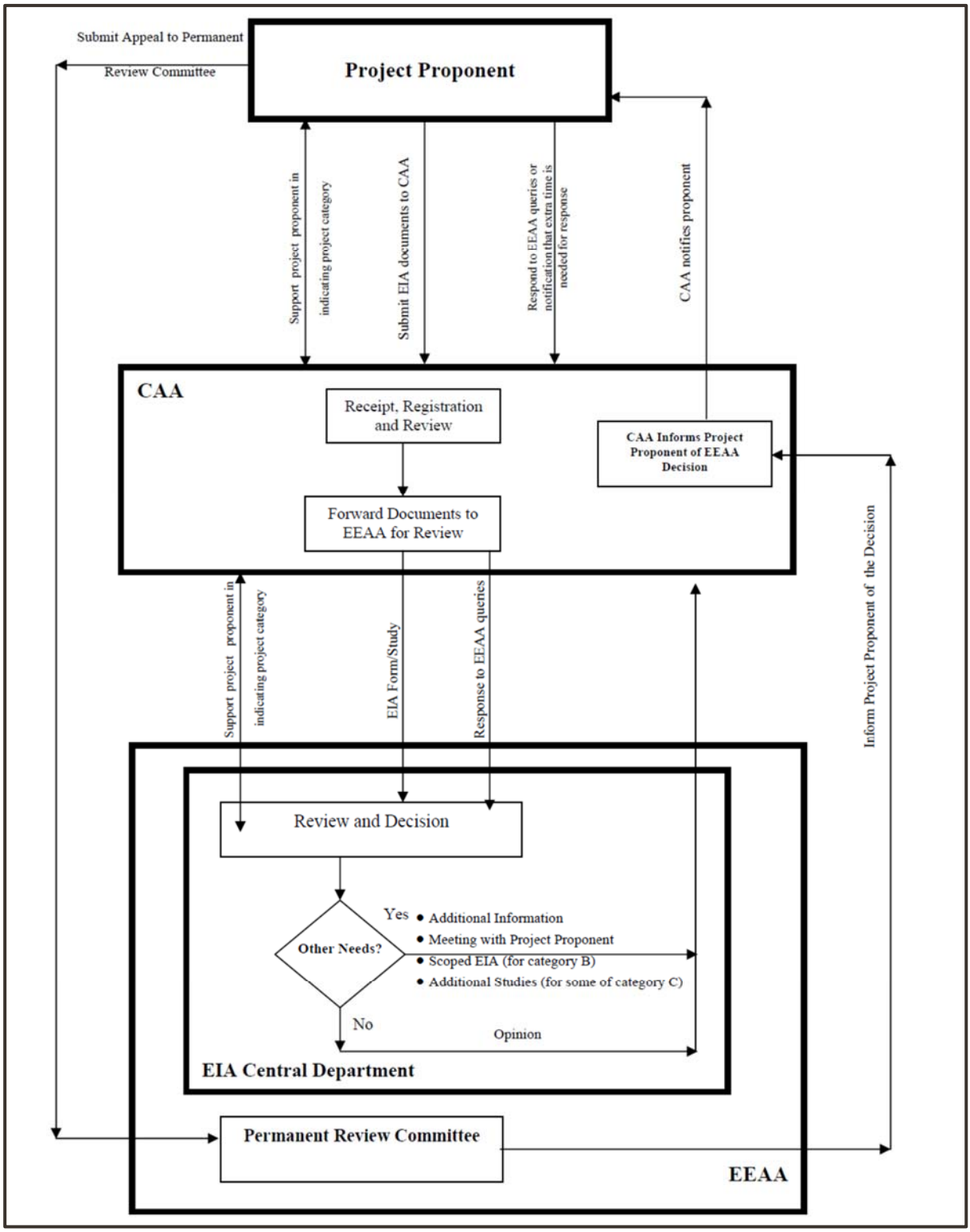

Figure 2-1: ESIA Procedures

2.1.4 Applicable Environmental Legislation in Egypt

The Egyptian environmental law covers many aspects, such as air quality, water quality, noise and solid waste management. Each of these aspects will be discussed in details and the allowable limits for the different aspects included according to its applicability to this project.

2.1.4.1 Ambient air quality

Ambient air emissions limits are presented in Annexes 5 and 6 of the ER of Law No. 4/1994 amended by Laws No. 9/2009 and 105/2015.

The following table presents the maximum permissible limits of outdoor air pollutants and periods of exposure.

Table 2-1: Maximum limits of outdoor air pollutants (ambient air quality) – Urban areas

Annex 5-ER Law 4/1994 (as amended by Decrees No. 1095/2011)				
Pollutant	**Maximum Limit [µg/m^3]**			
	1 hour	**8 hours**	**24 hours**	**1 Year**
Sulphur Dioxide (SO_2)	300	-	125	50
Carbon Monoxide (CO) - mg/m^3	30	10	-	-
Nitrogen Dioxide (NO_2)	300	-	150	60
Ozone	180	120	-	-
Total Suspended Particles (TSP)	-	-	230	125
Particulate Matter less than 10 µm (PM_{10})	-	-	150	70
Particulate Matter less than 25 µm ($PM_{2.5}$)	-	-	80	50
Suspended Particles Measured as Black Smokes	-	-	150	60
Lead	-	-	-	0.5
Ammonia (NH_3)	-	-	120	-

Article 35 of the Egyptian Law No. 4/1994 and article 34 of its modified ER by Decree No. 710/2012, provide the maximum allowable limits for ambient air pollutants.

Article 36 of the Egyptian Law No. 4/1994 amended by Law No. 9/2009 and article 37 of its modified ER by Decrees No. 710/2012 and 964/2015, provide the maximum allowable limits for exhaust gases from machines, engines and vehicles.

Article 40 of the Egyptian Law No. 4/1994 and article 42 of its modified ER by Decree No. 964/2015, provide the maximum allowable limits for the concentrations of pollutants resulting from burning of fuels.

Table 2-2: Maximum allowable emissions from power generation by diesel engines

Table 2 - Annex 6-ER Law 4/1994 (as amended by Decrees No. 1095/2011 and 710/2012)				
Fuel Type	**Maximum Emission Limits (mg/m^3)**			
	TSP	**CO**	**SO_2**	**NO_x**
Natural Gas	50	150	100	600
Diesel Oil ("Solar")	100	250	400	600
The above concentrations are based on the following reference conditions: Oxygen percentage: 15% Temperature: 273 ^oK Pressure: 1 atm				

Table 2-3: Maximum allowable emissions from Vehicles using gasoline fuel

Table 23 – Annex 6-ER of Law 4/1994 (as amended by Decree No. 710/2012)						
Pollutants	**Before 2003**		**From 2003 – 2009**		**From 2010 till present**	
	HC ppm	**%CO**	**HC ppm**	**%CO**	**HC ppm**	**%CO**
Maximum limits	600	4	300	1.5	200	1.2
Measured at Idle speed from 600 to 900 cycle/minute						

Table 2-4: Maximum allowable emissions from Vehicles using diesel fuel

Table 24 – Annex 6-ER of Law 4/1994 (as amended by Decree No. 710/2012)		
Year of manufacture (Model)	**Before 2003**	**From 2003 till present**
Smoke density Coefficient K (m^{-1})	2.8	2.65
Opacity* (%)	30	25

* Opacity measured at light flow device 127 mm.

2.1.4.2 Noise Intensity

Article 42 of the environmental law states that during the construction and operation phases of the project, the resulting noise levels must not exceed the sound intensity levels given by Table 3 of **Annex 7** of the ER when carrying out production, service or other activities, particularly when operating machinery and equipment or using sirens and loudspeakers.

Commitment to keep the ambient noise levels inside places of work and times of noise exposure within the limits stipulated to by the Law is required. Also, prevention of causing the increase of ambient noise levels than the averages stipulated to by the Executive Regulation (Articles: 42 of the Law, and article 44 and Appendix 7 of the ER) outside the site must be performed.

Table 2-5: Maximum limits of noise level exposure in different areas pursuant to the Council of Ministers Resolution No. 1095/2011 amended by decree number 710/2012

Table 3 of Annex 7 of the ER amended by Decree No. 710/2012		
Area Type	Maximum Permissible Equivalent Noise Level [dB (A_{eq})]	
	Day (7am – 10pm)	Night (10pm – 7am)
Sensitive areas to noise (schools- hospitals – public parks – rural areas)	50	40
Residential areas are located adjacent to roads whose width is less than 12 m, and have some workshops or commercial activities or administrative activities or recreational activities … etc.	65	55

Table 2-6: Noise intensity and maximum number of intermitted impacts from heavy hammers

Table 2-Annex 7- ER of Law 4/1994 (as amended by Decrees No. 1095/2011 and 710/2012)					
Noise Intensity Level (A) (LAeq) - Decibel	135	130	125	120	115
Number of permissible impacts	300	1000	3000	10000	30000

2.1.4.3 Vibration Limits

The following are the threshold limits of exposure to vibration according to the labour law 12/2003 (Table 10).

Table 2-7: The threshold limits of exposure to vibration according to Labour Law 12/2003

Daily exposure period	The square root of the dominant effect of any axis of the daily exposure period of the three axes, which should not be exceeded (m/s^2)
4 hours and less than 8 hours	4
2 hours and less than 4 hours	6
An hour and less than 2 hours	8
less than an hour	12

2.1.4.4 Waste Management Regulations (Hazardous and non-hazardous)

The collection, transportation and safe disposal of solid waste from houses, public places, commercial and industrial establishments is regulated through Public Cleanliness Law No. 38/1967 amended by Law No. 31/1976 and Law No.202/2020, as well as the Environmental Law No. 4/1994 and its executive regulations:

- **Public Cleanliness Law No. 38/1967**

Law No. 38/1967 amended by Law No. 31/1976 and Law No. 202/2020 prohibit the dumping of solid waste 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.

Article 1 of the Ministry of Housing and Utilities Decree No. 134/1968 defines solid waste as any waste generated by persons, residential units, non-residential constructions such as commercial establishments, camps, animal cages, slaughterhouses, markets, public spaces, parks, and means of transportation.

The specifications in the executive regulations are summarized in the following table. If a local authority hired a solid waste service provider, the contractor is responsible for the actions of the hired waste collector firm.

Table 2-8: Solid waste management specifications

Solid Waste Management Specifications in the ER for Law 38 of 1967 (Minister of Housing Decree 134/1968)		
Component	Article	Specification
Storage containers	6	- Suitable capacity for the waste generated. - Hard metal or similar material and void of holes. - Tight cover and two handles. - The local authority may provide detailed specifications or model names. - Containers must be kept inside the building they serve except at the time of garbage collection. - They must be kept clean and washed after each use.
Protective clothing for garbage collectors	10	- Garbage collectors must be provided with clothing suitable to provide health protection, as specified by the local council.
Collection frequency	11	- The local council shall determine the period and time for waste collection.
Collection containers	12	- Containers used by garbage collectors must be made of resistible material. - Void of holes to prevent spillage and kept clean. - The local authority can make specifications that are more detailed.
Garbage sorting	13	- Only allowed in designated areas. - Prohibited in vehicles.
Collection vehicles	14	- Adequate capacity. - Good working condition and void of holes. - Tight cover. - Lined with galvanized tin or zinc or other suitable material as determined by the local authority. - Parked, washed and sanitized at designated garages. - Not used for any other purpose.
Construction and demolition debris collection vehicles	15	- Good working condition. - Tight cover to prevent spillage.
Spillage	16	- Contractor must remove any spillage during transfer.
Disposal area	17	- Sufficient size and location with easy traffic flow. - 250 meters downwind from the nearest residential unit. - Fenced, with a gate suitable for truck access. - Adequate sanitary facilities for workers. - Suitable water source for dust control and firefighting. - Garbage heaped in piles with slopes of 1:2 or put in ditches, depressions, or abandoned canals. - Compacted, covered with 15 cm of soil, and sprayed with water.
Composting	17	- Suitable place provided for sorting waste and removing glass, tin, rubber, rocks, and other non-organic waste. - Prohibit use as animal food unless meeting conditions set by the competent local council.

Solid Waste Management Specifications in the ER for Law 38 of 1967 (Minister of Housing Decree 134/1968)		
Component	Article	Specification
Incineration	17	- Complete burn. - No air pollution. - Prohibit use as fuel in hearths unless meeting conditions set by the competent local council.

- **Environmental Law No. 4/1994**

The law prohibits the disposal of any solid waste except in areas designated for this purpose through article 37, and articles 38, 39 and 41 of the ERs which require that during the project's activities, the entity undertaking the work must take the necessary precautions to safely store and transport the resulting waste in accordance with the set procedure. For example, the disposal of excavation/construction waste at licensed locations should be through the local authority.

Regarding hazardous waste, and in accordance with the provisions of articles 29 to 33 of Law No. 4/1994 which is equivalent to Law No. 9/2009 and articles 28, 31 and 33 of the ERs, the entity producing hazardous waste 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.

Hazardous waste should be collected in specific locations with clear warning signs and oral or written instructions for safety conditions that prevent the occurrence of any damage generally or to people who get exposed to it. Additionally, the workers should be trained on proper handling procedures.

The transportation vehicles used to transport hazardous waste should belong to licensed entities that manage hazardous waste and follows the guidelines included in the executive regulations.

With respect to other non-hazardous materials, the Executive Regulations state that:

"…respective bodies competent to issue a license for their disposal shall be designated by a decree of the Minister for Environmental Affairs on the basis of a proposal by the CEO of the EEAA."

Further, that:

"…an emergency plan is in place to confront any potential accidents which may occur during the production, storage, transportation or handling of such substances, provided the plan is reviewed and approved by the licensing authority after consulting the EEAA and the Civil Defence Department".

2.1.4.5 Solid Waste Management Regulation No. 202 /2020

Article (3): A public agency called the "Waste Management Regulatory Authority" shall be established with public legal personality, and its main headquarters is in Cairo, and the competent minister is subordinate to it, and it is permissible, by a decision of the Chairman of the Board of Directors, to establish branches or offices of the Waste Management Regulatory Authority in other Governorates.

Article (4): The agency aims to regulate, follow up, monitor, evaluate and develop everything related to the activities of integrated waste management, and to attract and encourage investments in the field of integrated waste management activities to ensure sustainable development, and follow up the implementation of plans necessary to organize waste management in cooperation with state institutions, local administrations, the private sector, civil society organizations and International organizations.

The agency also aims to support relations between the Arab Republic of Egypt and the countries and international and regional organizations in the field of waste management.

Article (15): The generator or holder of waste may take all necessary measures related to the waste management hierarchy, in order to achieve the following:

- Reducing waste generation;
- Promote reuse;
- Working to ensure recycling, treatment and final disposal of waste;
- Waste management in a way that reduces harm to public health and the environment; and
- The executive regulations of this law specify the other measures that the generator or owner of waste must take.

Article (16): The generator or holder of waste shall bear the cost of integrated waste management in a healthy and environmentally safe manner, as determined by the executive regulations of this law.

Article (20): Open burning of residues is prohibited.

Article (31): The Waste Management Regulatory Authority supervises the organization and planning of integrated municipal waste management processes and prepares tender document and technical specifications for implementing integrated municipal waste management services, and the ministries and competent authorities should assist the agency in doing so.

Article (33): Ownership of municipal waste shall be vested in the competent administrative authority as soon as the owner has abandoned it in the places designated for this or once it is delivered to the persons authorized to do so, unless the contracts between the competent administrative authority and any other body to provide any of the integrated management services for municipal waste otherwise stipulate.

It is not permissible for the owner of municipal waste to abandon it or deliver it except in the designated places or to the persons authorized to do so.

Article (34): The integrated waste management units of the municipality in the competent authority in the Governorates, centers, cities, neighborhoods, villages, and agencies of new urban communities, by themselves or by others, shall collect a monthly fee for the services they provide for the integrated waste management or one of these services, from the built units and space lands that are subject to the provisions of this law.

Article (38): Municipal waste is prohibited to be dumped, sorted, or treated except in designated places in accordance with the procedures specified by the executive regulations of this law.

Article (41): The agency, in cooperation with the competent administrative authorities, reviews the current system for collecting, transporting and disposing of demolition and construction waste, and the competent administrative authority takes all necessary measures to implement the new system and provides sites designated for treatment and final disposal of demolition and construction waste, as well as coordinating with the agency to supervise the implementation and control of those processes.

The executive regulations of this law determine the conditions, controls, specifications and procedures necessary for this.

Article (42): All parties and individuals shall, when carrying out demolition and construction work, manage transport, recycling and safe disposal operations through authorized persons in the manner indicated by the executive regulations of the law.

Persons authorized to practice integrated management activities for demolition and construction waste must recycle or dispose it in the designated sites.

In all cases, the competent administrative authority may carry out these actions at the expense of the generation of these types of waste in case of breaking, neglecting or failing to perform any of these stages as detailed in the executive regulations of this law.

Article (43): The competent administrative authority is obligated to issue demolition and building permits after issuing any license for these works unless the license applicant submits evidence indicating his contract with a person authorized by the agency to handle demolition and construction waste, otherwise the specialist must be held disciplinary accountable.

Article (44): The Agency shall, in conjunction with the competent administrative authorities, establish a system to stimulate projects for the recycling and treatment of demolition and construction waste in accordance with the controls issued by the Agency's Board of Directors.

Article (53): The Agency shall establish a technical committee from the competent administrative authorities for hazardous materials and wastes, which is concerned with developing, issuing and reviewing the unified lists of hazardous materials and wastes, setting controls and requirements for handling and the integrated management of hazardous materials and waste and determining the method of limiting their generation. The committee shall have a technical secretariat with experience, and the executive regulations of this law determine the formation of the committee, its jurisdiction and its system of work.

Article (54): The competent administrative authority shall be responsible for issuing licenses for handling and the integrated management of hazardous materials and waste in accordance with the lists, controls and requirements set forth by the committee referred to in Article (53) of this law. Relevant necessary measures, as the agency publishes information on hazardous materials and wastes and their classifications.

Article (55): It is prohibited to handle hazardous materials and wastes except after obtaining the approval of the agency with a license from the competent administrative authority. It is prohibited for persons licensed to handle hazardous materials or waste to abandon them or deliver them except in designated places or persons authorized to do so.

Article (56): Those in charge of the production or management of hazardous materials and wastes, whether in their gaseous, liquid or solid state, are obligated to take all precautions specified by the Agency and the Committee referred to in Article (53) of this Law to ensure that no damage occurs to the environment.

The owner of the facility or the person in charge of its departments whose activities result in hazardous waste in accordance with the provisions of this law must keep a record of these wastes and how to dispose of them, as well as the contracting agency for any management process for these wastes.

The owner of the facility or the person responsible for its management that generates hazardous waste must clean it and disinfect the soil and the place in which it was established, if the facility is moved or its activity is suspended, in accordance with the requirements and standards determined by the executive regulations of this law.

Article (58): The use of empty packages of hazardous materials or the use of products resulting from their recycling is prohibited, except in accordance with the requirements specified by the executive regulations of this law.

Article (60): It is prohibited to establish or manage any facilities for the purpose of circulation or integrated management of hazardous materials or wastes except with a license from the competent administrative authority after the approval of the agency, and the disposal of hazardous materials or waste shall be in accordance with the conditions and standards determined by the executive regulations of this law.

The competent administrative authority shall determine, after the approval of the agency, and after consulting the ministries and the concerned authorities, the places of disposal of these materials or wastes.

Article (61): All establishments that fail to perform their activities as hazardous wastes are obligated to classify, collect and pack them, as well as provide tools and requirements for separation, collection, transport and storage within the facility. The executive regulations of this law clarify the requirements and standards for these tools and requirements.

2.1.4.6 Discharge of Liquid Waste

As the nearest water bodies to the railway line between Tanta – El Mansoura – Damietta are the agriculture drains and the River Nile, **law 48/1982** and its Executive Regulations amended by Ministerial Decree No. 92/2013 will regulate the discharge of liquid waste.

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

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

Table 2-9: Maximum allowable limits for discharging liquid waste as per Law 48/1982

Parameters	Concentration (mg/l)
pH	6-9
Biological Oxygen Demand (BOD)	60
Chemical Oxygen Demand (COD)	80
Total Suspended Solids (TSS)	50
Total Dissolved Solids (TDS)	<2,000
Oil and Grease (OandG)	10
Total Nitrogen (TP)	-----
Total Phosphorous (TP)	-----

Law 93/1962 regulates the discharge of liquid waste to sewerage networks, thus protecting such networks and sewerage utilities from polluting discharges. Provisions of this law apply to all parts of sewerage networks including final inspection chambers and their joints to the main network and all pipelines whether constructed under public or private roads. Decree 649/1962 was revised (regulations of law 93/63) by Minister of Housing decree 44/2000 including the revised specifications of liquid waste, prior to their discharge to the sewerage network.

Wastewater discharged to the sewerage network should comply with the standards stipulated in the regulations (decree 44/2000). Article 14 details the physical/chemical standards that should comply with as indicated in the below table.

Table 2-10: Maximum allowable limits for discharging liquid waste as per Law 93/1962

Parameter	Standards and Specifications
pH	6 – 9.5
Temperature	43 ºC
Chemical Oxygen Demand (COD)	1100 ppm
Biological Oxygen Demand (BOD)	600 ppm
Total Suspended Solids (TSS)	800 ppm

2.1.4.7 Noise Intensity in workplace environment

Annex 7 of the ERs amended in 2012 stipulates the permissible limits for sound intensity and safe exposure times that must be observed by the operators for the work areas and places within the proposed project.

Table 2-11: Permissible noise levels inside sites of productive activities

Table 1- Annex 7-ER of Law 4/1994 (as amended by Decree No. 1095/2011 and 710/2012)	
Type of place and activity	**Maximum permissible equivalent noise level [dB(A)]**
A) Work places (workshops and industries) with up to 8-hour shifts (licensed before 2014)	90
B) Work places (workshops and industries) with up to 8-hour shifts (licensed since 2014)	85
According to article 1 (A and B), exposure to noise decreases to half while increasing the noise level by 3 dB (A) in order not to influence the sense of hearing and wearing appropriate ear plugs. During working hours, the instantaneous noise level must not exceed 135 dB Noise is measured inside the workplace and indoor at level "LAeq" according to International Standards specifications (Part 1 and 2) ISO – 1996 / ISO – 9612 or Egyptian specifications number 2836 (Part 1 and 2) and number 5525 issued in this regard. Equivalent noise level "LAeq" is the average sound pressure equivalent at measured level (A) during a specific time and is expressed in decibels (dB).	

2.1.4.8 Temperature and Humidity

Article 44 of Law No. 4/1994 and 46 of its amended ERs by Ministerial Decree No. 1095/2011 stipulate the conditions and requirements for work place temperature and humidity. Annex 9 of the ERs gives the maximum and minimum limits for temperature and humidity, the corresponding exposure times, and safety precautions within the project.

Table 2-12: Safe standards of temperature degrees in the work environment for each working hour (permissible heat stress exposure)

Table 1 - Annex 9 - ER of Law 4/1994 (as amended by Decree No. 1095/2011)			
System of work and hourly rest break	**Heat Stress:** - Wet Globe Thermometer temperature (°C) - Average exposure to heat in case of intermittent work		
	Light work	**Medium work**	**Hard work**
Continuous work	30 °C	26.7 °C	25 °C
75% work, 25% rest	30.6 °C	28 °C	25.9 °C

Table 1 - Annex 9 - ER of Law 4/1994 (as amended by Decree No. 1095/2011)			
System of work and hourly rest break	**Heat Stress:** - Wet Globe Thermometer temperature (°C) - Average exposure to heat in case of intermittent work		
	Light work	**Medium work**	**Hard work**
50% work, 50% rest	31.4 °C	29.4 °C	27.9 °C
25% work, 75% rest	32.2 °C	31.1 °C	30 °C

Table 2-13: Business description

Table 2 - Annex 9 - ER of Law 4/1994 (as amended by Decree No. 1095/2011)	
Physical Activity	**Business Description**
Light work	**(Light body movement)** Administrative work, office work, washing dishes and utensils, sewing, and machines work either standing or sitting … etc.
Medium work	**(Medium body movement)** Sweeping, cooking, cleaning, shoe industry, the use of remove, install and walking tools, gardening, cars driving, tractors and harvesters driving … etc.
Hard work	**(Violent body movement)** Rowing, blacksmithing, plumbing, horseback riding, running, football playing, ascending the stairs quickly or carrying loads, excavating and loading, climbing up electricity towers, sorting, manual work in the field, construction work, driving heavy equipment … etc.

2.1.4.9 Nature Protection Law no. 102/1983

The main law for protecting wildlife and natural habitats is Law number 102 of 1983 concerning Natural Protected Areas. The law was created to allow the establishment of "Natural Protected Areas" to protect areas of special natural attractions, natural landscape, natural habitats and wildlife. The Prime Ministerial Decree 1067/1983 designates the Egyptian Environmental Affairs Agency (EEAA) as the authorized administrative body charged with the implementation of law 102 of 1983.

In addition, the Agricultural Law 53 of 1966 is the main legislation protecting wildlife and specially birds. The law and its executive regulations which provide lists of legally protected wildlife species will be the main legal reference for identifying the significance of potential impact of the project on wildlife.

2.1.4.10 Traffic Related Laws

The applicable laws regarding the traffic and work done in relation to roads is governed by Traffic law 66/1973 amended by law 121/2008 and updated in 2018. The law is concerned with traffic planning during the construction of projects. Law 140/1956 is also concerned with the utilization and blockage of public roads, and Law 84/1968 is also concerned with public roads, including Highways, main roads and regional roads.

The governing laws require that no works that could affect the traffic flow be undertaken without prior permission, and specifies that the competent administrative authority could utilize public ways for a fee. The executive regulations of law 140/1956 outlines the specifications for the management of

construction and demolition debris, and in general prohibits vehicle drivers to cause any road pollution by dumping wastes, or construction wastes, or any other material.

2.1.4.11 Environmental Register

Article 22 of Law 9/2009 amending Law 4/1994 and article 17 of its modified ER by Decree No. 1741/2005, stipulate that establishments should maintain environmental registers for their activities.

Article 17 and Annex 3 of the ER provide the content of the environmental register and require that the owner of the facility informs the EEAA of any non-compliance.

Articles 28 - 32 of the modified ERs are concerned with the rules and procedures of hazardous substance handling and waste management. Accordingly, a register for hazardous waste should be maintained as well as a record for the hazardous substances used.

According to article 33 of Law 4/1994 and article 33 of the modified ERs, the owner of an establishment whose activity results in hazardous waste pursuant to the provisions of these ERs shall be held to keep a register of such waste and the method of its disposal, as well as of the names of the parties contracted with to receive the said waste, as follows:

- Name and address of the establishment.
- Name and job title of the person responsible for filling in the register.
- The period covered by the current data.
- The special conditions issued for the establishment by the EEAA.
- A list of the types and quantities of hazardous waste resulting from the establishment activity.
- Method of disposal thereof.
- The parties contracted with to receive the hazardous waste.
- Date on which the form is filled.
- Signature of the officer in charge

The EEAA shall follow up the information in the registers to ensure its conformity with reality.

2.1.5 Applicable Social Legislations in Egypt

The table below lists the key relevant legislation and regulator relevant to the social parameters being studied and assessed within this ESIA. Throughout the following Chapters, reference to the requirements set out within those pieces of legislation is provided under each relevant parameter.

Table 2-14: National Legislation and Guidelines Governing the Social Compliance for the project during all Phases

Legislation	Relevant Article	Requirements
Land Use		
Law 144/ 2020	Ministerial Decree 144/ 2020 on the amendment of some provisions of Law No. 152 of 1980 establishing the Egyptian National Railways Authority (ENR). Replace the text of Article (7) of Law No. 152 of 1980 establishing the National Authority for Egyptian Railways	• The facilities of the National Authority for Egyptian Railways, its operating buildings, railways, and crossings are considered state-owned public funds. They are also considered public facilities designated for public benefit, and it is not permissible to dispose of them, seize them, possess them, or gain any right in kind over them by prescription. • The RoW and crossings are defined by a decision of the Minister of Transport and with consideration to the provisions of Law No. 10 of 1990 regarding land acquisition of real estate for the public benefit. If the implementation of the previous paragraph results in impacts to the owners of real estate, or the owners of rights in it, they have the right to a fair compensation.
Law 187/2020	In addition to the amendments that have been referred in Law 24/2018 of Articles (2, 6, 13) the law stipulates Article 12 of Law No. 10 of 1990 regarding land acquisition for the public benefit shall be replaced by Article (12)	• If the forms or the ministerial decision have not been deposited according to the procedures stipulated in the previous articles within three years from the date of the public benefit decision in the official gazette; the decision shall be considered as if it was not for land acquisition for which the forms or the decision related to. • The proposed amendment aims to address some of the drawbacks that have emerged because of the application of Law No. 10 of 1990 regarding land acquisition for the public benefit, which lead to obstructing the procedures of property dispute for the public benefit. • The law also comes within the framework of creating a new constitution that aims to protect private property, through fair compensation paid in advance in accordance with the law; as this phrase was not found in the previous constitution.

Legislation	Relevant Article	Requirements
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 land acquisition for the public benefit	• 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. • The compensation is estimated according to the prevailing prices at the time of the expropriation decision, and additional (20%) twenty percent of the value of the estimate included in the compensation. 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, it will be affixed in the place prepared for advertisements at the headquarters of the local administration units, in the mayor's or police headquarters, and in the primary court located in the property department, and on the front of the property 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. Article 7	• The first section of article 7 of the law states that: After depositing the compensation, the entity in charge of acquisition 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.
Law 10/1990	Article 6	• The members of the Compensation Assessment Commission. The commission is made at the Governorate level, and consists 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

Legislation	Relevant Article	Requirements
		prevailing market prices at the time of the issuance of the Decree for Expropriation.
Law 577/1954	Law 577/54, later amended by Law 252/60 and Law 13/162	• Establishes the provisions pertaining to the expropriation of real estate property for public benefit and improvement.
Civil code 131/1948	Articles 802-805	• Recognizes private ownership right. - Article 802 states that the owner, pursuant to the Law, has the sole right of using and/or disposing his property. - Article 803 defines what is meant by land property - Article 805 states that no one may be deprived of his property except in cases prescribed by Law and would take place with an equitable compensation.
Unified Building Law No. 119 of year 2008	Article 39	• Apply and a receive the construction permit before start of the implementation • Ensure that all designs abide by the building codes of Egypt
Occupational health and safety		
Law 4/1994	Articles 43 – 45 of Law 4/1994, which address air quality, noise, heat stress, and the provision of protective measures to workers.	• The owner of the project should abide by the limits stated in Annex 7 of the Executive regulations • In case the limits are exceeded, special protective equipment should be made available (earmuffs, masks…) • In case the limits are exceeded, the workers should have rests as specified by the limits (especially for noise and vibration from electric jack hammers or any other ramming equipment) • Conduct regular medical check-ups for workers that are facing noise, vibration or heat stress exceeding the limits
Law 12/2003 on Labour 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

Legislation	Relevant Article	Requirements
		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 Labour and Workforce Safety and Book V on Occupational Safety and Health (OSH) and assurance of the adequacy of the working environment	Minister of Labour Decree 48/1967. Minister of Labour Decree 55/1983. Minister of Industry Decree 91/1985 Minister of Labour 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 aid 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 Labour 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.
Socio-economics		
Law 94/2003		• The Law on Establishing the National Council for Human Rights (NCHR) aims to ensure respect, set

Legislation	Relevant Article	Requirements
		values, raise awareness and grant 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. • This Constitution came into force after a public referendum on 11th September 1971 and was amended on 22nd May 1980 to introduce the Shoura Council and the press.

2.1.6 Relevant conventions and agreements to which Egypt is a Signatory

Egypt has signed and ratified a number of international conventions that commit the country to conservation of biological resources. The following is a list of conventions that are, in one way or another, relevant to this project:

Name of Multilateral Environmental Agreement	Opening for signature date
Biodiversity and Natural Resources	
International Plant Protection Convention. The convention includes measures for the protection of natural vegetation cover.	Rome - 1951
Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Near East	1965
Convention on Wetlands of International Importance Especially as Waterfowl Habitats. The convention identifies wetlands of international importance for resident and migratory birds. Some of the northern Delta lakes are among the wetland areas identified in the convention.	RAMSAR - 1971
UNESCO Convention for the Protection of the World Cultural and Natural Heritage including archaeological sites	Paris - 1972
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1973
Convention on the Conservation of Migratory Species of Wild Animals. The convention covers migratory bird flights across Egypt in Autumn and Spring	Bonn - 1979
Protocol to Amend the Convention on Wetlands of International Importance Especially as Water Fowl Habitat	1982
Protocol concerning Mediterranean Specially Protected Areas and Biological Diversity Convention (CBD)	1992
Convention on biological diversity, which covers the conservation of habitats, animal and plant species, and intraspecific diversity.	Rio de Janeiro - 1992
Agreement for the Establishment of the Near East Plant Protection Organization	1993
United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	1994
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	1995

Name of Multilateral Environmental Agreement	Opening for signature date
African Convention on the Conservation of Nature and Natural Resources (revised) including threatened species of plants and animals and their natural habitats.	2003
International Tropical Timber Agreement	2006
Hazardous Materials and Chemicals	
Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents	1974
Convention on the Prohibition of the Development, Production and Stock-Piling of Bacteriological (Biological) and Toxin Weapons, and on their Destruction	1972
Protocol on the Prevention of Pollution of the Mediterranean Sea by Trans boundary Movements of Hazardous Wastes and their Disposal	1976
Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques	1976
Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and Their Disposal	1989
Bamako Convention on the Ban of the Import into Africa and the Control of Trans boundary Movement and Management of Hazardous Wastes within Africa	1991
Amendment to the Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and Their Disposal	1995
Stockholm Convention on Persistent Organic Pollutants (POPs)	2002
Atmosphere, Air Pollution and Climate Change	
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies	1967
Vienna Convention for the Protection of the Ozone Layer	1985
Montreal Protocol on Substances that Deplete the Ozone Layer	1987
(London) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1990
United Nations Framework Convention on Climate Change. The convention covers measures to control greenhouse gas emissions from different sources including transportation.	New York - 1992
(Copenhagen) Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	1992
Kyoto Protocol	1997
Paris Agreement under the United Nations Framework Convention on Climate Change	2015
Health and Worker Safety	
International Labour Organization Core Labour Standards	1936
Convention Concerning the Protection of Workers Against Ionizing Radiation	1960

Name of Multilateral Environmental Agreement	Opening for signature date
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration	1977
Occupational Safety and Health convention	1979

2.1.7 International Labour Conventions[6]

Since 1936, Egypt has been party to many regional and international conventions, treaties and agreements addressing labour standards as well as environmental protection. Such regulations have also been incorporated in the different national laws. Out of **64** Conventions ratified by Egypt, of which **62** are in force, No Convention has been denounced; 2 instruments abrogated; none have been ratified in the past 12 months.

- Fundamental Conventions: **8 of 8**
- Governance Conventions (Priority): **3 of 4**
- Technical Conventions: **53 of 177**

From the above-mentioned conventions, the following conventions are found to be relevant to the project:

- **Forced Labour:**
  - Clause 29 Forced Labour Convention, 1930 (No. 29) 29.11.1955
  - Clause 105 Abolition of Forced Labour Convention, 1957 (No. 105) 23.10.1958
- **Freedom of Association:**
  - Clause 87 Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87) 6.11.1957
  - Clause 98 Right to Organize and Collective Bargaining Convention, 1949 (No. 98) 3.07.1954
- **Discrimination:**
  - Clause 100 Equal Remuneration Convention, 1951 (No. 100) 6.07.1960
  - Clause 111 Discrimination (Employment and Occupation) Convention, 1958 (No. 111) 10.05.1960
- **Child Labour:**
  - Clause 138 Minimum Age Convention, 1973 (No. 138) Minimum age specified: 15 years 9.06.1999
  - Clause 182 Worst Forms of Child Labour Convention, 1999 (No. 182) 6.05.2002

[6] https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:102915

2.2 International Safeguards and Guidelines

2.2.1 European Investment Bank (EIB) Environmental and Social Standards (2018)[7]

The EIB finances projects to achieve a number of priority EU policy objectives. The standards and principles are outlined in the statement of Environmental and Social Principles and Standards issued in October 2018[7].

Table 2-15 Applicability of EIB Environmental and Social Standards to the project

Environmental and Social Standard	Title of the EIB Environmental and Social Standard	Triggered or not (Y/N)
1	Assessment and Management of Environmental and Social Impacts and Risks	Yes
2	Pollution Prevention and Abatement	Yes
3	Biodiversity and Ecosystems	Yes
4	EIB Climate -Related Standards	Yes
5	Cultural Heritage	Yes
6	Involuntary Resettlement	Yes
7	Rights and Interests of Vulnerable Groups	Yes
8	Labour Standards	Yes
9	Occupational and Public Health, Safety and Security	Yes
10	Stakeholder Engagement	Yes

2.2.1.1 EIB Environmental and Social Standards applicable to the proposed project

EIB Standard 1: Assessment and Management of Environmental and Social Impacts and Risks

The overall objective of this Standard is to outline the promoter's responsibilities in the process of assessing, managing and monitoring environmental and social impacts and risks associated with the operations, specifically policy commitment, assessment, management, monitoring and evaluation and stakeholder engagement. This Standard applies to all operations likely to have significant and material environmental and social impacts and risks. These impacts and risks need be taken into account at the earliest possible stage in all the technical planning and decision-making processes.

[7] https://www.eib.org/attachments/strategies/environmental_and_social_practices_handbook_en.pdf

EIB Standard 2: Pollution Prevention and Abatement

The objective of the second standard is to avoid and minimise pollution from EIB-supported operations. It outlines a project-level approach to resource efficiency and pollution prevention and control in line with best available techniques and internationally disseminated practices.

EIB Standard 3: Biodiversity and Ecosystems

Underpinning the Biodiversity and Ecosystem Standard of the EIB is the overall goal of maintaining the integrity of areas important for biodiversity as well as the natural functions, processes, and resilience of ecosystems, with the aim of achieving no net loss or a net gain of biodiversity and ecosystem. The rationale is that for any given environment, it is possible to compare current biodiversity values with those that would occur in an ideal state of conservation. All projects should seek to contribute towards this state, avoid or minimize further losses and finally compensate for any residual impact.

EIB Standard 4: Climate Related Standards

EIB financing as a whole is aligned with EU climate policies, which should be taken into account at all stages of the project cycle, in particular regarding the assessment of the economic cost of greenhouse gas emissions and the climate vulnerability context. Specifically, project promoters must ensure that all projects comply with appropriate national and, where applicable, EU legal requirements, including multilateral agreements, related to climate change policy.

EIB Standard 5: Cultural Heritage

The EIB standard defines cultural heritage as a variety of components that contribute to the heritage of a community, both in the past and in the present. Tangible heritage, which includes buildings, structures, technology, as well as archaeological, historical, cultural and religious value. The standard also recognizes intangible heritage such as language, art, music, religion and customary practices and traditions.

The objective of the Cultural Heritage Standard is to outline the responsibilities to be taken in order to promote cultural heritage management. The Project activities will involve excavation works for cable trenching along the railway track and the construction of technical buildings, as well as neglecting the construction of the multiplying area; but the railway track is not known to contain archaeological sites, therefore, there are no risks of finding tangible physical cultural heritage. However, the possibility of the "chance finds" will be taken into account.

Standard 5 is relevant to the project due to the possibility of the "chance finds" and some Mosques and a cemetery may be impacted negatively by project activities; if the construction activities can take place near some mosques at the crossings level and a cemetery; they are spiritual and/or religious significance as buildings of great value to community members.

EIB Standard 6: Involuntary Resettlement

The development of projects may require land acquisition, resulting in the temporary or permanent resettlement of people. As such, it is crucial to identify affected members and be provided an opportunity participate through consultation, as well as be informed on both the project and the grievance mechanism in place.

The objective of Standard 6 is to minimize project related resettlement whenever feasible, respecting the rights of communities and groups to adequate housing.

Any person negatively affected by the project is eligible for compensation, livelihood restoration and/or other resettlement assistance. The promoter will inform EIB in advance of land acquisition and impacts on communities gaining access to their land, housing or establishment as a direct result of the project to allow for a timely resettlement action plan. Moreover, the use of planning tools such as an RPF/RAP is required in cases of non-voluntary resettlement and as such, the promoter is required to report on the progress of their implementation. Both tools require displaced persons are informed about their options, consulted, provided compensation, and offered assistance for livelihood restoration.

Standard 6 is relevant to this project since the land required for the infrastructure, doubling area has not been fully determined yet. ENR will pay compensation for agricultural losses and for the most vulnerable tenants losing their livelihoods ENR will work to provide alternative sources of income.

EIB Standard 7: Rights and Interests of Vulnerable Groups

Standard 7 sets out to avoid or minimize, or otherwise mitigate and remedy, potential harmful effects of EIB operations to vulnerable individuals and groups whilst seeking that these populations duly benefit from such operations. As a means to foster those project outcomes, Standard 7 proposes a framework and tools to address inequalities and other factors contributing to vulnerability, and, as appropriate, to allow for equal access to and enjoyment of project benefits for those individuals and groups.

EIB Standard 8: Labour Standards

Project workforce are at the center of its development, and play a crucial role in its establishment and success. As such, Standard 8 aims to provide all involved labour with the necessary protections to foster security, productivity and efficiency throughout the entirety of a project's lifecycle.

The Promote fair and non-discriminatory treatment and opportunities in the workplace. Compliance with international and national labour and employment rules and regulations, particularly concerning health and safety. Prohibit the use of child labour throughout all stages of a project's development. Provide workers, particularly those belonging to a vulnerable group, with protections from exploitation, unacceptable employment practices.

Project activities will involve employment of labour. 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. The scale of the project is expected to require employment of various types of workers including direct, contracted, and primary suppliers.

Standards 8 is relevant to this proposed project due to the need for workers and health and safety impacts associated with the nature of project activities as well as the other risk related to the hiring procedures and the labour working conditions.

EIB Standard 9: Occupational and Public Health, Safety and Security

The Promote and protect the health and safety of employees at work throughout the project life cycle by ensuring safe, healthy, hygienic and secure working and accommodation conditions and, effectively, a working environment that respects and safeguards the right to privacy, and when appropriate, to the enjoyment of the highest attainable standard of physical and mental health of workers and their families (e.g., in workers accommodation). Ensure that promoters duly anticipate, avoid or minimize, and effectively mitigate risks and adverse impacts to the health and safety of host communities within the project's determined area of influence (including all associated facilities) as well as end users, during both construction and operation phases. Help promote public health and safety across the project's

area of influence by inter alia supporting and promoting programme which aim at preventing the spread of major communicable diseases. Ensure the provision of private or public security to protect the project's workers and assets consistent with international human rights standards and principles and, ensure effective access to grievance mechanism and recourse to remedy for all project workers and members of the public in cases of violations of their rights falling within the scope of the present standard.

Standard 9 is relevant to the project due to possible risks and impacts on the community health and safety from project activities, including:

(i) risks for communities living adjacent to physical works, (ii) risks from ENR's operations and current safety performance, (iii) the COVID-19 pandemic also introduces potential risks of community exposure through contagion pathways such as meetings, stakeholder engagement sessions and construction sites, and from train travel in general.

EIB Standard 10: Stakeholder Engagement

Stakeholder Engagement is the establishment of a relationship with relevant stakeholders. Engagement activities, which are tailored, based on the nature of the project and its stakeholders aim to achieve the following objectives: a) Maintain constructive dialogue between the promoters, affected communities and identified stakeholders through meaningful consultations and disclosure of information. b) Provide equal opportunities for marginalized communities to engage and express concerns. c) Assess quality of engagement process undertaken by third parties. d) Ensure transparency, non-discriminatory practices and public participation are applied throughout the consultation activities.

Consultations will be conducted as part of the ESIA and RAP, that could be developed as needed. Related information disclosure will be done using the appropriate modalities for each group of the stakeholders as per the SEP.

Standard 10 is relevant to the project due to the involvement of various stakeholders and complex implications of the project.

2.2.1.2 Project Categorization according to EIB

According to the EIB Environmental and Social Handbook (2013), the projects are categorized into four categories based on the magnitude of impacts on the environment, as follows:

- **Category A** – Minimal or no adverse impacts – Low risk.
- **Category B** – Environmental and social impacts can be readily identified and mitigation and/or remedial measures can be put in place – Medium risk;
- **Category C** – There may be highly significant, adverse and/or long-term environmental and social impacts, the magnitude of which is difficult to determine at the screening stage–High risk.
- **Category D** - Not acceptable in EIB terms.
- In terms of EIB classifications, the project is classified as a **Category (C) Project**. For Category C project, it is required to conduct public consultation and disclosure event for the full ESIA study.

2.2.2 World Bank Safeguard Policies and Standards

2.2.2.1 World Bank Safeguard policies applicable to the proposed project

The World Bank Environmental and Social Framework[8] sets out the World Bank's commitment to sustainable development, through a Bank Policy and the ten Environmental and Social Standards which are designed to guide borrowers to operate in compliance with good international practices in the key areas of environmental and social issues and impacts. The following table shows all the EandS standards as stipulated by the WB and indicates their applicability to the project.

Table 2-16: EandS standards as stipulated by the WB in the latest EandS framework issued in 2018[8]

Environmental and Social Standard (ESS)	Title of the ESS	Triggered or not (Y/N)
ESS 1	Assessment and Management of Environmental and Social Risks and Impacts	Yes
ESS 2	Labour and Working Conditions	Yes
ESS 3	Resource Efficiency and Pollution Prevention and Management	Yes
ESS 4	Community Health and Safety	Yes
ESS 5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Yes
ESS 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes
ESS 7	Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	No
ESS 8	Cultural Heritage	Yes
ESS 9	Financial Intermediaries	No
ESS 10	Stakeholder Engagement and Information Disclosure	Yes

Eight EandS standards are triggered for the project as a whole.

ESS1: 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

[8] http://pubdocs.worldbank.org/en/837721522762050108/Environmental-and-Social-Framework.pdf

- 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

Project activities will impact environmental receptors including air quality, noise levels, and soil. The 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 near communities.

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

a) Environmental risks and impacts, including: (i) those defined by the EHSGs; (ii) those related to community safety (including pedestrian safety and safe use of railways); (ii) noise from construction activities, solid and hazardous waste; and
b) Social risks and impacts, including: (i) risk of child labour, (ii) temporary labour influx, (iii) risk of gender-based violence, and (iv) land acquisition).

ESS 2: Labour 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 labour 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 labour in order to promote safe working conditions.

Project activities will involve employment of labour. 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. The scale of the project is expected to require employment of various types of workers including direct, contracted, and primary suppliers.

ESS 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 reducing the air pollutants and GHG emissions that will result from the doubling component.

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

ESS4: 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.

Project activities involving infrastructural physical interventions, transportation of wastes along roads. The operation of the project will involve management of hazardous wastes, road safety, pedestrian crossing the railway tracks, vehicles and people safety risks at level-crossings in addition to the diesel

storage tanks present at some of the station sites with possible risks on the community health and safety.

ESS 5: Land Acquisition, Restrictions on land 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.

ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

ESS 6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development. Biodiversity is defined as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.

ESS 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.

ESS 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.

2.2.2.2 Project Categorization according to WB

The upgrading of Tanta- El Mansoura – Damietta railway line including the doubling between El Mansoura and Damietta has been classified as a category (A) project, “High risk” project according to the EandS risk classification of WB. This type of project in particular could have potential safety risks during construction and operation phases as well as adverse environmental impacts on human populations or environmentally important and other natural habitats.

The environmental and social impacts that are likely to be caused by the project have been analyzed in this ESIA report. Mitigation measures were identified for the critical EandS impacts as shown in **Chapter 6** of this report.

2.2.3 International Finance Corporation (IFC) Performance Standards

The International Finance Corporation (IFC) Performance Standards for Environmental and Social Sustainability underline that Performance Standard 1 applies to all projects that have environmental and social risks and impacts. However, depending on project circumstances, other Performance

Standards may apply as well. The requirements section of each Performance Standard applies to all activities financed under the project.

The following list of IFC Performance Standards is applicable to the proposed project:

- Performance Standard 1: Social and Environmental Assessment and Management System
- Performance Standard 2: Labour and Working conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety and Security
- Performance Standard 5: Land Acquisition
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 8 - Cultural Heritage

2.2.3.1 IFC Performance Standards applicable to the proposed project

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts

The objectives of Performance Standard 1 are the following:

- 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 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.
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.

In regards to the stakeholder engagement plan, which is stipulated in this report, Performance standard 1 sets out the following recommendations:

- “An effective social and environmental management system…involves communication between the client, its workers and the local communities directly affected by the project”;
- “Ensure that affected communities are appropriately engaged on issues that could potentially affect them”;
- “…the client will identify individuals and groups that may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status….”
- “Community engagement is an on-going process involving the client’s disclosure of information”;
- “When local communities may be affected by risks or adverse impacts from a project, the engagement process will include consultation with them”;
- “The purpose of community engagement is to build and maintain over time a constructive relationship with these communities”;

- "The nature and frequency of community engagement will reflect the project's risks to and adverse impacts on the affected communities"; and
- "Community engagement will be free of external manipulation, interference, or coercion, and intimidation, and conducted on the basis of timely, applicable, understandable and accessible information"[9].

Performance Standard 2: Labour and Working conditions

Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the worker rights. The requirements set out in this Performance Standard have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN).[10]

The objectives of Performance Standard 2 are the following:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labour.

Performance Standard 3: Resource Efficiency and Pollution Prevention

Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations.

The objectives of this PS are:

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce project-related GHG emissions.

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[9] IFC Performance Standard 1, found at https://www.ifc.org/wps/wcm/English_2012.pdf

[10] These conventions are:
ILO Convention 87 on Freedom of Association and Protection of the Right to Organize
ILO Convention 98 on the Right to Organize and Collective Bargaining
ILO Convention 29 on Forced Labor
ILO Convention 105 on the Abolition of Forced Labor
ILO Convention 138 on Minimum Age (of Employment)
ILO Convention 182 on the Worst Forms of Child Labor
ILO Convention 100 on Equal Remuneration
ILO Convention 111 on Discrimination (Employment and Occupation)
UN Convention on the Rights of the Child, Article 32.1
UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families

Performance Standard 4: Community Health, Safety and Security

Performance Standard 4 addresses potential risks and impacts to the Affected Communities from project activities. The objectives of Performance Standard 4:

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

There are also Good Practice Notes (GPN) and other applicable documents on the social and environmental assessment process and a Policy on Access to Information, which this Management Plan takes into account.[11] Inherent in IFC Performance Standards and related guidance literature is the critical importance of a sustained and carefully planned consultation program.

In regards to the stakeholder engagement plan, which is stipulated in this report, Performance standard 1 sets out the following recommendations:

- "An effective social and environmental management system…involves communication between the client, its workers and the local communities directly affected by the project";
- "Ensure that affected communities are appropriately engaged on issues that could potentially affect them";
- "…the client will identify individuals and groups that may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status…."
- "Community engagement is an on-going process involving the client's disclosure of information";
- "When local communities may be affected by risks or adverse impacts from a project, the engagement process will include consultation with them";
- "The purpose of community engagement is to build and maintain over time a constructive relationship with these communities";
- "The nature and frequency of community engagement will reflect the project's risks to and adverse impacts on the affected communities"; and
- "Community engagement will be free of external manipulation, interference, or coercion, and intimidation, and conducted on the basis of timely, applicable, understandable and accessible information"[12].

Performance Standard 5: Land Acquisition

Project related land acquisition may have adverse impacts on communities residing or dependent on project land. Standard five aims to avoid or reduce the need for involuntary resettlement, and mitigate risks associated with temporary or long-term loss of land. As such, clients are advised to consider alternative project designs, compensate displaced communities and engage with stakeholders to address concerns. Additionally, a grievance mechanism must be introduced to enable stakeholders and

[11] For more information, see "The IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, found at http://www.ifc.org/wps/wcm/connect/IFC_GoodPracticeHandbook_CumulativeImpactAssessment.pdf
IFC Policy on Access to Information, found at http://www.ifc.org/wps/wcm/connect/FCPolicyDisclosureInformation.pdf

[12] IFC Performance Standard 1, found at https://www.ifc.org/wps/wcm/English_2012.pdf

host communities to submit complaints and feedback. In the event where involuntary resettlement is unavoidable, affected communities are required to be both identified and compensated, and a monitoring procedure must be set in place to evaluate the efficiency of an established Resettlement Action Plan. In the case of projects involving economic displacement only, the client is advised to develop a Livelihood Restoration Plan. In the event in which government bodies are responsible for the land acquisition and resettlement, the client is to collaborate with them in order to achieve the standard's objectives.

Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.

The objectives of this performance standard are:

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services.
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Performance Standard 8 - Cultural Heritage

Standard eight recognizes the potential impact of projects on the culture and heritage of communities. As such, the standard aims to establish protections and preserve culturally valuable heritage, as well as promote the equitable sharing of benefits. In addition to implementing national laws, clients are advised to avoid contributing to the creation of adverse impacts on cultural heritage, consult affected communities to identify valuable cultural features and allow continued access of communities to cultural sites. Clients are advised to avoid the removal of cultural heritage that is nonreplicable and in cases where their usage is unavoidable, additional measures must be considered under the law. Furthermore, where a project proposes the use of cultural heritage, the client will inform affected communities of their rights, the scope of the project and potential consequences using a fair negotiation process.

2.2.3.2 IFC General Environmental, Health and Safety guidelines

Ambient air quality[13]

As per the general Environmental, Health and Safety guidelines, the ambient air emissions should be compliant with the limits stated in the below table.

Table 2-17: Ambient Air Quality Guidelines

[13] https://www.ifc.org/wps/wcm/connect/4e01e089-ad1a-4986-b955-e19e1f305ff0/1-1%2BAir%2BEmissions%2Band%2BAmbient%2BAir%2BQuality.pdf?MOD=AJPERES&CVID=ls0KF2J

Pollutant	Average Period	Guideline Value in µg/m^3
Sulfur Dioxide (SO_2)	24 hours	125 (Interim Target1) 50 (Interim Target 2) 20 (Guideline)
Nitrogen Dioxide (NO_2)	1 hour 1 year	200 (guideline) 40 (Guideline)
Particulate Matter (PM_{10})	24 hours 1 Year	150 (Interim Target 1) 100 (Interim Target 2) 75 (Interim Target 3) 50 (Guidelines) 70 (Interim Target 1) 50 (Interim Target 2) 30 (Interim Target 3) 20 (Guidelines)
Particulate Matter ($PM_{2.5}$)	24 hours 1 Year	75 (Interim Target 1) 50 (Interim Target 2) 37.5 (Interim Target 3) 25 (Guidelines) 35 (Interim Target 1) 25 (Interim Target 2) 15 (Interim Target 3) 10 (Guidelines)

Noise Limits[14]

As per the general Environmental, Health and Safety guidelines, the noise limits should not exceed the limits presented in the following table:

Table 2-18: Noise limits

Location Category	Limits in decibels, dB(A)	
	Day	Night
Residential institutional, educational	55	45
Commercial/industrial	70	70

[14] https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%2BNoise.pdf?MOD=AJPERES&CVID=ls4XYBw

2.2.3.3 IFC Specific Environmental, Health and Safety Guidelines for Railways

The EHS Specific Guidelines for Railways are applicable to activities typically conducted by rail infrastructure operators dedicated to passenger and freight transport. The guidelines provide a summary of EHS issues associated with railways that may occur during the construction and operation phases of any project.

Environment

Rail operations

Environmental issues associated with construction and maintenance of rail infrastructure, as well as operation of rolling stock (e.g., locomotives and rail cars), may include the following:

- Habitat alteration and fragmentation
- Emissions to air
- Fuel management
- Wastewater
- Waste
- Noise

Maintenance of Rolling Stock

The main environmental issues typically encountered in locomotive and railcar maintenance activities may include:

- Hazardous materials
- Wastewater
- Waste management

Occupational, Health and Safety

Rail Operations

Occupational health and safety hazards during the construction of railway systems are common to those of most large industrial facilities and their prevention and control is discussed in the General EHS Guidelines. Additional health and safety issues specific to railway operations include the following:

- Train / worker accidents
- Noise and vibration
- Diesel exhaust
- Fatigue
- Electrical hazards
- Electric and magnetic fields

Maintenance of Rolling Stock

Occupational hazards typically associated with locomotive and railcar maintenance activities may include physical, chemical, and biological hazards as well as confined space entry hazards. Physical hazards may be associated with work in proximity to moving equipment (e.g., locomotives and other

vehicles) and machine safety, including work-portable tools, and electrical safety issues. Chemical hazards may include potential exposures to a variety of hazardous materials (e.g., asbestos, PCB, toxic paint, heavy metals, and VOCs, including those resulting from the use of solvent-based paints and cleaning solvents in enclosed spaces). Other chemical hazards may include the potential for fire and explosion during the conduct of hot work in storage tank systems. Biological hazards may include potential exposures to pathogens present in sewage storage compartments. Confined spaces may include access to railroad tank and grain cars during repair and maintenance. All of these occupational health and safety hazards should be managed based on the recommendations provided in the General EHS Guidelines[15]

Community Health and Safety

Community health and safety impacts during the construction, rehabilitation, and maintenance of railways are common to those of most infrastructure or large industrial facility construction projects, and are discussed in the General EHS Guidelines[15]. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labour. Health and safety issues specific to railway operations include:

- General rail operational safety
- Transport of dangerous goods
- Level crossings safety
- Pedestrian safety

2.2.4 Gap Analysis of National and International Requirements for Key Environmental Issues:

As stated in the EandS Framework, the project is required to apply the relevant national and international requirements and standards which contain the performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. The following tables are presenting comparisons between Egyptian, WB and EIB standards regarding ambient air quality, noise levels and vibration levels.

2.2.4.1 Ambient Air Quality

This section outlines the key requirements of both the Egyptian Legislations and the World Bank policies and the gaps between the requirements of the two entities in urban areas to the ambient air quality.

[15] https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p

Table 2-19: Ambient Air Quality limits in the National legislations and Internationals Standards

Ambient air parameters	Requirements of Egyptian legislations µg/m³				Requirements of WB µg/m³				EU-directive 2008 50			
Exposure period	1 hr	8hr	24hr	1year	1 hr	8hr	24hr	1year	1 hr	8hr	24hr	1year
Carbon monoxide CO µg/m³	30	10	NA	NA	NA	NA	NA	NA	NA	7 mg. m^{-3} Upper assessment threshold 5 mg. m^{-3} Lower assessment threshold 10 mg/m³ (limit value guideline)	NA	NA
Sulfur dioxide SO_2 µg/m³	300	NA	125	50	NA	NA	125 (IT-1) 50 (IT-2) 20 (Guidelines)	N/A	NA	NA	125 Lower assessment threshold	NA
Nitrogen oxides NO_x µg/m³	300	NA	150	60	200 (Guidelines)	NA	NA	40 (Guidelines)	200	NA	NA	24
Particulates PM_{10} µg/m³	NA	NA	150	70	NA	NA	150 (IT-1) 100 (IT-2) 75 (IT-3) 50 (Guidelines)	70 (IT-1) 50 (IT-2) 30 (IT-3) 20 (Guidelines)	NA	NA	35 Upper assessment threshold 25 Lower assessment threshold 50 µg/m3, not to be exceeded more than 35 times a calendar ye	28 Upper assessment threshold 20 Lower assessment threshold
Particulates $PM_{2.5}$ µg/m³	NA	NA	80	50	NA	NA	75 (IT-1) 50 (IT-2) 37.5 (IT-3) 25	35 (IT-1) 25 (IT-2) 15 (IT-3) 10	NA	NA	NA	17 Upper assessment threshold

							(Guidelines)	(Guidelines)				12 Lower assessment threshold
TSP µg/m³	NA	NA	230	125	NA	NA	NA	NA	NA	NA	NA	NA
Ozone µg/m³	180	120	NA	NA	NA	160 (IT-1) 100 (Guidelines)	NA	NA	180	NA	NA	NA

2.2.4.2 Ambient Noise

Table 2-20 Maximum permissible limit for noise intensity in the different areas according to Egyptian and World Bank requirements

Requirements of Egyptian Law 4 - 1994			**Requirements of WB**		**International Permissible Directive 2002/49/EC**	
Type of Area	**DAY 7 a.m. to 10 p.m.**	**NIGHT 10 p.m. to 7 a.m.**	**DAY 7 a.m. to 10 p.m.**	**NIGHT 10 p.m. to 7 a.m.**	**DAY 7 a.m. to 10 p.m.**	**NIGHT 10 p.m. to 7 a.m.**
Sensitive Areas to noise (schools- hospitals- public parks- rural areas)	50	40				
Residential areas located adjacent to roads which width is less than 12m, and workshops or commercial or entertainments activities are found	65	55	55	45	75	70

2.2.4.3 Noise Exposure in workplace environment

Table 2-21 Limits for Noise exposure in the Work Environment as per Egyptian and WB requirements

Egyptian Law Permissible Noise Level			WB Permissible noise levels			Directive 2003/10/EC
Type of place and activity	**Maximum permissible equivalent noise level [dB(A)]**	**Exposure duration**	**Location/Activity**	**Equivalent Level, L_{Aeq}, 8 hrs(dB)**	**Maximum LA max, fast**	**It sets exposure limit values and exposure action values in respect to the daily and weekly noise exposure level as well as peak sound pressure.**
a) Work places (workshops and industries) with up to 8 hour shifts (licensed before 2014)	90	8	**Heavy Industry (no demand for oral communication)**	85 dB(A)	110 dB(A)	Lower Value 80 dB
b) Work places (workshops and industries) with up to 8 hour shifts (licensed since 2014)	85	8	**Light industry (decreasing demand for oral communication)**	50-65 dB(A)	110 dB(A)	Upper value 85 dB
*: If the measured noise at the workplace increased over the maximum allowable limit by 3 dBA, the exposure period shall be reduced to half of the exposure period. In addition, wearing proper ear muffs is a must. Noise level at any time at the work place shall not exceed 135 dBA. Noise shall be measured inside working environment in LAeq unit in accordance with ISO 9612/ ISO 1996 or Egyptian standards.						

2.2.4.4 Vibration Exposure in workplace environment

Table 2-22: The threshold limits of exposure to vibration according to National Labour Law 12/2003 , ACGIH 16 and EU Directive 2002-/44/-EC

Daily exposure period (m/s^2)	National Labour Law	ACGIH	EU Directive 2002-/44/-EC
4 hours and less than 8 hours	4	4	Limit 8 hours :Daily Limit 5 (m/s^2)
2 hours and less than 4 hours	6	6	
An hour and less than 2 hours	8	8	
less than an hour	12	12	

2.2.5 Gap Analysis of National and IFIs Standards for Key Environmental and Social Issues

The following table shows the gaps between the IFIs Environmental and Social Standards and Egyptian laws.

Table 2-23 Gap analysis between Social IFIs standards and national laws

WB ESS	IFC PS	EIB ESS	National Laws	Gap
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	PS 1: Social and Environmental Assessment and Management System	Standard 1: Assessment and Management of Environmental and Social Impacts and Risks	• 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	• Discrepancies in air quality, water quality and noise limits between the national laws and WB standards • Not addressing all social risks and impacts, including: (ii) temporary labour influx, and (iii) risk of gender-based violence. • Objectives related to avoiding impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in

[16] Vibration values set by The American Conference of Governmental Industrial Hygienists (ACGIH) based on Environmental, Health, and Safety (EHS) Guidelines set by IFC ,a sister organization of the World Bank and member of the World Bank Group

WB ESS	IFC PS	EIB ESS	National Laws	Gap
			• 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. • 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 202/2020 regarding solid waste management. • 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	sharing development benefits and opportunities resulting from the project. • The lack of a specific role for the official in charge of social aspects

WB ESS	IFC PS	EIB ESS	National Laws	Gap
ESS 2: Labour and Working Conditions	PS 2: Labour and Working conditions	Standards 8: Labour Standards	• 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 • Labour Law No. 12/2003	• The Egyptian labour 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, • Egyptian Labour 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. • The IFIs standards stipulates number of requirements related to labour safety, welfare and working conditions. The most common gap between the Egyptian labour law and those requirements are that the latter did not set clear provisions for GRM of labour nor the work-related facilities to be offered for labour. The law assumed equitable treatment for labour without classifying the various types of labour.
ESS 3: Resource Efficiency and Pollution Prevention and Management	PS 3: Resource Efficiency and Pollution Prevention	Standard 2:Pollution Prevention and Abatement	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	No Gap identified

WB ESS	IFC PS	EIB ESS	National Laws	Gap
			and Decree No. 618 and 1963 of 2017	
ESS4: Community Health and Safety	PS 4: Community Health, Safety and Security	Standards 9: Occupational and Public Health, Safety and Security	Law no. 94/2003, Protection of communities Human Rights Laws	No Gap identified
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	PS 5: Land Acquisition and Involuntary Resettlement	Standard 6: 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. The amendment of the year 2018 entailed increase for the value of the compensation to include additional 20% above the prevailing market price for the interest of the affected persons (landowners), and Law 187/2020 which most importantly

WB ESS	IFC PS	EIB ESS	National Laws	Gap
				include committing the project proponent to deposit the value of the compensation in no more than 3 months from the public interest decree issuance date. Previous Egyptian experiences show that the full replacement (providing assistance is not covered) 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 6:Biodiversity Conservation and Sustainable Management of Living Natural Resources	PS 6: Biodiversity Conservation and Sustainability	Standard 3 :Biodiversity and Ecosystems	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.	• National and EIB standards are recommending to protect and conserve all levels of biodiversity and sustainably managing living natural resources are fundamental to sustainable development and it recognizes the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity. • ESS6 also addresses sustainable management of primary production and harvesting of living natural resources, and recognizes the need to consider the livelihood of project-affected parties, including Indigenous Peoples, whose access to, or use of, biodiversity or living natural resources may be affected by a project.
ESS 7: Indigenous Peoples/Sub-Saharan African	PS 7: Indigenous Peoples	Standard 7: Rights and Interests of Vulnerable Groups	• Standard 7 places emphasis on protecting indigenous communities, however, there are no indigenous	• With regard to vulnerable groups; Egyptian regulations have not addressed how vulnerable groups affected by project

WB ESS	IFC PS	EIB ESS	National Laws	Gap
Historically Underserved Traditional Local Communities			communities residing in Egypt.	activates and expropriation of property should be treated. • Definite identification of those groups, and their associated sizes and characteristics have not yet been clarified. In the coming stage, the project needs to conduct a social survey in order to identify all vulnerable groups. Subsequently, the impacts of the project have to be assessed.
ESS 8: Cultural Heritage	PS 8: Cultural Heritage	Standard 5: Cultural Heritage	• Law No. 117 of 1983 Amended by Law No. 12 of 1991 for the Protection of Archaeological Areas and Cultural Heritage • The Relevant International Treaties Signed by Egypt: Respect for cultural heritage and non-financing of projects that threaten the safety of sites with a high level of protection for reasons of cultural heritage, for example UNESCO World Heritage Sites	No Gap identified
ESS 10: Stakeholder Engagement and Information Disclosure	Disclosure of Information and Stakeholder Engagement addressed in PS 1: Social and	Standards 10: Stakeholder Engagement	• EEAA EIA guidelines related to the Public Consultation prior to the project construction and implementation are related to Category C Projects.	• There are no regulations on committing the project owner to conduct 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

WB ESS	IFC PS	EIB ESS	National Laws	Gap
	Environmental Assessment and Management System			community members, throughout the project life cycle • There are no regulations on committing the project owner in establishing a grievance mechanism

2.3 Summary of EEAA, EIB and WB safeguards and policies for environmental and social aspects:

Table 2-24: Summary of EEAA, EIB and WB safeguards and policies for the most significant environmental and social aspects

No.	Safeguard	Policy Triggered (Yes/No)			Justification
		EEAA	EIB	WB	
1	**Environmental Assessment**	Yes	Yes	Yes	• ESIA is a compulsory study (in accordance to Egyptian and International guidelines and regulations); that has to be provided prior to the implementation of any project. • This policy applies to the project as it is classified as: o Category B Scoped of Egyptian Laws and Regulations 4/1994, o Category A of WB EES1 o Category C of EIB Standard 1 • In addition, the EIA is in accordance to EIA Policy summarized in Environmental Statement 2004 governed by Directive 85/337/EEC, amended by Directives 97/11/EC and 2003/35/EC according to EIB guidelines. • All Environmental and Social aspects related to construction and operation of the rehabilitation project will be adequately examined
2	**Biodiversity and Ecosystem conservation**	No	Yes	Yes	The project activities will be undertaken in the intensively cultivated, and densely populated Nile Valley and Delta. The upgrading of the signalling system between Tanta – El Mansoura – Damietta will not affect local habitats; however, the construction works for the doubling of the single-track railway between El Mansoura and Damietta will result in the destruction of the vegetation cover along the land strip to be occupied by the new railway track.

No.	Safeguard	Policy Triggered (Yes/No)			Justification
		EEAA	EIB	WB	
3	**Land Acquisition and Involuntary Resettlement**	No	Yes	Yes	• The involuntary resettlement will be triggered for the project in some construction sites, depending on the project's activities and land needed.
4	**Public Consultation**	No	Yes	Yes	• The project will require public consultation activities before the construction phase of the project. • Consultation activities will be designed according to EIB, WB standards and regulations.
5	**Disclosure**	No	Yes	Yes	• According to Egyptian Law and Regulation, Disclosure is applicable to category C project only. • However, as the Disclosure process is compulsory under the EIA Directive, it has been designed in according the EIB disclosure requirements.

2.4 National Institutional and Administrative Framework

This section identifies the organizations and/or agencies primarily responsible for the project's implementation, as well as detailing the capacity of these entities for effective implementation by reference to links to authority, prior experience with resettlement, and number and training of their personnel. Lastly, this section briefly describes the key implementation capacity-building measures required to carry out the project's activities.

2.4.1 ENR's Institutional and Organizational Structure

ENR serves as the project's implementation agency under the oversight of a Steering Committee, which mainly combines the Ministries of Transport, Finance, Investment and International Cooperation. A Project Implementation Unit (PIU) needed to be established within ENR to coordinate and implement project activities, and to liaise with the Bank.

An Environmental Affairs Department (EAD) was established by ENR to oversee and implement the environmental, occupational health and safety, and social requirements of the various funding agencies. The EAD's organizational chart is displayed below. The EAD reports directly to the Vice Chairman for the Shared Services Sector. Below is the organizational scheme of responsibilities for the management of the project:

Figure 2-2: ENR Organizational Structure *(Source: ENR)*

The key tasks of environmental specialists in the EAD include, but are not limited to the following:

- Conduct environmental inspection activities for railway replacement, development and maintenance activities (including replacement and renewal of signalling systems, and various construction and maintenance activities of service workshops).

- Conduct environmental measurements to verify compliance of various activities with the national standards and guidelines and applicable environmental management plans and health and safety measures.
- Take necessary administrative actions for reporting and correcting non-compliance or violations according to the provisions of the law of environment and ENR operating regulations
- Conduct awareness campaigns including on safety and occupational health at all levels i.e., ENR employees and public.

The role of the social officer will be critical in reaching out to the locations, conducting consultations, monitoring the implementation of all the social measures associated with the ESMP, ensuring the grievance system is operational, examining the need for preparing RAPs/ARAPs and participating in the process of the RAP/ARAP preparation and monitoring. The social officer will continue to monitor the complaints received from PAPs and ensure that prompt response is offered to deal with their concerns.

The institutional structure of the project shows that the EAD setup covers finance, procurement, environment, and reporting. The following is a brief description of the different national authorities and institutions of relevance to this project (ENR, Ministry of Transport, EEAA, etc.).

2.4.2 Egyptian National Railways (ENR)

The railway sector in Egypt is managed and operated by the Egyptian National Railways (ENR), a public undertaking subordinated to the Minister of Transport (ENR is one of the Economic Bodies of the Ministry of Transport) established pursuant to Law No. 152/1980. The 2006 amendment to the same law authorized the ENR to award concessions to investors in order to build and operate new railway lines and networks. Hence, ENR is the public authority responsible for managing the Egyptian railways, and reports directly to the Ministry of Transport. ENR owns the railway network and manages infrastructure maintenance services and railway expansion.

The first railway line in Egypt was decided in 1851 which makes the railway one of the oldest in the world. ENR is an associate member of the International Union of Railways (IUR) since 1977. ENR has more than 71,000 employees, classified as engineers, technical personnel, administrative personnel, etc.

2.4.3 Ministry of Transport

The ENR operates under the final responsibility of the Ministry of Transport and its board of directors is appointed by the president of the Republic, as designated by the Ministry of Transport. The ENR's Board of Directors (BoD) includes representatives from the Ministries of Transport, Treasury, Economy, Industry, and the Supreme Council of the Armed Forces. Other members are elected by the Ministry of Transport, and include some of the directors of the ENR.

The Ministry of Transport must approve all decisions made within the ENR, before going into effect. These measures encompass the ENR's general policy, lending strategy, and ENR staff regulation and pricing policies. The Ministry of Transport is therefore the responsible authority for supervising the management of the railway, while the ENR provides the services that affect infrastructure. Moreover, the ENR is undergoing a restructuring process that begun in 2007, and is scheduled to be completed by 2019, as per Law No. 417/2007. The Ministry of Transport of the Arab Republic of Egypt is responsible for the necessary authorizations, regulatory issues, and oversight throughout the whole

project's lifecycle (preliminary design, detailed design, construction, testing and commissioning and operation).

The Ministry of Transport (MoT)'s strategic objectives are as follows:

- Sustain economic growth and improved productivity through reliable and efficient transport networks.
- Improve environmental performance in the transport sector.
- Strengthen transport safety and security.
- Enhance access to jobs, services and social networks.
- Encourage investment in the transportation sector.

To achieve these objectives, the MoT seeks to:

- Improve the current operation and capacity of transport networks and services.
- Shape the future demand trend for transport and land-use planning.
- Track the environmental impacts of modes of transport.
- Plan and manage long-term investment programs.
- Regulate and license public transport services and operators.

2.4.4 Egyptian Environmental Affairs Agency

The Egyptian Environmental Affairs Agency (EEAA) is an authorized state body regulating environmental management issues. Egyptian laws identify three main roles for the EEAA:

- A regulatory and coordinating role in most activities, as well as an executive role restricted to the management of natural protected areas and pilot projects.
- The agency is responsible for formulating the Environmental Management (EM) policy, setting the required action plans for protecting the environment, and following up their execution in coordination with the Competent Administrative Authorities (CAAs).
- In specific to this project, EEAA is responsible for review and approve of the environmental impact assessment studies.

According to Law No.4/1994, the ESIA report should be submitted by the legal entity responsible for the project (ENR) to the EEAA for review and approval, before the ENR can proceed with project construction activities. The EEAA has 30 days to issue its response, and may require some revisions in the ESIA report, including additional mitigation measures before approving the report.

If no response is received beyond this period, the ESIA study is automatically approved. The project proponent is informed of the decision, and, in the event of an approval, the required stipulations for the implementation of the project. The project proponent has the right to issue an appeal within 30 days from receipt of the decision.

Once the ESIA has been approved, the Environmental and Social Management Plan (ESMP) presented in the ESIA study will be considered as an integral part of the project. Accordingly, the project proponent (ENR) will be legally responsible for the implementation of the ESMP, by ensuring that all mitigation measures and environmental and social requirements described in the ESMP and clearly referred to in the tender documents, are implemented. The project proponent (ENR) should follow-up during the project's construction as well as operation and maintenance phases to ensure that the ESMP is being adequately implemented during project phases.

2.4.5 Governorates (Environmental Management Unit at Governorate and District Level):

The Governorate is responsible for the environmental performance of all projects/facilities within the Governorate's premises. The Governorate has established environmental management units at both the Governorate and city/district level. The EMU is responsible for the protection of the environment within the Governorate boundaries and in hence, mandated to undertake both environmental planning and operation-oriented activities. The environmental management unit is mandated to:

- Follow-up on the environmental performance of the projects within the Governorate during both the construction and operation phases to ensure that the project abides by laws and regulations, as well as mitigation measures included in its ESIA approval,
- Investigate any environmental complaint filed against projects within the Governorate.
- The EMU is administratively affiliated with the Governorate, and technically affiliated with EEAA. EMUs submit monthly reports to the EEAA detailing their achievements and inspection results. The inspection as well as the legal departments at EEAA are the responsible entities in case of any non-compliance issue (After the project implementation).
- The Governorate has a solid waste management unit at the Governorate and district level. These units are responsible for the supervision of solid waste management contracts.

3 Project description

3.1 Project Background

For many reasons, including serious safety concerns, the declining level of service provided and the burden imposed by the sector on the public budget, railway operations have become a matter of deep concern to the Government of Egypt.

ENR has adopted a wide-ranging strategic plan to improve and upgrade all railway infrastructure in Egypt using state-of-the-art technological solutions that have been proven in other railway networks around the world for their efficiency and reliability.

In line with this strategic plan, ENR envisages upgrading the railway line between Tanta, El Mansoura and Damietta. The Tanta-Damietta corridor is located in the Delta region, on the Mediterranean façade of Egypt. This railway line has a total length of 119 km and is divided into two sections. :

1. Between **Tanta and El Mansoura**: a non-electrified **double-track** line, length: 54 Km with 16 stations.
2. Between **El Mansoura and Damietta**: a non-electrified **single-track** line, length: 65 Km with 19 stations.

The objective of this project is to improve the reliability, efficiency and safety of this railway line, through two components:

- **Component (A):** Modernization of the Signalling System between Tanta and Damietta
- **Component (B):** Doubling of the single-track between El Mansoura and Damietta.

3.2 Project Objectives

The overall objective of the upgrading project is to fill a crucial gap in the Egyptian Railway sector, which has seen prolonged periods of underinvestment leading to poor reliability, saturation of capacity and increased risk of accidents. The project will focus on improving the reliability, efficiency and safety of the Tanta - El Mansoura - Damietta railway line.

In addition to the capacity increase, benefits are expected regarding passengers' travel time, operating costs and operations safety. This project is expected to reduce accidents caused by human error due to the failure of the existing, outdated mechanical signalling system. The project is also expected to allow much safer operation of a large number of level crossings along this line, and to boost freight transportation to and from Damietta Port.

For passengers, the project will offer a double benefit: better travel times and a densified service in term of frequencies. For freight, considering the capacity reserve, the project benefits would be essentially in the travel times which have lower influence in freight than in passenger transport (because of the type of transported goods in this line). The analysis of the current situation highlights the lack of reliability of the current railway freight service. This problem is clearly identified by the Damietta Port Authority and explains the main reason for the low market share. ENR is aware of this issue and plans to improve the signalling system along the Tanta - Mansoura - Damietta line.

3.3 Project Location

The Tanta-Damietta corridor is located in the Delta region, on the Mediterranean façade of Egypt. There are 83 level crossings on the line, and 23 interlockings; it passes through three Governorates (Gharbia, Dakahlia and Damietta). The following figure shows the project assessment area from Tanta to Damietta.

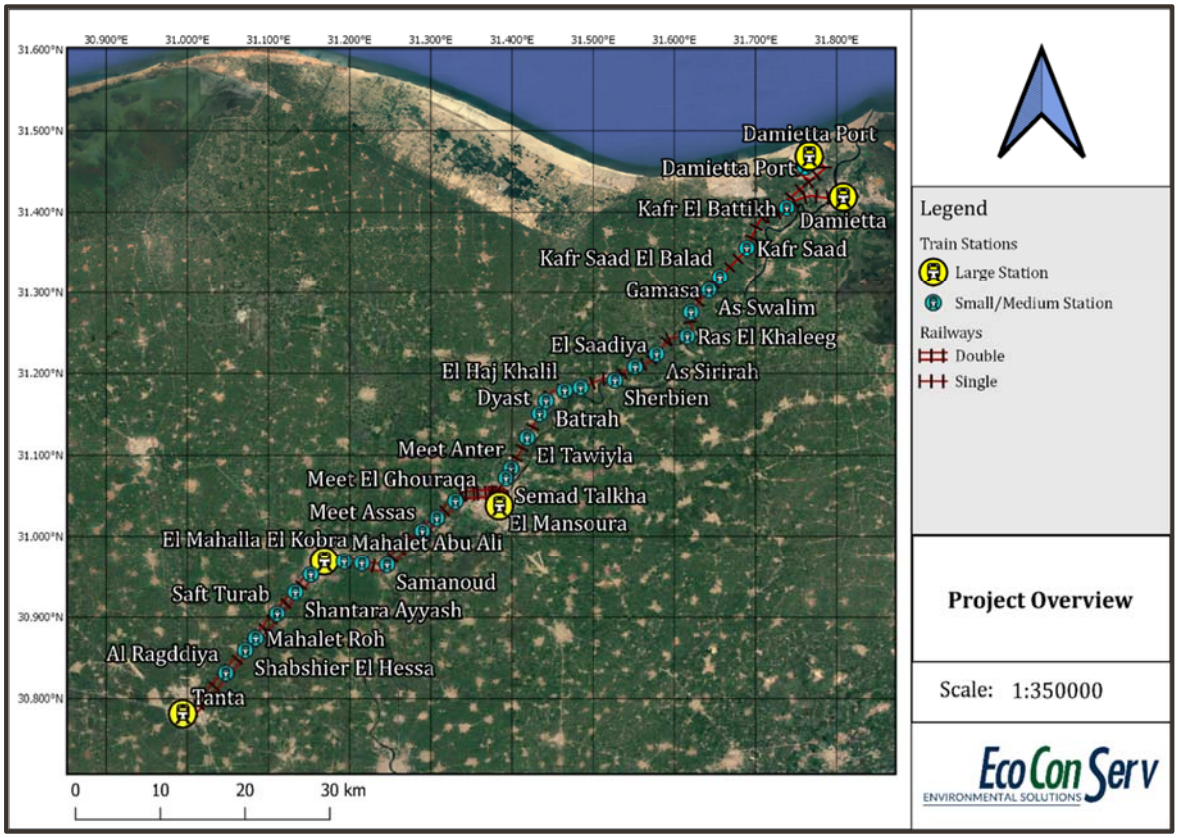


Figure 3-1: Map showing the project assessment area (Tanta- El Mansoura – Damietta)

The first part of the route, between **Tanta and El-Mansoura**, is a non-electrified double-track line with a length of 54 Km and 16 stations as shown in the following figure.

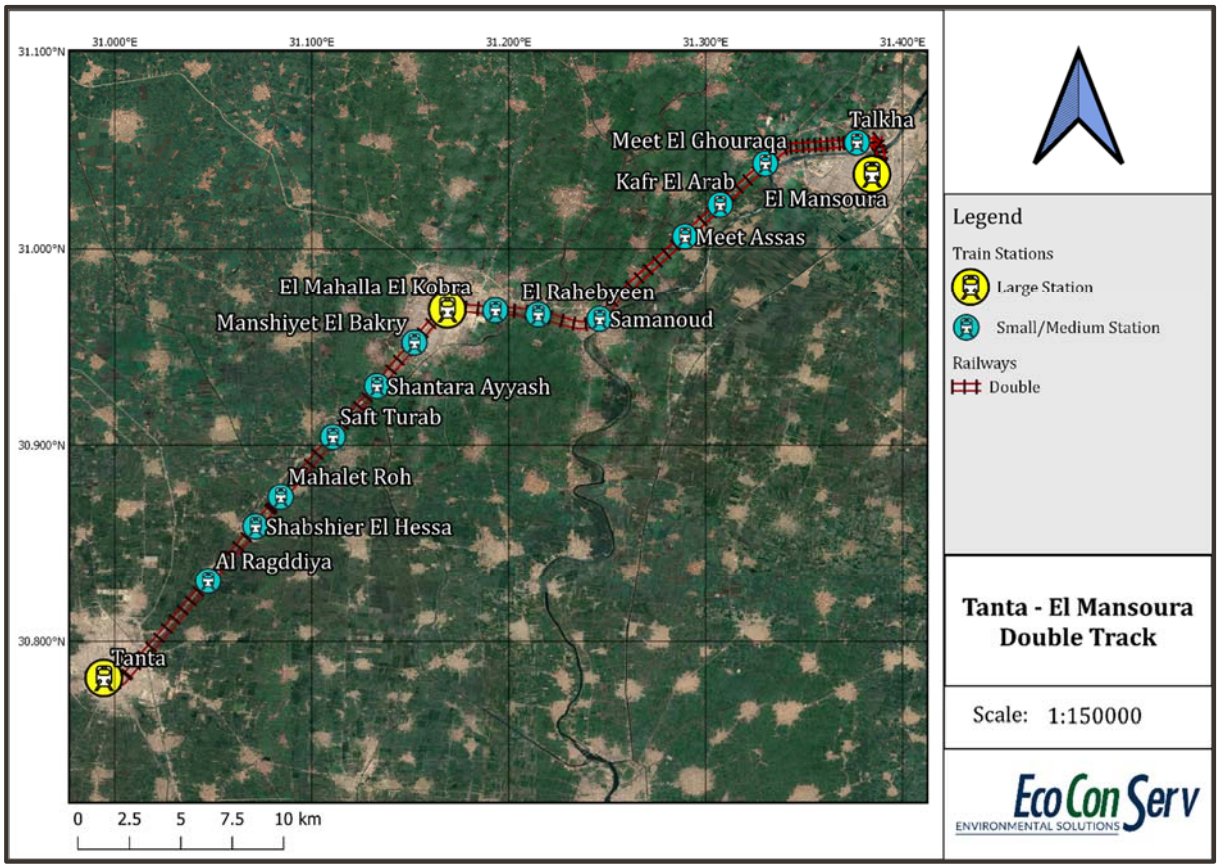


Figure 3-2: Map showing the 54-km, double-track railway line between Tanta and El Mansoura

The second part, between **El-Mansoura and Damietta** is a non-electrified single-track line with a length of 65 Km and 19 stations, as shown in the following figure. Both sections support mixed traffic of passengers and freight.

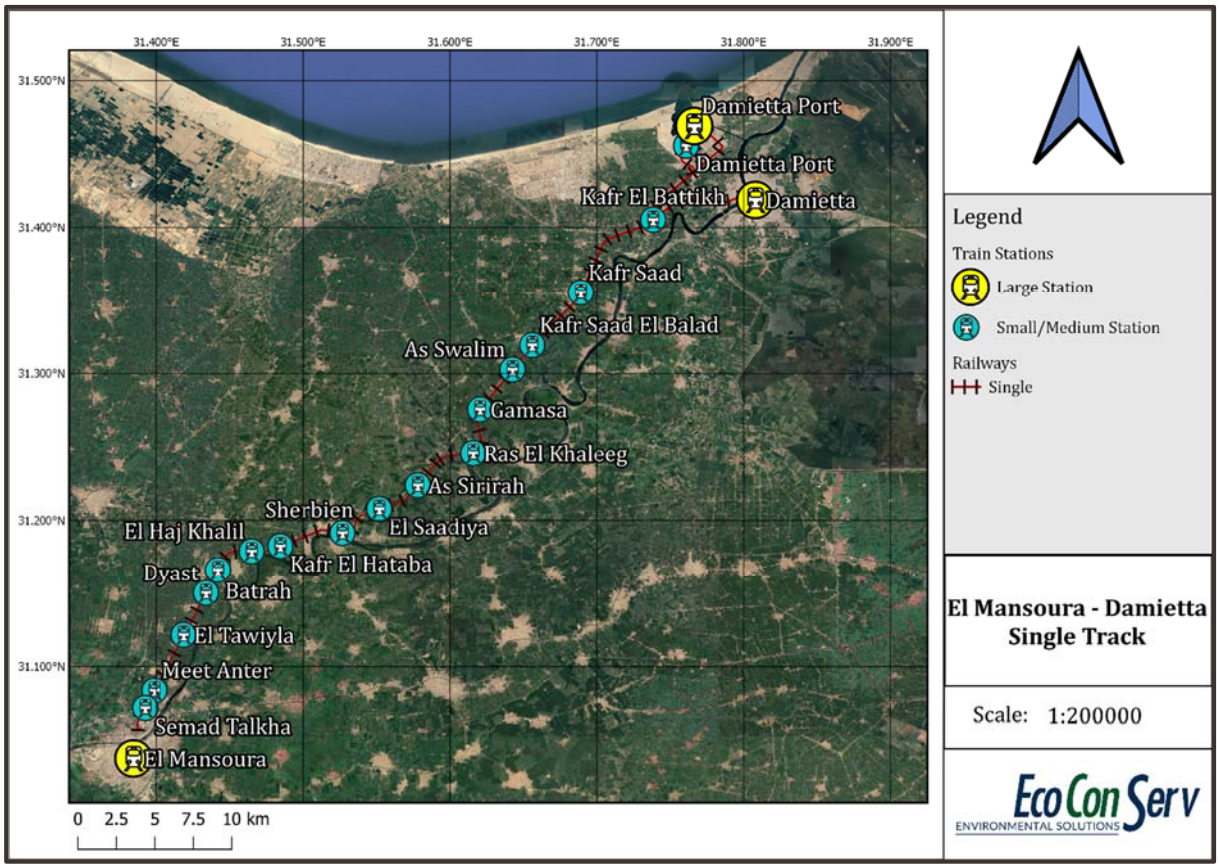


Figure 3-3: Map showing the 65-km, single-track railway line between El Mansoura and Damietta

3.4 Current Condition of Tanta – El Mansoura - Damietta Railway Line

3.4.1 Existing signalling system

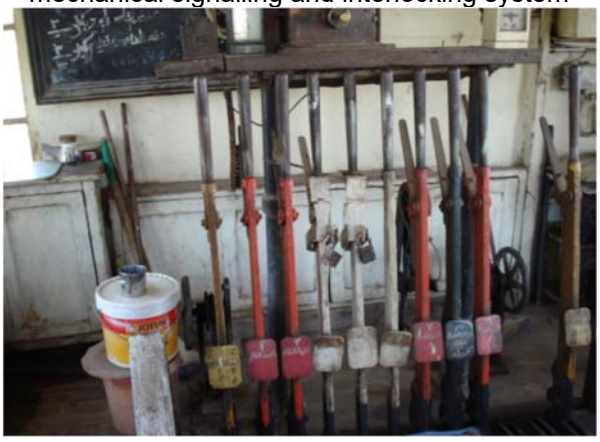
The signalling system in Tanta Station and up to Blocking Building (BB) no.6 is electromechanical. The BB contains the mechanical interlocking and is situated every 3 Km (approximate average). The block operator shall only monitor and control train traffic by direct visualization in the first floor. The BB have magneto-telephones to communicate with adjacent ones and with level crossings. The majority of the level crossings are managed from BB manually. The following figure shows some photos for the current status of the signalling system.

Typical interlocking building (BB)

Block nº 6 is electrically controlled from Tanta station

Currently BB and stations are using both mechanical signalling and interlocking system

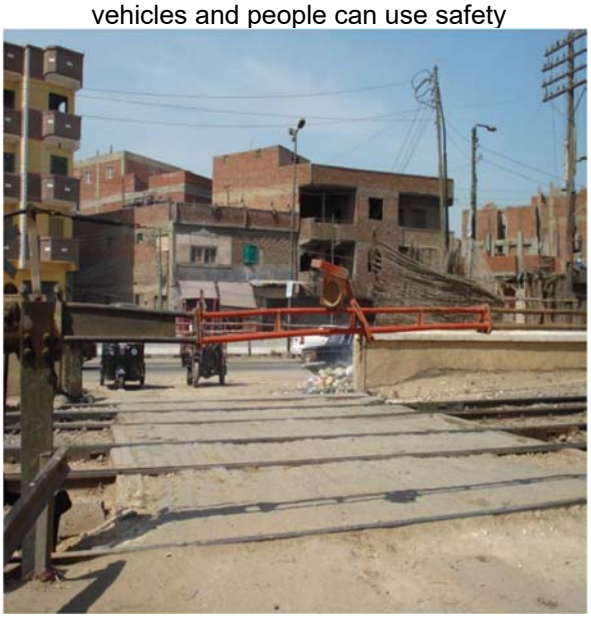
Signalling signals are controlled mechanically



Mechanical system is based on a set of pulleys, levers and gears

Local Control Panel (LCP) is controlled mechanically from BB and has a pavement where vehicles and people can use safety

Detail of blocking system of mechanical Local Control Panel barrier



Level crossing pass barrier has a signal out of order and in bad condition

3.4.2 Existing status of rails, sleepers, ballast and level crossings

The rails are continuous welded or jointed with fishplates. The following photos show the current condition of the rails, sleepers and ballast.

Bad condition of jointed track

Several rail sections have not electrical continuity due to the gap at the joints, or the physical connection is in bad condition

Several rails deformed at the joints or in poor condition, which can cause high dynamic forces when trains are passing

Damaged point blade

Contaminated ballast with debris, dust and oils at a station

Lack of ballast / contaminated ballast

Contaminated ballast with vegetation

Mono block sleepers with Vossloh fasteners

Twin block sleepers with Pandrol fasteners

Different types of sleepers (mono-block and twin block). Most of the sleepers are in good condition.

Upgraded Level crossing

A non-upgraded level crossing

3.4.3 Existing drains and irrigation channels along the railway line

There are about 22 irrigation drains between El Mansoura and Damietta. Only 10 of these drains are parallel to the railway line and need to be covered to provide more space and enable the doubling of the existing line.

There are nine culverts crossing the railway line from El-Mansoura to Damietta. Some of them have been rehabilitated, while others require to be rehabilitated and extended.

3.5 Main Project Components

The project aims to upgrade and modernize the existing line's infrastructure. The proposed project consists of two main components:

Component (A): Modernization of the existing mechanical signalling system of Tanta – El Mansoura – Damietta railway line (along the whole line, 119 km).

Component (B): Doubling of the single-track between El Mansoura and Damietta (65 km).

3.5.1 Component (A): Modernization of the existing mechanical signalling system of Tanta – El Mansoura – Damietta railway line:

The main works associated with upgrading the signalling system include:

- Replacement of mechanical interlocking with a new electronic interlocking system.
- Replacement of mechanical switches with point machines.
- Renewal of all signalling ground installations, including civil works (trenches and buried pipes), required for connecting cables to the field elements.
- Installation of a train detection system using traditional track-circuit technology and its associated infrastructure.
- Construction of new technical buildings along the line to house the new signalling, telecommunications and energy equipment.

- Installation of new conduits, with four spare pipes, installed at each side of the track.
- Introduction of a new power supply system managed via SCADA system. The power supply will be connected to two different sources: the national electricity grid and an emergency generator (fixed and mobile).
- Establishment of a Centralized Traffic Control (CTC) Command Center.
- Implementation of a new transmission system to communicate all equipment along the tracks, and inside the technical building, with the CTC.
- Installation of a new protection and automation system for level crossings.
- Setting up of a fibre optic cable network along the tracks to connect the transmission network and signalling devices. The network consists of two cables of 48 optical fibres laid on each side of the track (a total of four main cables).
- Training of operation and maintenance staff.

All new buildings will have a fire alarm, anti-intrusion, and access control systems, fire protection and firefighting measures, in addition to a CCTV-based monitoring system, in order to increase security.

Details on the new buildings and systems that will be added/upgraded as part of the modernization process are presented in the next section.

3.5.1.1 Centralized Traffic Control (CTC) Building

In order to enhance a remote control of traffic, the line will be controlled from a Centralized Traffic Control (CTC), which will provide the following functions:

- Automatic vehicle supervision and regulation;
- Management and interface with communication subsystems;
- Operation management functions;
- Maintenance management functions
- Maintenance management for optimization of maintenance activities to enhance productivity and system availability.
- Instantaneous overall view of all events and alarms occurring within the system, made available at the CTC traffic room on corresponding control desk according to line and function responsibilities,
- Storage for archiving all events and alarms to assist in incident and fault diagnostic investigations and statistics.

The CTC building will be located at El Mansoura main station; the building will be built entirely within the property of ENR, as shown in the following figure.

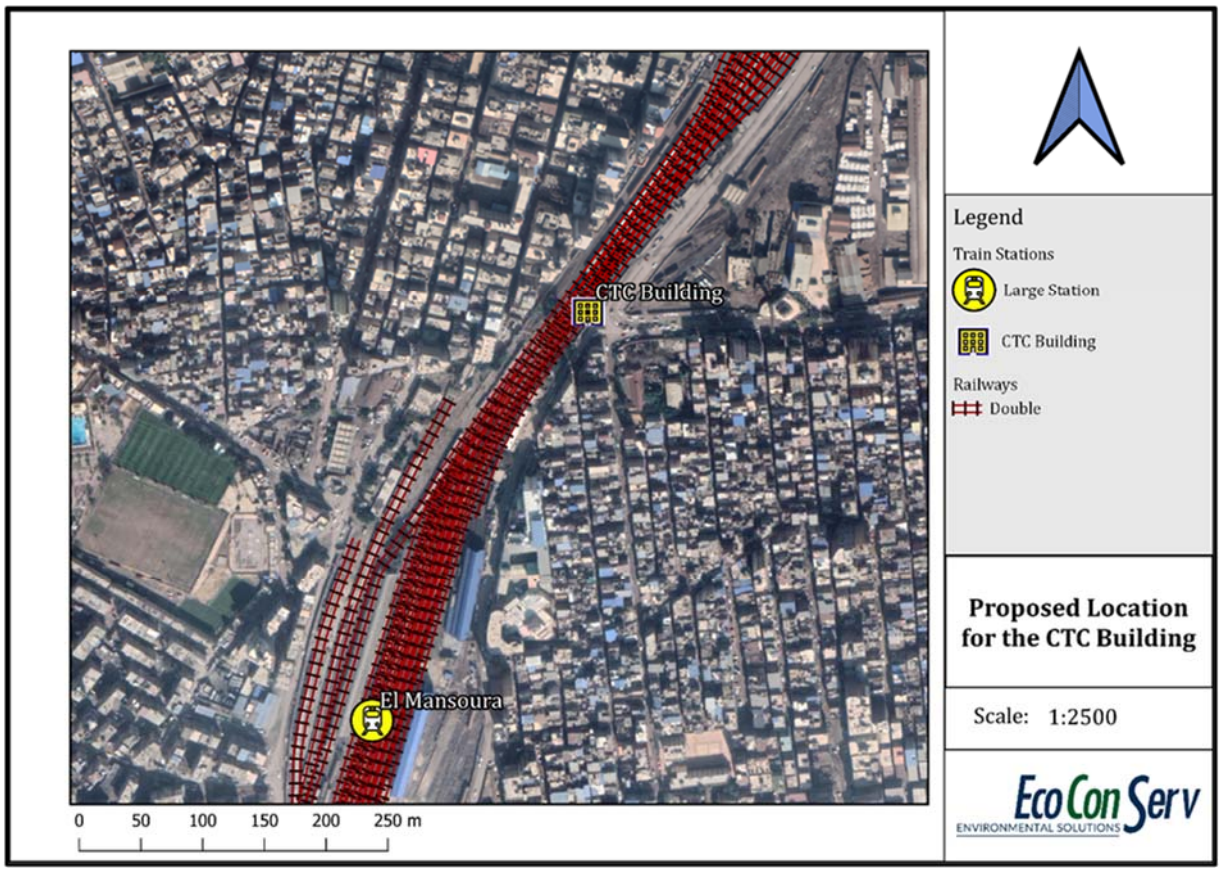


Figure 3-4: Map showing the location of the Centralized Traffic Control (CTC) Building

The purpose of the CTC is to have a centralized command center to control traffic on the Tanta – El Mansoura – Damietta line. The CTC will utilize modern technologies to maintain high standards for security, reliability and efficiency. The CTC will be designed to operate 24 hours a day, seven days a week.

The functionality of the CTC is to ensure the complete management of train traffic, and to allow for swift decision making in the event of accident or deficiencies.

The CTC will allow for several operating modes on the line, as follows:

- Centralized (Primary) mode: technical personnel usually supervise the systems and make decisions at abnormal situations;
- Local mode: in the event of an important reason, an operator can take control of some part of the line to solve the problem. This situation can be considered as a degraded mode;
- Field mode: when there is a major problem in the system, actions are carried out on-field.

The CTC will be operated by a main supervisor. A train dispatcher controls the train operation as per the timetable, deals with incidents' scenarios, communicates with the train drivers, etc. There will also be other personnel for managing signalling systems and inspecting equipment.

3.5.1.2 Technical Buildings

The technical buildings will be built along the line to house the new signalling, telecommunications and energy equipment. There will be no fence protection along the line; therefore, the buildings will be secured with safety locks and heavy materials. The buildings will have several independent rooms for signalling, telecommunications, power supply, offices, etc.

The buildings will contain a floating floor and/or false ceiling to allow a clean distribution of equipment, in order to avoid cables from being visible. The buildings will be equipped with lighting, air conditioning, and other basic utilities. The buildings will be built on-site and will not be prefabricated.

The buildings will be electrically protected using a grounding grid composed of bare copper and rods, such that contact voltage and contact step remain lower than the maximum admissible voltage. In addition, the technical buildings will include a fire-fighting system for extinguishing any accidental fires.

The Tanta – El Mansoura – Damietta Corridor has 45 Local Block Buildings to control all level crossings, small stations and switch points located along the corridor. For the upgrading project, around **14 Main Technical Buildings (MTB)** will be constructed as per the below table.

According to the latest update received from ENR on 04th of March 2021about 12 locations out of 14 Main TB have been identified, and during the coming period the remaining sites of Mahalet Rawh and Sherbin will be determined. ENR provided the sketch drawings for only 12 technical buildings, as shown in **Annex (1).**

Table 3-1: List of Main Technical Buildings along the railway line between Tanta – El Mansoura – Damietta (Source: ENR Projects Department-Update of 4 March 2021)

No.	Name	Kilometric Reference	Confirmed location	Date of memo	Dimensions (L x W)	Area (m^2)	**Past Usage**	**Current Usage**
1	El Ragddya	8.340	Yes	26/7/2020	Not provided	1,000	Empty land owned by ENR	Empty land owned by ENR
2	Mahalet Rawh	14.800	No				Not identified	
3	El Mahala El Kobra	27.650	Yes	19/9/2017	24 m x 25 m	600	Empty land owned by ENR	Empty land owned by ENR
4	Samannoud	35.238	Yes	Not mentioned	Not clear in the sketch		Empty land owned by ENR	Empty land owned by ENR
5	Talkha	51.740	Yes	8/11/2018	Not provided	1,000	Empty land owned by ENR	Empty land owned by ENR
6	El Mansoura	54.600	Yes	20/5/2019	40 m x 25 m	1,000	Warehouses	Empty land owned by ENR
7	Altawilla	63.000	Yes	4/10/2020	50 m x 16 m	800	Empty land owned by ENR	Empty land owned by ENR
8	Battra	66.357	Yes	23/8/2020	35 m x 32 m	1,120	Empty land owned by ENR	Empty land owned by ENR
9	Sherbin	75.660	No				Not identified	
10	Al-Sabrya	82.230	Yes	24/11/2020	23 m x 31 m	713	Empty land owned by ENR	Empty land owned by ENR
11	Al-Sawalem	94.250	Yes	10/12/2020	40 m x 25 m	1,000	Empty land owned by ENR	Empty land owned by ENR
12	Taftish Kafr Saad	101.649	Yes	26/1/2021	35 m x 32 m	1,120	Empty land owned by ENR	Empty land owned by ENR
13	Kafr El-Batikh	109.387	Yes	27/1/2021	40 m x 20 m	800	Empty land owned by ENR	Empty land owned by ENR
14	Damietta	116.179	Yes	Not mentioned	76 m x 41 m	3,100	Workshop	Not utilized

El Mahalla El-Kubra

Samannoud

El Ragddya

Damietta

El Mansoura

Figure 3-5: Photos for some of the confirmed locations of the main technical buildings

Regarding the **Secondary Technical Buildings (STB),** there is no information on the location of the STBs or their expected number so that the exact location of the construction works is not identified yet. The only information made available by ENR is that the expected building area is around 50 m^2, each building consists of one floor and will be constructed within ENR's property.

3.5.1.3 Train Protection System: ETCS Level 1

The European Train Control System (ETCS) has been proposed as a protection system to cover the ENR traffic control requirements along the Tanta/El Mansoura/Damietta Corridor. The line will be equipped with an ATP system ETCS Level 1, with trackside and on-board equipment, which allows continuous speed control of the trains.

Level 1 of the ETCS is a moving-train control system, based on communication between Euro-balises located along the track and the on-board equipment.

In this level of coverage, the movement authority is generated in fixed wayside equipment and is transmitted to the train through fixed and switchable Euro-balises. ETCS Level 1 provides monitoring that also protects against undue excesses of the movement authority, while train detection and monitoring of the integrity of their composition is carried out by the fixed wayside equipment (interlocking, traditional track circuits, etc.).

3.5.1.4 Telecommunications and Signalling System

The communication systems will include the following:

- Backbone Communication System (based on SDH technology)
- Physical Layer (fibre optic network and copper cables)
- Operational Voice Communication
- Administrative Voice Communication
- Renovation of Very High Frequency (VHF) Radio System
- Voice Recorder System
- Clock System
- SCADA
- Radio Interface/Dispatching System
- LAN/WAN
- Access Control and Anti-intrusion System
- Fire Alarm and Firefighting System
- Alarm System
- CCTV for New Buildings
- Passenger Information System

A completely new fibre optic network will be installed in this line to transmit all signals. Two cables of 48 optical fibres shall be laid on each side of the track. New conduits, with four spare pipes, will be installed at each side of the track. The cables shall be made of single-mode optical fibre. Fibres will comply with norm G 652 D (ITU-T). The system will include connection boxes and splice works.

A digital transmission network will be installed to transmit data, voice, or other information required in the future by ENR. The system will be based on SDH technology, and the architecture will be according to ENR principles for the CCN (Core Communication Network), with interfaces IP (LAN/WAN) and 2-4 wires EandM channels (TDM for radio sites).

The topology of the systems shall be ring topology, to assure a back-up solution in case of failure.

A voice communication system (operational and administrative) will be considered to allow for communication between operational and maintenance staff. Hence, the voice system will allow

communication between dispatchers and CTC, signalling shelters, etc. A voice recorder system will also be included in the project.

LAN/WAN will be implemented as part of the access network for new signalling components inside the technical buildings.

3.5.1.5 Power Supply System

In this system, two sources will be available to supply power to all the equipment on railway track, as well as inside the technical buildings.

The main source will be a double, 11-kV line coming from the national electricity grid. The secondary source will a diesel generator acting as a backup during emergencies. It will also be possible to connect a mobile diesel generator to a train wagon. The switch between the two 11-kV lines (working on 1+1 configuration) will be automatic. If a failure occurs in electric power supply from the national grid, the diesel generators will kick in automatically.

The circuit breakers, disconnecting switches, etc. for the 11-kV lines will be carried out by means of SF6 cells, gas-insulated switchgear (GIS).

A UPS will maintain the electric power supply of critical equipment, such as point motors, signals, level crossings, etc. The autonomy shall be at least 10 hours for telecommunication systems (dc power), and 8 hours for remaining systems. Rectifiers will be installed to convert the current from AC to DC.

Depending on the availability of 11-kV lines in every technical building, a medium- or low-voltage power line distribution will be considered in order to energize equipment along the line. The voltage of this line will be calculated taking into account voltage drops, consumer loads and conductor's section. If the line's voltage is greater than 400 V, a transformer will be necessary for decreasing voltage at every receiving point along the line.

The power supply system will be managed from the CTC. The telecommunication system based on fibre optic cable will transmit the information from the equipment to the CTC. The control system will also monitor the main parameters of power supply, such as medium voltage values meter in SF6 cubicles, diesel generator main variables, low-voltage supply, battery charge levels, etc.

3.5.2 Component (B): Doubling of the single-track Railway Line between El-Mansoura and Damietta

ENR envisages the doubling of the El Mansoura – Damietta railway line as part of a critical renewal and development program of the Egyptian railway network.

The line is a part of the Damietta – Cairo line, which starts at El Mansoura City and extends northeast through Nile Delta until it reaches Damietta City. Currently, it is a 65-km single-track line used by both passengers and freight trains.

As it is a single-track line, passing loops are required to allow trains to pass and cross each other. The average spacing between passing loops is around 4.5 km, but that spacing is irregular as the loops are located at stations and currently vary from 2 to 5.7 km. Generally, the track's condition is good, but, in some areas, renewal is needed.

The doubling of El Mansoura – Damietta railway line will include the following construction activities:

3.5.2.1 Installing the new second track and its components:

Generally, the double track will be installed on the Eastern side of the existing railway line as El Sahel Canal is extending along its total length on the western side.

In some segments, there is an old track already in place as shown in the following figure, or at least there is space for the construction of the new double line. In other segments however, earthworks and other civil works will be required to build the new second track. As per ENR, in areas where there is the old track in place, the doubling will be done by removing the old track and installing a new one.

Figure 3-6: Railway Tracks ready for doubling

The doubling will end at Damietta Station, as after this station the line is divided into two single-track lines: The first (around 7 km) goes to Damietta City, and the second (around 12 km) to Damietta Port. Only freight trains go to Damietta Port, whereas only passenger trains go to Damietta City Station.

3.5.2.2 Characteristics of the new double track

As per the SYSTRA study[17] and the "*Track Alignment Report*" elaborated by the TA Consultant, all line sections of the doubling line will have the following characteristics:

- Line category: class 1.
- Nominal train speed: 120 km/h
- Maximum axle load: 24 tons
- Track gauge: 1.435 mm.
- Welding Type: Continuous welded rails (CWR).
- Distance between running tracks: 4.0 m between track centres.
- The line shall be designed future electrification

[17] "Duplication of the El Mansoura - Damietta Railway Line" (Systra, ACE Consulting Engineers and El Maktab)

3.5.2.3 Components of the new double track

As per the SYSTRA study[18] and the "*Track Alignment Report*" elaborated by the TA Consultant, the new double track will consist of the following components:

- Rails;
- Sleepers: pre-stressed mono block sleepers, including fastening system;
- Ballast;
- Arrangements to prevent derailment or to limit the consequences of derailment on bridges and level crossings;
- Check rails if any;
- Components for switches and crossings;
- Train stops (Buffer stops).

3.5.2.4 Construction steps of the new double track

As reported in the Cost estimate study prepared by SYSTRA[19], the construction steps of the new double track will be implemented in the following consequence:

Removal of Existing Track

- Removal of existing old track components (rail, sleepers, fastening) including loading of assembled or dismantled materials on flat wagons;
- Complete removal of ballast in old track (mostly contaminated); and
- Loading sleepers and rails on railway wagons on the site.

Removal of Existing Turnouts

- Removal of existing turnout including loading of assembled or dismantled materials on flat wagons;
- Complete removal of ballast (mostly contaminated); and
- Loading ballast and turnouts on railway wagons on the site.

Renewal of existing track

- Unloading of new ballast in 2 layers of 10 cm thickness with intermediate equalizing and consolidating.
- Installation of new track;
- Lifting, tamping, lining and regulating of plain track for a speed of 30km/h, including unloading of complementary new ballast before and after tamping;
- Lifting, tamping, lining, dynamic stabilizing and regulating of plain track for a speed of 60km/h, including unloading of complementary new ballast before and after tamping;
- Distressing of CWR in track and produce final weld;
- Lifting, tamping, lining and regulating of plain track for a speed of 90km/h, including unloading of complementary new ballast before and after tamping;

[18] "Duplication of the El Mansoura - Damietta Railway Line" (Systra, ACE Consulting Engineers and El Maktab)
[19] Cost Estimate Study, Systra, November 2016

- Final lifting, tamping, lining and regulating of plain track for a speed of 120km/h, including unloading of complementary new ballast before and after tamping; and
- Manufacturing and installation of boundary stones alongside the new straight track (every 50m) and alongside the new curved track (every 10m).

Installation of new Track

- Installation of new track;
- Concrete pre-stressed mono-block sleeper provided with pre-mounted elastic fastening type Vosloh SKL 14 Axle load 24 tons;
- Supply and spread of crushed ballast with thickness of 15 cm by trucks
- Set of Fish plates with wear compensation of 2mm, 4mm and 6 mm bolts, nuts and washers for one fish plated rail joint for connecting old turnouts to the adjacent new tracks;
- Set of new fishplates and bolts, nuts and washers for rail profile UIC 54
- Incorporating of isolated glued fish plated joints in track;
- Welding including workmanship and de-stressing work;
- Lifting, tamping, lining and regulating of plain track for a speed of 30km/h, including unloading of complementary new ballast before and after tamping;
- Lifting, tamping, lining, dynamic stabilizing and regulating of plain track for a speed of 60km/h, including unloading of complementary new ballast before and after tamping;
- Lifting, tamping, lining and regulating of plain track for a speed of 90km/h, including unloading of complementary new ballast before and after tamping;
- Final lifting, tamping, lining and regulating of plain track for a speed of 120km/h, including unloading of complementary new ballast before and after tamping; and
- Install Signs and markers at the start and end of horizontal and vertical curves with the chainage and the necessary data of the curves as well as installation of benchmarks on the straight line every 100 m and on curves every 10 m in both directions.

Installation of new Turnouts

- Loading turnouts on railway wagons from the inventory area designated by ENR to work site;
- Loading sleepers of different lengths on railway wagons from the inventory area designated by ENR to the work site;
- Loading fastening system on railway wagons from the inventory area designated by ENR to work site;
- Unloading of new ballast in 2 layers of 10 cm thickness with intermediate equalizing and consolidating;
- Installation of new turnout all operations included;
- Lifting, tamping, lining and regulating of plain track for a speed of 30km/h, including unloading of complementary new ballast before and after tamping;
- Lifting, tamping, lining, dynamic stabilizing and regulating of plain track for a speed of 60km/h, including unloading of complementary new ballast before and after tamping;

- Remove the fastenings on 4 rail lengths on each side of the turnout and adjust the opening of 3 fish plated joints in function of the rail temperature: eventually in combination with shortening of the rails and confirming the instruction of the engineer;
- Lifting, tamping, lining and regulating of plain track for a speed of 90km/h, including unloading of complementary new ballast and after tamping; and
- Final lifting, tamping, lining and regulating of plain track for a speed of 120km/h, including unloading of complementary new ballast before and after tamping.

3.5.2.5 General installation techniques for ballasted track and design considerations

Dismantling the existing track components (sleepers, rails and turnouts) will allow the earthwork activities to start. Construction works for the ballasted track shall be started following the civil and earthwork platform and structures handover.

Track yoke laying crane will be used for the assembled track panels placing on the railway line. Track adjustment and tightening will proceed, ballasting, tamping and distressing and thermic welding will be followed until receiving the track at its designated condition.

Rails

The rails will be stacked on several layers and timbers will be placed between each layer. The rail section for all running tracks shall be UIC 54. The rails will be received at the port then it will be transported by train wagons to a centralized workshop in the delta region to be assembled and welded. The welded rails will be transferred to the site using train wagons.

Sleepers

The new sleepers to be used for the track will be pre-stressed mono-block concrete sleepers. Sleepers will be locally manufactured and delivered to the site. Staking of the sleepers will not exceed 10 layers and timbers will be placed on the shoulders to prevent the sleeper from any damages. The following figure shows photo for the mono-block concrete sleeper.

Figure 3-7: Mono-Block Concrete Sleepers

Rail fasteners

The rail fasteners will be selected to properly fix the rails to the sleepers. The type of rail fastenings will be pre-mounted elastic fastenings, maintenance-free and provided with an anti-vandalism design. They will be electrically isolated and including rail pads and isolators.

Ballast

The contractor should supply the new ballast from one of the five quarries approved by ENR. The ballast will be delivered to site by train wagons and other means and stocked in the dedicated storage areas according to the work progress. The dedicated areas should be within ENR property and will be specifically set up and compacted to prevent any contamination.

Pre-assembled panels

The new track will be laid by pre-assembled panels and welded on site at a later stage. Sleepers will be delivered to the area implemented for pre-assembly and distributed by using a gantry crane. The pre-assembly process and storing of the panels in layers will be done under the gantry crane. Then, placing the sleepers on the mentioned track using cranes will be carried out. The following figure shows a photo of sleepers for pre-assembled panels.

Figure 3-8 Sleepers for pre-assembled Panels

Placing the new rails on the sleepers and tightening the new fasteners after track adjustment will be by crane. The track panels will be stored in layers to allow the laying crane/or overhead gantry crane to load on the wagons.

Track Laying

The work train loaded with the new track panels will move to the work site for laying the panels. Loading at the storage yard will be carried out by the gantry crane. The work train will consist of two locomotives, 10 special railway wagons loaded with panels on it, and the laying crane. The train will stop in front of the section where panels are to be placed and the laying crane is offloaded from the wagons. The crane will pick up a new panel to lay it in its position where its centre line has been previously marked by the surveying team.

The track panel will be jointed to the previous one, and the work train will be pushed on the new laid panel to assembly the next panel. The action will be repeated.

After completing the laying of the new panels at their places, the work train will leave the site to allow ballast train and tamping machine to perform track ballasting and tamping

Tamping and ballasting

Once the track is laid, track ballasting by ballast train will follow and the track will be tamped in several steps until the final position. Ballast regulator machine will follow each pass of ballasting and tamping. The welding and eventual finishing will happen prior to carry out a final tamping.

Figure 3-9 Ballast Train

The following figure shows photos for the tamping machines.

Figure 3-10 Tamping Machines

3.5.3 Increasing the train speed and increasing the curve radii

The SYSTRA study[20] examined the feasibility of increasing the speed on the present curves by increasing the super elevation values or the radii without modifying the present location of the track embankment. SYSTRA recommends increasing the maximum speed to 120 km/h, which can be realized on all curves of the line excluding the curve in the vicinity of Sherbin station with a radius of 500m.

The horizontal alignment between the Talkha Triangle and Damietta City station consists of fifty-nine (59) curves. There are twenty-one (21) curves with radii more than 20.000m and twenty-six (26) curves

[20] "Duplication of the El Mansoura - Damietta Railway Line" (Systra, ACE Consulting Engineers and El Maktab)

with radii between (5.000m - 739m). According to ENR guidelines, the min. horizontal radius for speed 120 Km/hr and cant 130mm is 739m. The remaining 12 curves allowing speed <120 km/h.

Sherbin railway station zone is exempted as the curve radius is 500m only, while increasing its radii would impact existing residential buildings of Sherbin city. Accordingly, it was studied that the line doubling is to be carried out by transferring the line and Sherbin station to be near the road, outside the residential area of Sherbin city. The line extends between El Sahel Canal and Mansoura/Damietta road. The distance of the part that will be relocated outside the city of Sherbin is about 3.5 Kilometers (From Km 73.9 to Km 77.5) as stated in the SYSTRA study (Alignment report dated April 2015). However, this proposed will not be considered by ENR.

3.5.4 Modernization of the level crossings

Some of the most dangerous facilities are railway level crossings, where many accidents occur mainly due to the lack of automated barriers, protective pedestrian gates, warning signs, bells and flashing lights or other deficiencies, such as poor sightlines for drivers, confusing road signs and overgrown bush.

There are 1,332 level crossings throughout the ENR Network. ENR has a large project for improving the level crossings along its network to increase their safety level.

The Tanta – Damietta line section has 83 level crossings. Five of them have been developed (all required civil works and railway traffic control systems completed); El Shorouk W El Sabaa Banat level crossing in kilometre 26+780 has been eliminated, and an overpass was constructed in its place. In addition, there are 30 bridges. Among the 30 bridges, there are 8 pedestrian bridges located at stations and 6 vehicle tunnels between Zefta and El Mansoura.

The following table shows a list of all the level crossings that exist along Tanta – El Mansoura – Damietta railway line.

Table 3-2: List of all the level crossings exist along Tanta – El Mansoura – Damietta railway line

No.	Level Crossing Name	Kilometric Reference	Development Status	Development Type
1	El Kassed - ElGharbi	3,150	Partially Developed	Civil Works Development
2	El Kassed - ElSharqi	3,180	Partially Developed	Civil Works Development
3	El Ragddya	8,540	Undeveloped	----------
4	El Ragddya – El Balad	9,180	Partially Developed	Civil Works Development
5	Sarhan	11,730	Fully Developed	Civil and Control Systems Development
6	Shipshear	12,480	Partially Developed	Civil Works Development
7	Mahalet Rawh - Block 1	14,150	Undeveloped	----------
8	Mahalet Rawh - Block 2	15,120	Undeveloped	----------
9	El Shorouk	15,780	Partially Developed	Civil Works Development

No.	Level Crossing Name	Kilometric Reference	Development Status	Development Type
10	El Handasa	16,060	Partially Developed	Civil Works Development
11	El Shaab	16,120	Partially Developed	Civil Works Development
12	Saft Torab	18,550	Partially Developed	Civil Works Development
13	Abou Wafy	20,300	Fully Developed	Civil and Control Systems Development
14	Shentetha Ayyash	22,450	Undeveloped	----------
15	Shoubra Ma kan	22,940	Undeveloped	----------
16	Kafr ElAlw	23,560	Undeveloped	----------
17	Manshiet El Bakry	25,140	Fully Developed	Civil and Control Systems Development
18	Hai El Gomhoria	25,330	Fully Developed	Civil and Control Systems Development
19	El Shown LX / El Sabaa Banat LX	26,780	Cancelled and an upper bridge was built instead	
20	Sherket El Ghazl	29,100	Undeveloped	----------
21	El Sawame	29,540	Partially Developed	Civil Works Development
22	El Mallah	29,600	Undeveloped	----------
23	Mahalet Abou Ali	29,690	Fully Developed	Civil and Control Systems Development
24	El Rahbeen	32,420	Partially Developed	Civil Works Development
25	El Qantara	33,420	Partially Developed	Civil Works Development
26	El Saeidy	34,240	Fully Developed	Civil and Control Systems Development
27	El Wasat	34,662	Undeveloped	----------
28	Sammannode-Block 1	35,100	Undeveloped	----------
29	Samaha	36,436	Undeveloped	----------
30	Meat Khalaf	39,036	Undeveloped	----------
31	Meat Assas	40,212	Undeveloped	----------
32	Meat Assas Block 1	41,606	Undeveloped	----------
33	Kafr Hassan	42,985	Undeveloped	----------
34	Kafr ElArab	43,929	Undeveloped	----------
35	Meat Thabet	45,182	Undeveloped	----------

No.	Level Crossing Name	Kilometric Reference	Development Status	Development Type
36	ElKarma ElGedeed	46,700	Undeveloped	----------
37	Meat ElKarma	47,303	Undeveloped	----------
38	Googar	48,548	Undeveloped	----------
39	51Km	51,030	Undeveloped	----------
40	Talkha - Block 1	51,984	Fully Developed	Civil and Control Systems Development
41	Talkha El Dawae	52,420	Undeveloped	----------
42	El Nile	52,900	Fully Developed	Civil and Control Systems Development
43	Okasha	53,062	Undeveloped	----------
44	El Takato - Block 2	53,300	Undeveloped	----------
45	M. Anttar Block	56,420	Undeveloped	----------
46	Sherinqash	57,676	Undeveloped	----------
47	El Tawila	60,945	Undeveloped	----------
48	Kafr El Tawilla	62,080	Undeveloped	----------
49	Diast	64,420	Undeveloped	----------
50	Battrah	66,675	Undeveloped	----------
51	Adham	68,400	Undeveloped	----------
52	El Hag Khaleel	69,540	Undeveloped	----------
53	El Hataba - Block 3	71,500	Undeveloped	----------
54	*K.* El Dabbousy	73,100	Undeveloped	----------
55	El Mostashfa	75,050	Undeveloped	----------
56	West El Balad	75,420	Undeveloped	----------
57	Dongway	76,231	Undeveloped	----------
58	El Saadwa	78,800	Undeveloped	----------
59	El Sabryya	82,100	Undeveloped	----------
60	El Lowzy	84,100	Undeveloped	----------
61	Raas El Khaleag Kebly	86,300	Undeveloped	----------
62	Raas El Khaleag El Mahttah	87,000	Undeveloped	----------
63	Raas El Khaleag -	87,494	Undeveloped	----------

No.	Level Crossing Name	Kilometric Reference	Development Status	Development Type
	Bahary			
64	El Alaylee	91,060	Undeveloped	----------
65	Taha - El Maghrabi	92,000	Undeveloped	----------
66	Mohamed Erfan	92,200	Undeveloped	----------
67	El Sawalim	94,200	Undeveloped	----------
68	Saad El Balad - Block	96,200	Undeveloped	----------
69	ElShalib	98,500	Undeveloped	----------
70	El Basaty	100,240	Undeveloped	----------
71	Kafr Saad - Block 1	101,275	Undeveloped	----------
72	Kaheel 1	104,200	Undeveloped	----------
73	Kaheel 2	108,300	Undeveloped	----------
74	Kafr El Batteekh	109,200	Undeveloped	----------
75	ElMahtta El Qadeema	109,900	Undeveloped	----------
76	El Basateen	111,900	Undeveloped	----------
77	Hawees Domiat	113,700	Undeveloped	----------
78	Kobry A. El Megeed	114,200	Undeveloped	----------
79	ElSannanyah	114,840	Undeveloped	----------
80	El Matahin	115,240	Undeveloped	----------
81	Shill	116,300	Undeveloped	----------
82	Menaa Domiat	5,000	Undeveloped	----------
83	Bawabet ElHaweyat (Kwat El Amn)	5,558	Undeveloped	----------

Each LX on Tanta / El Mansoura / Damietta Corridor has one of the following statuses:

1) Fully Developed LX (Control System Modernization + Civil works).
2) Partially Developed LX (Civil Works Only).
3) Undeveloped LX (neither Control Systems nor Civil Works).

Therefore, the status of the Level Crossings that will be modernized may be in three different ways listed hereunder:

1. Level Crossing has been fully developed (Control System Modernization + Civil works) by other contractors; therefore the contractor will only develop the interface between the existing installations of the Level Crossing and the new Interlocking.
2. Level Crossing has been partially developed (Civil Works Only), in this case the LX Shelter has been built but it has not been fitted with a new Control System. Therefore, the contractor will

use the existing shelter and he will make all the required new installations and interface with new interlocking.

3. Level Crossing has not yet been developed in any way (neither Control Systems nor Civil Works). The Contractor will be responsible for developing the entire Level Crossing, thus including the construction of LX Building for the necessary equipment, the level crossing protection mechanism as well as the interface between the Level Crossing and the interlocking.

The following figure shows photos for some of the Level Crossings that need to be developed within the doubling project.

Undeveloped Level Crossing

Developed Level Crossing

Figure 3-11: Expansion and improvement of Level Crossings to serve the doubling project

3.5.5 Line doubling at the stations and halts

There are 20 railway stations between El-Mansoura and Damietta. The "*Track Alignment Report*" elabourated by the TA Consultant presents the condition of the stations.

Most of the existing stations along the railway line between El Mansoura and Damietta are already double-track. According to the SYSTRA study, five stations are single track and need to be expanded to accommodate the second track. This expansion process will require demolition of some of the existing buildings in those stations in addition to modifying the platforms and the turnouts (for more details, see "*Track Alignment Report*", elabourated by the TA Consultant).

Figure 3-12: Kafr Saad station with double track

3.5.6 Line doubling nearby the irrigation drains

Nearly 10 irrigation drains are parallel to the existing railway line and require coverage to enable the execution of the railway doubling between El-Mansoura and Damietta. The following table shows the data of the parallel drains and sections needed to be covered.

Table 3-3: Data of the parallel drains and sections needed to be covered

No.	Drain Name	Length (Km)	Sections (Km)	Comments
1	El Tawila	7.65	From 0 to 1.2	Drain is far from the line and no need to be covered
			From 1.2 to 6.65	Drain is near the line and need to be covered
			From 6.65 to 7.65	Drain is far from the line and no need to be covered
2	Diast	3.4	From 0 to 0.05	Drain is near the line and need to be covered
			From 0.05 to 0.28	Drain is already covered
			From 0.28 to 3.4	Drain is near the line and need to be covered
3	Batra El Qibly	4	From 0 to 2.1	Drain is far from the line and no need to be covered
			From 2.1 to 4	Drain is near the line and need to be covered
4	El Sabrya	4	From 0 to 2	

No.	Drain Name	Length (Km)	Sections (Km)	Comments
				Drain is near the line and need to be covered. There is an existing coverage in the first 700 meters with length equals 500 meters.
			From 2 to 4	Drain is far from the line and no need to be covered.
5	El Sawalem El Qebly	5.78	From 0 to 5.28	Drain is near the line and need to be covered
			From 5.28 to 5.78	Drain is far from the line and no need to be covered.
6	El Sawalem El Bahary	2.37	From 0 to 2.37	Drain is near the line and need to be covered
7	El Mashaleb El Qebly	3.1	From 0 to 3.1	Drain is near the line and need to be covered
8	El Mashaleb El Bahary	3	From 0 to 3	Drain is near the line and need to be covered
9	Ganabyt Kafr El Batikh	6	From 0 to 0.8	Drain is far from the line and no need to be covered.
			From 0.8 to 6	Drain is near the line and need to be covered
10	El Sanannya	10.8	From 0 to 2	Drain is near the line and need to be covered
			From 2 to 5.5	Drain is far from the line and no need to be covered.
			From 5.5 to 9.4	Drain is near the line and need to be covered
			From 9.4 to 10.8	Drain is already covered

In addition, there are nine culverts crossing the railway line from El-Mansoura to Damietta. Seven culverts have been improved and soil replacement has been performed. The first five culverts are not in need to be extended. These culverts are for:

1) El Tawila Drain.
2) Donshwai Drain.
3) El Daherya Drain.
4) Apo El Nom Drain.
5) El Mashalib el omomy Drain.

The other two culverts shall be extended with an inspection room 4mx4m each. These two culverts are:

1) End of el Sanannya drain at Kafr El Batikh.
2) Ganabyt Kafr EL Batikh Drain.

There are two culverts which have not been renewed and where soil replacement has not been performed yet. These two culverts are for Batra El Qibly and Kafr El Dabousy drains, each 110 meters long, and they shall use hydraulic jacking method of diameter 1.5 meters.

The hydraulic study (SYSTRA) recommended that:

- Inspection rooms have to be made at the intersection of the covered drains with the drains which shall be covered; and

- Inspection rooms have to be made at the ends of the private drains with the drains which shall be covered.

3.5.7 Type of the line cross sections

There are three main types of the line cross sections (as per the SYSTRA study):

1. The **first type:** without any adjacent water way in its parallel as shown in the following figure.

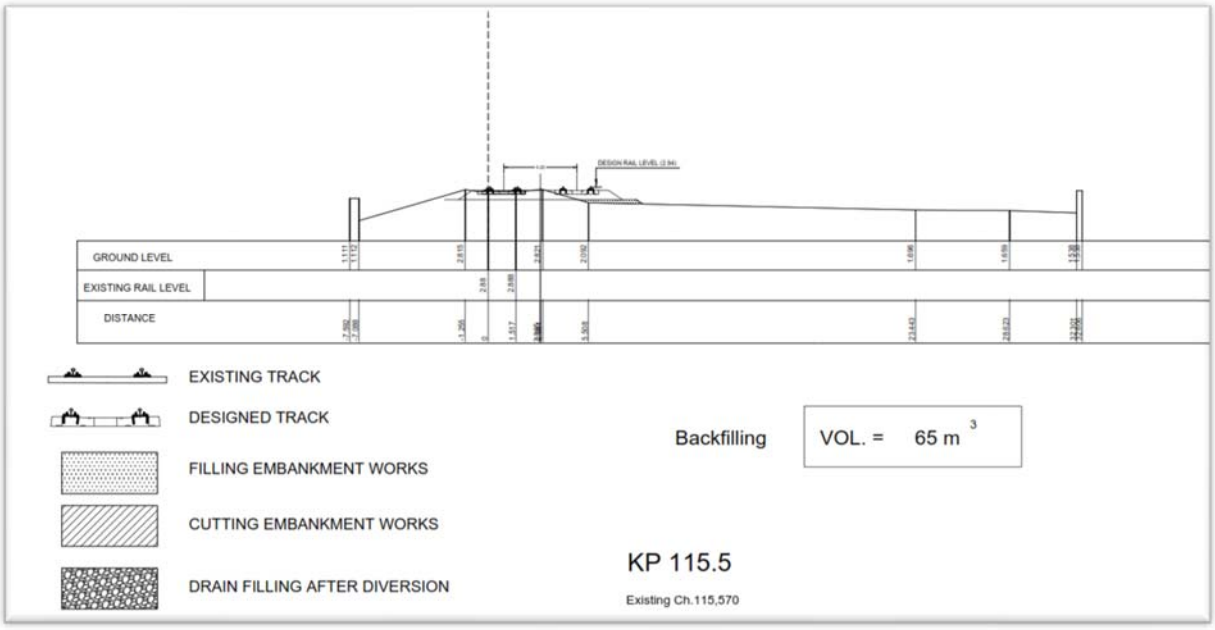


Figure 3-13: Type 1-line cross section

2. The **second type:** for the line extending along El Sahel Canal which is located on the western side at a distance of 12m in average as shown in the following figure.

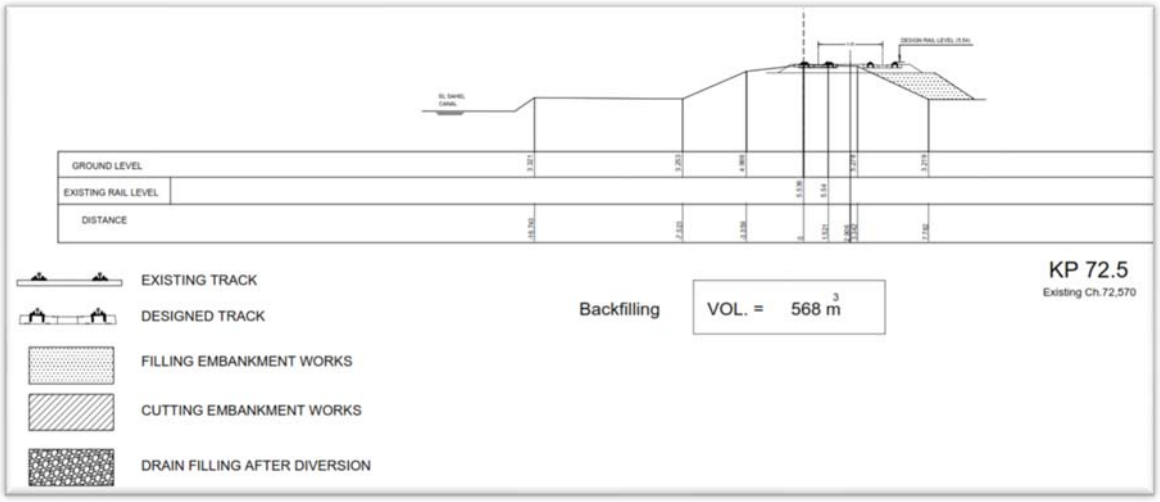


Figure 3-14: Type 2-line cross section

3. The **third type:** extends between El Sahel Canal on the western side and the drain on the eastern side as shown in the following figure.

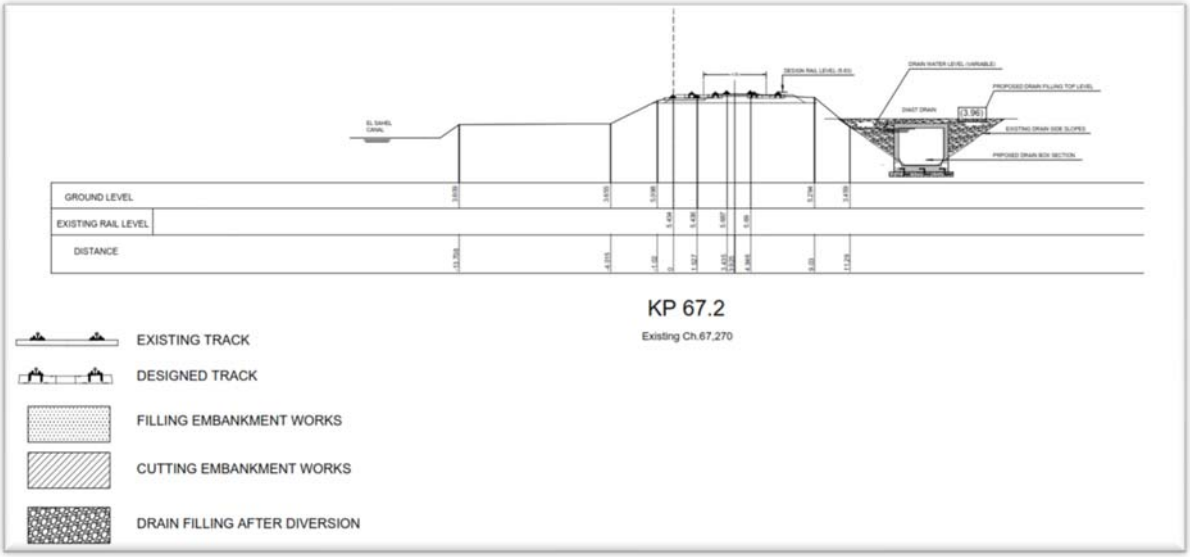


Figure 3-15: Type 3-line cross section

3.6 Waste Generation

3.6.1 During Construction Phase

Solid waste, during the construction phase, will comprise domestic (general) as well as construction and demolition waste. It is worth mentioning that construction wastes will be generated only during a relatively short period at work sites. The waste is expected to include the following waste streams:

Solid (Non-hazardous) waste:

- Excavated soil due to trenching activities;
- Construction and Demolition waste (concrete, debris, bricks, sand and gravel);
- Old rails, fastenings, turnouts, sleepers;
- Un-contaminated ballast;
- Steel, metals, wood, empty cement sacks, wires, cables and all materials from the old signalling system that will be replaced; and
- Domestic waste (resulting from workers' accommodation (food remains, paper, plastics, and glass)).

Solid Hazardous waste:

- Contaminated ballast/wooden sleepers/soil;
- Leakages from temporary petrol tanks;
- Spent welding materials;
- Waste Electrical and Electronic Equipment (WEEE); and

- Empty containers of chemicals, spent lubricating oils, and paint used for construction machinery.

Liquid waste:

In addition to sanitary waste (domestic wastewater) that will be generated from the temporary residential facilities (Workers caravans). The wastewater will be collected in temporary holding tanks and regularly evacuated by the local authority and transported to the nearest wastewater treatment plant or sewage pumping station.

3.6.2 During Operations Phase

The project is expected to generate relatively small amounts of waste during the operations and maintenance phases including:

Solid (Non-Hazardous) waste including steel scrap, wood scrap and domestic waste. Passenger-generated waste (leftover food, paper, plastics, and glass) is expected to be generated on-site during the operation phase.

Liquid waste: Wash water for the train wagons after finishing the trips as well as the sewage generated from the passengers.

Hazardous waste including Waste Electrical and Electronic Equipment (WEEE), empty containers of chemicals, spent lubricating oils, and paint used for maintenance works, ballast and sleepers if contaminated with oil. Improper handling and storage of hazardous substances and/or waste, would result in environmental contamination

3.7 Waste Handling and Disposal

3.7.1 During Construction Phase

The disposal of all the non-hazardous **solid wastes** generated during the construction phase is the responsibility of the contractor and should be disposed through specialized and certified solid waste contractors in public dumpsites. Non-hazardous wastes generated on-site during the construction phase normally have a high recycling potential. For non-recycled waste, the contractor should direct it to the nearest solid waste disposal site.

The disposal of the old track components (rails, fastenings, etc.) will undergo quality control check and be either reused in other railway lines or sold as scrap.

For the disposal of the **wooden sleepers**, it should be disposed in a hazardous landfill.

The **old ballast** will be sieved and screened, and if contaminated, it will be disposed in a hazardous landfill, and if not, it will be reused.

Through discussion with ENR experts regarding the possibility of conserving scrap waste resulting from the dismantlement of the **old mechanical signaling** in the Egyptian Railway Museum, they advised that the Museum will send a technical committee to check all the dismantled parts and choose which parts they will utilize in the museum. However, the other parts will be stored in a ENR storage area to be reused in other lines if needed.

Transportation and disposal of **hazardous waste are the contractor's responsibility** and should be done through licensed and approved hazardous waste contractors and in compliance with the legal requirements and instructions to be disposed to the approved landfill.

The chosen landfill should:

- Accept and treat the different types of hazardous waste generated;
- Have the adequate capacity to deal with the hazardous wastes generated;
- Far from any protected areas or residential communities;
- Be authorized and licensed from the competent authority (EEAA).

During the construction phase, the **domestic wastewater** will be collected in holding tanks and evacuated regularly and transported to the nearest wastewater treatment plant or sewage pumping station.

3.7.2 During Operations Phase

The disposal of **solid waste** generated from stations (Garbage) is the responsibility of ENR. ENR has contracted a private cleaning company (ENR Integrated Services) to carry out all cleaning activities for train wagons.

With respect to **liquid waste**, there are several central cleaning stations at the largest stations all over Egypt to clean trains after they have completed their assigned trips. Central washing stations have their own wastewater treatment plants to treat wash water before being disposed and to ensure full compliance with the national regulations.

3.8 Personnel Requirements

The project activities will require engineers, skilled and unskilled labour. Construction work will depend on local labor and local contractors whenever possible, according to the project's labor needs. The expected daily number of workers will range from 20 -30 in each site depending on the activities planned on that day.

The contractor must ensure no child labour less than 18 year' by 'all workers hired by contractors will be 18 years old or older. Child labour is prohibited especially for hard works that might put them in risk.

The contractor should provide health care, food and drinking water to the workers from the local market, as well as portable toilets associated with holding tanks.

During the operation phase, the Egyptian National Railway (ENR) will be responsible for operation and maintenance of the railway line.

3.9 Resources Consumption

3.9.1 Water

Safe drinking water is available onsite as there is water treatment plant that provides water suitable for drinking in the three Governorates. However, the contractor will be responsible for providing drinking water to the labour force during the construction phase.

3.9.2 Fuel/Electricity

The South and North Delta Electricity Distribution Companies serve a number of Governorates including Gharbia, Dakahlia and Damietta. However, the contractor will be responsible for providing the electricity

at the project locations. He will also be responsible for providing the fuel needed for trucks/construction equipment.

3.10 Project Duration

The implementation period for component (A) is 4 years according to the feasibility study conducted by Getinsa,[21] while the implementation period for component (B) is 3 years, according to SYSTRA feasibility study[22].

[21] Task A. Preliminary Evaluation of the Costs for the Modernization of the Signalling System on the railway section, Feasibility Study, GETINSA, Hamza Associates and Almatouck, August 2017.
[22] "Duplication of the El Mansoura - Damietta Railway Line" (Systra, ACE Consulting Engineers and El Maktab)

4 Environmental and social baseline conditions

The environmental and social baseline of the project area will be described in this chapter. The baseline description will discuss the existing environmental and social context without implementing the project and conditions around the project paying attention to any area of particular environmental and social importance and the use of natural resources.

4.1 Environmental Baseline

This section will describe the environmental baseline and conditions within the project assessment area. The railway line covers three different Governorates (Gharbia, Dakahlia and Damietta), and passes through several large cities and many villages along the way. The project is located in a heavily cultivated and densely populated area of the Delta region. The concerned assessment areas are those close to the railway line. The factors characterizing the physical and biological environment of the project area are as follow:

- Climatic Conditions (Temperature, relative humidity, precipitation, wind speed and direction);
- Air Quality;
- Noise and Vibration;
- Topography and geology;
- Soil;
- Hydrology, drainage and surface water;
- Groundwater;
- Flora and Vegetation;
- Fauna;
- Rare and endangered species; and
- Protected areas.

4.1.1 Physical Environment

4.1.1.1 Climatic Conditions

The climate within the project assessment area is classified as BWh on the Köppen-Geiger classification, which corresponds to subtropical deserts, characterized by hot arid conditions and clear skies.

- ***Temperature and Relative Humidity***

The average annual temperature ranges from 23.1 to 27.8°C in the project areas. The warmest month of the year is August, with an average temperature of 35°C. January has the lowest average temperature of the year at 15 °C.

Relative humidity varies between 64% and 72% in Damietta, being the most humid city followed by El Mansoura where relative humidity varies between 51% and 69% and Tanta, where relative humidity varies between 48% and 67%, being the least humid city. There is no high variation in the average relative humidity throughout the year within the same area.

The following figures show the annual average temperature (°C) and relative humidity (%) for the year 2020 within the project assessment area (Tanta – El Mansoura and Damietta)[23].

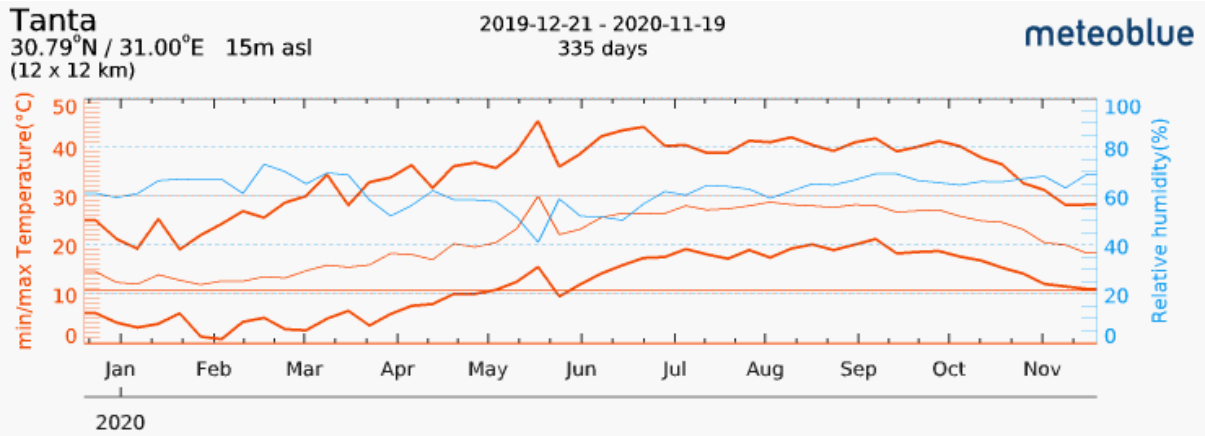


Figure 4-1: Minimum and Maximum temperature and relative humidity (%) in Tanta – Gharbia Governorate for the year 2019/2020

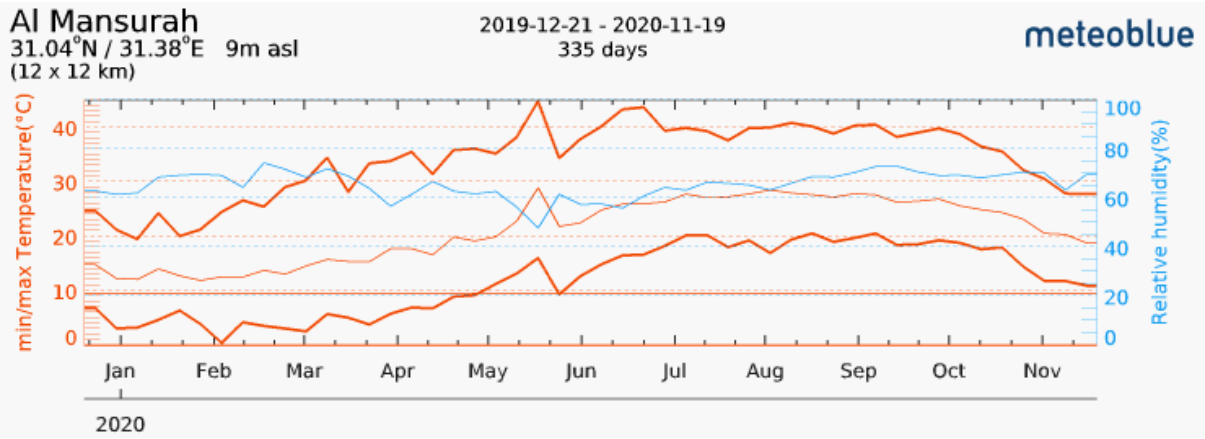


Figure 4-2: Minimum and Maximum temperature and relative humidity (%) in El Mansoura – Al Dakahlia Governorate for the year 2019/2020

[23] www.meteoblue.com

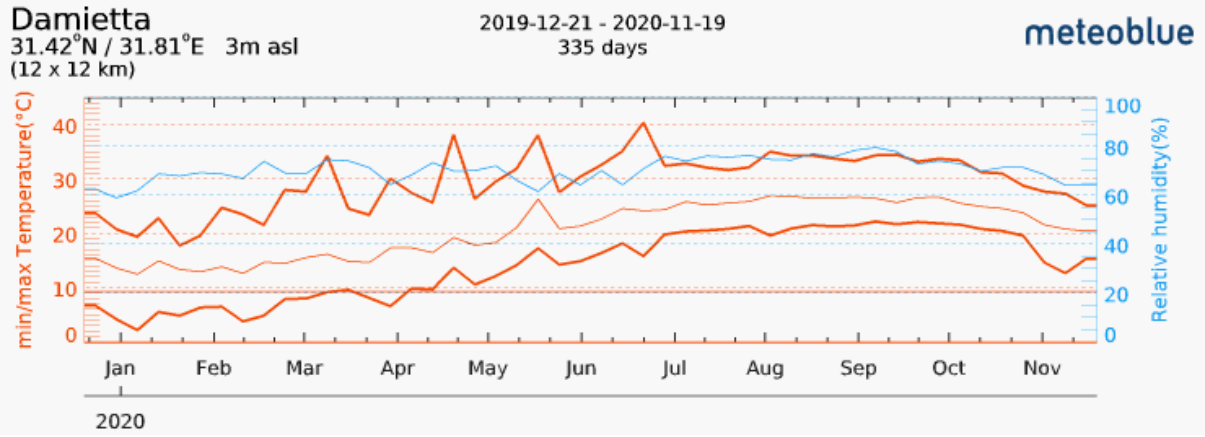


Figure 4-3: Minimum and Maximum temperature and relative humidity (%) in Damietta Governorate for the year 2019/2020

- ***Precipitation (Rainfall)***

While the area is mostly arid, rainfall is expected during the winter, with most precipitation occurring in March. The level of rainfall varies between the different regions; as it tends to increase in areas closer to the coast. The maximum annual precipitation rate is 81.9 mm in Tanta, 43.1 mm in El Mansoura and 111.5 mm in Damietta. The following figures show the average precipitation rates in the major cities within the project assessment area. The gray background represents the clouds, the yellow background represents the clear sky; therefore, the darker the grey background, the denser is the cloud cover.

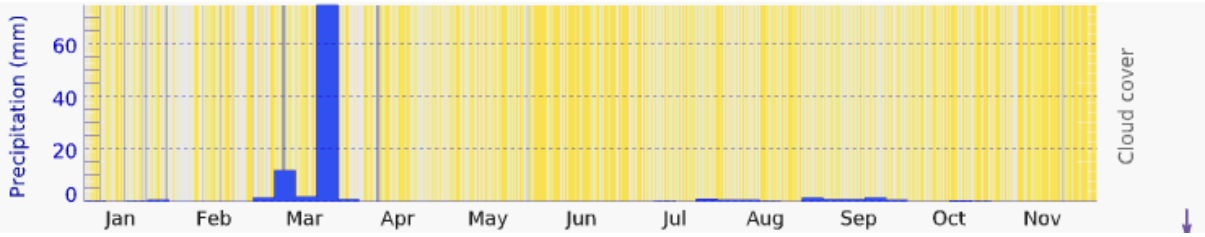


Figure 4-4: Average monthly precipitation rates (mm) in Tanta – Gharbia Governorate for the year 2019/2020

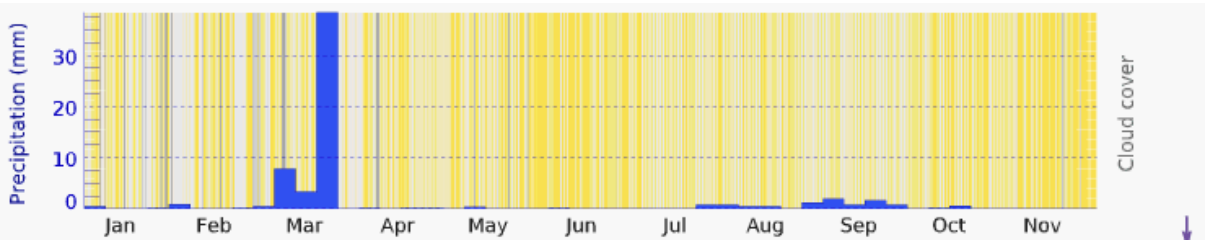


Figure 4-5: Average monthly precipitation rates (mm) in El Mansoura – Al Dakahlia Governorate for the year 2019/2020

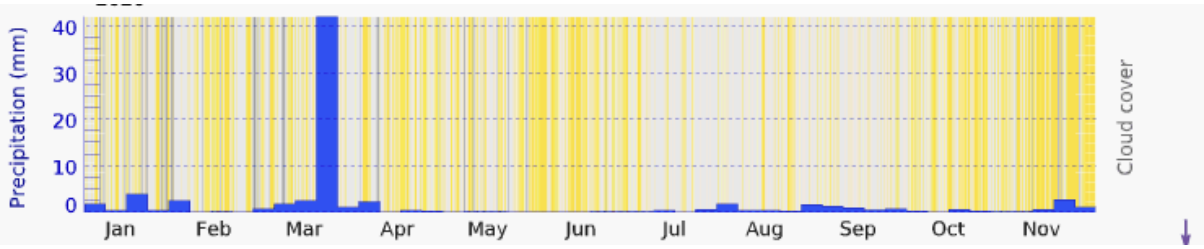


Figure 4-6: Average monthly precipitation rates (mm) in Damietta Governorate for the year 2019/2020

- ***Wind Speed and Wind Direction***

The average wind speed is 13.4 K/h in Tanta, 13 Km/h in El Mansoura and 17.5 Km/h in Damietta. The following figures show the wind speed in Km/h and direction in degrees (0° = North, 90° = East, 180° = South and 270° = West) in the major cities within the project assessment area. The purple points represent the wind direction, as indicated on the right axis of the figures.

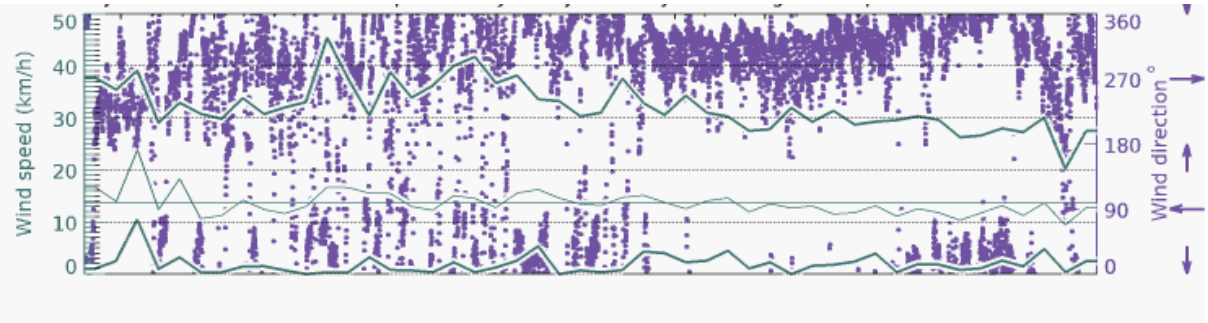


Figure 4-7: Wind speed in (Km/h) and direction in Tanta – Gharbia Governorate for the year 2019/2020

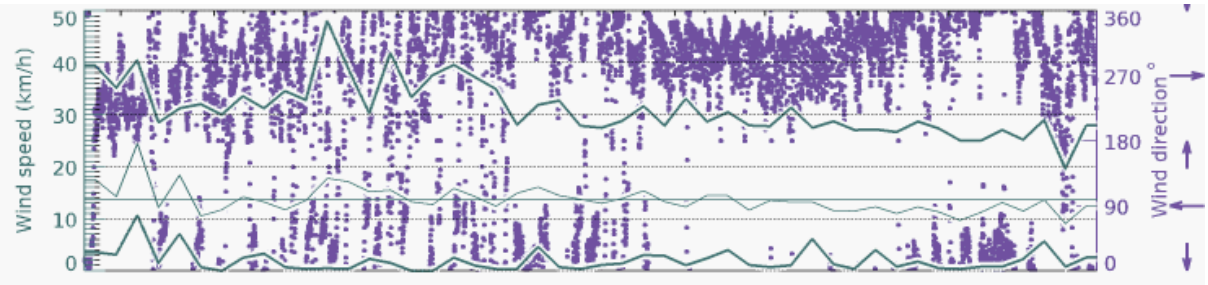


Figure 4-8: Wind speed in (Km/h) and direction in El Mansoura – Al Dakahlia Governorate for the year 2019/2020

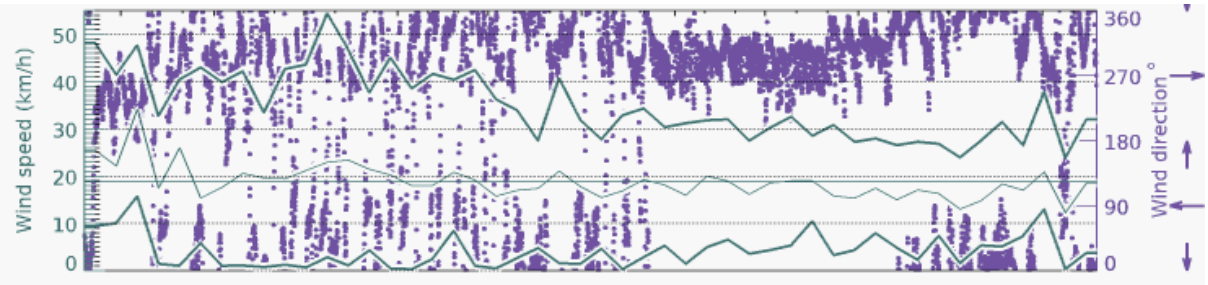


Figure 4-9: Wind speed in (Km/h) and direction in Damietta Governorate for the year 2019/2020

- ***Wind Rose***

The dominant wind direction is South West (SW) in Tanta and El Mansoura and North-North East (NNE) in Damietta. The following figures show the wind rose in each Governorate.

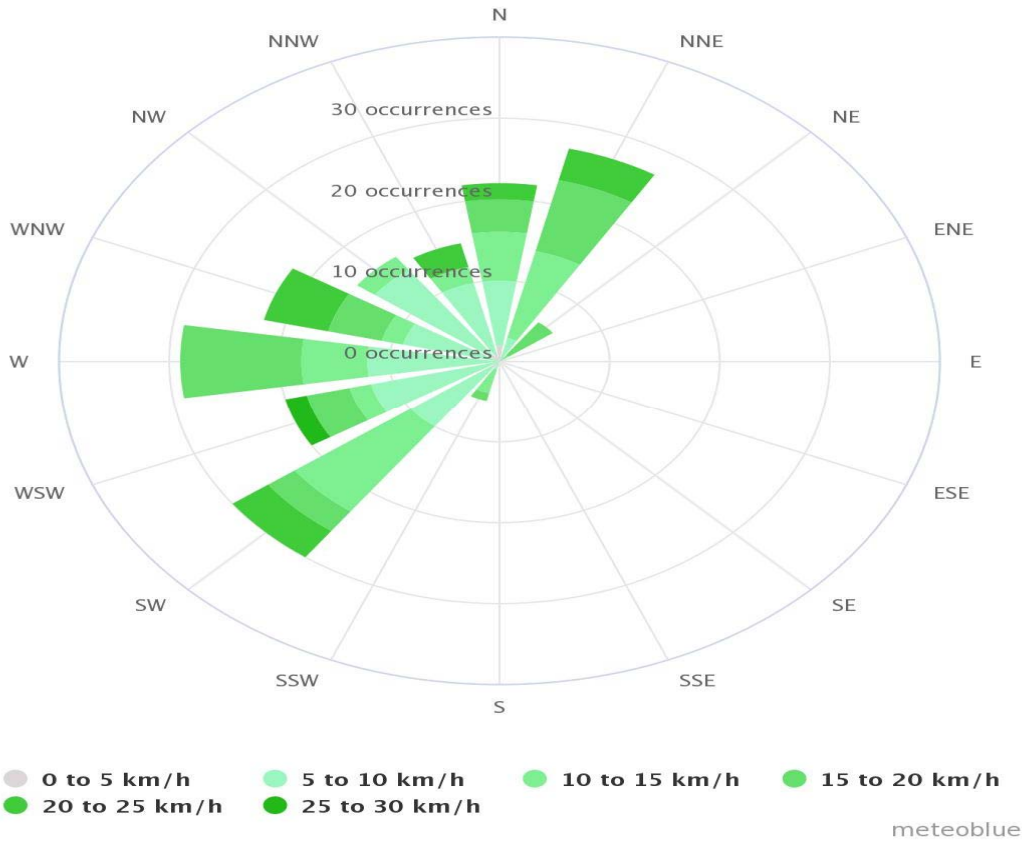


Figure 4-10: Wind rose of Tanta – Gharbia Governorate

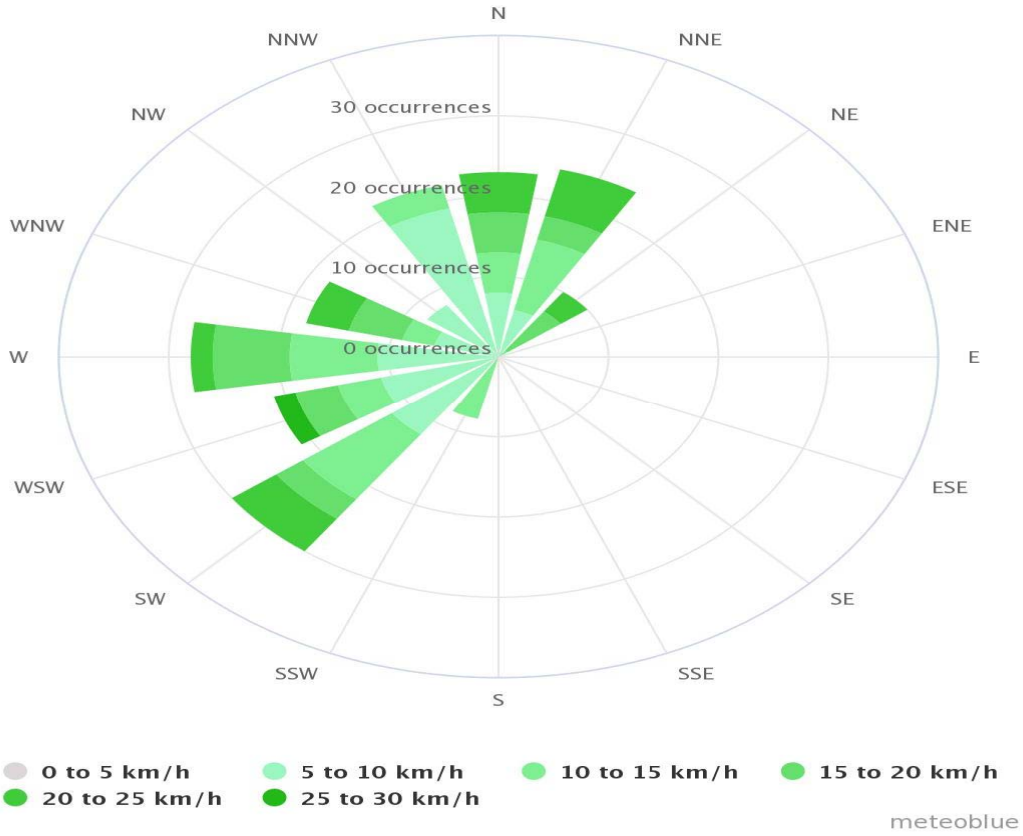


Figure 4-11: Wind rose of El Mansoura – Al Dakahlia Governorate

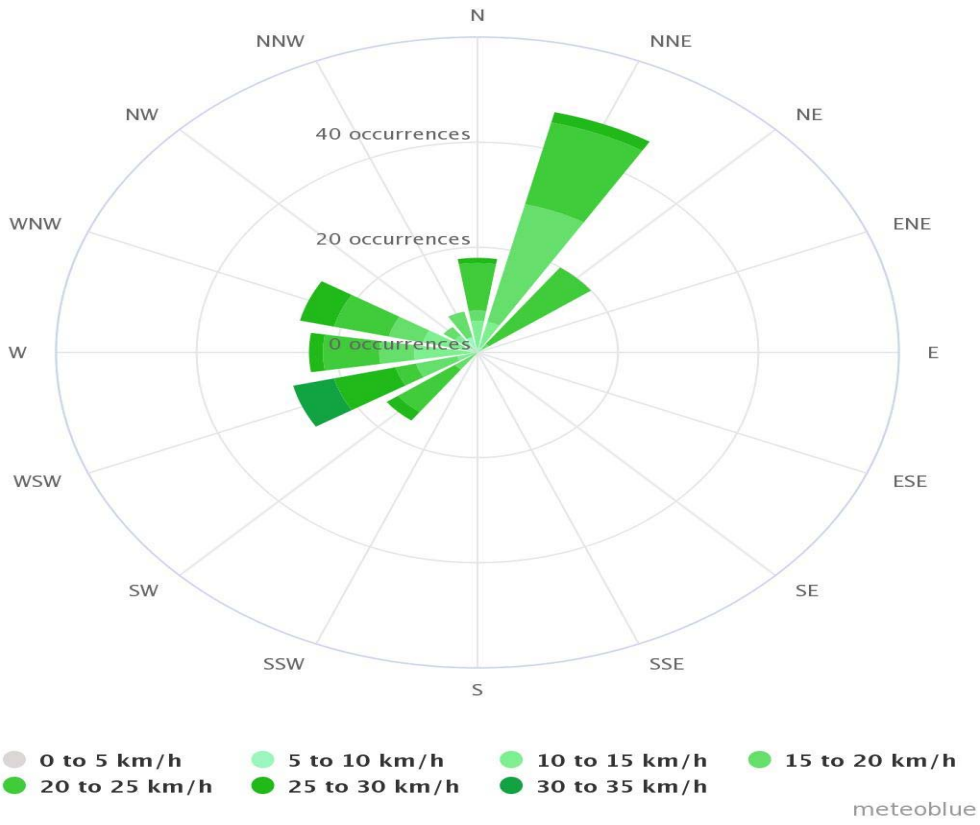


Figure 4-12: Wind rose of Damietta Governorate

4.1.1.2 Air Quality

The major air pollution sources observed throughout the project assessment area are: emissions from trains running on diesel, open burning of municipal solid waste dumped alongside the tracks, and industrial plants located in certain areas in close proximity to the railway line (e.g. Talkha Fertilizer Company).

Recent air quality measurements were conducted in ten locations along the Tanta – El Mansoura - Damietta railway line.

- ***Selection Criteria for the measurement points***

The selection of the air measurement locations was based on the following parameters:

- The nearest sensitive receptors located along the railway line between Tanta – El Mansoura – Damietta including the area between El Mansoura and Damietta (where the double track will be constructed); and
- The nearest potential source of air emissions along the railway line between Tanta – El Mansoura – Damietta including the area between El Mansoura and Damietta (where the double track will be constructed).

➢ Measurements Plan and Locations

The following table shows the air quality measurements' plan including the GPS coordinates of each measurement point and its relevant station.

Table 4-1: Air quality measurements' plan

Railway Current Conditions	Point #	Station Name	Kilometric Reference	GPS Coordinates
Double Railway Line	1	El Ragddya	8.34	30°49'53.00"N 31° 2'52.00"E
	2	Mahlet Rawh	14.80	30°52'25.50"N 31° 5'5.43"E
	3	El Mahala El Kobra	27.65	30°58'11.00"N 31°10'15.60"E
	4	Samannoud	35.24	30°57'48.79"N 31°14'44.21"E
	5	El Mansoura	54.60	31° 2'26.00"N 31°23'7.60"E
Single Railway Line	6	Battra	66.357	31° 7'16.99"N 31°25'8.75"E
	7	Sherbin	75.66	31°11'28.00"N 31°31'41.60"E
	8	Ras Al Khaleej	82.23	31°14'49.00"N 31°37'5.66"E
	9	Taftish Kafr Saad	101.649	31°19'9.75"N 31°39'22.36"E
	10	Damietta	116.179	31°25'21.00"N 31°48'8.60"E

The below figure shows the location of the air quality measurements.

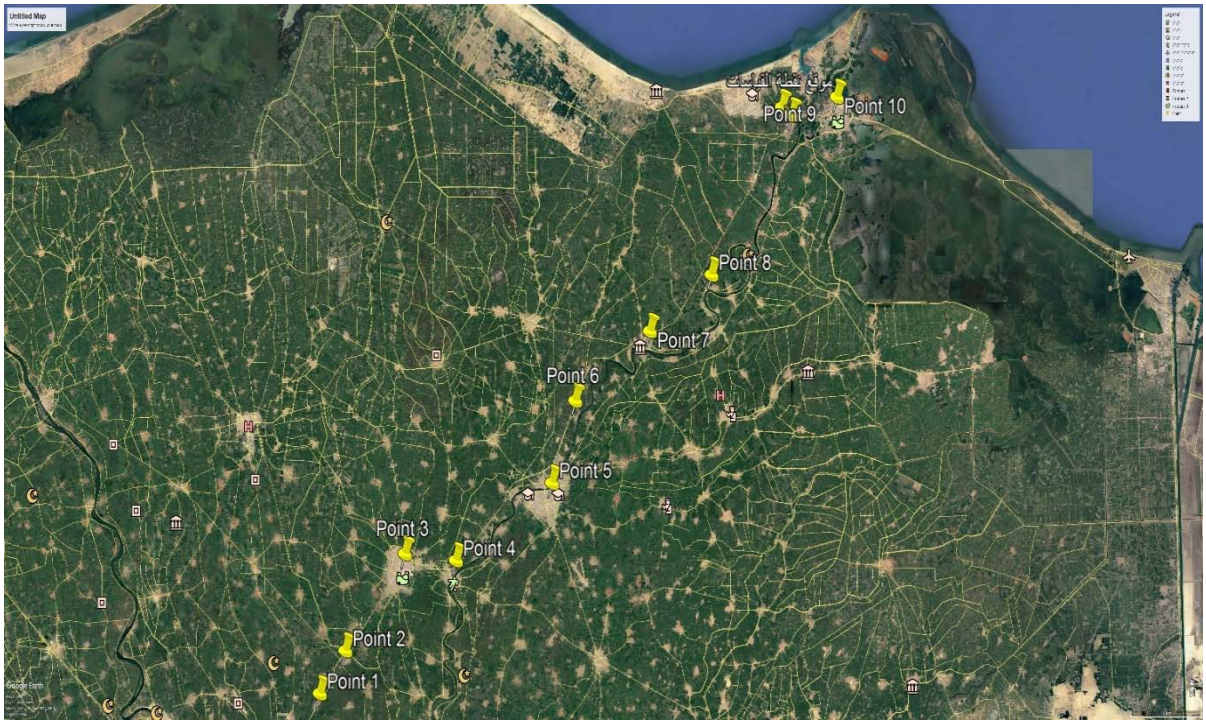


Figure 4-13: Satellite map showing the location of the baseline measurements

- ***Air Quality measurement results in the assessment area***

Ten locations were sampled over 8 hours for air quality. The most common gaseous air pollutants measured were Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Total Suspended Solids (TSP) and Particulate Matter (PM_{10}). The following tables show the measurement results for the air quality based on one-hour average results for 8 hours continuous measurements, compared with the maximum permissible limits in the Egyptian Environment Law as well as the international guidelines and standards.

Table 4-2: Air measurements (Hourly average results (µg/m³)) for Point (1) - El Ragddya– Double Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m³)	PM_{10}	T.S.P
09:00 AM	One train	5.4	1.4	4.6	58	111
10:00 AM	Two trains	16.1	3.2	4.6	127.4	138
11:00 AM	One train	5.7	1.1	4.5	60.1	117
12:00 PM	One train	5.2	1.3	4.5	61.2	118.5
1:00 PM	No train	2.6	0.6	4.6	56.7	106.4
2:00 PM	One train	5.6	1.3	4.6	62.6	113.3
3:00 PM	One train	5.6	1.2	4.7	58.2	119.7
4:00 PM	Two trains	12.8	3.5	4.8	126.1	144.9
Average		**7.38**	**1.7**	**4.61**	**76.29**	**121.1**
National Limits (µg/m³)		**300**	**300**	**30 (mg/m³)**	**-----**	**-----**

Table 4-3: Air measurements (Hourly average results (µg/m3)) for Point (2) - Mahlet Rawh – Double Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	Two trains	10.9	2.4	4.8	144	181.3
10:00 AM	No train	1.8	0.8	5	76	111.2
11:00 AM	One train	7.7	1.9	4.9	123.1	142.5
12:00 PM	No train	1.7	0.8	5	83	116.7
1:00 PM	No train	1.1	0.6	5	85	130
2:00 PM	No train	1	0.8	5.1	96	134.4
3:00 PM	One train	7.8	1.2	5.2	102.8	147.1
4:00 PM	Two trains	10.7	0.7	5.2	195.1	187.4
Average		**5.34**	**1.15**	**5.03**	**113.13**	**143.83**
National Limits (µg/m³)		**300**	**300**	**30 (mg/m³)**	**-----**	**-----**

Table 4-4: Air measurements (Hourly average results (µg/m3)) for Point (3) - El Mahala El Kobra – Double Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	Two trains	5.7	1.6	5.3	97.6	101.5
10:00 AM	No train	3.2	0.9	5.4	53.3	72.4
11:00 AM	Two trains	5.2	1.3	5.5	87.2	133
12:00 PM	No train	3.1	1.2	5.5	50.5	66.6
1:00 PM	No train	3.8	1.1	5.5	32.2	58.9
2:00 PM	No train	1.8	1	5.6	38.4	42.7
3:00 PM	Two trains	4.6	1.5	5.6	92.3	101
4:00 PM	No train	2.1	0.6	5.7	58.3	42.8
Average		**3.69**	**1.15**	**5.51**	**63.73**	**77.36**
National Limits (µg/m³)		**300**	**300**	**30 (mg/m³)**	**-----**	**-----**

Table 4-5: Air measurements (Hourly average results (µg/m3)) for Point (4) - Samannoud – Double Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	No train	1.4	0.6	4.9	64.2	124.3
10:00 AM	One train	6.1	1	5	80.9	138.2
11:00 AM	No train	3.8	0.6	5	56.6	86
12:00 PM	No train	1.4	0.7	5	83.1	114.8
1:00 PM	No train	0.4	0.6	5.1	78	139.7
2:00 PM	Two trains	8.8	0.7	5.1	86.4	141.4
3:00 PM	No train	2	0.6	5.2	79.1	105
4:00 PM	Two trains	5.5	1.1	5.2	87.1	146.2
Average		**3.68**	**0.69**	**5.06**	**75.47**	**124.45**
National Limits (µg/m³)		**300**	**300**	**30 (mg/m³)**	**-----**	**-----**

Table 4-6: Air measurements (Hourly average results (µg/m3)) for Point (5) - El Mansoura – Double Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	No train	2.5	1.1	5.3	42.9	81.6
10:00 AM	One train	6.9	1.2	5.4	57.6	102.5
11:00 AM	No train	2.2	0.4	5.5	49.1	101.2
12:00 PM	One train	5.5	1.5	5.4	57.3	112
1:00 PM	No train	4.1	1	5.6	44.4	81.7
2:00 PM	No train	2.4	0.6	5.6	48.2	89.7
3:00 PM	One train	5.4	1.4	5.6	58	139.12
4:00 PM	Two trains	11.9	1.6	5.7	102.3	177.4
Average		**5.11**	**1.10**	**5.51**	**57.48**	**110.65**
National Limits ($\mu g/m^3$)		**300**	**300**	**30 (mg/m^3)**	-----	-----

Table 4-7: Air measurements (Hourly average results (µg/m3)) for Point (6) - Al-Battra – Single Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	No train	2.8	0.9	4.8	59.8	69.4
10:00 AM	One train	5.1	0.5	5	83	152.8
11:00 AM	No train	1.6	0.7	5	57	118.9
12:00 PM	One train	4.1	0.6	5	102.9	189.1
1:00 PM	No train	1.3	0.6	5.1	61.5	124
2:00 PM	One train	4.1	0.6	5.1	93.1	171.1
3:00 PM	No train	0.4	0.9	5.2	51.6	110.1
4:00 PM	One train	5.8	0.6	5.2	99.6	188.2
Average		**3.15**	**0.68**	**5.05**	**76.06**	**140.45**
National Limits ($\mu g/m^3$)		**300**	**300**	**30 (mg/m^3)**	-----	-----

Table 4-8: Air measurements (Hourly average results (µg/m3)) for Point (7) - Sherbin – Single Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	One train	3.8	0.8	5.4	60.1	128
10:00 AM	No train	3.4	1	5.3	36.9	79.1
11:00 AM	One train	5.4	0.4	5.6	64.2	131.4
12:00 PM	No train	2	1	5.4	47	45.5
1:00 PM	No train	1.8	1	5.6	55.2	97.8
2:00 PM	No train	2.1	1.1	5.6	45.3	78
3:00 PM	One train	3	0.9	5.6	79.7	187.1
4:00 PM	One train	5.9	0.6	5.7	74.7	181

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
Average		**3.43**	**0.85**	**5.53**	**57.89**	**115.99**
National Limits ($\mu g/m^3$)		**300**	**300**	**30 (mg/m^3)**	-----	-----

Table 4-9: Air measurements (Hourly average results (µg/m3)) for Point (8) - Ras Al Khaleej – Single Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	No train	2.2	0.7	4.8	55.8	68.14
10:00 AM	No train	3.4	0.5	4.9	57.2	59.4
11:00 AM	One train	4.8	0.8	5	129.6	178.9
12:00 PM	One train	3.1	0.6	5	100.5	140
1:00 PM	One train	3	0.6	5.1	105.1	168.2
2:00 PM	No train	2.7	0.9	5.1	58.1	65
3:00 PM	No train	1.3	0.9	5.2	53.9	70
4:00 PM	No train	0.9	0.7	5.2	56.5	52.12
Average		**2.68**	**0.71**	**5.04**	**77.09**	**100.22**
National Limits ($\mu g/m^3$)		**300**	**300**	**30 (mg/m^3)**	-----	-----

Table 4-10: Air measurements (Hourly average results (µg/m3)) for Point (9) - Taftish Kafr Saad – Single Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	No train	2.9	0.8	5.4	49.4	54.12
10:00 AM	No train	1.7	1.1	5.4	46.5	77.1
11:00 AM	One train	4.5	0.3	5.6	77.2	99.12
12:00 PM	One train	4.5	0.6	5.4	67.2	87.4
1:00 PM	One train	4.7	1.1	5.5	91.9	117.9
2:00 PM	One train	6.6	1	5.6	64.7	133.2
3:00 PM	No train	2.1	0.8	5.6	43	71.6
4:00 PM	No train	1.9	0.5	5.7	48.9	88.4
Average		**3.61**	**0.78**	**5.53**	**61.10**	**91.11**
National Limits ($\mu g/m^3$)		**300**	**300**	**30 (mg/m^3)**	-----	-----

Table 4-11: Air measurements (Hourly average results (µg/m3)) for Point (10) - Damietta – Single Track Railway Station

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
09:00 AM	No train	2.8	0.7	4.6	48.9	72.3
10:00 AM	No train	1.2	1	4.59	56.4	79.5
11:00 AM	One train	5.3	1.3	4.56	94.4	172.6
12:00 PM	One train	5.9	1.3	4.57	66.9	108.2
1:00 PM	No train	2.8	1.2	4.62	44.7	74.8
2:00 PM	One train	5.1	1	4.7	88.1	101.1

Time	Condition	NO_2	SO_2	CO (mg/m^3)	PM_{10}	T.S.P
3:00 PM	No train	2.3	1.1	4.8	62.2	81
4:00 PM	No train	3	1	4.9	59.3	69.1
Average		**3.55**	**1.08**	**4.67**	**65.11**	**94.83**
National Limits ($\mu g/m^3$)		**300**	**300**	**30 (mg/m^3)**	-----	-----

➢ ***Analysis of air quality results***

In general, there are two main factors affecting the ambient air concentration of a certain pollutant emitted from a certain source(s) in a selected area:

- The intensity of the emissions (e.g., concentration and flow rate) from the source(s).
- The uncontrollable atmospheric dispersion conditions, which include but not limited to (wind speed, wind direction, temperature, humidity, rainfall, atmospheric turbulence, solar radiation intensity and atmospheric pressure).

Daytime air quality samples were taken to analyse the change in air quality over the three different conditions (Without Train – with one train passing and with two trains passing). The analysis results of each parameter showed that it increased gradually to record relatively high values during the passage of two trains at the stations with double track. However, all the recorded results showed compliance with the national and international guidelines for ambient air quality.

Annex (2) shows the baseline measurements report during the daytime.

4.1.1.3 Noise measurements during Day time

The railway line covered in this ESIA study transects areas that vary considerably in terms of background noise levels. There are highly urbanized cities, such as Tanta, El Mansoura and Damietta, in addition to small towns, villages, and agricultural areas. It is also expected that noise levels could vary significantly along the day and night at any given point, due to variations in the levels of human activities.

Noise generated by passing trains adds to, and usually overshadows, the often-excessive ambient noise. Residential areas experience high noise levels during the passage of daily trains, especially in areas where the buildings are in close proximity to the railway, such as in the case of Ras Al Khaleej, and at level crossings located within urban areas.

Recent noise level measurements were conducted in ten locations along the Tanta – El Mansoura - Damietta railway line.

➢ ***Selection Criteria for the measurement points***

The selection of the measurement locations was based on:

- The nearest sensitive receptors located along the railway line between Tanta – El Mansoura – Damietta including the area between El Mansoura and Damietta (where the double track will be constructed);
- The nearest potential source of high noise levels;
- The minimum and maximum noise levels that could occur.

➢ ***Measurements Plan and Locations***

The measurements were conducted along five consecutive days for one-hour average results over 8 hours to cover the different conditions that occurred along the day such as:

- ***Baseline Condition:*** – Without passage of trains
- ***Condition II:*** With passage of one train
- ***Condition III:*** With passage of two trains simultaneously (Which is the worst-case scenario in the current railway line between Tanta and El Mansoura and considered as forecast for the new doubling project between El Mansoura and Damietta).

The measurements plan and locations are the same for the air quality (Please refer to section 4.1.1.2).

- ***Ambient Noise Measurement Results in the assessment area during Day time***

With the aim of determining the background noise levels, and comparing it to the national, international laws and standards, 10 ambient noise measurement points were measured onsite during daytime. The following tables show the analysis results of Ambient (8 Hours) Noise levels for the 10 points compared with the maximum permissible limits stated in the national and international laws.

Table 4-12: Analysis results for the noise levels at point (1) El Ragddya

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
9:13AM	One Train	80.49	79.37	71.77	57.19	48.87	95.04	65	55
10:13AM	Two Trains	80.62	80.16	71.83	41.73	40.5	96.87		
11:13AM	One Train	79	78.96	68.34	51.15	45.61	94.66		
12:13PM	One Train	75.92	76.02	70.09	47.6	43.77	91.22		
1:13 PM	No train	75.09	74.33	63.07	40.45	39.26	97.14		
2:13 PM	One Train	78.53	76.82	66.38	40.79	37.82	94.12		
3:13PM	One Train	78.3	77.83	68.08	45.5	39.83	95.34		
4:13 PM	Two Trains	80.99	81.88	70.88	47.77	40.3	95.28		

Table 4-13: Analysis results for the noise levels at Point (2) Mahlet Rawh

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
9:13AM	Two Trains	75.5	80.09	71.52	45.12	42.17	96.83	65	55
9:42 AM	No train	71.3	75.62	67.8	58.42	52.68	98.65		
10:42 AM	One Train	75.87	80.78	64.38	42.47	37.51	101.25		
11:42 AM	No train	71.17	75.93	45.55	34.16	32.74	99.52		
12:42 PM	No train	69.83	74.38	64.69	38.76	34.53	93.28		
1:42 PM	No train	57.79	60.03	44.47	32.72	31.49	95.51		
2:42 PM	One Train	75.95	80.5	71.86	60.4	51.27	100.92		
3:42 PM	Two Trains	75.26	79.83	70.86	60.3	59.1	99.75		

Table 4-14: Analysis results for the noise levels at Point (3) El Mahala El Kobra

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
9:35 AM	Two Trains	76.13	80.37	72.2	52.37	45.65	100.92	65	55
10:35 AM	No train	76.11	79.04	75.14	70.45	67.69	96.71		
11:35 AM	Two Trains	76.81	81.37	72.03	52.69	47.98	109.29		
12:35 PM	No train	74.78	79.39	70.36	49.01	45.54	97.9		
1:35 PM	No train	75.1	79.25	72.82	53.1	45.95	104.24		
2:35 PM	No train	76.06	78.87	75.24	71.09	69.4	96.24		
3:35 PM	Two Trains	77.69	82.26	73.98	60.13	51.62	100.11		
4:35 PM	No train	75.05	77.94	74.09	69.77	68.24	95.08		

Table 4-15: Analysis results for the noise levels at Point (4) Samannoud

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:01 AM	No train	73	77.06	68.33	52.43	50.36	109.77	65	55
11:01 AM	One Train	77.45	81.16	76.09	53.3	46.72	99.81		
12:01 PM	No train	77.03	80.39	75.98	66.26	61.65	99.52		
1:01 PM	No train	76.48	79.88	75.42	66.54	61.86	99.02		
2:01 PM	No train	76.78	80.23	75.67	64.73	48	99.22		
3:01 PM	Two Trains	80	83.52	78.75	69.46	63	101.15		
4:01 PM	No train	76.54	80.09	75.38	63.45	46.57	100.39		
5:01 PM	Two Trains	77.55	82.05	74.58	48.87	47.96	100.93		

Table 4-16: Analysis results for the noise levels at Point (5) El Mansoura

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
9:12 AM	No train	77.53	81	76.38	64.94	46.66	102	65	55
10:12 AM	One Train	77.71	81.89	75.32	50.82	47.09	105.65		
11:12 AM	No train	77.62	81.22	76.08	52.04	48.77	101.15		
12:12 PM	One Train	77	79.82	76.51	67.92	64.18	107.99		

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
1:12 PM	No train	75.95	78.95	75.05	63.82	55.06	117.36		
2:12 PM	No train	74.46	78.33	70.2	56.68	51.84	112.11		
3:12 PM	One Train	78.26	81.84	75.07	51.26	48.72	105.92		
4:12 PM	Two Trains	83	87.41	79.54	55.41	52.53	108.9		

Table 4-17: Analysis results for the noise levels at Point (6) El Battra

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
8:06 AM	No train	76.95	80.58	75.35	65.85	63.8	111.41	65	55
9:06 AM	One Train	76.35	79.73	74.67	62.97	55.2	112.94		
10:06 AM	No train	75.23	78.86	73.99	49.44	46.08	108.27		
11:06 AM	One Train	76.09	79.17	75.28	66.54	61.06	109.11		
12:06 PM	No train	74.88	79.21	71.96	50.2	46.2	110.67		
1:06 PM	One Train	75.72	81.06	69.92	60.57	56.8	103.45		
2:06 PM	No train	71.31	75.37	69.44	55.92	46.95	108.52		
3:06 PM	One Train	77.58	81.9	74.03	63.12	59.96	112.85		

Table 4-18: Analysis results for the noise levels at Point (7) Sherbin

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:04 AM	One Train	81.79	88.11	87.04	76.11	55.56	51.5	65	55
11:00 AM	No train	74.82	81.32	78.36	70.73	56.44	52.4		
12:00 PM	One Train	83.61	88.32	87.56	82.44	55.2	52.12		
1:00 PM	No train	77.7	82.21	81.47	77.05	45.14	44.53		
2:00 PM	No train	77.58	82.3	81.52	76.75	44.65	44.39		
3:00 PM	No train	77.9	81.34	80.79	77.24	49.02	47.35		
4:05 PM	One Train	85.26	88.92	88.42	85.07	54.63	52.4		
5:00 PM	One Train	83.54	88.98	88.09	79.46	55.8	51.67		

Table 4-19: Analysis results for the noise levels at Point (8) Ras Al Khaleej

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
9:00 AM	No train	77.44	81.01	74.59	49.65	44.17	116.73	65	55
10:00 AM	No train	79.19	83.46	74.62	50.6	43.78	116.73		
11:00 AM	One Train	80.88	85.16	77.96	65	58.2	102.92		
12:00 PM	One Train	81.88	86.44	76.11	51.28	47.84	111.4		
1:00 PM	One Train	83.93	87.38	82.6	75.22	68.1	104.24		
2:00 PM	No train	75.55	79.11	74.62	45.28	44.05	97.64		
3:00 PM	No train	80.47	85.11	77.48	45.76	44.42	101.97		
4:00 PM	No train	80.68	84.24	79.65	46.14	45.27	100.8		

Table 4-20: Analysis results for the noise levels at Point (9) Taftish Kafr Saad

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
8:00 AM	No train	79.44	80.56	69	49.17	42.37	100.42	65	55
9:00 AM	No train	80.04	81.71	68.22	44.96	42.84	98.96		
10:00 AM	One Train	85.32	83.9	79.1	67.47	44.34	101.74		
11:00 AM	One Train	85.96	84.35	80.26	74.09	71.28	100.98		
12:00 PM	One Train	85.08	84.59	78.79	68.25	61.52	111.36		
1:00 PM	One train	86.05	86.57	79.56	66.56	57.5	101.57		
2:00 PM	No train	73.79	72.28	68.25	52.9	41.66	88.31		
3:00 PM	No train	73.32	71.8	66.8	51.93	40.18	90.75		

Table 4-21: Analysis results for the noise levels at Point (10) Damietta

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
8:06 AM	No train	77.21	81.12	75.72	43.34	42.81	98.06	65	55
9:06 AM	No train	78.1	81.92	74.89	48.19	44.61	112.03		
10:06 AM	One Train	79.11	81.85	75.71	44.37	43	116.21		
11:06 AM	One Train	81.39	83.64	77.91	61.82	47.24	116.21		
12:06 PM	No train	77.57	80.72	76.68	50.2	44.51	97.09		
1:06 PM	One train	78.13	82	76.37	43.95	43.13	97.07		
2:06 PM	No train	76.93	80	76.38	58.8	45.76	96.94		

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Day Time (7 am – 10 pm)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
3:06 PM	No train	77.88	83.3	69.71	47.17	45.78	101.25		

- ***Analysis of noise intensity Results:***

The results showed that the noise levels during the daytime are exceeding the maximum permissible limits under national and international laws and standards.

It is noted that the areas assessed are very crowded (urban areas). The surrounding environment includes several sources of noise such as road traffic, level crossings, movement of vehicles, buses, train horns, etc.

But generally, the noise levels are higher in the case of the passing of two trains simultaneously. However, in few cases the noise levels are close to the noise levels while only one train is passing and this can be justified as follows:

- When the train starts the trip, it generates high noise due to the full power of the engine;
- The training passing by the stations with a high speed without stopping generates high noise levels;
- In other cases, the noise levels decreased when the train slows down before passing the level crossing or entering the station.

Annex (2) shows the baseline measurements report during the daytime.

4.1.1.4 Noise measurements during Night time

Recent noise level measurements were conducted in the same ten locations along the Tanta – El Mansoura – Damietta railway line which are measured during the night time.

- ***Selection Criteria for the measurement points***

The selection of the measurement locations was based on:

- The nearest sensitive receptors located along the line including the area between El Mansoura and Damietta (where the double track will be constructed);
- The nearest potential source of high noise levels;
- The minimum and maximum noise levels that could occur.

- ***Measurements Plan and Locations***

The measurements were conducted along five consecutive days for one-hour average results of 8-hour during night time to cover the different conditions that occurred along the day such as:

- ***Baseline Condition:*** – Without passage of trains
- ***Condition II:*** With passage of one train
- ***Condition III:*** With passage of two trains simultaneously (Which is the worst-case scenario in the current railway line between Tanta and El Mansoura and considered as forecast for the new doubling project between El Mansoura and Damietta).

The measurements plan and locations are the same as for air quality (Please refer to section 4.1.1.2).

- ***Ambient Noise Measurement Results in the assessment area during Night time***

The following tables show the analysis results of Ambient (8 Hours) Noise levels for the 10 points measured during the night time compared with the maximum permissible limits stated in the national and international laws.

Table 4-22: Analysis results for the noise levels at point (1) El Ragddya

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	One Train	78.52	85.27	LAF50.0	53	43.49	101.16	55	45
11:00PM	Two Trains	76.57	82.82	77.1	53.5	42.42	97.49		
12:00AM	One Train	77.22	83.01	75.45	64.1	42.78	97.72		
1:00 AM	No train	76.3	82.36	76.4	41.33	40.14	97.71		
2:00 AM	No train	76.14	81.56	75.72	51	41.6	96.59		
3:00 AM	No train	76.04	81.88	75.49	42.45	41.23	97.3		
4:00 AM	One Train	77.22	82.63	75.17	63.3	44.75	97.37		
5:00 AM	Two Trains	75.6	82.4	76.72	47.5	45.62	97.84		

Table 4-23: Analysis results for the noise levels at Point (2) Mahlet Rawh

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	One Train	62.2	89.4	62.32	43.88	43.32	106.13	55	45
11:00PM	Two Trains	61.7	84.85	61	50.66	45.17	112.53		
12:00AM	One Train	62	69.17	41.42	34.61	33.69	96.97		
1:00 AM	No train	61.1	67.33	44.34	37.2	36.2	87.55		
2:00 AM	No train	62.3	59.66	37.92	33.73	33.01	85.85		
3:00 AM	No train	62.5	73.8	41.1	34.54	33.52	99.91		
4:00 AM	No train	60.7	61.8	51.54	45.8	43.88	96.19		
5:00 AM	Two Trains	62.6	60.2	51.91	45.99	44.35	100.92		

Table 4-24: Analysis results for the noise levels at Point (3) El Mahala El Kobra

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	One Train	66.2	71.85	66.63	42.12	38.98	89.02	55	45
11:00PM	Two Trains	63.4	69.59	64.3	41.6	38.04	87.94		
12:00AM	One Train	68.5	65.42	60.2	50.32	40.66	83.44		
1:00 AM	No train	67.9	66.75	59.16	38.99	38.4	85.71		
2:00 AM	No train	69.2	59.03	52.77	39.51	38.89	82.1		
3:00 AM	No train	62.8	60.61	54.86	44.82	39.6	81.5		
4:00 AM	No train	66.1	66.51	54.65	44.82	43.59	91.97		
5:00 AM	Two Trains	62.2	82.94	62.32	43.88	43.32	106.13		

Table 4-25: Analysis results for the noise levels at Point (4) Samannoud

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	No train	57.5	57.15	53.97	53.25	53.06	110.02	55	45
11:00PM	Two Trains	57.7	62.84	58.44	52.15	48.26	109.85		
12:00AM	Two Trains	60.4	59.62	50.89	43.34	42.11	92.3		
1:00 AM	No train	61.5	60.33	52.45	42.69	39.36	83.07		
2:00 AM	No train	62.6	64	60.41	49.46	42	79.01		
3:00 AM	No train	56.5	63.86	59.98	49.1	42.4	79.01		
4:00 AM	One Train	59.7	66.16	60.54	39.22	38.87	80.94		
5:00 AM	No train	56.4	65.86	59.15	44.65	40.53	81.56		

Table 4-26: Analysis results for the noise levels at Point (5) El Mansoura

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	Two Trains	58.3	62.62	57.91	47.68	38.42	95.37	55	45
11:00PM	No train	61.7	62.23	57.59	40.8	36	90.46		
12:00AM	Two Trains	59.2	62.48	57.62	49.4	45.3	85.26		
1:00 AM	No train	63.6	60.7	52.33	37.46	37.22	79.38		
2:00 AM	No train	62.7	60.29	53.36	39.32	38.61	84.68		
3:00 AM	One Train	53.6	63.41	58.37	50.65	45.96	94.27		
4:00 AM	One Train	55.3	65.05	57.88	46.28	42.61	101.28		
5:00 AM	One Train	52.8	63.7	59.45	48.84	45.92	91.63		

Table 4-27: Analysis results for the noise levels at Point (6) El Battra

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	One Train	75.88	79.35	74.86	64.8	60.72	99.74	55	45
11:00PM	One Train	68.57	72.88	64.35	57.65	54	93.41		
12:00AM	No train	74.79	79.29	71.41	54.5	49.14	109.9		
1:00 AM	No train	59.72	63.81	57.44	40.45	38.82	81.6		
2:00 AM	No train	61.66	65.88	59.19	40.99	39.99	83.25		
3:00 AM	No train	60.81	65.01	58.26	39.24	37.02	84.48		
4:00 AM	No train	62.26	65.78	61.08	42.77	40.8	86.04		
5:00 AM	One Train	59.59	63.35	56.46	50.77	47.96	100.46		

Table 4-28: Analysis results for the noise levels at Point (7) Sherbin

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	Two Trains	74.31	78.21	72.23	63.11	58.25	103.12	55	45
11:00PM	Two Trains	72.9	76.35	70.8	67.04	66.11	103.78		
12:00AM	No train	72.27	76.33	69.09	61.8	55.66	112.74		
1:00 AM	No train	65.37	68.74	62.57	50.93	49.41	111.83		
2:00 AM	No train	65.53	69.4	63.6	58.36	56.6	97.74		
3:00 AM	No train	64.68	69.23	60.79	48.08	43.43	106.9		
4:00 AM	No train	62.65	66.72	60.35	48.27	43.54	97.93		
5:00 AM	No train	60.71	64.5	58.61	41.55	37.7	81.2		

Table 4-29: Analysis results for the noise levels at Point (8) Ras Al Khaleej

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	One Train	67.04	70.79	63.64	54.98	48.35	101.29	55	45
11:00PM	No train	76.4	81.03	72.96	58.85	54.6	118.27		
12:00AM	No train	77.29	81.82	74.01	62.5	57.4	100.41		
1:00 AM	No train	67.9	72.25	64.45	52.25	50.05	109.79		
2:00 AM	No train	68.4	72.86	64.84	50.16	48.2	99.74		
3:00 AM	No train	67.6	71.47	65.01	48.21	47.08	90.54		
4:00 AM	No train	67.86	72.44	64.23	49.1	48.32	112.39		

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
5:00 AM	No train	71.66	75.88	67.97	59.68	56.4	106.45		

Table 4-30: Analysis results for the noise levels at Point (9) Taftish Kafr Saad

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	One Train	72.93	76.23	72.01	65.45	64.6	111.92	55	45
11:00PM	One Train	75.95	78.66	76	63.94	60.4	103.23		
12:00AM	One Train	64.86	68.6	62.49	52.77	51.04	92.4		
1:00 AM	No train	67.96	71.75	66.4	49	46.78	87.46		
2:00 AM	No train	67.25	70.97	65.8	54.22	47.71	87.62		
3:00 AM	No train	66.71	70.4	65.11	53.12	47.81	86.56		
4:00 AM	No train	67.83	72.15	65.57	45.73	44.32	87.82		
5:00 AM	No train	68.91	73.01	65.57	47.75	44.98	104.06		

Table 4-31: Analysis results for the noise levels at Point (10) Damietta

Start Time	Condition	Sound Level Equivalent and Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA) Night Time (10 pm – 7 am)	
		LAI eq	LAF10	LAF50	LAF90	LAF95	LA peak	National	International
10:00PM	One Train	79.21	83.99	74.02	62.68	58.29	113.3	55	45
11:00PM	No train	71.26	76.28	66.73	53.69	51.75	105.19		
12:00AM	Two trains	77.47	80.44	63.31	52.37	48.4	106.55		
1:00 AM	No train	63	66.99	60.43	45.45	44.37	85.15		
2:00 AM	No train	62.92	67.15	59.55	44.83	43.86	84.61		
3:00 AM	No train	66.4	70.18	61.58	52.93	48.66	111.05		
4:00 AM	No train	67.2	70.69	65.45	58.93	57.69	97.86		
5:00 AM	One Train	75.57	79.35	73.93	65.55	61.75	102.19		

- ***Analysis of noise intensity Results during night time:***

The results were qualitatively identical to those during daytime; they showed that the noise levels during the night time are exceeding the maximum permissible limits under national and international laws and standards.

Noise levels may vary from one hour to the other but generally, the noise levels are higher in the case of the passing of two trains simultaneously. However, in few cases the noise levels are close to the noise levels while only one train is passing and this can be justified as follows:

- When the train starts the trip, it generates high noise due to the full power of the engine;
- The train passing by the stations with a high speed without stopping generates high noise levels;
- In other cases, the noise levels decreased when the train slows down before passing the level crossing or entering the station.

Annex (3) shows the baseline measurements report during the night-time.

4.1.1.5 Vibration Spot Measurements (Daytime)

Ten samples were collected to measure the spot vibrations during daytime in three different conditions as follow

- ***Baseline Condition:*** – Without passage of trains
- ***Condition II:*** With passage of one train
- ***Condition III:*** With passage of two trains simultaneously (Which is the worst-case scenario in the current railway line between Tanta and El Mansoura and considered as forecast for the new doubling project between El Mansoura and Damietta).
- ***Spot Vibration Measurement Results in the assessment area during Daytime***

The following tables show the analysis results of Spot vibration (8 Hours) for the 10 points compared with the maximum permissible limits stated in the national law.

Table 4-32: Analysis results for the spot vibration levels at point (1) El Ragddya

Start Time	Condition	Acceleration (m/s^2)	National Limits m/s^2
9:13AM	One Train	21.0584	12
10:13AM	Two Trains	116.101	
11:13AM	One Train	40.011	
12:13PM	One Train	15.013	
1:13 PM	No train	0.0274	
2:13 PM	One Train	19.0211	
3:13PM	One Train	20.02	
4:13 PM	Two Trains	58.055	

Table 4-33: Analysis results for the spot vibration levels at Point (2) Mahlet Rawh

Start Time	Condition	Acceleration (m/s^2)	Limits m/s^2
9:42 AM	Two Trains	88.071	12
10:42 AM	No train	0.0253	
11:42 AM	One Train	25.049	
12:42 PM	No train	0.0312	
1:42 PM	No train	0.0332	
2:42 PM	No train	0.0204	
3:42 PM	One Train	31.077	
4:42 PM	Two Trains	78.064	

Table 4-34: Analysis results for the spot vibration levels at Point (3) El Mahala El Kobra

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
9:35 AM	Two Trains	104.111	12
10:35 AM	No train	0.0409	
11:35 AM	Two Trains	79.055	
12:35 PM	No train	0.0301	
1:35 PM	No train	0.0477	
2:35 PM	No train	0.0397	
3:35 PM	Two Trains	65.044	
4:35 PM	No train	0.0503	

Table 4-35: Analysis results for the spot vibration levels at Point (4) Samannoud

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
10:01 AM	No train	0.0243	12
11:01 AM	One Train	80.215	
12:01 PM	No train	0.0221	
1:01 PM	No train	0.0188	
2:01 PM	No train	0.0208	
3:01 PM	Two Trains	188.115	
4:01 PM	No train	0.0317	
5:01 PM	Two Trains	320.36	

Table 4-36: Analysis results for the spot vibration levels at Point (5) El Mansoura

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
9:12 AM	No train	0.0243	12
10:12 AM	One Train	76.202	
11:12 AM	No train	0.0237	
12:12 PM	One Train	70.212	
1:12 PM	No train	0.0333	
2:12 PM	No train	0.015	
3:12 PM	One Train	80.114	
4:12 PM	Two Trains	91.306	

Table 4-37: Analysis results for the spot vibration levels at Point (6) El Battra

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
8:06 AM	No train	0.0278	12
9:06 AM	One Train	78.103	
10:06 AM	No train	0.0352	
11:06 AM	One Train	63.111	
12:06 PM	No train	0.0347	
1:06 PM	One Train	50.401	

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
2:06 PM	No train	0.0211	
3:06 PM	One Train	82.114	

Table 4-38: Analysis results for the spot vibration levels at Point (7) Sherbin

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
10:00 AM	One Train	51.107	12
11:00 AM	No train	0.0318	
12:00 PM	One Train	41.2	
1:00 PM	No train	0.0232	
2:00 PM	No train	0.0251	
3:00 PM	No train	0.0254	
4:05 PM	One Train	71.17	
5:00 PM	One Train	38.1	

Table 4-39: Analysis results for the spot vibration levels at Point (8) Ras Al Khaleej

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
9:00 AM	No train	0.0201	12
10:00 AM	No train	0.0234	
11:00 AM	One Train	80.316	
12:00 PM	One Train	70.0145	
1:00 PM	One Train	60.019	
2:00 PM	No train	0.0201	
3:00 PM	No train	0.0217	
4:00 PM	No train	0.0221	

Table 4-40: Analysis results for the spot vibration levels at Point (9) Taftish Kafr Saad

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
8:00 AM	No train	0.0177	12
9:00 AM	No train	0.0254	
10:00 AM	One Train	34.213	
11:00 AM	One Train	20.101	
12:00 PM	One Train	20.206	
1:00 PM	One train	30.115	
2:00 PM	No train	0.0271	
3:00 PM	No train	0.0256	

Table 4-41: Analysis results for the spot vibration levels at Point (10) Damietta

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
8:06 AM	No train	0.0201	12
9:06 AM	No train	0.0234	

Start Time	Condition	Acceleration (m/s^2)	Limits m/s^2
10:06 AM	One Train	40.055	
11:06 AM	One Train	30.01	
12:06 PM	No train	0.0211	
1:06 PM	One train	55.087	
2:06 PM	No train	0.0217	
3:06 PM	No train	0.0221	

- ***Analysis of spot vibration Results:***

The results of the spot vibration during the daytime can be summarized as follow:

- 0.015 – 0.0503 m^2/sec without train passing (Complying with the national law limits).
- 15.013 - 82.114 m^2/sec in case of passing one train (Not complying with the national law limits- 4 m/s^2).
- 58.055 - 320.36 m^2/sec in case of passing two trains (Not complying with the national law limits- 4 m/s^2).

Annex (2) shows the baseline measurements report during the daytime.

4.1.1.6 Vibration Spot Measurements (Night time)

With the aim of measuring the spot vibration onsite during the night time in the three different conditions of the train passing, ten samples were collected to measure the spot vibrations during night time.

- ***Spot Vibration Measurement Results in the assessment area during night time***

The following tables show the analysis results of Spot vibration (8 Hours) for the 10 points compared with the maximum permissible limits stated in the national law.

Table 4-42: Analysis results for the spot vibration levels at point (1) El Ragddya

Start Time	Condition	Acceleration (m/s^2)	National Limits m/s^2
10:00PM	No train	2.563	12
11:00PM	One train	35.152	
12:00AM	Two trains	50.324	
1:00 AM	No train	0.045	
2:00 AM	No train	0.0715	
3:00 AM	No train	0.0521	
4:00 AM	Two trains	40.215	
5:00 AM	Two trains	30.345	

Table 4-43: Analysis results for the spot vibration levels at Point (2) Mahlet Rawh

Start Time	Condition	Acceleration (m/s^2)	Limits m/s^2
10:00PM	Two trains	71.018	12
11:00PM	Two trains	82.066	
12:00AM	One train	30.086	
1:00 AM	No train	0.0201	

Start Time	Condition	Acceleration (m/s^2)	Limits m/s^2
2:00 AM	No train	0.0374	
3:00 AM	No train	0.0335	
4:00 AM	One train	33.056	
5:00 AM	Two trains	60.08	

Table 4-44: Analysis results for the spot vibration levels at Point (3) El Mahala El Kobra

Start Time	Condition	Acceleration (m/s^2)	Limits m/s^2
10:00PM	Two trains	73.0203	12
11:00PM	Two trains	32.0108	
12:00AM	Two trains	80.0308	
1:00 AM	No train	0.0187	
2:00 AM	No train	0.0518	
3:00 AM	No train	0.0364	
4:00 AM	No train	0.0277	
5:00 AM	Two trains	61.0296	

Table 4-45: Analysis results for the spot vibration levels at Point (4) Samannoud

Start Time	Condition	Acceleration (m/s^2)	Limits m/s^2
10:00PM	No train	0.0206	12
11:00PM	Two trains	71.0422	
12:00AM	Two trains	80.0504	
1:00 AM	No train	0.0212	
2:00 AM	No train	0.0306	
3:00 AM	No train	0.0277	
4:00 AM	One train	40.0108	
5:00 AM	No train	0.0302	

Table 4-46: Analysis results for the spot vibration levels at Point (5) El Mansoura

Start Time	Condition	Acceleration (m/s^2)	Limits m/s^2
10:00PM	Two trains	81.0629	12
11:00PM	No train	0.0255	
12:00AM	Two trains	40.0809	
1:00 AM	No train	0.0609	
2:00 AM	No train	0.0287	
3:00 AM	One train	22.0517	
4:00 AM	One train	30.0701	
5:00 AM	Two trains	62.0439	

Table 4-47: Analysis results for the spot vibration levels at Point (6) El Battra

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
10:00PM	One train	24.0616	12
11:00PM	One train	30.0286	
12:00AM	No train	0.0283	
1:00 AM	No train	0.0295	
2:00 AM	No train	0.0259	
3:00 AM	No train	0.0267	
4:00 AM	No train	0.0307	
5:00 AM	One train	20.0561	

Table 4-48: Analysis results for the spot vibration levels at Point (7) Sherbin

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
10:00PM	Two trains	70.0533	12
11:00PM	Two trains	52.0495	
12:00AM	No train	0.0166	
1:00 AM	No train	0.0159	
2:00 AM	No train	0.0188	
3:00 AM	No train	0.0197	
4:00 AM	No train	0.0202	
5:00 AM	No train	0.0178	

Table 4-49: Analysis results for the spot vibration levels at Point (8) Ras Al Khaleej

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
10:00PM	No train	0.0254	12
11:00PM	One train	24.0318	
12:00AM	No train	0.0237	
1:00 AM	No train	0.0251	
2:00 AM	No train	0.0296	
3:00 AM	No train	0.0243	
4:00 AM	No train	0.0211	
5:00 AM	No train	0.0283	

Table 4-50: Analysis results for the spot vibration levels at Point (9) Taftish Kafr Saad

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
10:00PM	One train	30.0616	12
11:00PM	One train	31.0481	
12:00AM	One train	29.0504	
1:00 AM	No train	0.0306	
2:00 AM	No train	0.0321	
3:00 AM	No train	0.0349	

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
4:00 AM	No train	0.0387	
5:00 AM	No train	0.0319	

Table 4-51: Analysis results for the spot vibration levels at Point (10) Damietta

Start Time	Condition	Acceleration (m/s²)	Limits m/s²
10:00PM	One Train	30.0516	12
11:00PM	No train	0.0571	
12:00AM	Two trains	32.0577	
1:00 AM	No train	0.0524	
2:00 AM	No train	0.0538	
3:00 AM	No train	0.0568	
4:00 AM	No train	0.0549	
5:00 AM	One Train	30.589	

- ***Analysis of spot vibration Results:***

The results of the spot vibration during the night time are qualitatively identical to those during daytime; they can be summarized as follow:

- 0.0159 – 0.0715 m^2/sec without train passing (Complying with the national law limits).
- 2.563 - 40 m^2/sec in case of passing one train (Not complying with the national law limits if more than 4).
- 32.0577 – 82.066 m^2/sec in case of passing two trains (Not complying with the national law limits--4 m/s^2).

Annex (3) shows the baseline measurements report during the night time.

Vibration Simulation Measurements (Daytime)

Measurements for the vibration in form of simulation graph have been conducted for the same locations only during the moment of passing the train. It records the vibration levels in the period of passing the train. It differs from the spot vibration measurements as the spot vibration measurements are not performed on a continuous basis. The following tables show the analysis results of vibration simulation for the same 10 points covering the 3 different conditions.

Table 4-52: Analysis results for the simulation vibration levels at point (1) El Ragddya

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0265	0.003
With One Train	20.168	0.521
With Two Trains*	202.325	8.654

* measured during 2 trains travelling together with normal speed

Table 4-53: Analysis results for the simulation vibration levels at point (2) Mahlet Rawh

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0341	0.007
With One Train	60.187	8.531
With Two Trains	320.36	7.632

* measured during 2 train travelling in not same time (time shift by 2.2 sec to 4 sec)

Table 4-54: Analysis results for the simulation vibration levels at point (3) El Mahala El Kobra

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0152	0.002
With One Train	80.184	2.514
With Two Trains	110.51	5.634

* measured during 2 train travelling in not same time (time shift by 2.2 sec to 4 sec)

Table 4-55: Analysis results for the simulation vibration levels at point (4) Samannoud

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0223	0.005
With One Train	40.354	0.758
With Two Trains*	90.351	4.632

* measured during 2 train travelling in not same time (time shift by 2.2 sec to 4 sec)

Table 4-56: Analysis results for the simulation vibration levels at point (5) El Mansoura

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0221	0.007
With One Train	90.148	1.352
With Two Trains*	200	9.235

* measured during 2 train travelling in not same time (time shift by 2.2 sec to 4 sec)

While for the following section, the vibration simulation was measured for only two conditions, as the railway line is single track. These measurements can be taken as a forecast for the implementation of the double track of the railway between El Mansours and Damietta.

Table 4-57: Analysis results for the simulation vibration levels at point (6) Battra

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0785	0.012
With One Train	80.215	8.215

Table 4-58: Analysis results for the simulation vibration levels at point (7) Sherbin

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0126	0.002
With One Train	40.847	2.215

Table 4-59: Analysis results for the simulation vibration levels at point (8) Ras Al Khaleej

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0235	0.007
With One Train	45.213	2.152

Table 4-60: Analysis results for the simulation vibration levels at point (9) Taftish Kafr Saad

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0136	0.007
With One Train	140.521	4.215

Table 4-61: Analysis results for the simulation vibration levels at point (10) Damietta

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0875	0.011
With One Train*	135.3	0.452

4.1.1.7 Vibration Simulation Measurements (Night time)

Measurements for the vibration in form of simulation graph have been conducted for the same locations during night time. Not all the measurements cover the three conditions as the train traffic during night is low. The following tables show the analysis results of vibration simulation for the 10 points.

Table 4-62: Analysis results for the simulation vibration levels at point (1) El Ragddya

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0715	0.0296
With One Train	340.156	5.717

Table 4-63: Analysis results for the simulation vibration levels at point (2) Mahlet Rawh

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	2.5081	0.1323
With One Train	2.563	0.132

Table 4-64: Analysis results for the simulation vibration levels at point (3) El Mahala El Kobra

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.045	0.0288
With One Train	45.517	2.266

Table 4-65: Analysis results for the simulation vibration levels at point (4) Samannoud

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	10.254	0.1591
With One Train	30.345	1.476

Table 4-66: Analysis results for the simulation vibration levels at point (5) El Mansoura

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0423	0.0039
With One Train	35.152	1.252
With Two Trains*	230.48	5.634

* measured during 2 train travelling in not same time

While for the following section, the vibration simulation was measured for only two conditions, as the railway line is single track. These measurements can be taken as a forecast for the implementation of the double track of the railway between El Mansours and Damietta.

Table 4-67: Analysis results for the simulation vibration levels at point (6) Battra

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0512	0.0025
With One Train	72.265	5.325

Table 4-68: Analysis results for the simulation vibration levels at point (7) Sherbin

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0521	0.0033
With One Train	40.215	10.312

Table 4-69: Analysis results for the simulation vibration levels at point (8) Ras Al Khaleej

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0252	0.0037
With One Train	50.324	2.942

Table 4-70: Analysis results for the simulation vibration levels at point (9) Taftish Kafr Saad

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²

Without Train	0.054	0.0046
With One Train	80.215	1.494

Table 4-71: Analysis results for the simulation vibration levels at point (10) Damietta

Condition	Acceleration Transient m/s²	Acceleration RMS m/s²
Without Train	0.0517	0.0024
With One Train*	92.204	4.632

4.1.1.8 Topography and Geology

The delta region is characterized by its low topography, and gradual slopes north towards the Mediterranean Sea, where coastal lakes such as Manzala, Burullus and Edku are found due to the interaction of the sea with the land of the delta, up and down. The current delta basin has been extended since ancient times, east and west, as the Nile has developed many branches. Changes in sea level and activated tectonics have led to the disappearance of these branches and the survival of the two current branches (Damietta and Rasheed). In general, altitudes in the delta range between 10 to 20 meters above sea level. The following figure shows a topographic map of the Delta region[24].

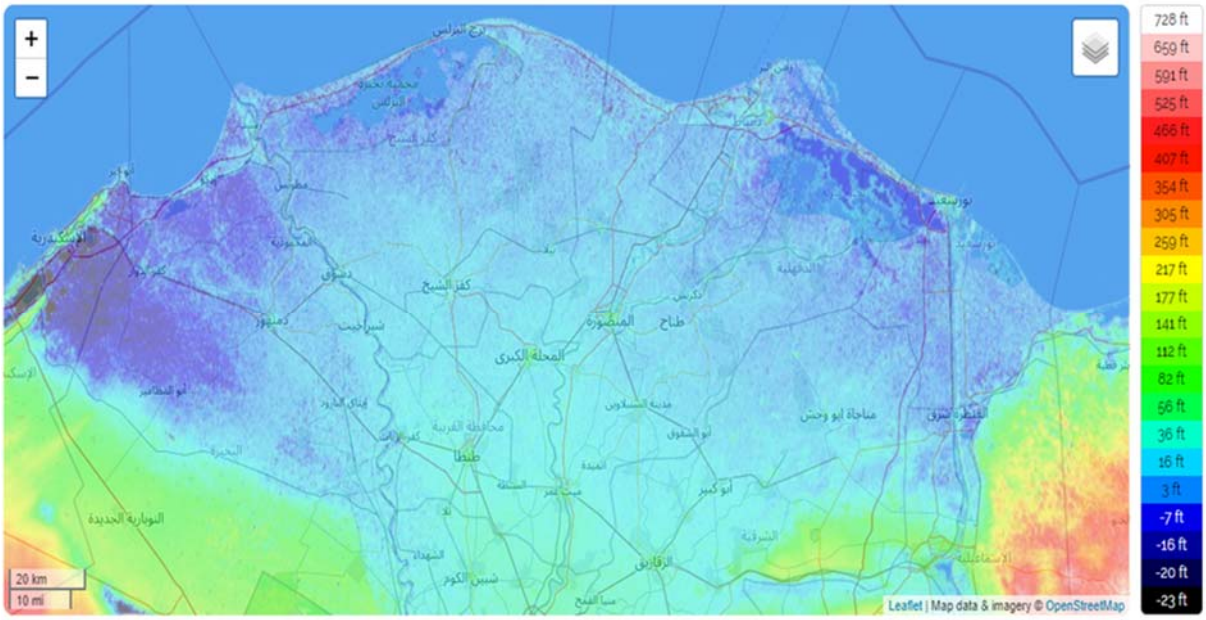


Figure 4-14: Topography map for the Delta Region

The Nile Delta area is totally covered by the Nile silt, clay, sandy clay, sands and gravels deposits of the Quaternary.

The Tanta – El Mansoura – Damietta railway line passes by the central and eastern sides of the Nile Delta. The Delta is a uniformly flat triangle, about 166 km long from North to South, and 250 km wide across its Mediterranean front base, with elevations of about 20 m and decreasing gradually towards the Mediterranean. The delta is covered with The Nile sediments that are hundreds of meters thick in some places. The sediments have been deposited during the Pleistocene and Holocene evolution of the river regime.

[24] https://en-us.topographic-map.com/maps/2bvi/Damietta/

The Damietta and Rosetta branches are the only active branches of the Nile forming the present Delta. Extinct branches, however, reached areas far to the east and west of the present Delta. Several lakes forming the Delta estuaries represent the transition zone between the Nile and the Mediterranean Sea. The following figure illustrates the types of geologic formations in the Delta region.

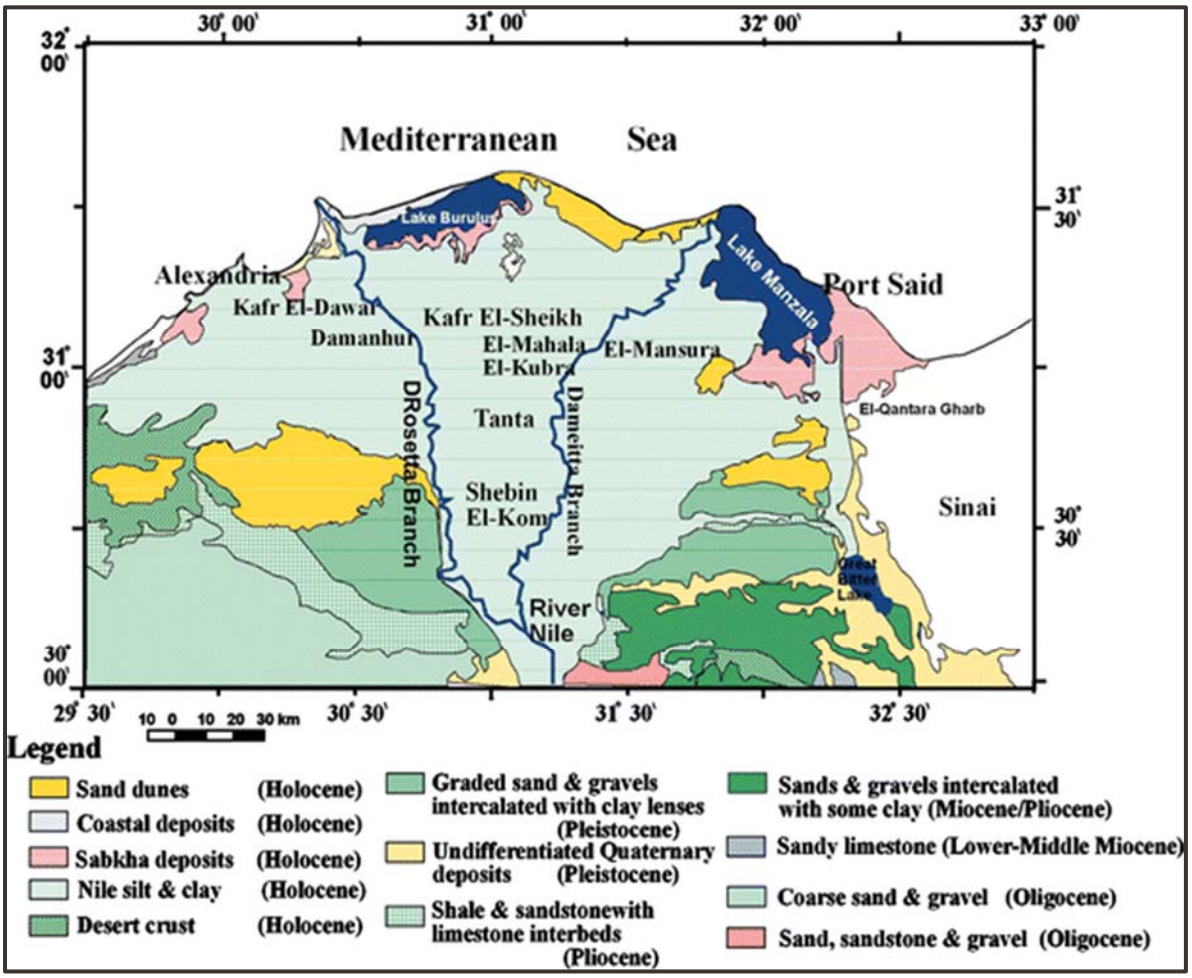


Figure 4-15: Geologic map of the River Nile Delta *Source: Hydro-environmental status and soil management of the River Nile Delta, Egypt (2009)*

4.1.1.9 Soil

The Delta region is mainly covered by silt and clay. The sedimentary soil is mainly formed from clay deposit. The porous nature of the soil makes it suitable for agriculture. It also makes it more sensitive to contamination.

In the geotechnical report[25], it is explained that 98 soil borings have been analysed along the doubling area starting from Talkha to El Mansoura in order to study the nature of the soil layers and recommend the best methods for the foundations.

The soil has been bored for a depth of 10 meters to analyse the nature of the soil layers. The results were as follows:

[25] Geotechnical and foundation report for the railway line between El-Mansoura and Damietta- SYSTRA and ACE – October 2016

- From surface to up to 1.5 meters → Fill: Limestone pieces, dust, straw;
- From 1.5 meters and up to 3 meters → Clay: medium stiff, silt, Brown;
- From 3 meters to and up to 6 meters → Clay: medium stiff, silt, Grey;
- From 6 meters to and up to 10 meters → Silt medium stiff, sandy, Grey.

In some areas, wooden sleepers contaminated with spent oil were spotted during the study team's site visits. These wooden sleepers will be replaced with concrete ones. The removed wooden sleepers could become a source of water pollution, if they are stored (even if temporarily) near a water body. Hence, good management and safe disposal of the removed wooden sleepers is important.

Figure 4-16: Contaminated wooden sleepers

Oil spills were also observed on one side of the train tracks near Ras El Khaleej station and at El Mahala El Kobra station. The reason for the existence of oil spill in this area in particular is unknown but it may have resulted from maintenance works or leaks from train wagons.

Figure 4-17: Oil spills observed near Ras El Khaleej station

Figure 4-18: Spilled oil on the ground of the railway line (El Mahala El Kobra Station)

Soil Contamination Test:

The following table shows the proposed locations for soil contamination tests that are proposed by the ESIA consultant as per the reconnaissance site visits conducted along the railway line and the reason for selecting each point.

Table 4-72: List of the proposed locations for the soil contamination tests along the railway line between Tanta - El Mansoura and Damietta

Point No.	GPS Coordinates	Real Photo from site visit	Selection Criteria
1 El Ragddya Station (KP 8.34)	30°49'51''N 31°2'50''E		Spillover of dangerous substances was observed at El Ragddya Railway Station

Point No.	GPS Coordinates	Real Photo from site visit	Selection Criteria
2 EL MAHALA EL KOBRA Station (KP 27.65)	30°58'6''N 31°10'4''E		Spillover of dangerous substances was observed at El Mahala El Kobra Railway Station

Point No.	GPS Coordinates	Real Photo from site visit	Selection Criteria
3 Sammanoud Station (KP 35.238)	30°57’52’’N 31°14’47’’E		Spillover of oil was observed at Sammanoud Railway Station

Point No.	GPS Coordinates	Real Photo from site visit	Selection Criteria
4 EL MANSOURA Station (KP 54.6)	31º2’36’’ N 31º23’15’’E		Railway marshalling yards where spillover of oil was observed at El Mansoura Station

Point No.	GPS Coordinates	Real Photo from site visit	Selection Criteria
5 SHERBiN Station (KP 75.66)	31°3’15”N 31°22’47”E		Railway marshalling yards where spillover of dangerous substances was observed at Sherbin Station

Point No.	GPS Coordinates	Real Photo from site visit	Selection Criteria
6 Damietta Station (KP 116.179)	31°25’21”N 31°48’8”E		Disused building owned by ENR and will be demolished to build new technical building at Damietta Station

The soil excavated during boring was sampled in such a manner that the sample obtained is sufficiently representative of the soil layer concerned and that the contaminant concentrations have not suffered evaporation or contamination caused by the packaging or the sampling equipment. The samples were collected at depth (15-30cm) after removing the 30 cm top soil. They were collected in sealed polyethylene bags using a clean stainless-steel shovel to avoid any cross-contamination. The bags were numbered and the location was written on each of them. and the collected samples were analysed according to the international standards and compared with the Dutch pollution standards (Target value) as shown in the below table.

Table 4-73: Analysis results for the soil contamination test

Parameter	Unit	Sample (1) El Ragddya	Sample (2) El Mahala El Kobra	Sample (3) El Mansoura	Sample (4) Samannoud	Sample (5) Sherbin	Sample (6) Damietta	Dutch pollutant standards-target value
Chemical Oxygen Demand (COD)	mgO_2/Kg	1650	1700	1560	1750	1330	1400	------
Biological Oxygen Demand (BOD)	mgO_2/Kg	410	450	390	500	375	400	------
Chloride	mg/Kg	800	950	1100	1050	500	420	------
Nitrates	mg/Kg	90	80	75	85	40	30	------
Total Phosphorous	mg/Kg	450	600	620	500	350	380	------
Oil and Grease	mg/Kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	------
Arsenic (As)	mg/Kg	8.75	2.4	1.75	5.7	5.25	1.25	29
Copper (Cu)	mg/Kg	103.7*	71.2*	48.2	85*	90*	40	36
Lead (Pb)	mg/Kg	51.25	53.87	32.5	78.75	90	27.5	85
Chromium (Cr)	mg/Kg	45	30	32.5	45	28.75	20	100

Parameter	Unit	Sample (1) El Ragddya	Sample (2) El Mahala El Kobra	Sample (3) El Mansoura	Sample (4) Samannoud	Sample (5) Sherbin	Sample (6) Damietta	Dutch pollutant standards-target value
Cadmium (Cd)	mg/Kg	0.72	4*	3.5*	0.75	0.4	<0.05	0.8
Mercury (Hg)	mg/Kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.3
Cyanide (CN)	mg/Kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	5

N.D.: Not Detected

The analysis results show that some samples exceed the allowable contamination threshold values especially for copper, lead and cadmium. The full analysis report including the sampling and analysis methodology is attached in Annex 4.

In addition, soil sample number (6) has been analyzed for detecting Asbestos. The analysis results showed that the asbestos was not detected, please refer to Annex (4) for the analysis results certificate.

4.1.1.10 Hydrology, Drainage and Surface water

Agricultural drains along the doubling route

There are about ten agricultural drains parallel to the railway line and close to it. They will need to be covered in order to double the existing single track between El Mansoura and Damietta. The following table shows the details of the ten drains and identifies whether it will be covered or not.

Table 4-74: List of the agriculture drains along the railway line between El Mansoura and Damietta

Agriculture drain name	Length (Km)	Reference Kilometer	Flow (m^3/sec)	Bottom Depth (m)	Water Depth (m)
El Tawila	7.65	0-3	1.06	2	1.1
		3-5	0.53	2	0.65
		5-7.65	0.43	1	0.60
Diast	3.4	0-3.4	1	2	0.69-1.27
El Battra El Qebly	4	0-4	0.37	1	0.7
El Sabrya	4	0-4	0.95	2	1
El Sawalem El Qebly	5.78	0-3	1.7	2.5	1.2
		3-5.78	---	1.5	0.98
El Sawalem El Bahary	2.37	0-2.37	0.55	2	0.89-1
El Mashaleb El Qebly	3.1	0-3.1	0.39	1	0.8-1.14
El Mashaleb El Bahary	3	0-3	0.4	1	0.8-0.95
Ganabya Kafr El Batikh	6	0-0.8	------	4	1
		0.8-3		3	0.85
		3-5.5		2	0.7
		5.5-6		1	0.52
El-Sinaniyah	10.8	0-2	1.16	3	1.03
		2-9.75	0.7	2	0.83
		9.75-10.8	0.23	1	0.54

Siphons crossing the railway line:

There are seven siphons beneath the railway line and they have been replaced and renewed as listed in the following table. El Tawila siphon will not need to be lengthened due to the planned doubling of the railway line; nor will the Dengway, El Dhahrya, Abu al-Num, and El Mashleb El Omomy need to be lengthened.

As for the siphon of the El-Sinaniyah drainage in Kafr al-Battikh as well as Ganabya Kafr El Battikh, an inspection room must be constructed at the siphon.

Table 4-75: List of the upgraded siphons crossing the railway line between El Mansoura and Damietta

Agriculture drain name	Reference Kilometer (Km)	Siphon Diameter (m)	Remarks
El Tawila	1.2	1.2	Already doubled – No need for lengthening
Dengway	6.4	1.5	
El Dhahrya	6.75	1.5	
Abu al-Num	14.975	1.5	
El Mashleb El Omomy	7.16	1.5	
El-Sinaniyah	14.625	1.5	An inspection room must be constructed (4m X 4m)
Ganabya Kafr El Batikh	0.8	1.5	

There are also two siphons that have not been replaced and upgraded: Siphon of El Batrah El Qebly drain and siphon of Kafr El Dabosy drain, each with 110 meter in length. They should be replaced and renewed by tunnelling with a 1.51-meter diameter pipe. The following table shows a list of the siphons crossing the railway line between El Mansoura and Damietta that need to be upgraded.

Table 4-76: List of the siphons requiring upgrading crossing the railway line between El Mansoura and Damietta

Agriculture drain name	Reference Kilometer (Km)	Siphon Diameter (m)	Remarks
El Batrah El Qebly	2.1	1.5	Tunnelling with a 1.51-meter diameter pipe will be used for the upgrading of the siphon
Kafr El Dabosy	1.28	1.5	

Water quality deterioration

Prior to any human intervention, all of the coastal lakes that are now receiving domestic, agricultural and industrial wastewaters were open to the sea. They had, therefore, proper exchange rates with the Mediterranean Sea. Today, three of the four lagoons have lower exchange rates with the Sea (Mariout does not) as found in (El-Adawy et al., 2013; Oczkowski and Nixon, 2008). Therefore, the continuous charging of these wastewaters causes drastic changes in the ecosystem of the coastal lakes. For example, it negatively affected fish production quantitatively and qualitatively.

Furthermore, large spatial gradients are observed in lagoon salinities. As an example, El Manzalah Lake showed ranges in salinity from 2.7 to 39.1 mg/l with the lowest salinities inshore while the highest rates of salinity are observed closer to the breach way.

Surface Water Contamination

The extensive use of pesticides, chemical fertilizers and other agrochemicals in the agricultural areas surrounding the project is expected to contribute to the pollution of water bodies.

A large portion of the railway is located between an irrigation canal and agricultural drain. The agricultural drain is contaminated with municipal solid waste near residential areas, chemical and industrial effluent in industrial areas (especially near the fertilizer factory in Talkha). The pollution manifests itself in the greenish color of the water in the area, which is noticeably different from the color of water in other areas along the line.

Figure 4-19: Polluted agricultural drain (to the right) and the irrigation canal (to the left)

4.1.1.11 Groundwater

The Nile Delta has one of the biggest semi-confined groundwater aquifers in Egypt. The Pleistocene sands mainly filled the Morpho-tectonic depression of the southern and the middle The Nile Delta and gravels intercalated with thin slits and clay lenses. These deposits represent the degradation and aggradations phases, which were accompanied by several sea level changes that prevailed during the Late Pleistocene and Holocene times.

The Quaternary deposits cover the entire Nile Delta area with a thickness that ranges between 200 m (in the south) and 1,000 m (in the north). The thickness is thinning southwards and near the fringes. These deposits are mainly acting as water-bearing formations of free to confined and semi-confined aquifers depending on the nature of the overlying bed of the Holocene lithology. The Late Tertiary layer of clays, which covers the Pleistocene water bearing-bed, acts in fact as the main aquiclude.

The following figure shows a thickness contour map of the Quaternary Aquifer system for the Nile Delta area.

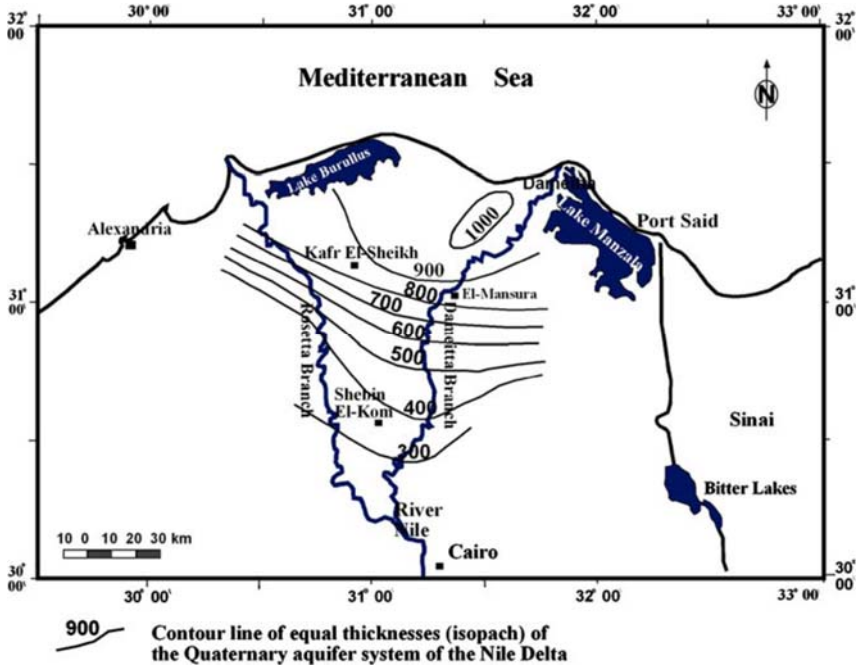


Figure 4-20: Thickness contour map of the Nile Delta Quaternary Aquifer system
Source: Hydro-environmental status and soil management of the River Nile Delta, Egypt (2009)

The Pleistocene aquifer is essentially free in the south and both fringes, but becomes locally confined and semi-confined towards the north.

The groundwater contained in the Quaternary aquifer is in hydraulic contact with the surface water (drainage and irrigation canals). Therefore, the aquifer could be considered as a large storage reservoir that is supplied by the Nile water itself through the irrigation canals. In fact, Mit Ghamr and Bilqas Formations are water-bearing ones as they are hydraulically interconnected and could supply adequate water for domestic and irrigation purposes. The following figure is a map showing the groundwater potentiality of the Nile Delta Aquifer system.

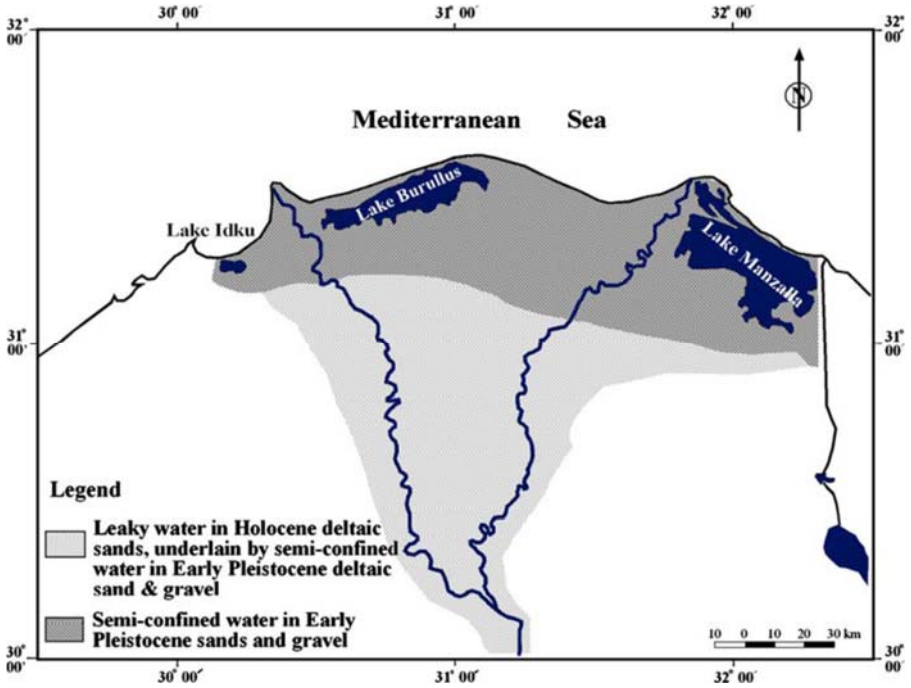


Figure 4-21: Groundwater potentiality map of the Nile Delta Quaternary Aquifer System
Source: Hydro-environmental status and soil management of the River Nile Delta, Egypt (2009)

The groundwater aquifer in the Delta region is covered by a thin layer of clay ranging from 5 m in the south, and increases gradually reaching about 20 m in the center, and 50 m in the north of the Delta.

As per the geotechnical report[25], the groundwater depth ranges between 1.5 and 2 meters. It has been analysed to determine:

- The % TDS,
- SO_3 to study its effect on the concrete as well as
- The chlorides to study their effect on the reinforcing bars

In order to take the necessary measures during the design and implementation of the foundations.

The following table shows the analysis of the groundwater at five different locations.

Table 4-77: Analysis results of the groundwater at five different locations

Sample #	TDS (mg/l)	NaCl (mg/l)	SO_3 (mg/l)	pH
1	1,700	850	450	7.6
2	14,800	11,600	1,220	7.35
3	1,930	840	390	7.7
4	3,410	1,580	650	8.2
5	1,260	960	345	7.2

4.1.1.12 Natural Hazards

The Nile Delta region is one of the Egyptian areas that exposed to risk from natural and man-made impacts, created by geological (e.g. land subsidence) and meteorological disturbances of sea surface and human interventions to the coasts. These risks are of two kinds (i) short term risks associated with storms, swells, reclamation pollution, etc., and (ii) long-term risks related to climate change, sea level rise, damming of the river, coastal protection measures, etc. Often, it is a mixture of these two effects. The region is characterized by relatively low land elevation, which leaves it severely exposed to rising sea levels. In addition, it suffers from local land subsidence, compounding the effects of rising seas.

Like other deltaic regions worldwide, the Nile Delta is subject to shoreline changes resulting from erosion and accretion, subsidence, and **sea level rise** resulting from climate change. Several studies indicated that a large percentage of the Nile Delta is directly vulnerable to inundation and saltwater intrusion that could drive millions from their homes[26].

According to the available information on past data series, the **coastal flood hazard** is classified as **high** in the project area and especially at Damietta. This means that potentially-damaging waves are expected to flood the coast at least once in the next 10 years. Based on this information, the impact of coastal flood **must be** considered in different phases of the project for any activities located near the coast. Project planning decisions, project design, and construction methods must take into account the level of coastal flood hazard. The following figure shows the hazard level of coastal flood in Damietta[27].

Coastal flood risk is likely to increase over the lifetime of the project as a result of the rise in sea level expected as a consequence of climate change.

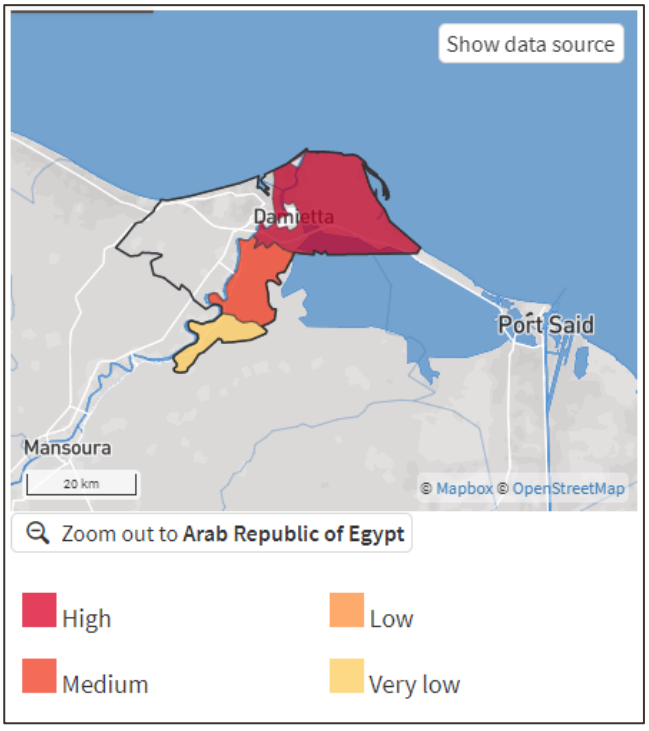


Figure 4-22: Hazard level of coastal flood in Damietta

[26] https://www.eeaa.gov.eg/portals/0/eeaaReports/CCRMP/7.%20CC%20Water%20Strategy/CC%20Final%20Submitted%208-March%202013%20AdptStrtgy.pdf
[27] https://thinkhazard.org/en/report/61517-arab-republic-of-egypt-damietta/CF

The Nile delta is characterized by the thick sedimentary cover gaining a bad impact because of the severe amplification of any seismic waves produced during any earthquake that could happen.

The potential **seismic risk** of the Nile delta is due to the amplification of the ground motion caused by the presence of soft basin sediments. The area recently suffered extensive damage and casualties due to a M 5.9 earthquake, occurred on 12 Oct. 1992, located 25 km southwest of Cairo (El-Sayed et al., 1998). The biggest losses were recorded in Cairo and the Nile delta basin. Several thousand people were killed or injured and thousands of buildings were totally collapsed and damaged[28].

4.1.1.13 Biological Environment

The project activities will be undertaken in the intensively cultivated, and densely populated The Nile Valley and Delta. The area has been inhabited since prehistoric times and its natural ecology has been almost totally obliterated by thousands of years of human activities. Agriculture and its associated irrigation and drainage infrastructure, as well as a vast and highly diverse multitude of life support systems and facilities for its millions of inhabitants have created man-made ecosystems that have been in place for thousands of years.

The railway line has been in place for more than a century and is already part of the man-made landscape of the Nile Valley and Delta. Although some wildlife and flora seem to utilize man-made microhabitats around the railway line, none of them seem to be obligate users, i.e. to require these microhabitats for its survival.

The following section will illustrate the different types of biological environment that exist in the project area.

According to Zahran and Willis (2009), the Nile system of Egypt includes a number of habitats formed and/or greatly influenced by the water of the River Nile. Accordingly, the following types of habitats were recognized in the project area:

- Aquatic habitat
- Canal bank habitat
- Cultivated lands
- Railways and road sides
- The northern lakes

4.1.1.14 Flora and Vegetation

Aquatic Vegetation:

The cultivated land is dissected by a complicated network of irrigation canals and drains. Major irrigation canals divide repeatedly to bring fresh water to every farm plot. Smaller drains collect excess irrigation water from farm plots and bring it to larger drains which release their water into the Brullus and Manzala lakes. The aquatic weeds of the Nile system of Egypt are made up of some 35 species of 19 genera of 15 families (Täckholm, 1974). The plants are either entirely submerged, free floating or their roots may penetrate the soil at the bottom of the stream. Some of these bottom-rooting plants have floating leaves. Free Floating include *Pistia stratiotes* (Figure 4-23) which presence in a limited area of the northern section of the Nile Delta, in calm and stagnant canals of Faraskur (about 20 km south of Damietta). *Eichhornia crassipes* is the worst aquatic weed in Egypt (Figure 4-24 and Figure 4-25). It is called the Nile Lily, Ward El-Nil or Water Hyacinth, *Azolla filiculoides*, *Lemna gibba* and *Wolffia hyalina* are common in the stagnant fresh and brackish waters. Floating species with roots penetrating the soil as

[28] Elsayed Fergany and Khaled Omar, "Liquefaction potential of Nile delta, Egypt, NRIAG Journal of Astronomy and Geophysics, Volume 6, Issue 1, 2017, Pages 60-67".

Jussiaea repens and *Nymphaea lotus*, which are common floating perennial herb, *Ottelia alismoides* and *Marselia aegyptiaca* were also recorded. Submerged plants include *Potamogeton nodosus, P. pectinatus, Ceratophyllum demersum, Rubia maritima, Najas pectinatus and Zannichellia palustris.*

In the swampy parts of reeds area some speicies grow near water e.g., *Agrostis semiverticillata*, *Alternanthera achyranthoides*, *Diplachne fusca*, *Echinochloa stagnina* and *Jussiaea repens*. *Cyperus alopecuroides* and *Typha domingensis*; or the plant grows in relatively deep water, e.g., *Cyperus articulatus* and *Phragmites australis*.

Figure 4-23: Pistia stratiotes

Figure 4-24: Eichhornia crassipes

From the site visit, it was observed from the below figure that the water Hyacinth has blocked the water canal and canal bank vegetation.

Figure 4-25: Water Hyacinth blocking the water canal and canal bank vegetation (31º23'27'' N and 31º42'20''E)

Canal Banks Vegetation:

The muddy and moist banks of irrigated canals and drains support the growth of hydrophilic species including tall reeds, trees, shrubs, under shrubs or herbs. Trees such as *Acacia nilotica*, *Ficus sycomorus, Eucalyptus australis, Morus alba, M. nigra, Salix safsaf, Tamarix* arborea and Ziziphus spina-christi, and undershrubs, herbs and grasses e.g., *Alhagi maurorum*, *Arundo donax*, *Chenopodium ambrosioides, Conyza dioscoridis, Cynodon dactylon, Desmostachya bipinnata*, Imperata cylindrica, Panicum maximum and *Suaeda vermiculata*. weed species, either perennials, e.g., *Cyperus laevigatus*

and Lippia nodiflora, or annuals, e.g., *Trifolium resupinatum.* The flora of the canal banks may also include *Ambrosia maritima, Andropogon annulatus, Coronopus niloticus, Eclipta alba, Ethulia conyzoides, Glinus lotoides, Gnaphalium pulvinatum, Potentilla supina, Urospermum picroides and Verbena supina.* Bassia indicais a richly branched herb which is one of the very common canal bank species, especially in the Nile Delta as shown in the following figures.

Figure 4-26: Trees and shrubs grows on canal banks

Figure 4-27: Trees and shrubs grows on canal banks

Cultivated lands:

The most common crop in permanently irrigated land during winter is wheat (Triticum vulgare). Other important crops include broad beans (*Vicia faba*) and Egyptian clover (*Trifolium alexandrinum*). During summer the main local cereal crop is maize (*Zea mays*) as shown in Figure 4-28 . It is customary to have an associate crop in the same field, namely cow-pea (*Vigna sinensis*). Cotton (*Gossypium*

barbadense) is cultivated on a larger scale in the Delta region. Rice (*Oryza sativa*) is cultivated on a large scale in Lower Egypt (Figure 4-29).

Figure 4-28: Zea mays (Maize) and vegetables cultivation (31º12'36''N, 31º33'28''E)

Figure 4-29: Oryza sativa (Rice) cultivation

Weed vegetation:

The weeds of the cultivated lands of The Nile Delta are mainly short-lived (ephemerals, annuals and biennials) herbs. Perennial herbs, under-shrubs and shrubs may also be present in certain neglected areas where the soil is affected by salt (with halophytes) or swampy (with helophytes).

Weeds of very common occurrence in the cultivated lands of winter crops *are Anagallis arvensis* (Figure 4-30), *Brassica nigra, Beta vulgaris (*Figure 4-31*), Emex spinosa, Medicago polymorpha, Chenopodium album, C. murale, Convolvulus arvensis, Euphorbia helioscopia, E. peplus, Melilotus indica* (Figure 4-32)*, Polypogon monspeliensis, Sonchus oleraceus, Urospermum picroides* (Figure 4-33)*, Cichorium endivia Phalaris paradoxa, Polypogon monospeliensis, Rumex dentatus and Trifolium resupinatum.*

Figure 4-30: Anagallis arvensis

Figure 4-31: Beta vulgaris

Figure 4-32: Melilotus indicus

Figure 4-33: Urospermum picroides

The very common weeds in summer crops include Hebiscus trionum (Figure 4-34), Dinebra retroflexa, Amaranthus hybridus, A. viridis (Figure 4-35), Convolvulus arvensis, Corchorus olitorius, Cynodon dactylon, Portulaca oleracea, Solanum nigrum, Sonchus oleraceus Cyperus rotundus. Less common weeds of summer crops include Cichorium pumilum, Dactyloctenium aegyptium, Eragrostis pilosa, Gynandropsis gynandra, Urochloa reptans and Xanthium brasilicum.

Figure 4-34: Hebiscus trionum

Figure 4-35: Amaranthus viridis

The rice fields, mainly in the Nile Delta, are characterized by a weed flora many of which are helophytes, e.g., Carex divisa, Cyperus alopecuroides (C. dives), C. articulatus, C. difformis, C. longus, Diplachne fusca, Echinochloa colona, E. crus-galli, E. stagnina, Foeniculum vulgare, Lythrum junceum, Paspalidium obtusifolium, Polygonum lanigerum, Scirpus fistulosus and S. supinus along with Alternanthera sessilis, Ammania baccifera and Bergia capensis.

The weed communities of the inland date palm orchards of Aga-Mansoura area (El Halawany, 2000) comprise indicator species, which are characteristic to weed assemblages of crop plants, viz. Ammi majus, Solanum nigrum, Urtica urens, Euphorbia peplus, Dinebra retroflexa, etc. The weed communities with common occurrences in the well-maintained and neglected orchards are dominated by herbaceous grasses such as Lolium perenne or Polypogon monospeliensis. The well-maintained orchards are dominated by annual herbs such as Chenopodium murale or Rumex dentatus. In the newly reclaimed cultivated lands of the Nile Delta, other species have been recorded, e.g., Andrachne racemosa, Physalis angulata, Striga asiatica and Tagetes minuta.

Railways and roadsides:

Three plant communities dominated by Desmostachya bipinnata (Figure 4-36), Pluchea dioscoridis, Alhagi graecorum (Figure 4-37), Pharagmites australis (Figure 4-38) and Bassia indica (Figure 4-39), are characterized the railways and roadsides inside the Nile Delta. The common associates of Imprata cylindica, Leersia hexandra, Arundo donax, Chenopodium murale, and Cynodon Dactylon.

Figure 4-36: Desmostachya bipinnata community

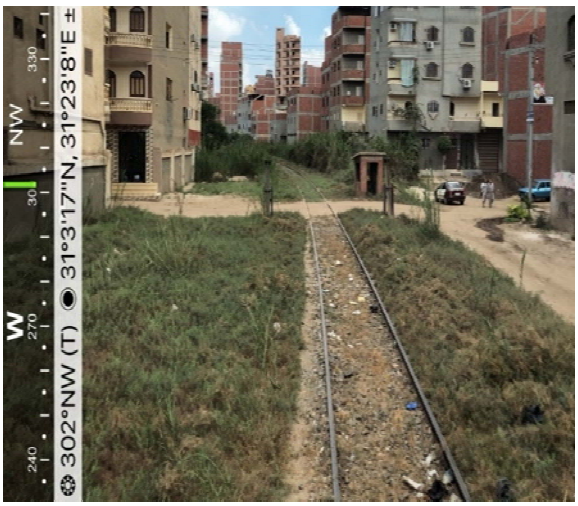


Figure 4-37: Alhagi graecorum community

Figure 4-38: Pharagmites australis community

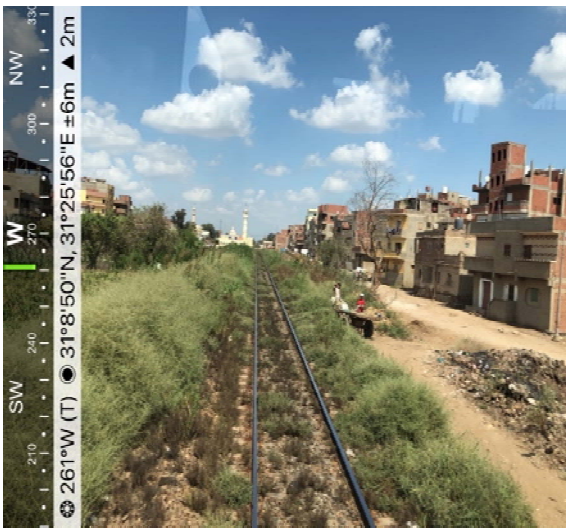


Figure 4-39: Bassia indica community

The Northern Lakes:

According to Zahran et al. (1989), the islands of Lake Manzala are characterized by tracts of land which are converted into salinas as a result of the evaporation of water seeped from the lake. The vegetation of these islands, essentially halophytic, is described in seven communities dominated by *Phragmites australis* (Figure 4-40), *Juncus acutus* (Figure 4-41), *J. rigidus, Arthrocnemum macrostachyum, Atriplex portulacoides, Halocnemum strobilaceum and Zygophyllum aegyptium.The common associates include Inula crithmoides, Sarcocornia fruticosa, Atriplex portulacoides, Carex extensa, Cressa cretica, Conyza dioscoridis, Cyperus laevigatus, Juncus bufonius, Paspalidium geminatum, Scirpus tuberosus, Suaeda pruinosa, S. salsa and Tamarix nilotica. Halocnemum strobilaceum, Sporobolus virginicus and Suaeda pruinose, Cyperus laevigatus, Frankenia hirsuta, Scirpus tuberosus, Frankenia hirsuta, Kochia indica, Sporobolus virginicus, Tamarix nilotica and Zygophyllum aegyptium.*

Figure 4-40: Pharagmites australis

Figure 4-41: Juncus acutus

According to Montasir (1937), the hydrophytes commonly growing in the water of Lake Manzala include *Ceratophyllum demersum* (Figure 4-42), *Eichhornia crasssipes, Lemna spp. and Potamogeton crispus.* However, Khedr (1989) states that apart from the dominant *"reeds" (Phragmites australis and Typha domingensis),* the water habitat of Lake Manzala is characterized by five dominant hydrophytes *(Eichhornia crassipes, Jussiaea repens, Najas armata, Potamogeton pectinatus and Ruppia maritima)* and four associates *(Ceratophyllum demersum, Lemna gibba, Spirodela polyrhiza* (Figure 4-43) *and Potamogeton crispus). Chara sp.* is also commonly present.

Figure 4-42: Ceratophyllum demersum

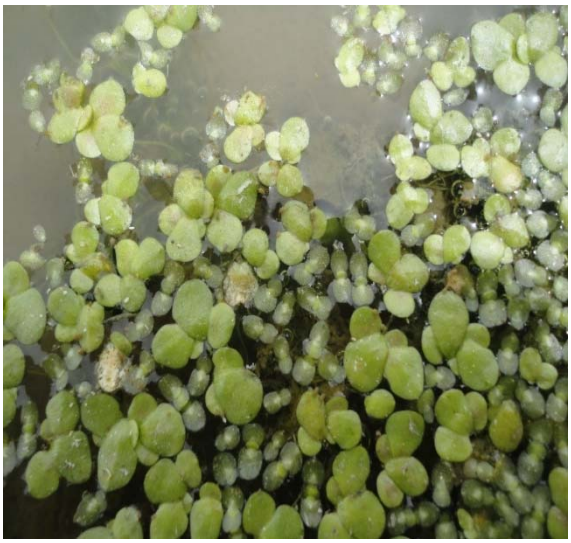


Figure 4-43: Spirodela polyrhiza

4.1.1.15 Fauna

Domestic animals:

In agriculture, grazing is a method of animal husbandry whereby domestic livestock are allowed to consume wild vegetation outdoors in order to convert grass and other forages into meat, milk, wool and other animal products, often on land unsuitable for arable farming. Domestic animals in the area are mainly cows and sheep. Other animals such as goats, donkeys and camels are also present.

Figure 4-44: Grazing of Cows on agriculture remains and canal bank vegetation

Figure 4-45: Sheep grazing on wild canal bank vegetation

Mammals:

Mammals that inhabit the region are either commensal or able to tolerate human activities. The Nile Rat (*Arvicanthis niloticus*) (Figure 4-46) and House Mouse (*Mus musculus*) are common in the region together with Long-eared Hedghoge (*Hemiechinus auratus*) (Figure 4-47) and the Egyptian Red Fox (*Vulpes vulpes*) (Figure 4-48). The wild*cat* (*Felis sylvestris*) and Weasel (*Mustela nivalis*) (Figure 4-49) which is found in Cairo and Alexandria.

Figure 4-46: The Nile Rat (Avicanthis niloticus)

Figure 4-47: Long-eared Hedghoge (Hemiechinus auratus)

Figure 4-48: The Egyptian Red Fox (Vulpes vulpes)

Figure 4-49: Weasel (Mustela nivalis)

The following table a list of mammals in the area.

Table 4-78: Common mammals in the area (after Osborn and Helmy 1980; Wassif 1995; Hoath 2003)

Latin Name	English Name	Family
Hemiechinus auritus	Long-eared Hedgehog	Erinaceidae
Crocidura olivieri	Greater Red Musk threw	Soricidae
Rousettus aegyptiacus	Egyptian Fruit Bat	Pteropodidae
Pipistrellus kuhlii	Kuhl's Pipistrelle	Vespertilionidae
Nycteris thebaica	Egyptian slit-faced Bat	Nycteridae
Acomys chairinus	Egyptian spiny mouse	Muridae
Arvicanthis niloticas	The Nile Rat	Muridae
Gerbillus andersoni	Anderson's Gerbil	Muridea
Mus musculus	House Mouse	Muridea
Rattus norvegicus	Brown Rat	Muridídea
Rattus	Black Rat	Muridea
Canis aureaus	Golden jackal	Canidea
Vulpes Canidae	Egyptian red fox	Canidea
Felis sylvestris	Wild Cat	Felidea
Herpestes ichneumon	Egyptian Mongoose	Herpestidea
Mustela nivalis	Egyptian weasel	Mustelidea

Reptiles:

Among the reptiles that inhabit this area are the African Beauty Snake (*Psammophis sibilans*) (Figure 4-50), Tessellated Water Snake (*Natrix tessellata*) (Figure 4-51) which is common in streams and irrigation canals of the Delta. The Ocellated Skink (*Chalcides ocellatus*). Bosc's Lizard (Acanthodactylus *boskianus*) (Figure 4-52) and Common Chamaeleon (*Chamaeleo chamaeleon*) (Figure 4-53) are fairly common. Several amphibians are also found in the region, most commonly the Square-marked Toad (Bufo *regularis*) (Figure 4-54) which can be heard calling in urban gardens everywhere. The endangered marine turtle—Caretta regulars (EN) is known to breed locally in the lakes.

Figure 4-50: Tessellated Water Snake (Natrix tessellate)

Figure 4-51: African Beauty Snake (Psammophis sibilans)

Figure 4-52: Bosc's Lizard (Acanthodactylus boskianus)

Figure 4-53: Common Chamaeleon (Chamaeleo chamaeleon)

Figure 4-54: Egyptian Square Marked Toad (Bufo regularis)

A list of reptiles and amphibians reported in the region are shown in the following table.

Table 4-79: Common reptiles in the region (after Marx 1968; Saleh 1997; Bahaa El-Din 2006).

Latin name	English name	Family
Reptiles		
Hemidactylus tarcicus	Turkish Gecko	Gekkonidae
Tarentola annularis	Egyptian Gecko	Gekkonidae
Trapelus pallida	Pale Agama	Agamidae
Trapelus flavimaculatus	Savigny's Agama	Agamidae
Acanthodactylus boskianus	Bosc's Lizard	Lacertidae
Acanthodactylus pardalis	Egyptian Leopard Lizard	Lacertidae
Mesalina rubropunctat	Red-Spotted Lizard	Lacertidae

Chalcides ocellatus	Ocellated Skink	Scincidae
Sphenops sepsoides	Audouin's Sand-Skink	Scincidae
Mabuya quinquetaeniata	Bean Skink	Scincidae
Chamaeleo chamaeleon	Common Chamaeleon	Chamealeonidae
Coluber florulentus	Flowered Snake	Colubridae
Malpolon monspessulanus	Montpelier Snake	Colubridae
Psammophis schokari	Schokari Sand Snake	Colubridae
Psammophis sibilans	African Beauty Snake	Colubridae
Natrix tessellata	Tessellated Water Snake	Colubridae
Caretta scholar	Loggerhead Turtle	Cheloniidae
Chelonia mydas	Green Turtle	Cheloniidae
Amphibians		
Bufo regularis	Egyptian Square Marked Toad	Bufonidae
Bufo virdis	Green Toad	Bufonidae
Rana mascareniensis	Common Mascerene Frog	Ptychadenidae

Insects and other invertebrates

Common insects found in the area are Beetles, Butterflies, Dragonflies, dense flies, Ants, wasps and bees along with common insects associated with agricultural lands such as lady bug (*coccinella* sp.) (Figure 4-55), Mole cricket (*Gryllotalpa Gryllotalpa*) (Figure 4-56), the Gaint Water Bug (*Belostoma flumineum*), (Figure 4-57) and *Gryllus bimaculatus* Cricket (Figure 4-58).

Figure 4-55: ladybug (coccinella sp.)

Figure 4-56: Mole cricket (Gryllotalpa Gryllotalpa)

Figure 4-57: Gaint Water Bug (Belostoma flumineum)

Figure 4-58: Gryllus bimaculatus Cricket

Birds:

The most common avian species in the Nile Delta are namely: House sparrow (*Passer domesticus*); Cattle erget (*Bubulcus ibis*); Graceful warbler (*Prinia gracilis*) Hooded crow (*Corvus corone cornix*); Swallow, *Hirundo rustica*, Yellow wagtail (*Motacilla flava*); Common bulbul (*Pycnonotus babatus*); Laughing dove (*Streptopelia senegalensis*); Rock dove (*Columba livia*); Little egret (*Egretta garzetta*); Pied kingfisher (*Ceryle rudis*); Kestrel (*Falco tinnunculus*); Spur-winged plover (*Hoplopterus spenosus*); Moorhen (*Gallinula chloropus*); Senegal coucal (*Centropus senegalensis*) and Hoopoe (*Upupa epops).*

Water birds winter here in the Delta, including the world's largest concentrations of little gull (*Larus minutus*) and whiskered tern (*Chlidonias hybrida*) in Lake Manzala (Baha El Din, 1999).

Figure 4-59: House sparrow (Passer domesticus)

Figure 4-60: Cattle erget (Bubulcus ibis)

Figure 4-61: Hooded crow (Corvus corone cornix)

Figure 4-62: Laughing dove (Streptopelia senegalensis)

Figure 4-63: Hoopoe (Upupa epops)

Figure 4-64: Little gull (Larus minutus)

The following table shows common birds from the Nile Delta.

Table 4-80: Common birds from the Nile Delta (Tharwat 1997; Baha El Din 1999, 2006; Porter and Cottridge 2001).

Latin Name	English Name	Family
Burhinus senegalensis	Senegal thick-knee	Burhinidae
Limicola falcinellus	Broad-billed Sandpiper	Scolopacidae
Phylloscorpus collybita	Chiffchaff	Sylviidae
Acrocephalus stentoreus	Clamorous Reed Warbler	Sylviidae
Glareola pratincola	Collared Pratincole	Glareolidae
Tadorna adorn	Common Shelduck	Anatidae
Fulica atra art	Coot	Rallidae
Phalacrocorax carbo	Cormorant	Phalacrocoracidae
Calidris ferruginea	Curlew Sandpiper	Scolopacidae
Calidris alpina alpine	Dunlin	Scolopacidae
Caprimulgus aegyptius	Egyptian Nightjar	Caprimulgidae
Aytha nyroca	Ferruginous Duck	Anatidae
Prinia gracillis deltae	Graceful Warbler	Sylviidae
Larus ichthyaetus	Great Black-headed Gull	Laridae
Egretta alba ichthyses	Great White Egret	Ardeidae
Ardea cinerea Area	Grey Heron	Ardeidae
Pluvialis squatarola	Grey Plover	Charadriidae
Circus cyaneus canes	Hen Harrier	Accipitridae
Corvus corone cornix	Hooded Crow	Corvidae
Upupa epops	Common Hoopoe	Upupidae
Passer domesticus niloticus	House Sparrow	Passeridae
Charadrius alexandrines	Kentish Plover	Charadriidae
Vanellus Vanillas	Lapwing	Charadriidae
Ixobruchus minutus	Little Bittern	Ardeidae
Larus minutus	Little Gull	Laridae
Egretta garzetta	Little Egret	Ardeidae

Latin Name	English Name	Family
Bubulcus ibis	Cattle Erget	Ardeidae
Calidris minuta	Little Stint	Scolopacidae
Sterna albifrons	Little Tern	Laridae
Marmaronetta angustirostris	Marbled Duck	Anatidae
Falco columbarius aesalon	Merlin	Pandionidae
Gallinula chloropus	Moorhen	Rallidae
Streptopelia senegalensis	Laughing Dove	Columbidae
Columba livia	Rock Dove	Columbidae
Recurvirostra avosetta	Pied Avocet	Recurvirostridae
Ceryle rudis avocets	Pied Kingfisher	Alcedinidae
Prinia gracilis	Graceful Warbler	Cistiicolidae
Aythya ferina	Pochard	Anatidae
Porphyrio madagascariensis	Purple Gallinule	Rallidae
Tringa totanus tetanus	Redshank	Scolopacidae
Philomacus pugnax	Ruff	Scolopacidae
Centropus senegalensis	Senegal Coucal	Cuculidae
Anas clypeata	Shoveler	Anatidae
Larus genei	Slender-Billed Gull	Laridae
Hoplopterus spinosusb	Spur-Winged Plover	Charadriidae
Ardeola ralloides	Squacco Heron	Ardeidae
Chlidonias hybrida Stucco	Whiskered Tern	Laridae
Pycnonotus barbatus	Common Bulbul	Pycnonotidae
Motacilla flava	Yellow Wagtail	Motacillidae
Motacilla alba Motacillid	White Wagtail	Motacillidae

4.1.1.16 Rare and endangered species:

The Nile Delta of Egypt contains a considerable number of rare and endangered species e.g *Cyperus papyrus* and *Nymphaea lotus* are among the endangered plants of the area and *Pistia stratiodes* and *Otttelia alsinoides* are described as least concern (El Hadidi and Hosni, 2000). The endangered marine turtles - *Caretta area* are known to breed locally in the lakes. This area has suffered in recent past more than almost any other in Egypt from unregulated building and habitat destruction.

Common birds, such as the house sparrow and other common species were also observed. Stray dogs and cats can be found along the line, especially in urban areas, as they are attracted to municipal solid waste that is dumped alongside the railway line.

During the site visit, common species of plants were observed growing alongside the tracks. Willow trees, palms, heath, and other species of plants that are edible tress. Groups of cows were observed on one track side also.

4.1.1.17 Protected Areas

There are 30 protected areas all over Egypt. The following figure shows their locations. According to law 102/1983, the area of the project is not defined as a protected area. The nearest protected areas to the project site are Ashtum El Gamil protected area to the East (31°13′ N-32°19′ E) and El Burullus protected area to the West (31°30′ N-30°50′ E) which are not affected by the project activities.

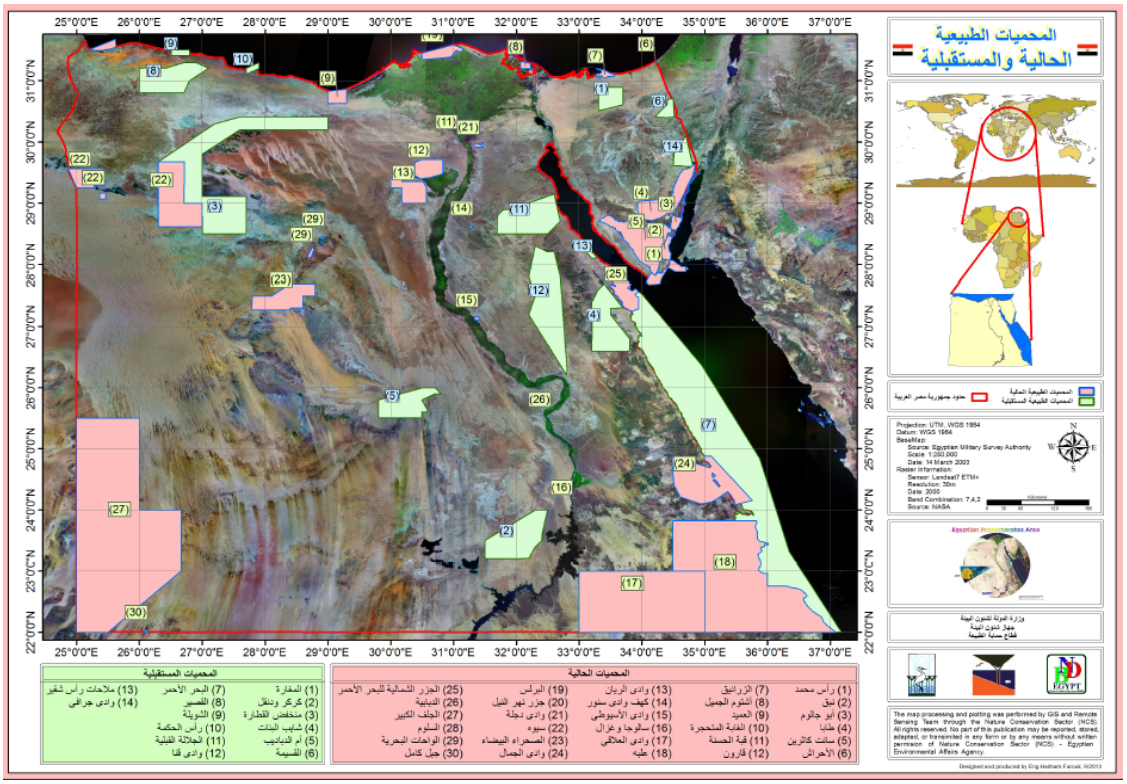


Figure 4-65: Location of all protected areas in Egypt

The nearest protected areas to the railway line are: Ashtum El-Gamel protected areas and El-Burullus protected areas .

The distance between the railway line and Ashtum El-Gamel protected areas is 35 Kilo-meters while the distance between the railway line and El-Burullus protected areas is 55 Kilo-meters as shown in the below figure.

Figure 4-66: Distance between the railway line and the nearest protected areas

4.1.1.18 Waste Management and General Housekeeping

As observed during the site visits, random dumping and accumulation of municipal waste (garbage) from houses and shops on and around both sides of the railway corridor were observed during site visits conducted by the study team. This results in a disagreeable visual impact to workers, as well as to the people living in the surrounding areas.

People sometimes dispose of their accumulated waste by open burning, disregarding the negative effect on the quality of air surrounding them. This negligent practice of open burning of waste releases toxic pollutants, especially if plastics are among the waste streams, representing a major health risk to surrounding people.

Figure 4-67 Dumping of waste on and around the railway corridor

Accumulation and disposal of organic wastes (food residuals) also results in potential impacts on the health and hygiene of both the general public and on-site workers, by attracting vermin to the site, such as birds, rodents or insects, which can act as disease vectors. This results in the spreading of disease and the disruption of the natural ecosystem. Odor may also be generated following long periods of accumulation, due to the decomposition of some organic wastes, thereby becoming an annoyance to both the general public and on-site workers.

It is to be noted that many parts along the track in both routes already suffer from waste accumulation. Soil leaching may occur in areas where accumulated waste is in direct contact with the soil, leading to a direct impact on the quality of groundwater.

The local administration units are the responsible entities to prevent waste accumulation inside the railway corridor and monitoring it. ENR should communicate with the local administration units with regard to this matter.

Figure 4-68 Random dumping of municipal waste inside the railway corridor

Figure 4-69 Open burnings of waste inside the railway corridor

4.2 Social Baseline

This section contains a description of the baseline socio-cultural characteristics of the social environment at the proposed project area. Existing baseline socioeconomic conditions were assessed through a desk-based study based on a combination of both primary resources reviewed including

statistical data and secondary data collected from the field. This section will highlight the following: basic information about the project areas; administrative areas; demographic characteristics and human development profile; access to basic services; health profile, economic characteristics, Archaeology and cultural heritage.

The project's area of influence includes three administrative areas belonging to three different Governorates: Gharbia, Dakahlia, and Damietta.

4.2.1 General Background

The railway route extends for 119 km from Tanta to Damietta and runs through three Governorates: Gharbia, Dakahlia, and Damietta. The first part of the route, between Tanta and El-Mansoura, consists of a 54-km non-electrified, double-track line, containing 16 stations.

The section between El Mansoura and Damietta consists of a 65-Km non-electrified, single-track line containing 19 stations. Both sections support mixed traffic of passengers and freight. There are 34 stations in the line, because El Mansoura Station is counted in both sections.

- **Gharbia Governorate**

Gharbia Governorate is in the middle of the Delta region, between Damietta and Rosetta branches. It is bordered by Kafr El Sheikh Governorate in the North, by Monufia Governorate in the South, by Dakahlia Governorate in the East, and by Beheira Governorate in the West.

The Governorate's total area is 1942.30 km2, forming 0.2% of the country's total area. It is divided into 8 cities (Markaz[29]), 4 districts, and 69 rural local units with 252 affiliated villages (Source: Gharbia Governorate, Information Center, 2019).

The railway passes through three Markaz in Gharbia Governorate: Tanta, El Mahalla El Kobra, and Samannoud, the railway serves many of the villages affiliated of these Markaz.

29 Markaz. In the administrative division of Egypt, the Markaz is the main city or village followed by a group of villages in agricultural areas (not urban), and often the most important city is a Markaz for a total of villages. The Markaz has more commercial markets than villages, and there may also be branches of government service institutions and agencies serving villages. Each Governorate of the Delta includes a number of Markaz, Cities and villages.

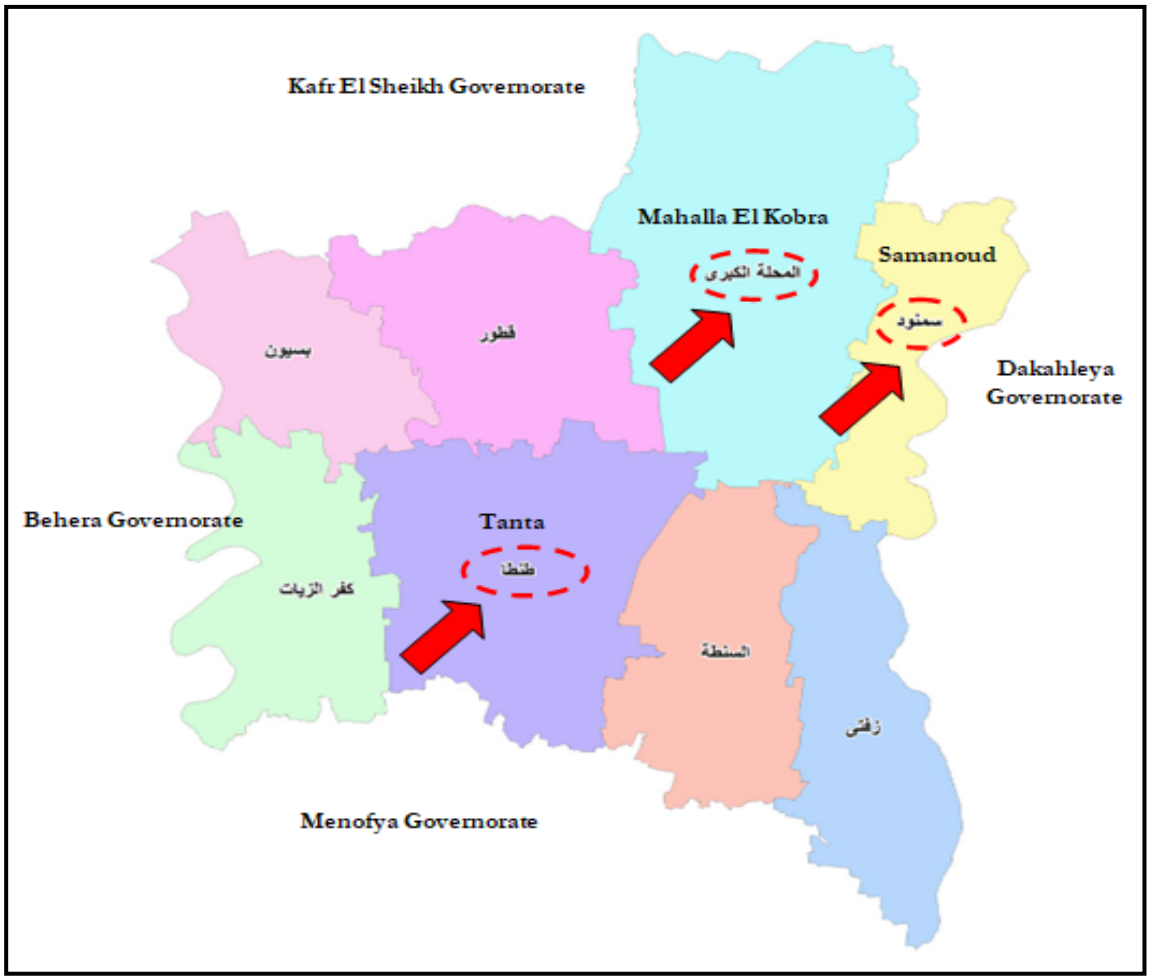


Figure 4-70-Qdministrative units and borders of Gharbia Governorate. The Cities and Markaz which the railway passes through

(Source: General Authority for physical Planning, Gharbia Governorate, 2018)

Gharbia Governorate is renowned for traditional crops such as cotton, rice, wheat, beans, maize and fruits, in addition to Jasmine, medical herbs and plants, of which, extracts and pastes are exported to Europe. The Governorate is also renowned for growing potatoes for export and local market. Gharbia is a lead Governorate in livestock and poultry breeding. In the industrial field, it hosts large industries including spinning and weaving, in locations such as El Mahalla El Kubra, Tanta, and Zefta. Kafr El Zayaat also hosts industries of oils, soaps, fertilizers, pesticides, chemicals, and paper as well as fragrances in Qutur (Source: Gharbia Governorate, Egypt Description by Information, 2017).

- **Dakahlia Governorate**

Dakahlia Governorate, the oldest among Egypt's Governorates, is located in the Delta region. It had been named after Dakahlia Village, which is currently in Markaz Zarqah, Damietta Governorate. It forms the base of the Nile Delta. It is bordered by Sharqia Governorate to the east and by Gharbia and Kafr El Sheikh Governorates to the west. Dakahlia is bordered by the Mediterranean Sea, Damietta and Port Said to the north, and by Qalyubia to the south.

The Governorate's total area is 3538.23 km2, comprising 0.4% of Egypt’s total area. Dakahlia Governorate is divided into 16 Markaz, 19 cities, two districts, and 120 rural local units, with 366 affiliated

villages, In addition to 1790 Sheikhs[30] and Hamlets (Azab[31]) (Source: Dakahlia Governorate, Egypt Description by Information, 2017).

The railway passes through three Markaz in Dakahlia Governorate: El Mansoura, Talka, and Shirbin. The railway serves many of the villages affiliated with these Markaz.

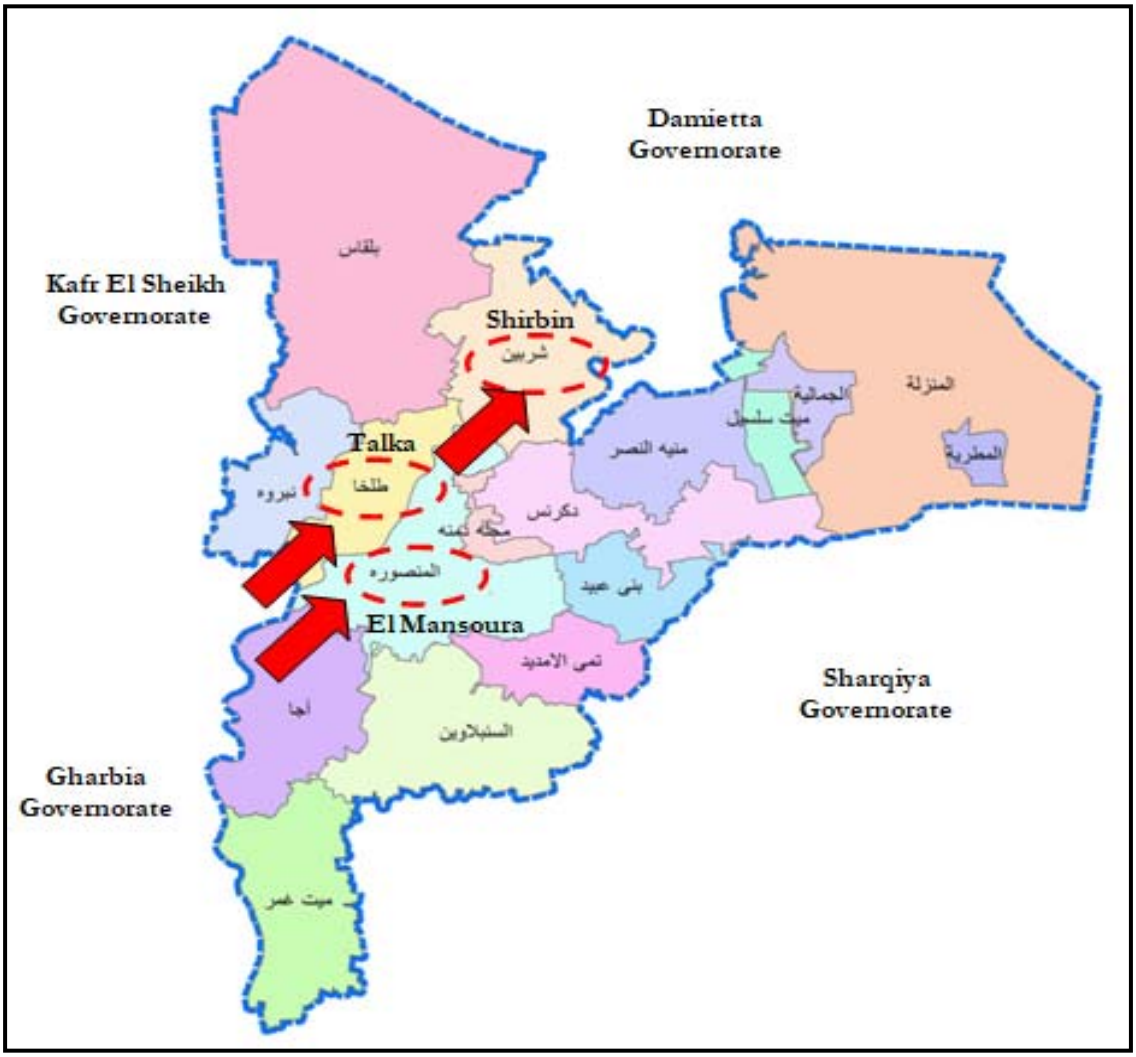


Figure 4-71- Administrative units and borders of Dakahlia Governorate; the cities and Markaz which the railway passes through

(Source: General Authority for physical Planning, Dakahlia Governorate, 2018)

Dakahlia serves as the base of the rich Nile Delta triangle, and ranks among the prime agricultural Governorates; it is blessed with abundant water and fish resources. Dakahlia is also famous for the production of meat, poultry and dairy products. Furthermore, the Governorate hosts major industrial facilities, spreading throughout its territory, and is well-renowned for its large-scale, diversified

30 Sheikh is an administrative division of urban areas only, used for a limited residential community.
31 Azab is a term used for a limited residential community in the middle or on the edge of the farmland. Azab is different from village in terms of size, shape and population. In terms of shape, it is usually unplanned and its size is as small as 20 houses, and its population usually is no more than 3,000 persons. The term "Azab" is used in administrative division only in rural areas.

industries, chiefly chemicals, spinning and textiles, garments, hydrogenated oils, soap, rice milling, grain mills, cotton ginning, and milk, alongside printing and publishing. In addition, small and indigenous industries are common in villages and hamlets (Source: Dakahlia Governorate, Egypt Description by Information, 2017).

- **Damietta Governorate**

Damietta Governorate is located in the north of the Delta, 15 km from the mouth of the river on the Mediterranean Sea. The Governorate is divided by the Nile River (Damietta Branch) to two parts; bordered to the north by the Mediterranean Sea; to the east by Manzala Lake, and to the south and west by the Delta farmlands.

Damietta's total area comes to 910.30 km2, constituting 0.1% of the country's total area, and is divided into five precincts (Markaz), 10 cities, and 47 rural local units, with 33 affiliated villages (Source: Damietta Governorate, Information Center, 2019).

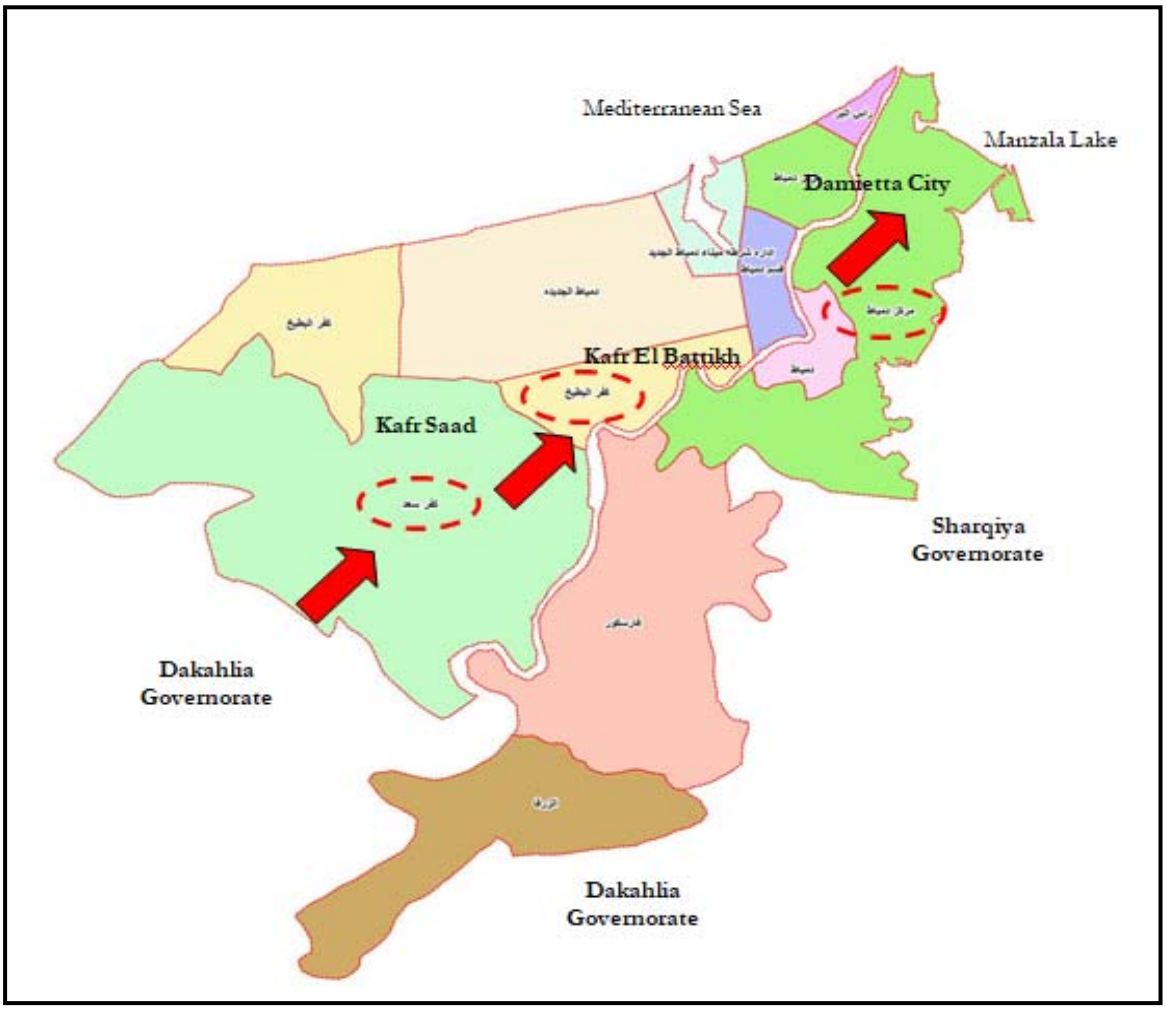


Figure 4-72- Administrative units and borders of Damietta Governorate. The Cities and Markaz through which the railway passes through

(Source: General Authority for physical Planning, Damietta Governorate, 2018)

The railway passes through three Markaz in Damietta Governorate: Kafr Saad, Kafr El Battik, and Damietta City, the railway serves many of the villages affiliated with these markaz.

The Governorate is signally distinct for its handicraft industries, including furniture carpentry, dairy products, shoes, sweets, as well as large-scale industries, such as spinning and weaving, fish processing, oils and soaps, compressed wood, rice mills and wheat grinder. The Governorate is home to a fishing fleet that constitutes a sizeable percentage of the entire national fishing fleet. Damietta is also home to a number of shipbuilding yards (Source: Damietta Governorate, Egypt Description by Information, 2017).

4.2.2 Demographic characteristics

4.2.2.1 Total Population

The following table presents the population of the three Governorates (Gharbia, Dakahlia, and Damietta) through which the railway passes. The railway will penetrate residential areas and farmlands in the surrounding villages.

The following table shows the total population in the study areas.

Table 4-81-Distribution of the number of households according to gender at Governorate and district level

Area	Number of Households	Population		Total Population
		Male	Female	
Gharbia Governorate	925,858	2,555,474	2,444,159	4,999,633
Tanta District	161,779	356,079	336,336	692,415
Al Santa District	113,907	249,437	238,088	487,525
Zefty District	101,449	224,656	209,546	434,202
Samnud District	94,684	206,151	199,095	405,246
Al Mahala Al Kobra District	187,438	408,704	393,530	802,234
Qutoor District	80,209	177,228	166,067	343,295
Bassyun District	70,547	155,074	146,866	301,940
Kafr El Zayat	108,276	235,615	227,808	463,423
Dakahlia Governorate	1,668,374	3,302,847	3,189,534	6,492,381
Mansoura District	139,151	318,956	307,225	626,181
Aga District	120,875	276,200	267,738	543,938
Meet Ghamr District	148,540	341,921	326,510	668,431
Al Sanbillion District	127,877	290,715	284,730	575,445
Tamy El Amdeed District	44,476	100,840	99,303	200,143
Bani Abeed District	29,737	68,173	65,643	133,816
Mahala Damna District	14,049	32,117	31,104	63,221
Dakrens District	79,871	182,113	177,309	359,422
Minya Al Nasr District	60,408	138,599	133,238	271,837
Meet Salseel District	16,746	38,083	37,275	75,358
Al Gamaleya District	31,600	72,757	69,446	142,203
Al Manzila District	91,567	188,403	178,649	367,052
Shirbeen District	96,292	219,030	214,286	433,316
Talkha District	88,581	201,568	197,047	398,615
Nabrawa District	63,754	146,718	140,174	286,892
Bolkas District	119,820	275,082	264,107	539,189
Damietta Governorate	380,553	782,594	739,617	1,522,211
Farsko District	52,153	133,718	127,047	260,765
Al Azrak District	28,827	73,293	70,843	144,136
Kafr Saad District	53,808	137,141	131,897	269,038

Area	Number of Households	Population		Total Population
		Male	Female	
Kafr El Batikh	27,103	70,120	65,394	135,514

Source: CAPMAS, Census of Population Activities of the Governorates of the Arab Republic of Egypt, 2018.

These Governorates are characterized by an increase in their populations. The rural population outnumbers the urban populations, in addition to the annual increase rates. The services are concentrated in cities and Markaz, rather than in villages.

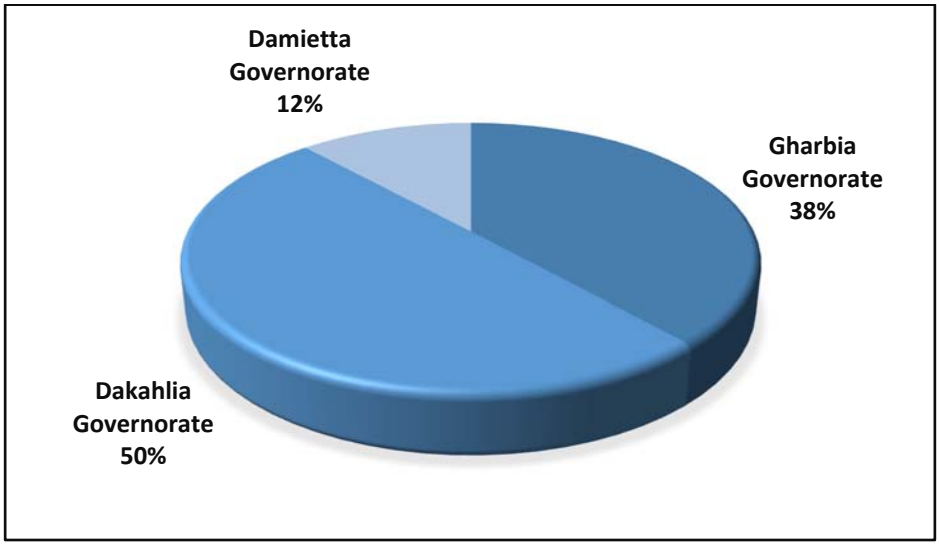


Figure 4-73 Percentage distribution of the population in the three Governorates

4.2.2.2 Age and Gender Distribution

Figures from CAPMAS Statistical Yearbook 2017/2018 indicate that the project area's population is predominantly young. Based on data from the 2017 Population Census, between 63.7% and 68.5% of the population in the three Governorates is below 45 years of age.

With respect to gender, statistical data shows that the female population is slightly lower than male population in the three Governorates.

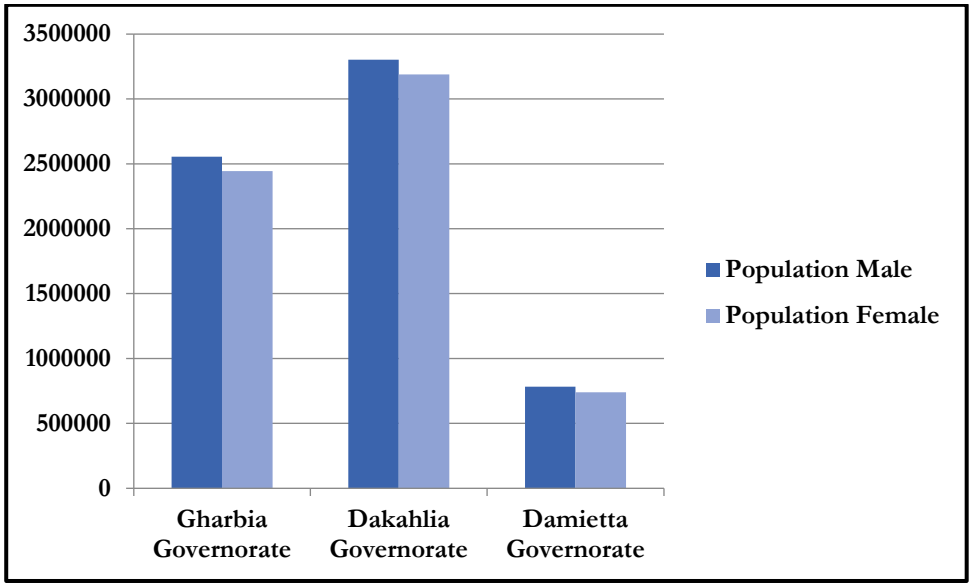


Figure 4-74-Male-Female population ratio in the project area

4.2.2.3 Growth Rate

The following table provides data on natural growth rates in the three Governorates (Gharbia, Dakahlia and Damietta). In addition, the table displays the percentage of each Governorate's population out of the total population of the Arab Republic of Egypt.

Table 4-82- Growth rate in project areas

Item	Unit	Area		
		Gharbia Governorate	Dakahlia Governorate	Damietta Governorate
The population to total population nationwide	%	5.4%	6.6%	1.8%
Population natural growth rate	Person	22.50	22.80	22.60
Birth rate	Live Birth/ Thousand Persons	29.20	29.50	30
Mortality rate	Dead Person/ Thousand Person	6.70	6.62	7

Source: CAPMAS Population Data, 2018.

4.2.2.4 Poverty Index

According to the Poverty Mapping introduced by CAPMAS in 2018, the percentage of poor people in the project areas is limited, and the majority of households in the project areas are not below the poverty line.

Table 4-83-Poverty index in Project Areas

Area	Percentage of Poor People
Gharbia Governorate	9.7%
Dakahlia Governorate	13.8%
Damietta Governorate	14.3%

Source: CAPMAS, Income and Spending Research Data 2017/2018.

The poverty rate in Gharbia was the second lowest nationwide, after Port Said Governorate.

4.2.2.5 Urban vs. Rural Population Breakdown

The vast majority of the population in Gharbia, Dakahlia and Damietta Governorates reside in rural areas, nearly doubling the urban population in the three Governorates.

Table 4-84- Urban vs. Rural Population Breakdown

Area	Urban	Rural
Gharbia Governorate	1,471,592	3,633,042
Dakahlia Governorate	1,925,919	4,700,516
Damietta Governorate	606,690	920,499

Source: CAPMAS, 2018

4.2.2.6 Household Size and Density

A household is defined as “Family (and non-family) members who share residence and livelihood and operate as one social and economic unit”.

Table 4-85-The average family size and density rate in Project Areas

Area	Average Family Size	Density Rate
Gharbia Governorate	4.28 persons	1.29 per room
Dakahlia Governorate	4.50 persons	1.70 per room
Damietta Governorate	5 persons	2.03 per room

Source: CAPMAS, Income and spending research data 2017/ 2018.

4.2.3 Services and facilities

4.2.3.1 Access to Electricity

The national grid provides access to electricity to 99% of Upper Egypt’s Governorates (Egyptian Human Development Report 2010). Even squatter areas have access to electricity, regardless of their illegality. The South and North Delta Electricity Distribution Companies serve a number of Governorates including Gharbia, Dakahlia and Damietta.

The following table shows access to electricity data in the project areas.

Table 4-86-Access to Electricity in project areas

Item	Unit	Value		
		Gharbia Governorate	Dakahlia Governorate	Damietta Governorate
Total electricity consumption	Million k.w.h yearly	4,193.78	6,133.06	1,935.44
Electricity consumption for lighting	Million k.w.h yearly	3,513.51	5,624.98	1,684.46
Electricity consumption for industrial utilization	Million k.w.h yearly	680.27	508.08	250.98
No. of subscribers in the electrical grid	Thousand subscribers	1,649.68	1,937.07	581.74
Per capita share of electricity used for lighting	k.w.h yearly/ Person	772.77	988.21	1,325.10

Source: Egypt Description by Information, 2017

4.2.3.2 Access to potable water and sanitation

The project areas in the three Governorates have access to potable water from the public network, but not all have public sewer connections, some villages suffer from a lack of sanitation, they depend on the agricultural banks as well as tanks.

The following table shows the data of access to potable water and sanitation in the project areas

Table 4-87-Access to potable water and sanitation project areas

Item	Unit	Value		
		Gharbia Governorate	Dakahlia Governorate	Damietta Governorate
Potable water production	Thousand m^3 /Day	779.91	1276.05	505.46
Potable water consumption	Thousand m^3 /Day	677.13	1020.55	355.20
Per capita water consumption	Liter. day/ Person	148.93	179.29	279.42
Sanitation capacity	Thousand m^3 /Day	360.05	415.74	248.99
Per capita sanitation capacity	Liter. day/ Person	79.19	73.04	195.89
Total capacity of sanitary drainage treatment plants	Thousand m^3/ day	491.0	415.74	317.60
Actual capacity of total capacities of sanitary drainage treatment plants	%	73.34%	71.62	78.40
Ration of potable water consumption to average produced water	%	86.82	79.98	70.27

Source: Egypt Description by Information, 2017

4.2.3.3 Health

Health data in Gharbia, Dakahlia and Damietta Governorates confirms that the health profile of each of them is free of the following:

- Endemic diseases

- Infectious diseases
- Diseases related to water and air quality

The data explained that the leading causes of ill-health from non-communicable diseases include diabetes, and hypertension. Other common diseases include the digestive system, and cardiovascular diseases. Cancer is also increasing in the population and the most common forms of cancers are of the breast, liver, bladder and lymph nodes. In addition, significant public health problems connected with other communicable diseases of concern include diarrhoeal diseases, especially in children, colds and flu, fevers and inflammations/infections of the ear, nose or throat, as well as skin rashes and infections.

The three Governorates in the project area suffer from a lack of specialized health services suitable for the middle classes. Health services are concentrated in the cities and are limited in villages to health units, women's health care centers and some specialized clinics.

The following table shows health services available in the project area according to the statistics of the Directorate of Health Affairs in each Governorate.

Table 4-88-Ministry of Health hospitals and other entities in project area

Item	Value		
	Gharbia Governorate	Dakahlia Governorate	Damietta Governorate
Public Hospital	4	5	3
Central Hospital	6	6	4
Specialized Hospital	11	12	7
Educational Hospitals	1	1	0
Urban Medical Center	10	13	9
Blood Bank	9	10	6
Private Hospital	72	62	58
Health Bureau	20	26	15
Maternity Care Center	14	13	7
Family Medicine Center /Unit	236	298	136

Source: CAPMAS, Census of Population Activities of the Governorates of the Arab Republic of Egypt, 2016.

Human resources are one of the main factors for the success and continuity of health services, and their absence affects the quality of the services provided. This is one of the problems plaguing the rural health sector; statistics from CAPMAS indicate a lack of human resources in rural areas, compared to urban areas.

4.2.4 Human Development Profile

Educational and employment levels need to be highlighted, in order to determine the current socioeconomic conditions of the local community in the project area.

4.2.4.1 Education

The following data zooms in on the education sector in the three Governorates.

Table 4-89-Education levels in the project areas

Education	Project Area		
	Gharbia Governorate	Dakahlia Governorate	Damietta Governorate
Percentage of persons with basic education (10+ years)	14.58%	13.30%	15.02%
Percentage of persons with basic education (10+ years) among females	12.33%	11.54%	13.24%
Percentage of persons with university education	14.14%	12.54%	14.82%
Percentage of persons with university education among females	11.08%	9.69%	12.11%
Illiteracy rate	28.30%	31.78%	26.24%
Illiteracy rate among females	38.10%	38.56%	34.65%

Source: CAPMAS Poverty Mapping Data 2015.

Despite high rates of illiteracy among the elderly, however, there is high demand for children's education in the local communities of the Delta Governorates. There are many educational facilities in the project area; primary schools are the most common amongst them. Secondary educational facilities are concentrated in cities and major villages.

Field observations of the stations in the project areas showed that students rely on trains as an essential means of transportation.

4.2.4.2 Work Status

The following data illustrate the labour sector in the three Governorates

Table 4-90-Work status in the project areas

Work Status	Project Areas		
	Gharbia Governorate	Dakahlia Governorate	Damietta Governorate
Labour force	33.73%	32.95%	34.10%
Unemployment rate	16.32%	14.10%	11.79%
Unemployed males % of total unemployed persons	49.58%	39.58%	38.72%
Growth in labour force	7.48%	3.41%	13.76%

Source: Egypt Description by Information, 2017

Statistical reports indicate high unemployment rates in rural areas, especially among young people, since most people in rural communities' work in agriculture, so many jobs are seasonal, associated with planting and harvesting seasons.

4.2.4.3 Sources of Income

Villages along the railway route witness increased poverty rates compared to cities. Most of the population depends on farming, whether as landowners or wageworkers employed in farming. Agriculture is the main activity in this area. Many residents are also employed in government, commercial, and service jobs.

As the route crosses the Nile in El Mansoura, it passes through agricultural lands. There are many industrial areas in the three Governorates, which are distantly located from the railway, except for a fertilizer factory in Talkha. Hence, these areas will not be directly affected by construction works and are likely to benefit in the future due to the availability of a means of fast and punctual transportation in the region. The project's construction activities are not expected to have a negative impact on livelihoods.

4.2.5 Land Use of the Railway Route

The railway route crosses residential and agricultural areas located in three Governorates: Gharbia, Dakahlia and Damietta.

The socioeconomic features that are dominant in the project area vary significantly along the railway track. The surrounding communities vary from urban cities of Tanta, Mansoura and Damietta to poor informal areas and remote villages. The railway track passes through rural areas where the main economic activity is agriculture. A great variety of crops are cultivated in that part of the valley, but the most common are wheat, corn, cotton, and vegetables, as well as groves of citrus and other fruit trees. The line also cuts through urban areas with more diverse economic activities.

The railway line was planned to run outside cities. However, informal encroachments of poorer sectors of the urban and rural societies took place gradually on the side of the track opposite from the formal part.

In most cities and villages, the area around the main train station is a local hub for economic activities. Businesses are formed to serve the passengers of the train whether in transportation, restaurants and coffee shops. Accordingly, some of these businesses directly depend on the operation of the railway service.

The railway track is usually surrounded by walls that allow traffic crossing the railway line at relatively limited intervals. With a highly dense population, these limited intervals weren't sufficient and caused traffic bottlenecks. Therefore, informal crossings were created by breaking the protective walls. Informal crossings cause major hazards to the people and the passing trains.

Figure 4-75-Residential areas on the railway route

Figure 4-76- Cultivated areas on the railway route

Figure 4-77- Urban extension towards the railway

The largest areas dedicated to agricultural use are located between El Mansoura and Kafr El Battikh; however, the spreading of residential areas along the railway route, they are concentrated as facilities adjacent to the route in Cities and Markaz located in the area from Tanta to El Mansoura.

The vast majority of the railway runs between residential areas, specifically the area between Tanta and El Mahala El Kobra. In addition to that, all stations are located in residential areas.

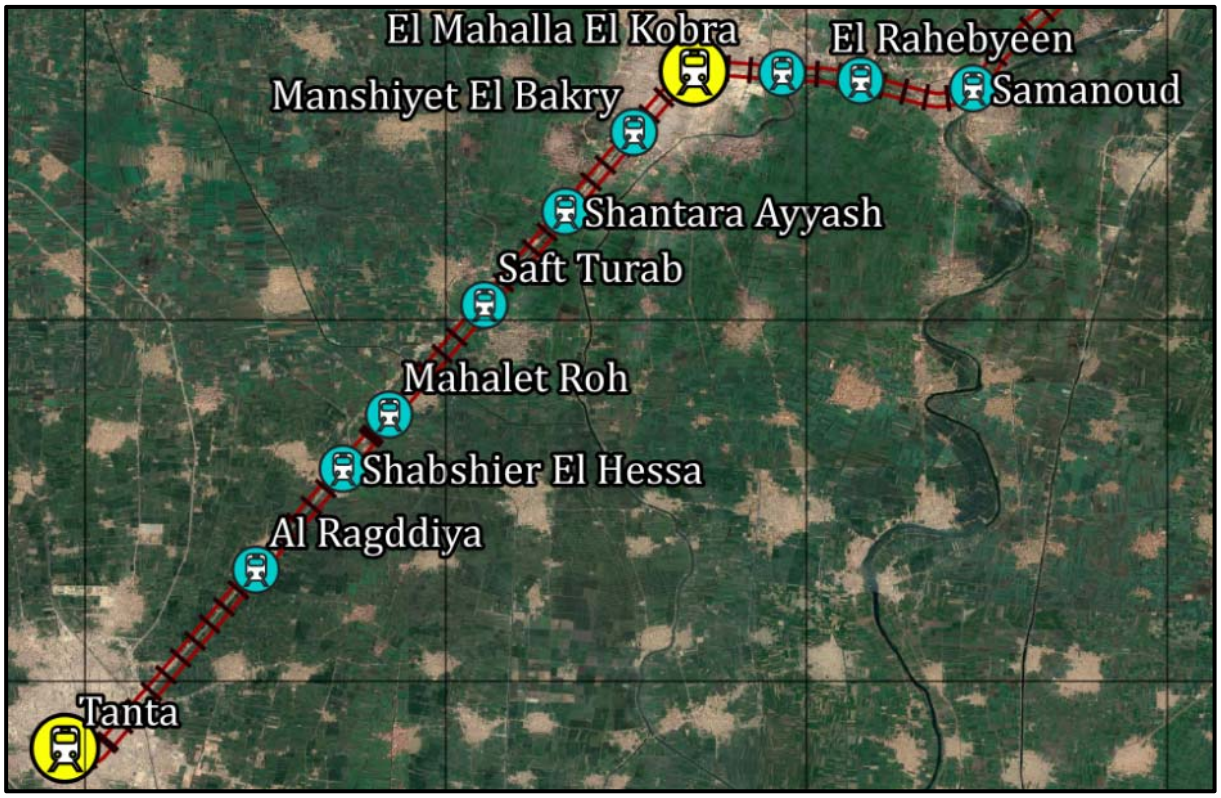


Figure 4-78-Areas of residential concentration in the area between Tanta and El Mahalla El Kobra

Traditional markets and shops are common in residential areas adjacent to the railway, and in many areas, they are contiguous with the walls surrounding the railway and main stations.

Figure 4-79-Traditional markets in residential areas adjacent to the railway

Fieldwork detected several encroachments on agricultural land, where structures have been erected on the railway route. The rapid pace of urbanization replaced a large proportion of agricultural land adjacent to the route of the line. This was evident in the difference between the description of plots of

land located on both sides of the railway line in property management maps and site visits to some areas between El Mansoura and Damietta (Ras Al Khaleej area as an example).

4.2.6 Land ownership in the project area

The regulation of the right to ownership in the constitution and the law, the new Egyptian constitution, which was issued at the end of 2012, stipulated in its article 21 that "the state guarantees the legitimate ownership of all kinds (Public, Cooperative, Private, and Endowment), and protects it, in accordance with the law".

According to the Egyptian law, the following table presents the types of lands ownership in Egypt:

Table 4-91: Type of land ownership in Egypt

Land ownership type	Description
Public or State land[32]	(in Arabic *Amlak Amiriya*), which is divided into the State's public domain that cannot be alienated (such as ENR properties), 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.
Endowment land	*Waqf* and (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 (*Urfi*) 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.

Ownership of land in the project area if other first three types: Public or State land (ENR and local units' ownership), Private land and Endowment land. There is no conflict in the project areas over the ownership of lands because they are defined by ownership documents.

4.2.7 The train as a means of transportation

The rail corridor Tanta - Damietta is an important corridor for transportation between Governorates, and transportation between areas and Markaz in other Governorates. Overall, it is used by large numbers of local population.

According to the project's feasibility study (SYSTRA study, 2015), the total number of rail passengers on the El Mansoura – Damietta line was estimated at 7.4 million in the reference year 2020; an annual average growth of 4.7% was assumed between 2014 and 2020, directly correlated to the GDP growth.

[32] The large majority of land in Egypt is public or State-owned desert land that is for the most part undeveloped (estimated to be 90-9 5% of the national territory).

The project effect is a traffic gain of 37% with respectively 46% and 36% additional passengers for Express and Omnibus trains. 7.4 million Passengers were expected with project in 2020, 90% of those in the omnibus trains.

The following tables show the number of trains and passengers:

Table 4-92 Project effect and average annual growth factor

		2014 (Base)	2020 (Reference)	Average annual growth factor	2020 (Project)	Project effect
Traffic	Express Trains	0.44	0.58	4.7%	0.84	46%
	Omnibus Trains	3.67	4.84	4.7%	6.58	36%
	Total	4.11	5.42	4.7%	7.42	37%
Revenues	Express Trains	2.19	2.88	4.7%	4.20	46%
	Omnibus Trains	2.77	3.65	4.7%	4.96	36%
	Total	4.95	6.54	4.8%	9.16	40%

The table below provides the number of trains and target occupancy rates between El Mansoura and Damietta

Table 4-93 Number of trains and occupancy rate targets between El Mansoura and Damietta

		Trains per day per direction	Seats per train	Occupancy rate
2014 (Base)	Express Trains	5	500	23%
	Omnibus Trains	9	1000	33%
2020 (Reference)	Express Trains	5	500	30%
	Omnibus Trains	9	1000	43%
2020 (Project)	Express Trains	8	500	27%
	Omnibus Trains	13	1000	41%

4.2.8 Status of Women

The table below aims to quantify the participation of women in employment in the Governorates of Gharbia, Dakahlia and Damietta. Despite the female population representing nearly 50% of the total population in the below Governorates, their presence in the labour force is considered low, with males representing nearly three times the female labour force. Moreover, despite representing nearly half of all higher education students, their role as researchers in higher institutions represents less than 40% of total research positions. The economic disparities can also be credited to the high number of female early marriages (under 18), which contribute to the decline of opportunities. Damietta, Gharbia and Dakahlia rank among the highest in female early marriages at 11.5%, 12.1% and 12.1%, respectively (CAPMAS, 2017).

Table 4-94-Breakdown of female representation in employment on a Governorate level

Female Representation	Gharbia	Dakahlia	Damietta
Female to Total Population	48.91%	49.14%	48.66%
Female Researchers	38.81%	39.20%	35.41%
Female Literacy	71.60%	72.60%	81.90%

Female Representation	Gharbia	Dakahlia	Damietta
Female University Students (of total enrollment)	45.99%	48.12%	49.05%
Female Labour Force (of total females)	26.60%	21.30%	23.10%

Source: CAPMAS, 2017

4.2.9 Gender-based Violence (GBV)

In general, violence and sexual harassment against women are considered as a serious social problem in Egypt. The 2015 survey "The Egypt Economic Cost of Gender-Based Violence Survey" (ECGBVS, 2015) 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 in five regions: urban Governorates, urban Lower Egypt, rural Lower Egypt, urban Upper Egypt, and rural Upper Egypt. 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. More than half of the survey respondents were from rural areas (54%).

The key outcomes and results of the study related to transportation and workplace demonstrate that:

- 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 Egypt Gender Profile which was conducted in 2018 echoes the ECGBVS findings and highlights the severity of gender-based violence and sexual harassment in Egyptian society. The profile also finds that women's access to land and financial resources is limited, despite women's land ownership and inheritance rights being legally approved. This is mainly due to the absence of legal frameworks as well as conservative social norms (JICA, 2018).

There are no clear data on GBV in the project area, or statistics about the grievances of the railway passengers for the Delta lines or Tanta Mansoura Damietta railway.

The risks related to gender-based violence have been assessed as moderate. During construction, communities adjacent to the works may be exposed to risks of noise and dust, traffic disruptions, accidents, and general construction hazards. Community interactions with work crews and resulting risks of inappropriate conduct or sexual harassment, are limited, as work crews are likely to be from the local area. However, given the diffuse geographic activities, including hard to supervise areas, mitigation measures against sexual exploitation and abuse and sexual harassment are required. All project workers will be required to understand and sign a Code of Conduct. The project will be required to develop and implement appropriate channels for receiving and handling any potential project related community complaints.

ENR, in cooperation with the National Council for Women, launched the (Railway Safety امان السكة) campaign on December 1, 2020, which is a campaign to develop awareness against harassment and encourage individuals who use railway services to submit their complaints through ENR's hotline

(15047). The campaign was announced on the official website of the Ministry of Transport on December 2nd.

Figure 4-80 Railway safety campaign from inside an ENR station

4.2.10 Child labour

Child labour is a challenging phenomenon in Egypt; the latest ILO/ Central Agency for Public Mobilization and Statistics (CAPMAS) National Child Labour Survey indicates that 1.6 million children are engaged in hazardous or unlawful forms of work among the 1.8 million working children in Egypt. Egypt has ratified the Convention no. 182-Worst Forms of Child Labour and Convention no. 138-Minimum Age Convention and made some progress; however, many challenges remain. There is a need for more efforts and measures to eliminate the worst forms of child labour. Based on previous national and international best practices, ILO will continue its work in supporting the national constituents in combating child labour with a high emphasis on its worst forms[33].

Child labour is widespread in rural areas to work in agriculture, especially during the seasons of harvesting crops and fruits.

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[33] Capacity of Egyptian Government, Workers' and Employers' Organizations Strengthened to Combat Child Labour.
https://www.ilo.org/africa/technical-cooperation/WCMS_548918/lang--en/index.htm#:~:text=Child%20labour

4.2.11 Illiteracy rates

Regarding the illiteracy situation in Egypt during the period (2017-2019), about 25% of the population in Egypt (10 years or more) were illiterate in 2017, and the illiteracy rate decreased from 39.4% in 1996 to 29.7% in 2006, then it reached 25.8% in 2017. According to data from the Public Authority for Adult Education, the illiteracy rate decreased to 24.6% in July 2019.

The number of illiterate people in Egypt reached 18.4 million (25.8%) in the 2017 census, and illiteracy was higher among females than males, (10.6 million women, ie 30.8%, compared to 7.8 million men, ie 21.1%). Illiteracy rates were higher in rural areas compared to urban areas (32.2% compared to 17.7% in urban areas). Illiteracy rates were lower among youth (15-24 years) at 6.9% compared to the elderly (60 years and over) at 63.4%.

Minya Governorate recorded the highest rate of illiteracy with a rate of 37.2%, and the Red Sea Governorate recorded the lowest rates of illiteracy at 12%. 5.69% of the illiterate population have disability, and in general the percentage is slightly higher for males than females. 3% of the illiterate people use computers and the Internet.

Unemployment rates for illiterates reached 2.2%, while the highest rates of unemployment are observed among those with a university degree or more (16.7%). This is due to the fact that illiterates accept jobs regardless of the skill level (manual and craft work) in contrast to those with a degree.

The percentage of female illiterate workers increased (22.3%) compared to illiterate male workers (18.0%) in 2019, and the (positive) change rates in wages during the last five years tended to decrease with the increase in the educational level of the employed. There is higher relative demand of workers for low educational levels compared to higher educational levels.

The issue of literacy is a concern to the international community in general and its elimination is of utmost importance in Egypt. It has been included in the international goals (sustainable development) as well as within the vision of Egypt 2030.

4.2.12 Cultural Heritage

The three Governorates (Gharbia, Dakahlia, and Damietta) are distinguished by the presence of many archaeological sites and religious shrines. The railway route of the current project is not located near the archaeological sites or religious sites. There are many small mosques located near the railway track at the stations or at the level crossings; Which may make it vulnerable as a result of the rehabilitation work or doubling activities.

The following is an overview of the most important cultural heritage sites in each Governorate:

Gharbia Governorate. There are many archaeological and tourist sites in the Gharbia Governorate, they vary between historical and religious archaeological sites (Sheikh Ahmed Al-Badawi Mosque - the Great Coptic Church) and archaeological sites (Museum of Antiquities in the Middle Delta - Temple of Samanoud - Salehjar Pharaonic).

Dakahlia Governorate. Dakahlia encompasses a great number of archaeological places that represent a long period of Egypt's history in different eras. Excavation and search works had taken place in these areas.

There is an archaeological area about 8 km northwest of the city of Al-Senbellawin. It combines between two adjacent archaeological areas, namely “Tel El-Rab’a” and “Tel Timai Al-Amdid”.

Among the most important Islamic shrines: Al-Mowafi Mosque: one of the most famous mosques in Mansoura. Al-Ghamry Archaeological Mosque and Minaret: It is located in Meet Ghamr city.

Muhammad Ibn Abi Bakr Al-Sedik Mosque: It is located in Meet Demsis at Markaz Aga. Prince Hammad Corner Zawya: It is located next to Al- Ghamry Mosque.

Among the most important Coptic shrines: Saint Mar-Gerges Church: It lies in Meet Demsis at Markaz Aga. Monastery of St. Damiana It is located in Damiana village at Markaz Belqas.

Damietta Governorate. Damietta is a very promising Governorate in terms of touristic and archaeological sites. It is known for Ras El Bar Island, a summer resort located on the Mediterranean Sea at the mouth of the Damietta Nile branch.

The Governorate is rich in cultural heritage, with various monuments dated back to Roman time such as El Barasheya hill area, Coptic time such as the church of St. Mary Gerges, and Islamic time such as Amr Bin El Aas Mosque in Damietta city.

5 Project alternatives

This Chapter presents the analysis of alternatives carried out for the project's activities. Alternatives for the following have been considered:

- **Component (A):** Modernization of the Signalling System of Tanta – El Mansoura – Damietta Railway Line.
- **Component (B):** Doubling of the Single-Track of El Mansoura – Damietta Railway Line.

Two main alternatives have been considered in the analysis of project components:

1. No action alternative for both components.
2. Project implementation alternative.

For the project implementation alternative, several alternatives have been further analyzed. These alternatives are evaluated, compared, and the optimal alternative selected, taking into account the relative environmental and social impacts during the implementation of project activities.

5.1 Alternative 1: No Action

To continue operating the railway line between Tanta – El Mansoura – Damietta with the current condition of the mechanical signalling system, given its frequent breakdowns and inefficient operational capability, places a major additional burden on the ENR's efforts to improve its services to the public and to overcome its major financial difficulties. Furthermore, the present mechanical signalling system is highly susceptible to human error and has been blamed for several accidents that have occurred in the past few years.

Difficulties facing the operation on the railway line are likely to escalate if not resolved immediately, which would become more difficult and more expensive to overcome without the planned project being implemented. Without this project, the railway service on the Tanta – El Mansoura – Damietta railway line will further deteriorate, affecting the passengers and freights using this line.

For Component B, the No Action alternative for the doubling of the single-track between El Mansoura and Damietta is not recommended, as the doubling project will offer numerous benefits for both passengers and freight, including:

- Decrease in the number of accidents on the roads (as the level crossings will be upgraded);
- Increase the volume of freight transportation (as the rail capacity will be increased and as the El-Mansoura – Damietta railway line is the only rail route serving Damietta Port.);
- Reduction in the travel time of passengers (as current speed restrictions will be removed);
- Reduction in operational, human, and environmental costs (as a result of the overall railway track improvement).
- The diversion of the road to rail traffic would also lead to a reduction in accidents and a reduction in environmental costs, primarily due to decreased road congestion and air pollution.

5.2 Alternative 2: Implementation of the Proposed Project Components (A and B)

The implementation of the project will benefit not only passengers using the line, but also freight transported to and from Damietta Port. Once completed, the project will improve the railway service of the Tanta – El Mansoura – Damietta railway line. The project is supposed to have some beneficial effects on the rail service, including the following:

- Improved train operation safety;
- Improved operation safety of level crossings;
- Increased train travel speed and as a result reduce the trip time;
- Allow more trains to safely use the line per unit time, as well as reduce operational delays;
- Reduce the cost of operation per traffic unit and fatalities arising from railway accidents; and
- Allow for growth in freight transport to and from Damietta Port, which will increase the Damietta port market share.

Despite the high economic cost of the proposed project, ENR believes that the modernization of the existing outdated signalling system and the doubling of the single-track are highly justifiable, in order to ensure the safe and efficient operation of the railway service along the line.

The modernisation of the railway system is an unavoidable expenditure which, sooner or later, must be made. The operation of the highly efficient modern system will also reduce operational costs per unit traffic, and will contribute to the ENR's efforts to reduce losses and increase revenue-generating potential.

The doubling of the line, on the other hand, will allow the train frequency to increase and contribute to providing passengers with quicker, safer and more convenient train services. A number of negative impacts are expected to occur during the construction phase of the project. These impacts are all temporary in nature, lasting only during the construction process, and can be readily mitigated or tolerated. In addition, as a result of the proposed project, the anticipated improvement in the railway service substantially outweighs any residual impacts expected.

5.2.1 Construction Scheduling:

Alternative (A): Works to proceed on several sites in parallel, in order to reduce the total construction time:

According to this alternative, construction activities will be scheduled to allow working in parallel along the entire line. While this will shorten the total construction time and minimize the duration of the adverse impact associated with these activities, it may considerably intensify the severity of some of the expected impacts. For instance, train delays as a result of reducing the speed at several construction areas will be one of the negative aspects of this alternative; therefore, this alternative is not recommended.

Alternative (B): Construction works to proceed on fewer sites in parallel, in order to reduce the intensity of construction-related impacts:

This alternative will restrict construction activities to a small section of the corridor at any given time, thus reducing the negative impacts of construction considerably. However, this will extend the required duration for completing the project.

Alternative (C): Construction works are to proceed intensively on predefined, relatively large "construction sections" of the line, in order to minimize generalized impacts and to allow better management thereof:

This alternative calls for dividing El Mansoura – Damietta line into defined number of construction sections and to implement all construction activities in each section at the same time, before starting on a new one. Concentrating all construction activities at each of these sections will restrict most of the adverse impacts to smaller, more manageable sections, and hence allowing for better management of these impacts. As most of the train delays will be caused by speed restrictions at the construction area, larger construction sections of the corridor will result in shorter delays, compared to several, smaller construction sites (and related speed restrictions) scattered along the length of the line; therefore, this alternative is recommended.

5.2.2 Trenching activities

One of the main activities during signalling modernization works is trenching along the railway tracks for placing underground cables required for the upgraded electrical system. From an environmental and social impact perspective, the other option would be to install the cables above ground to save the time and resources associated with the digging and backfilling activities. However, this alternative would result in increased risks of asset loss and deterioration. Specifically, exposed cables would be subject to damage due to weather, material wear and tear and the potential risk of cable theft.

5.3 Alternative 3: Transport of Construction Material and Waste

Alternative (A): Construction materials and waste will mostly be transported using trucks.

This alternative will contribute to increased traffic congestion problems, particularly in areas close to construction sites.

Alternative (B): Construction material and waste will mostly be transported using train wagons, as much as practically possible.

This alternative will mitigate potential traffic problems that might be caused by using trucks. Materials may be transported from the point of origin to the nearest railway terminal equipped for loading and unloading of such material, before being transported by train wagons to/ from construction sites. In addition, the transport of the components for the new double line (rails, sleepers, fastenings, ballast) should only be transported by train wagons.

5.4 Alternative 4: Double-Track Installation at El Mansoura – Damietta Railway Line

Alternative (A): Track sections will be transported on flat train cars from central ENR warehouses to construction sites, and then laid and welded in situ.

This alternative will allow easier handling of the rails, but will generate more pollution during the extensive welding process. The process of track installation will require more on-site working time.

Alternative (B): Rail assembling and welding into 250-m segments will be performed at ENR's workshop.

The long segments of pre-welded, pre-fabricated rails will be transported to installation sites on flat train cars. The installation will require less time at the construction site, and hence fewer delays in train operation. There will also be less welding performed at construction sites, thereby reducing the potential for hazardous emissions and accidents.

5.5 Alternative 5: The alignment of the new double line between El Mansoura – Damietta

The doubling between El Mansoura and Damietta (60 Kilometres) considered two options:

- Option 1: Locating the double line on the Eastern side of the existing railway line;
- Option 2: Locating the double line on the Western side of the existing railway line.

Based on the results of the alignment report of SYSTRA[34], the alignment for doubling the railway line between El Mansoura and Damietta is selected to be on the **Eastern side** of the existing railway line to keep the present single line in its location as El Sahel Canal is extending along its total length on the western side.

[34] Phase 1 Alignment Report, Systra, April 2015

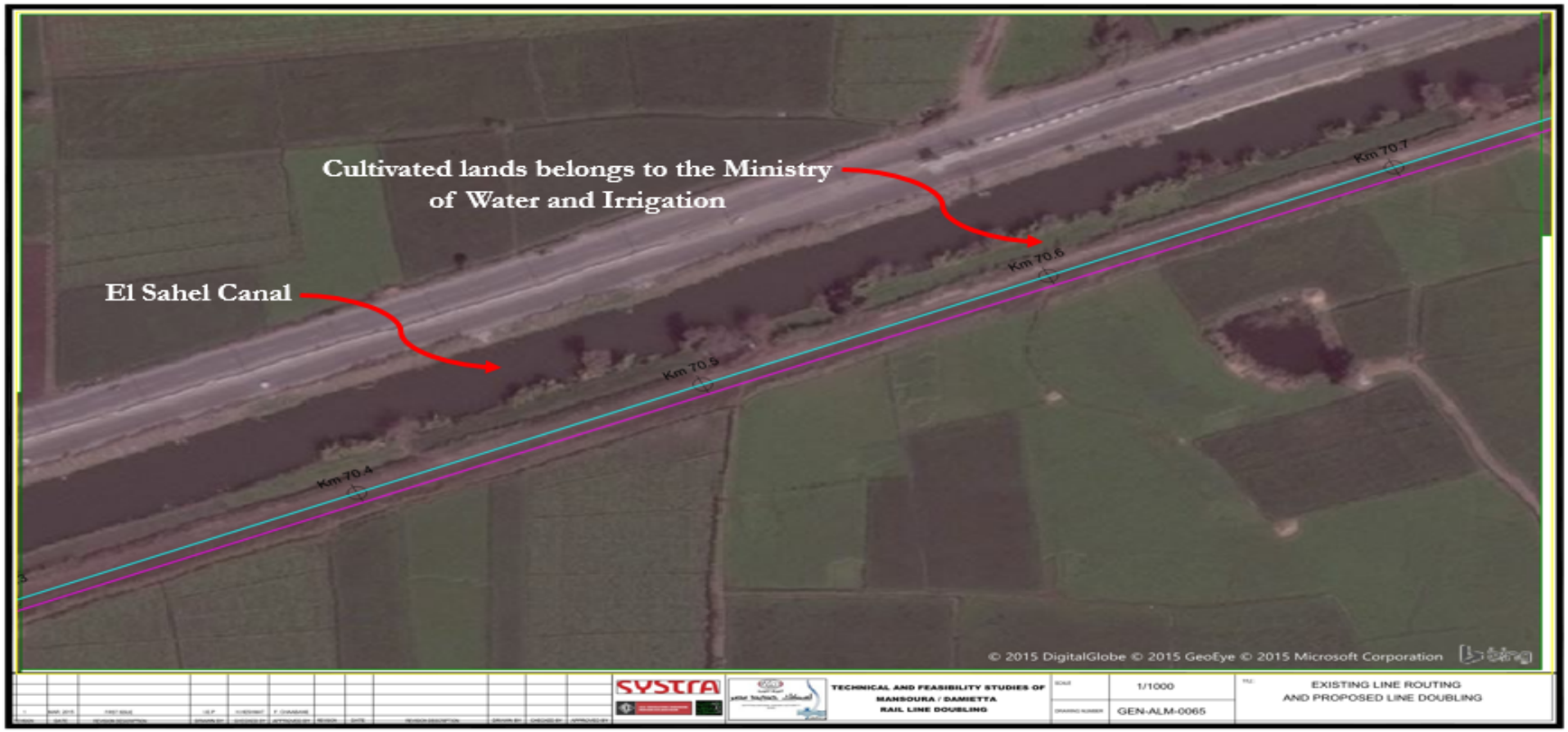

Figure 5-1: The selected alignment for most of the doubling area between El Mansoura and Damietta (Eastern Side)

The following table summarizes the two alignments from the environmental and social point of view.

Table 5-1: Comparison between the two alignments from the environmental and social point of view

Environmental and Social Indicator affected	Option 1 (Eastern Side)	Option 2 (Western Side)
Environmental Aspects		
Air Quality	There is no significant difference on each alignment on the air quality in the surrounding areas due to the construction works needed for the doubling.	
Noise	There is no significant difference on each alignment on the noise levels in the surrounding areas due to the construction works needed for the doubling.	
Biodiversity	The destruction of the vegetation cover along the land strip to be occupied by the new railway track will be less in this case.	The cultivated areas in the western side is much more that on the eastern side and the destruction of the vegetation cover along the land strip to be occupied by the new railway track will be more in this case.
Waste generation and management	There is no significant difference on each alignment on the waste generation and management	
Water Quality	There are some agricultural drains that are already covered and only	The water quality will be greatly affected as the coverage of the existing canal will have a negative impact
Social Aspects		
Cultural Heritage	Only two mosques will be demolished	The number of mosques located on the western side are much more than those located on the eastern side therefore a large number of mosques is expected to be demolished in this case
Land Use	ENR property on the eastern side did not intersect with any ministry's land holdings. Some critical points will need land acquisition (Number of PAPs are less in this case).	ENR property on the western side intersects with the land ownership of the Ministry of Water and Irrigation. The agricultural lands along the canal RoW are rented for local farmers and this will require more land acquisition (Number of PAPs are higher in this case).

Accordingly, it is recommended from the environmental and social point of view to locate the doubling in the Eastern side of the existing railway line.

5.6 Alternative 6: Elevating the track level between El Mansoura – Damietta:

The **elevating of the track level** is studied by SYSTRA and it is found that the track elevation contradicts with the following:

- The water ways adjacent to the line alignment when elevating the track level leads to the increase of the horizontal distances of the embankment side slopes.
- The existing platforms at the stations on the line
- The existing level crossings which are under upgrading process by ENR
- The existing overhead bridges on the line, especially with the possibility of the line electrification in the future.

However, this alternative may become relevant under scenarios of increased flood risk due to climate change. At present, there is no actionable information in our possession that would allow a quantitative analysis of the impacts through hydraulic modelling. It is suggested that a separate Climate Risk Vulnerability Assessment be carried out to check whether the additional costs of raising the track could be justified, or whether there are other solutions to increase the resilience of the line to climate change.

5.7 Alternative 7: Line Doubling Alternatives at Curves of Radius less than 850m

As mentioned in the SYSTRA study, three different alternatives have been studied to increase the train speed on the present curves by increasing the superelevation values or its radii without contradicting with the present location of the track embankment. The following figure shows the alternatives of increasing the curve radii as per SYSTRA Study[34].

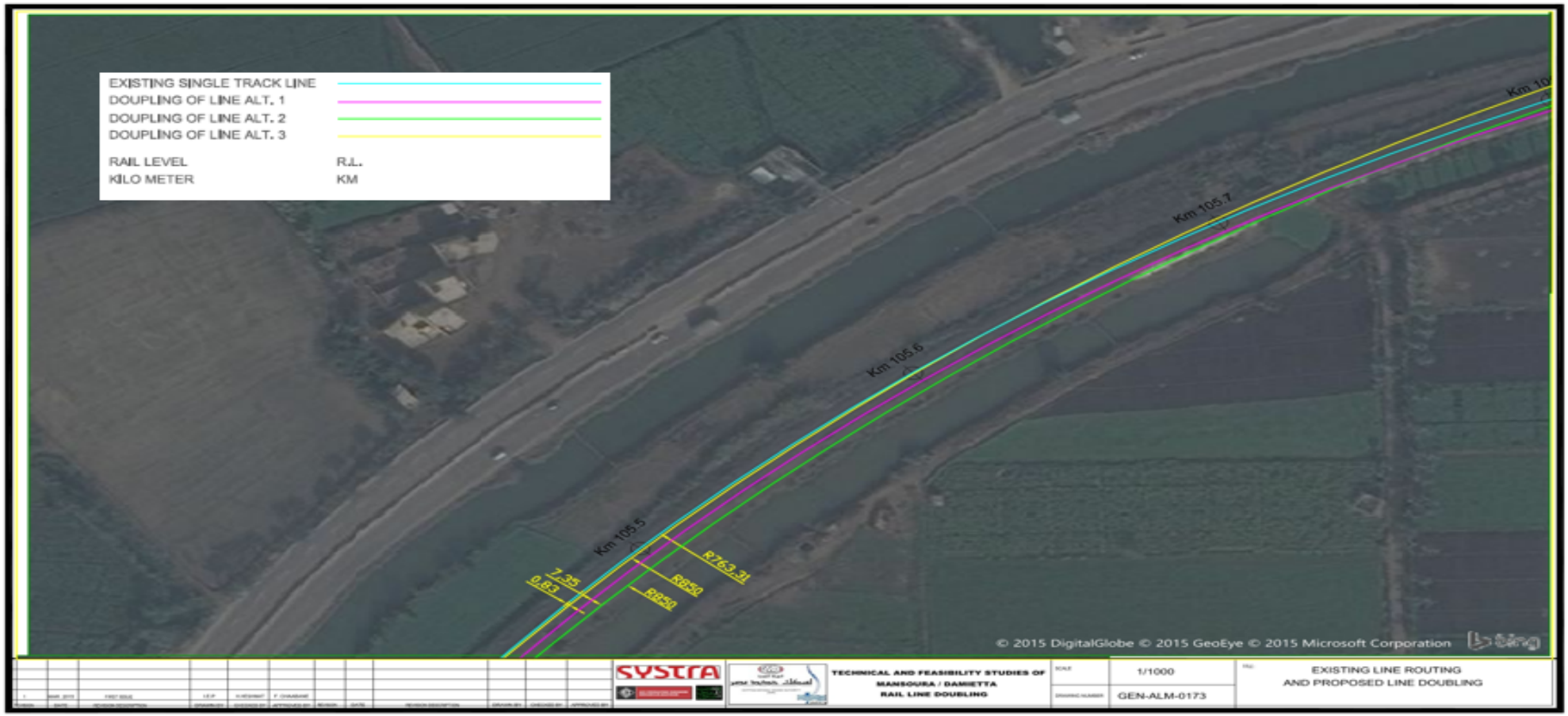

Figure 5-2: Different alternatives for increasing the curve radii to increase the train speed in the doubling area (El Mansoura – Damietta)

The following table shows a comparison between the three alternatives:

DOUBLING OF AL MANSOURA - DOUMITTA LINE
ALTERBATIVES FOR DOUBLING AT CURVES

CURVE No.	predicted	ENR	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
1	500				
2	500				
3	500				
4	10000				
5	10000				
6	20000				
7	20000				
8	20000				
9	20000				
10	792.9273	800	Keeping the radius value to 800m which will lead to a speed limit of 120km/h with cant 130mm	Increasing the radius value to 850m with the same location of straight lines. This will cause the tracks at the curve to be shifted towards the inner side (10m) which will interfere with the drain.	Increasing the radius value to 850m and shifting the straight lines towards the canal. This will keep the tracks at the curve slightly shifted towards the drain (3m).
11	781.1214	800	Keeping the radius value to 800m which will lead to a speed limit of 120km/h with cant 130mm	Increasing the radius value to 850m with the same location of straight lines. This will cause the tracks at the curve to be shifted towards the inner side (2m) towards the canal	Increasing the radius value to 850m and shifting the straight lines towards the canal. This will keep the tracks at the curve in its position.
12	819.5173	800	Keeping the radius value to 800m which will lead to a speed limit of 120km/h with cant 130mm	Increasing the radius value to 850m with the same location of straight lines. This will cause the tracks at the curve to be shifted towards the inner side (3m) towards the canal	Extending the line out of Sherbine city parallel to the canal.
13	20000				
14	526.6396	500	Keeping the radius value to 500m which will lead to a speed limit of 95km/h with can 130mm	Extending the line out of Sherbine city parallel to the canal.	
15	803.989	800	Keeping the radius value to 800m which will lead to a speed limit of 120km/h with cant 130mm	Increasing the radius value to 850m with the same location of straight lines. This will cause the tracks at the curve to be shifted towards the inner side (6m) towards the agriculture land.	
16	448.5968	600	Keeping the radius value to 600m which will lead to a speed limit of 100km/h with can 130mm	Increasing the radius value to 850m with the same location of straight lines. This will cause the tracks at the curve to be shifted towards the inner side (16m) towards the canal which will put the track on the edge of the canal	Increasing the radius value to 850m and shifting the straight lines towards the canal. This will keep the tracks at the curve in its position.
17	1543.751	1500			
18	944.2286				
19	1017.389	1000			
20	1581.757	1500			
21	20000				
22	337.606	700	Keeping the radius value to 700m which will lead to a speed limit of 110km/h with can 130mm	Increasing the radius value to 850m with the same location of straight lines. This will cause the tracks at the curve to be shifted towards the inner side (8m) towards the canal which will put the track on the edge of the drain	Increasing the radius value to 850m and shifting the straight lines towards the canal. This will keep the tracks at the curve in its position.
23	763.3094	770	Keeping the radius value to 7700m which will lead to a speed limit of 110km/h with can 130mm		
24	1272.126	1200			
25	1272.919	1300			
26	3463.554	3000			
27	1044.17	1000			
28	686.0025	700	Keeping the radius value to 700m which will lead to a speed limit of 110km/h with can 130mm	Increasing the radius value to 850m with the same location of straight lines. This will cause the tracks at the curve to be shifted towards the inner side (8m) towards the canal which will put the track on the edge of the canal	Increasing the radius value to 850m and shifting the straight lines towards the canal. This will keep the tracks at the curve in its position.
29	406.2625	400	Keeping the radius value to 400m which will lead to a speed limit of 85km/h with can 130mm		

It is recommended to increase the maximum speed to 120 km/h which can be realized on all curves of the line excluding the curve in the vicinity of Sherbin station which amounts 500m. At the distances of the curved line with curves of less than 850m radius, the studies were carried out for the possibility of increasing its radii to allow the required maximum speed. However, as per ENR, Sherbin railway station will not be relocated.

6 Environmental and social impacts

6.1 Introduction

This chapter addresses potential impacts (negative and positive) of all planned project activities during the construction and operational phases. The project's available documents have been reviewed and analyzed to identify the potential environmental and social impact as well as direct and indirect areas of influence. The main sources of data are including, but not limited to the following:

- **Reviewing available data provided by ENR:**

This includes a thorough review of the following studies:

A. *Modernization of Signaling Systems Tanta / El Mansoura / Domietta Corridor (GETINSA, Hamza Associates and Almatouck, November 2015)*
   - TASK A. Preliminary Evaluation of the Costs of the Modernization of the Signaling System on the Railway Section, Site Survey Inspection Report,
   - TASK A. Preliminary Evaluation of the Costs of the Modernization of the Signaling System on the Railway Section, **Feasibility Study Report**,

B. *The Duplication of El Mansoura – Damietta Railway line, SYSTRA, ACE Consulting Engineers, 2015*
   - Phase 1- Alignment Report
   - Phase 2 - Proposed Line Doubling Drawings on Satellite Image.pdf (line alignment-large-A01-1.pdf).
   - Phase 2: Feasibility Study Report
   - Phase 2 - Stations Layout Drawings - Rev 02 (stations.pdf and PLAN1 SEMAD TALKHA STATION (1).pdf
   - Phase 2 Final Submission – Full Package including:
     - **Alignment package issued on August 2016 (**DRAWING LIST Alignment.pdf, Stations-Schematic.pdf, Alignment Drawings.pdf, Talkha Station Layout.pdf and Stations Drawings.pdf);
     - **Survey package issued on October 2015 (**Topographic Survey Drawings, Topographic Survey Cross-Sections and Survey Report);
   - Phase 3 - Bid Documents - Plant and Design Build (Volume 1, 2, 3) issued on November 2016
   - Phase 3 – Technical study -Possibility of raising the track level at pedestrian and illegal crossing issued on December 2016;
   - Phase 3 - Geotechnical Report, issued on October 2016; and
   - Phase 3 - Hydraulic Study issued on October 2016.

These documents detail the project description for each component (the modernization of the railway line signalling system between Tanta and Damietta, as well as the doubling of the single-track railway between El Mansoura and Damietta).

- **Field visits to the project area:**

The ESIA team conducted several site visits to the project site in order to identify any areas of particular sensitivity. Details on the existing signalling system and its current mechanical operational conditions between Tanta – El Mansoura – Damietta, as well as the doubling of the single-track railway line

between El Mansoura and Damietta, were collected. The team also surveyed some specific critical sites to gather more details on their existing social and environmental settings to assess their vulnerabilities to the project activities (ex. Ras Al Khaleej Village).

- **Scoping meetings and interviews with relevant stakeholders:**

Several meetings and interviews were conducted to further investigate the project's activities with officials of the ENR's Property Department, and to check the maps of ENR property, in particular, those pertaining to the doubling of the single-track in certain critical sites. In addition, interviews were conducted with owners of the informal economic activities along the railway route.

Components and activities involved in the project phases (construction and operation) are identified on the basis of careful examination of the project documents, as well as extensive discussions with engineers and ENR experts involved in this project.

This chapter distinguishes between positive and negative impacts, direct, indirect and cumulative impact, local and regional, and temporary and permanent impacts during the construction and operation phases; by indicating their level of importance and probability of occurrence.

Impacts further identified the basis of unavoidability or irreversibility, while keeping sight of other projects or actions planned in the study area.

The identification and evaluation of the potential impacts on various environmental and social receptors as a result of planned activities are carried out at different levels during the project's two phases (construction and operation). This is important to propose suitable and effective mitigation measures to avoid and/or minimize negative impacts to the acceptable legal/standard level, and to maximize positive impacts. The proposed mitigation measures will be presented in chapter 7.

The evaluation of the potential impacts on various receptors is based on a specific followed methodology described in the following subsection.

6.2 Impact Assessment Methodology

Each potential positive and negative impact resulting directly or indirectly from the project is categorized based on the **magnitude of the impact** and **sensitivity of the receptor.**

a) **Magnitude of Impact:** The impact resulting from the project is first categorized as positive or negative impact; the latter is further analyzed and its magnitude assessed as ***Negligible***, ***Low***, ***Medium***, or ***High***. Various considerations come into play as the experts assess the impacts; the main parameters are shown in the figure below.

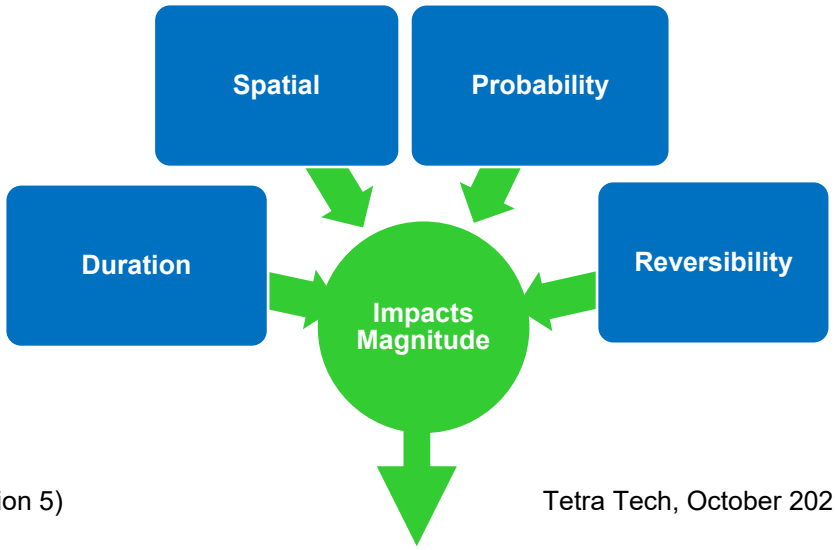

Figure 6-1: Impacts Assessment Method

After an analysis of the various parameters, an impact's magnitude is categorized as follows:

- **Negligible** – No anticipated change to the baseline environment
- **Low** – Minor anticipated change to the baseline environment
- **Medium** – Moderate anticipated change to the baseline environment
- **High** – Significant anticipated change to the baseline environment

Medium and High impacts usually cause a major temporary variance to the baseline conditions or a long-term ongoing modification.

b) **Sensitivity of the receptor:** is based on the relationship between the respective project and present baseline environment (the receptor). It is assessed based on vulnerability of the receptor, including the surrounding population and environment.

If the effect of an impact is more readily absorbed and easily mitigated it is less sensitive. On the other hand, if an impact is more challenging to mitigate and cannot be absorbed by the population and/or environment it becomes more sensitive and requires an extensive management plan.

The sensitivity of the receptor is assessed as:

- **Negligible:** Good capacity to absorb/mitigate impact
- **Low:** Existing capacity to absorb/mitigate impact
- **Medium:** Limited capacity to absorb/mitigate impact
- **High:** No capacity to absorb/mitigate impact

c) Impact Significance: The virtual resultant of the magnitude of the impact and sensitivity of the receptor for each impact is evaluated to generate the impact's significance and overall assessment as shown in the table below.

Table 6-1: Impacts evaluation methodology

		Magnitude of impact			
		Negligible	**Low**	**Medium**	**High**
Sensitivity of the receptor	**Low**	Level 1 Negligible	Level 1 Negligible	Level 1 Negligible	Level 2 Low
	Medium	Level 1 Negligible	Level 2 Low	Level 2 Low	Level 3 Medium
	High	Level 2 Low	Level 3 Medium	Level 3 Medium	Level 4 High

6.3 Identification, Evaluation and Assessment of Key Environmental and Social Impacts

Environmental impacts are caused by environmental aspects and can have a direct impact on the environment and contribute indirectly to a larger environmental change. Those impacts rated as Low, Medium or High are considered to require mitigation measures in order to eliminate the impact or, where this is not possible, to reduce their significance ranking to Low or Negligible.

Wherever possible, the impact assessment is based on a quantifiable analysis to the extent possible, in order to compare the expected impacts with relevant and applicable laws and standards, as detailed in Chapter 2 of this report.

The assessment of the EandS impacts is made without considering the application of preventive and corrective mitigation measures that could affect the impact's magnitude.

This analysis is conducted for both the project's construction and operation phases. Various project activities will result in both positive and negative impacts that should be mitigated. A thorough review of impacts was conducted based on project activities. Finally, mitigation measures were defined and residual impacts were reassessed.

Potentially adverse impacts of the project are expected to occur mostly during the construction phase, and to a much lesser extent during the operation phase, following the completion of the project. Elements of environmental and social impacts, as well as proposed mitigation measures, are described in the following section:

6.4 Impacts during Construction Phase

6.4.1 Positive Impacts

Create direct and indirect job opportunities

The project activities will require engineers, skilled and unskilled labour. Construction work will depend on local labor and local contractors whenever possible, according to the project's labor needs. The expected daily number of workers will range from 20 -30 in each site depending on the activities planned on that day.

As part of the construction phase, a lot of indirect benefits are expected to be sensed in the targeted areas due to the need for more supporting services to the workers and contractors who will be working in the various locations.

Creation of Indirect Job Opportunities:

Increased economic activity in the project area through the following supply chain:

- Implementation of works and provision of supplies related to construction, operation and closure of the site and ancillary facilities;
- Provision of transportation, freight and storage services to the project;
- Drivers and mini-bus owners will benefit from the transportation of workers;
- Provision of food supplies, catering, and cleaning services;
- Provision of building and auxiliary materials and accessories, engineering, installation and maintenance services;
- Provision of white goods, electronic appliances, communications and measurement equipment;
- Security personnel;
- Retail services; and
- Engineers may need accommodation facilities.

6.4.2 Negative Impacts

The following section describes the potential negative impacts expected during the construction phase of the two project components:

a) **Component (A):** Modernization of Signalling System between Tanta and Damietta Railway Line.

b) **Component (B):** Doubling of the Single-Track Railway line between El Mansoura and Damietta.

Most of the potentially adverse impacts of the project are expected to occur during the construction phase of the project. Construction will involve activities that may affect local communities and environmental conditions at construction sites, and may also directly or indirectly affect surrounding areas. Construction processes will also certainly result in temporary impacts that will affect users of the railway lines, or those directly or indirectly dependent on the services rendered by these lines. Construction activities will also directly affect the operation of the railway service and its associated components.

6.4.2.1 Gaseous and Dust Emissions

Air Emissions

Air quality may be impacted by dust and particulate emissions resulting from the following activities:

- Excavation and foundation for the main and secondary technical buildings as well as the construction activities needed for the new double track between El Mansoura and Damietta;
- Dismantlement activities of the existing signalling system;
- Excavation, preparing and placing the cables and backfilling for the trenches;
- Site levelling activities, backfilling;
- Transport and storage of construction material
- Removal /Upgrading the existing sleepers and rails;
- Transporting the concrete sleepers;
- Transporting the new ballast material to the work sites; and
- Unloading activities of the new ballast material;
- Air quality, noise and vibration levels will be affected by the construction works for the project activities (CTC, technical building and doubling the single track).

Dust

The impact of dust generation (particulate matter, suspended solids from excavation/backfilling operations, and possible dispersion from stockpiles of waste or sand used for filling trenches) will be limited to the working hours as site levelling and backfilling are carried out within the same day. Dust may be generated in the form of:

- Fugitive dust emissions (PM_{10}, $PM_{2.5}$)
- Particulate matter and suspended solids;
- Possible dispersion from stockpiles of soil used for backfilling.

Gaseous Pollutants Emissions will result from:

- Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SOx, NOx, CO, VOCs, etc;

- Exhaust of power generators and vehicles transferring raw materials and/or those disposing of excavated soil and construction waste; and
- Thermal welding as well as iron drawing works.

Machineries used during construction are certified and maintained as per IFC General EHS guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and international permissible levels.

Although these pollutants are expected to be generated in relatively small quantities during some of the construction activities, communities living very close to the construction sites may potentially be affected. These impacts will also affect construction crews/workers at construction sites.

The impact assessment of air emissions, dust and gaseous pollutants emissions is expected to be temporary, local, and of **medium severity.**

6.4.2.2 Noise and Vibration

Noise and vibration will result mainly from the following activities:

- Equipment mobilization, site preparation, excavation and trenching works needed to install the new signalling system;
- Dismantlement activities of the existing signalling system
- Lifting the damaged rails and concrete sleepers;
- Construction activities needed for the CTC, main and secondary technical buildings, doubling of the single-track and enlarging of the single railway stations;
- Operation and movement of construction machines/equipment;
- Construction works of culverts nearby the water canals;
- Loading and erecting the new double railway rails, concrete sleepers as well as wooden sleepers in the intersections;
- Unloading the ballast for the new double track; and
- Rail welding activities.

Construction activities of the project will likely increase noise and vibration levels on work sites beyond permissible limits due to excavation and heavy machinery.

The potential generated noise and vibration will mainly affect the workers on-site who are the most exposed due to their proximity to noise sources, as well as nearby communities and other sensitive receptors along the railway line between Tanta, El Mansoura and Damietta. This impact is occurring only during the actual construction works, and within a limited area, which will be undertaken gradually, for a few hours to a few days, at any given site along the railway corridor.

Various mechanical/electrical equipment will be required during the construction activities, including bulldozers, trucks, pavers, and other equipment. The expected levels of noise produced by different operating machinery are shown in the following table.

Table 6-2: Noise Emission Levels dB (A) of Typical Construction Equipment[35]

[35] USA, Environmental Protection Agency, 1995

Equipment	Expected Noise Emission Levels	Equipment	Expected Noise Emission Levels
Bulldozer	80	Concrete mixer truck	81-85
Front End Loader	72-84	Dump truck	83-94
Jack Hammer	81-98	Crane	75-77
Backhoe	72-93	Welding Generator	71-82

These noise levels sometimes exceed regulatory limits and, thus, require the workers onsite to use the personal protective equipment (PPE). In general, any noise level above 85 dB(A) requires the use of ear defenders or ear plugs. As most of the railway road lies in urban areas, this impact tends to be medium.

The impact assessment of noise and vibration is expected to be temporary, local, and of **medium severity.**

6.4.2.3 Water Resources

Surface water

Water bodies are vulnerable to pollution that reduces water quality and changes in the water characteristics (level and volume) from the project activities.

There are ten agricultural drains parallel to the existing railway line and close to it. They will be covered in order to enable the execution of the railway doubling between El-Mansoura to Damietta.

In addition, there are nine culverts beneath the railway line distributed as follows:

- Five have been replaced and renovated;
- Two need an inspection room (4mX4m) to be constructed at each one; and
- Two crossing the railway line between El Mansoura and Damietta and need to be upgraded through tunnelling with a 1.5-meter diameter pipe.

Covering the agriculture drains and upgrading the culverts crossing the railway line will have an impact on the surface water quality. In addition, there will be a potential to introduce pollutants into agricultural drains including sediment, oil and lubricants. These compounds directly impact the physical and chemical quality status of the water and indirectly influence the living organisms in water. The contamination of the water body may also occur indirectly by falling chemicals used in the construction works that may lead to leaching through soil until reaching the surface water body. The following figure shows photo for a single track located between two water bodies (canal and agricultural drain).

Figure 6-2: Construction of new railway track between two water bodies

During construction activities, there will be liquid waste mainly of domestic wastewater and wash water of vehicles/equipment. Mismanagement of this kind of liquid waste will negatively affect surface water.

This impact will occur only during the actual construction works, and within a limited area at the construction site, which will be undertaken gradually, for a few hours to a few days, at any given site along the railway corridor.

Groundwater

The project activities do not include any deep excavation; therefore it is not expected to have any negative impact on the groundwater from the construction activities. However, there might be a minor leakage from the generated wastewater during construction as it will be collected in holding tanks prior disposal. Consequently, domestic sewage could be highly significant if not well managed and controlled, and could possibly pollute the groundwater. The impact of domestic sewage on groundwater from the inappropriate management and disposal is expected to be of low severity.

The impact assessment on groundwater pollution is considered of **low severity**

6.4.2.4 Energy Efficiency and GHGs

The project activities of upgrading the signaling system does not generally involve consumption of electricity or fuel since it adopts manual digging. However, the doubling activities will include the following:

- Fuel consumed by vehicles transporting raw materials and/or collecting waste for disposal;
- Fuel consumed by diesel generators;
- Fuel consumed by machines used for the doubling activities;
- Electricity consumed by the temporary site offices;

- Track laying activities; for those activities small and heavy machines will be used; and
- Fuel consumed by staff and workers commuting to the site.

Sub-contractors usually hire local workers from nearby villages, which will reduce associated fuel consumption and GHGs emissions that could be generated by transportation means

The impact assessment on energy efficiency and GHG is considered of **low severity**

6.4.2.5 Soil

The construction activities will result in disturbance of the soil and geological characteristics causing a physical breakdown of soil particles potentially destabilizing the soil structure especially in the doubling area between El Mansoura and Damietta. This will be caused due to the following activities:

- Major excavations for trenching activities;
- Site levelling and backfilling activities; and
- Movement of heavy equipment on unpaved surface soils.

Inappropriate management and disposal of hazardous and non-hazardous waste (uncontrolled management system) will cause soil contamination. Potential soil contamination may also take place from old ballast, maintenance activities for the construction machines as well as any spillage or leaks.

The analyzed soil samples show high levels of copper and cadmium so that handling and disposing of the soil should be carried out carefully.

The evaluated impacts on soil are listed as follows:

- Impairment of soil quality (soil contamination) due to the introduction of pollutants;
- Soil erosion due to the clearance of vegetation and earth movements;
- Destruction of fertile top soil.

The impact assessment on soil is considered of **medium severity**

6.4.2.6 Hazardous and Non-Hazardous Waste:

- **Non-Hazardous Solid Wastes**

The following are the types of solid non-hazardous waste expected to be generated on-site during the construction phase:

- Excavated soil due to trenching activities;
- Construction and Demolition waste (concrete, debris, bricks, sand and gravel);
- Damaged concrete sleepers, old rails, fastenings, turnouts and old un-contaminated ballast;
- Steel, metals, wood, empty cement sacks, wires, cables and all materials from the old signaling system that will be replaced; and
- Domestic waste resulting from workers' accommodation (food remains, paper, plastics, and glass).

Non-hazardous wastes generated on-site during the construction phase normally have a high recycling potential. If not recycled, it should be directed to the nearest solid waste disposal site.

- **Solid Hazardous Waste**

Solid hazardous waste is expected to be generated including waste electrical and electronic equipment (WEEE), empty containers of chemicals, leakages from temporary petrol tanks, spent lubricating oils,

and paint used for construction machinery, contaminated (ballast, sleepers and soil), spent welding materials, etc.

The hazardous waste has to be collected via a licensed contractor and transferred to a landfill site. The storage and disposal of hazardous waste streams have to be carefully performed to comply with the existing legal framework. In addition to that, such hazardous waste can result in major, irreversible effects if not properly handled, stored and safely disposed of, as follows:

- Mishandling and uncontrolled disposal of hazardous liquids and solid waste would have major health impacts for on-site workers, inhabitants in the project's area of influence, people who get in contact with waste during transportation and disposal, as well as flora and fauna exposed to such hazardous waste.
- Air quality could also be affected, since uncontrolled dumping of hazardous materials would result in most cases to open burning and potential release of toxic emissions.
- Uncontrolled disposal of hazardous liquid waste can cause soil contamination through direct contact or leaching.

- **Liquid Waste**

Liquid waste expected to be generated from domestic wastewater of construction workers will be collected in holding tanks before being disposed. The holding tanks are regularly evacuated and transported to the nearest wastewater treatment plant or sewage pumping station.

Impact on the environment from generated wastes are the consequence of improper disposal of the solid, hazardous and liquid wastes. The impact is assessed and should be considered of Medium Significance, mainly due to the proximity of receptors. The impact of solid non-hazardous waste generation is expected to be fully controlled by implementing the mitigation measures.

The impact assessment on hazardous and non-hazardous waste is considered of **medium severity**

6.4.2.7 Biodiversity (Flora and Fauna)

Important species are not expected to occur within the project route and its close hinterland as the project is mainly located in intensely populated urban areas. Flora is mainly introduced and fauna is almost entirely composed of commensal species, able to tolerate the presence of man and his activities.

The upgrading of the signalling system between Tanta – El Mansoura – Damietta will not affect local habitats; however, the construction works for the doubling of the single-track railway between El Mansoura and Damietta will result in the destruction of the vegetation cover along the land strip to be occupied by the new railway track.

Some animals become accustomed to noise, including rats and many commensal birds. Clearance, leveling and excavation works pose the main source of direct impacts to floral and faunal species as these activities involve physical destruction of habitats. Although '*fauna is almost entirely composed of commensal species'*, there might be impacts on fauna such as construction during nesting and spawning seasons and increase in turbidity of water in canals and ditches.

Gaseous emissions, noise and vibrations from construction activities are short term impacts that can disturb wildlife or the surrounding area, although the habitats in this area are all man-made, none of them considered threatened, and none seems to be necessary for the survival of any endangered animal species or plants, the impact during construction works is considered of **medium Significance**.

With respect to the potential destruction of sensitive species, the baseline study on flora and fauna has not indicated the presence of endangered species in the area of the railway line. In addition, wild fauna

and flora along the railway corridor are expected to tolerate disturbances associated with construction activities of the project.

The impact assessment on Biodiversity is considered of **medium severity**

6.4.2.8 Impacts on Archaeological and cultural heritage

Many of the construction activities will be carried out on the railway land on the same site as the old buildings, and the trenching activities will be carried out parallel to the railway line. In addition, no deep excavations will be carried out, so there is no possibility of finding artifacts.

No deep digging/trenching during installation of signalling towers and track upgrade will take place, thus there is no probability to find antiquities. However, the study team recommends communicating to the members of the local community that the project area is far from any archaeological site. In the event that any archaeological remains are discovered during digging, the contractor must follow the Chance Find Procedures.

Cultural heritage will be impacted in a minor way in cases where construction activities take place near some mosques at the level crossings and a cemetery, as a result of the project; they are spiritual and/or religious significance as buildings of great value to community members.

The impact assessment on cultural heritage is considered of **medium severity**

6.4.2.9 Occupational Health and safety impacts and risks

Construction phase of the project will encompass different activities, which are expected to affect occupational health and safety for workers.

Train/ worker accidents are generated from railway workers being in the vicinity of rail lines as they are exposed to moving trains is one of the major risks. Also listed in the report are the main construction site hazards identified by the Occupational Safety and Health Administration (OSHA), all of which will be encountered during the construction of the different components of the project

1. Excavation and Trenching – OSHA has recognized excavation and trenching as the most hazardous construction site operation.
2. Fall - falling from scaffolding more than 6 feet or a steady ladder at a distance of more than 20 feet are among the most serious hazards at the site of construction and the most common.
3. Stable and mobile stairs - Fixed and mobile stairs are important causes of injuries and disasters among construction workers.
4. Scaffolding - The most likely hazards are due to the movement of the scaffold components, their collapse due to damage to their component, loss of load, suspension of a suspended material, electric shock or malfunction.
5. Heavy construction equipment. The main causes of such accidents include the injury of workers when the equipment is returning reverse or when the direction of the equipment is changed or when the brakes do not work properly.
6. Electricity - electricity is a major risk to people both at home and at work. Electricity line workers, electricity technicians and electricity engineers are constantly exposed to electricity and face daily risks.
7. Other HandS risks to consider are compliance with speed limits on construction sites and failure for workers to wear PPEs.

The projects involve a large work force and there will also be regular flow of parties entering and exiting the site. Given the complexity and the concentrated number of workers, the potential for the spread of infectious disease (COVID-19) in the project is extremely serious, as are the implications of such a spread.

In addition to the health and safety risks, workers may encounter inappropriate working conditions or risk of complaints that are not appropriately addressed…etc.

The impact assessment of OHS is expected to be Negative, temporary and of **High severity.**

6.4.2.10 Community Health and safety impacts and risks

Impacts on community health and safety are expected to result from emissions of gaseous pollutants and dust, increased background noise levels, and uncontrolled dumping of construction waste, in addition to:

- **Safety risks to the public at or near the construction sites**. Some of construction sites will be located near vital crossings for community. In addition to the random markets scattered, which attract a large number of individuals, which makes construction sites and construction equipment a high risk for the local community.
- **Accidents, loss of lives and properties.** Trespassers on rail lines and facilities may incur risks from moving trains, electrical lines and equipment, and hazardous substances, among other issues.
- **Longer train trip time and train delays**. Unexpected train delays due to reduction of train speed at the project's construction sites will result in longer train trip time.

The impact assessment of CHS is expected to be Negative, temporary and of **High severity.**

6.4.2.11 Reduced accessibility to various facilities around the construction sites

Level crossings represent high-risk accident locations for railways. Also, construction activities at level crossings will lead to complete or partial closure of the crossings to pedestrian and vehicles, causing increased traffic congestion, which reduced accessibility to various facilities around the construction sites.

The impact assessment Reduced accessibility to various facilities around the construction sites is considered of **High severity**

6.4.2.12 Traffic impacts

- Increased traffic flow on roads leading to and from the construction site
- Traffic jams and increased exposure of travellers and road users to exhaust and associated noise and possible accidents.
- Blocked roads as a result of the construction works, inadequate storage of excavated soil, trenching activities, etc.

The impact assessment Traffic is considered of **Medium severity**

6.4.2.13 Visual impacts

Project activities will entail the piling up of sand and movement of vehicles in various construction sites. Moreover, temporary storage areas will be used to store construction materials, which will result in a significant visual intrusion impact. However, the duration of visual intrusion impacts will be limited.

The impact assessment on Visual impacts is considered of **minor severity**

6.4.2.14 Risk of child labour

Child labour is a common practice in Egypt at large, and is a risk for the project in particular, considering constructions activities, primary supply; service provisions around stations. According to Egyptian Labour Law No.12/2003, child labour should be prohibited especially in dangerous works. Children below 18 are a favoured labour force, particularly in the informal sector, as they receive low salaries and they are less demanding in general.

There is a risk that this common practice is used in the project. This risk should be carefully handled and strict obligations and monitoring should be applied in the contractor obligations.

The impact assessment child labour is considered of **Medium severity**

6.4.2.15 Labour influx

The project shall recruit a number of workers and technicians during the construction phase. If not appropriately managed, the recruited workers' interactions with the local community may result in inconvenient, inappropriate and unappreciated acts, negative impacts on privacy, or even serious misconduct (e.g., harassment) or inappropriate behaviours that could affect different groups, including women. Although it is not that much expected in the project, In the meantime, the increase in the number of workers might engender in some areas an influx of additional population and put increased pressure on local resources, prices of commodities, accommodation and rents.

Transmission and spread of COVID-19 resulting in a large number of the work force becoming ill, project may become a threat and introduce infection to local communities.

6.4.2.16 Risk of gender-based violence (GBV)

The scale of labour influx and the absorptive capacity of the local community indicates the significance of the anticipated risk of GBV. Although there are no particular statistics on the rate of GBV of women specifically on the local communities in which the construction works are taking place.

The various forms of GBV that are likely to occur, include:

- Sexual harassment of women and girls by workers, this might lead to honour crimes,
- The probability of limitation of women and young girls' mobility in the project sites,
- Discrimination against women in terms of employment.

The impact assessment Labour influx is considered of **Medium severity**

6.4.2.17 Land use impacts

ENR has a large area of land properties along the project's railway line, however activities under project components might require land acquisition that could lead to negative impacts on land and/or livelihoods. The initial determination of the required land areas, location and the potential impacts have

not been identified or determined yet, the locations of the technical buildings MTB and STB and the area required have not determined yet. In addition to that in some areas ENR land properties are being cultivated by tenant farmers or exploited by squatters engaged in formal or informal economic activities.

Most of the railway tracks pass through agricultural land. The construction activities of MTB and STB and their access roads may result in having to provide compensations for agricultural land tenants in some areas; depending on the area allocated for construction.

Most of the single-track passes through agricultural land. Construction of the railway track doubling could result in Land acquisition, and provide compensations for agricultural land tenants in some areas; depending on the area allocated for construction.

The project will result in the following impacts related to asset, land acquisitions and economic displacement:

- Cultivated areas used by tenant farmers within the properties owned by ENR and the Ministry of Water Resources and Irrigation. These cultivated areas include some trees and crops,
- Potential assets to be removed such as mosques, shops, cafeteria and cemetery in some stations in addition to any buildings that conflict with the establishment of the doubling area,
- Most of the single-track passes through agricultural land. Construction of the railway track doubling could result in having to provide compensations for agricultural land tenants in some areas; depending on the area allocated for construction,
- Impact related to permanent land use; In case the project land needed for the project activities can be outside ENR property,
- Impact related to temporary land use; in case that the contractor needs land to store equipment and building materials that do not have space on the construction site.

The Resettlement Action Plan (RAP) data will include all impacts on lands and livelihoods (formal and informal) as a result of the project's construction activities.

The affected land users that will be impacted by the construction of:

- The doubling of El Mansoura – Damietta single-track and the storage areas needed for equipment and construction materials;
- The new technical buildings along the railway line MTB and STB,
- Informal economic activities that are located on the ENR RoW.

1. **<u>The doubling of El Mansoura – Damietta single-track and the storage areas needed for equipment and construction materials;</u>**

The Consultant conducted several site visits to the railway route in the doubling area. According to the results of the site visits and based on the visual investigation, the Consultant has identified 18 points along the doubling area (Includes the single stations) as sensitive areas in the doubling section; to ensure the availability of ENR property, and assess if it is sufficient for the project's land needed or not. The Consultant, in cooperation with the railway design team and ENR Environmental and Property Departments, conducted a survey of the sensitive points according to the following steps:

- As a first step after identifying the 18 points the Consultant has matched the points with SYSTRA drawings that were received from ENR (line alignment-large-A01-1, the topographic Survey Cross-Sections and SYSTRA Feasibility study),
- As a second step the railway design team determined the Right of Way RoW in those areas, and
- Accordingly, the Consultant conducted a survey for the identified sensitive locations with the assistance of ENR Environmental and Property Departments; to measure ENR property from the

centre line of the existing track, and the distance from the centre line to the sensitive point (building / agricultural land),

- The railway design team reviewed the measuring results of the ENR property and identified the affected areas.
- There are 6 affected points; these points do not represent all of the affected areas in the doubling sections, because the project's land needed have not been determined in the total path of the doubling line.

Table 6-3-Survey Results

Point number	Location	Status according to ENR property	ENR property	Land needed
Point 3	Km 69.8	Outside the ENR property	8 m	7.50m + additional service road (so we need 4.0m from the building)
Point 4	Km 72.9	Outside the ENR property	8 m	9.50m, so we need 1.5m from the agricultural land9.50m, so we need 1.5m from the agricultural land
Point 5	Km 74.2	Outside the ENR property	8 m	we need 9.0m + additional service road
Point 7	Km 86.6	The buildings (a mosque) trespassed on the ENR property for a distance of up to 3m	8 m	The needed distance 7.50m
Point 8	Km 87.3	Outside the ENR property	ENR property: 4.60 m from the right and 6.80 m from the left. In the area after the station directly. Then the property increases to 8 m near the crossings.	The distance in the right of track is sufficient, while in the lift we need 7.50m + additional distance for service road if needed
Point 15	Km 64.6	Outside the ENR property	8 m	Station will be redesign and shifted at least 4m

Point 3

Point 4

Point 5

Point 7

Point 8

Point 15

Figure 6-3: Photos of the affected points sites in the survey conducted for the most sensitive sites in the doubling area

ENR to provide to the Consultant at a later stage the list of all PAPs according to the current occupancies on the ENR properties in the doubling area.

Figure 6-4- Map of the affected points sites in the survey conducted for the most sensitive sites in the doubling area

Accordingly, digital maps were prepared showing the boundaries of the railway property in the path of the doubling area, as well as the boundaries of the land needed for the project in the same area; based on SYSTRA drawings (the topographic Survey Cross-Sections and SYSTRA Feasibility study) and the railway designer.

The data of the digital maps was used to verify the availability of the project's land needed in the ENR property, as well as the assets likely to be affected by the construction of the doubling area to clarify the impact on land use. The following table shows the current use of land according to the digital maps results.

Table 6-4: Digital Map Results

Item	Area	Percentage
The total doubling area land needed	35291 m^2	100 %
ENR property area out of the total area required for the doubling	29623 m^2	84 %
The area outside ENR property	4862 m^2	14 %
The unknown area out of the total (no ENR limits shown)	717 M^2	2 %
The agriculture land from the total doubling area land needed	26137 m^2	74 %
The agriculture land used by tenant farmers within the properties owned by ENR	22520 m^2	64 %
The agriculture land outside ENR property	3617 m^2	10 %
Potential assets to be removed from the total doubling area land needed	9154 m^2	26 %
Potential assets to be removed within the ENR property area	7103 m^2	20 %
Potential assets to be removed outside ENR property area	2051 m^2	6 %
Areas can be avoided in the final design	8302 m^2	23.5 %
Areas can be avoided in the final design within the ENR property area	6336 m^2	18 %
Areas can be avoided in the final design outside the ENR property area	1966 m^2	5,5 %
Temporary land use; in case that the contractor needs land to store equipment and construction materials outside the construction site	Based on digital maps and site visits, there are available areas of ENR property that allow the contractor to store equipment and construction materials. In the case that there is not enough area in ENR's property, this will be done based on the protocol for temporary use or rental of private land described in the RPF that has been prepared for the project.	

- It is clear from the previous table that the ENR property covers the vast majority of the land required for the doubling area 84 %.

- The private land area outside ENR property is about 14 %
- The unknown area is about 2 %.
- According to the digital map data; the ENR property includes establishments and agricultural land leased to farmers from the surrounding areas, represent about 64 % from the total doubling area land needed.
- The results of digital maps and site visits clarified that there are some areas of agricultural land and assets that overlap with the ENR property. Based on the railway designer, these areas can be avoided in the final design, especially the areas located at level crossing, represent about 23.5 % from the total doubling area land needed.
- The consultant conducted interviews with the government authorities concerned with the land acquisition in the governorates of Damietta, Gharbia, and Dakahlia

2. The new technical buildings along the railway line MTB and STB

MTB. According to the latest updated received from ENR on 04th of March 2021, about 12 sites out of 14 have been identified, It was found that the 12 sites have adequate areas for technical buildings construction within the ENR property.

.**STB**. The Consultant did not receive a list of the secondary technical buildings STB locations, or any information about the availability of lands to construct these buildings on the ENR properties. ENR depends on the construction contractor to locate the STBs and access roads.

In addition, changing the design upon implementation may result in a change in the number and identity of the PAPs according to changing the area of influence.




Figure 6-5: Photos of Some of the main technical buildings locations that have been identified

3. Informal economic activities that are located on the ENR RoW

The Informal economic activities are classified into:

- Established economic activities (wooden and metal kiosks)
  - Animals Stall (1)
  - Kiosk (7)

This type of economic activities is found in the Tanta Mansoura section. It is not known to the Consultant whether these activities are located on the ENR RoW or in the road RoW; they are located near the asphalt road.

- Movable economic activities (Street Vendors)

At some crossings, there are street vendors selling vegetables, fruits, fish, etc. Their number varies from day to day according to their movement from one place to another.

Kiosk for drinks and sweets

Gypsum board

Animals Stall

The following figure shows map for the Informal economic activities:

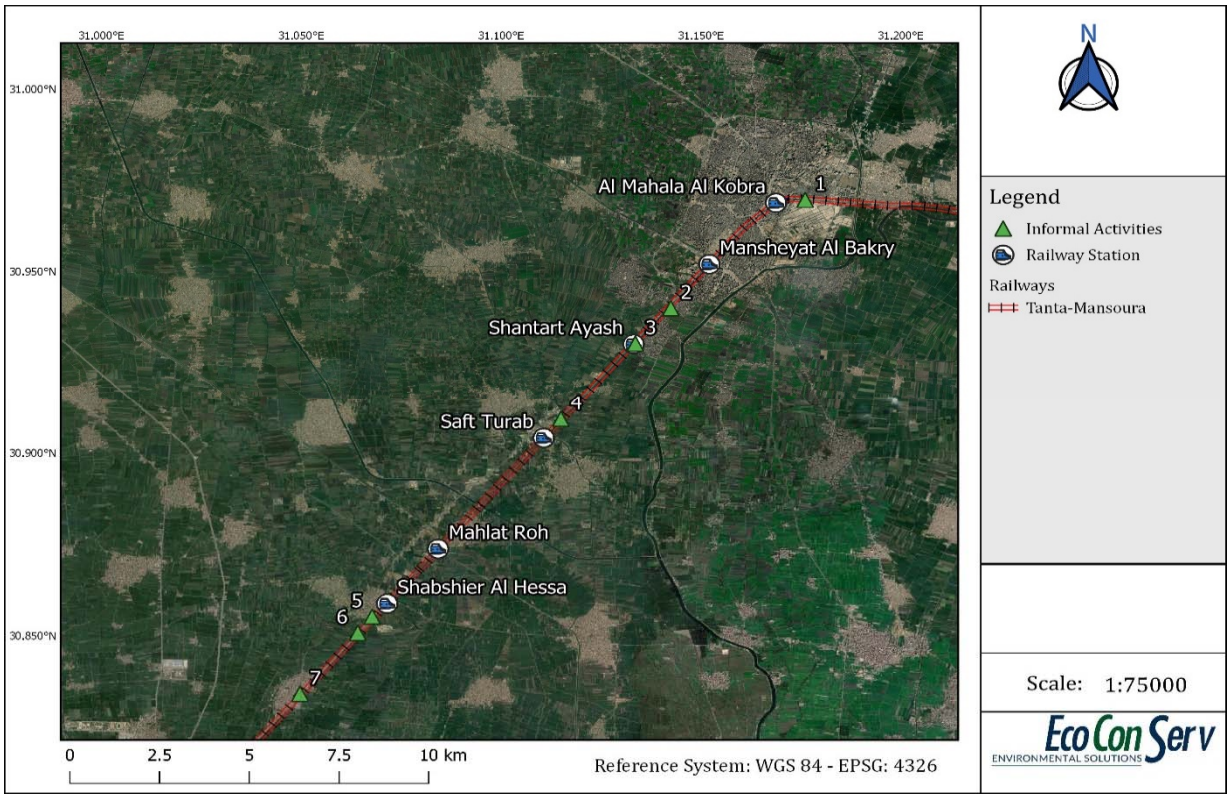

Figure 6-6: Map for the informal economic activities between Tanta and El Mansoura

The impact assessment on Land use is considered of **High severity**

6.5 Impacts during Operation Phase

6.5.1 Positive Impacts

Reduction of Carbon Footprint *(Component B)*

Improved air quality due to reduced air and noise pollution as the project provides an alternative mode of transportation that is less energy intensive and more environmentally friendly. The assessment of carbon footprint resulted in high reduction percentage of carbon emissions; nearly 28% which will lead to demonstrated improvement of air quality as health benefits due to the reduction of air pollutants associated with fuel consumption in addition to the economic benefits through saving fuel consumption as detailed in section 6.7.

Traffic Diversion and Fuel Saving (Component B)

The diversion of public transportation to the railway leads to a decrease in mileage travelled by gas or diesel motor vehicles, the reduction of air pollution, and reduction of greenhouse gas effects and a reduction in the number of accidents.

Social and Economic Benefits

- The project will result in a limited number of job opportunities during the operation phase, referring to maintenance staff recruited by the ENR *(Components AandB)*;
- Improved train operation safety and reduce accidents caused by human error or failure of the existing outdated signalling system now in use at certain sectors of that line *(Component A)*;
- Improved operation safety of the large number of level crossings along this line *(Component A)*;
- Improved railway service to the low-income public as well as freights *(Components AandB)*;
- Potential activity growth of freight transportation in the area is a clear chance as El-Mansoura / Damietta railway line is the only rail route serving Damietta port. Doubling this line will serve to increase the line capacity, and will permit to combine both passenger and freight services *(Component B)*;
- Increased line capacity because of the introduction of the doubling of El-Mansoura – Damietta single-track line. This will allow more trains to use the track every day, and provide passengers with a faster, safer and more comfortable train service *(Component B)*; and
- Increased safety and reliability of the national railway service and,
- Time saving is usually the main economic benefit of public transport projects. Time saving is especially important to former users of passenger trains that can take advantage of the reduction of journey times on the line. In addition, a certain number of private car users are diverted from roads, thanks to the railway service improvement *(Component B)*.
- Safety of railway operations is one of the motivations of this project. One particular dimension of this issue is the transportation of hazardous materials on road and rail in the corridor.

6.5.2 Negative Impacts

6.5.2.1 Air Quality

The main and only atmospheric pollution during the operating phase will result from:

- The operation of more locomotives on the new double track between El-Mansoura and Damietta.
- Increase in the traffic density on Tanta-El Mansoura as a result of the signalling improvements.

The emissions produced by the railway arise from the combustion of fuel inside an internal combustion engine. Consequently, the principal pollutants are those from diesel engines, principally CO_2, PM_{10} and NO_x, plus to a lesser extent of CO and hydrocarbons, together with SO_x and heavy metals originating from the fuel content in Sulphur and metals. However, the emissions from the railway operation are not expected to exceed the regulatory law limits.

The doubling of the single track between El Mansoura and Damietta will affect the near-by communities. However, as the air quality will be affected only when the two trains along the double track meet each other's (i.e., at specific site not exceeding 1 Km^2).

In addition, and as discussed in **Section 6.7** the considerable fuel saving resulting from the diversion of road traffic to rail will help to improve air quality conditions overall. Moreover, new locomotives can operate on the existing/ new doubling railway line which will produce low levels of air emissions compared to the old locomotives.

The impact assessment of air quality is expected to be permanent, local, and of **low severity.**

6.5.2.2 Noise and Vibration

No expected noise and vibration will result from the operation of the new electric signalling system between Tanta - El Mansoura – Damietta railway line. On the contrary, noise levels will rise due to train traffic, in addition to increasing vibration levels nearby the railway route, causing annoyances to residents.

The most important source of noise is rolling noise caused by wheel and rail vibrations induced at the wheel/rail contact. Irregularities on the wheels and rail running surfaces induces vertical vibration of the wheel and rail systems according to their dynamic properties. The poor maintenance of the railway tracks could cause rough rails, thereby further increasing the noise level. However, the use of new locomotives which operate on the existing/ new doubling railway line will produce low levels of noise and vibration compared to the old locomotives.

Other sources of railway noise include warning signals from trains (horns) and fixed installations (level crossings), track maintenance equipment, and shunting noise (noise from impacts between vehicles).

The quality of materials used to manufacture brakes, dampers and the rail track is also very important and has a great impact on the performance of rail traffic, and to human health/ environment in general, as a result of the annoyances caused to residents and damages to buildings due to vibrations from train traffic.

The impact assessment of noise and vibration is expected to be permanent, local, and of **medium severity.**

6.5.2.3 Surface Water

Maintenance operations of the elements of the railway line (e.g., lubrication of the track switches) involve the use of lubricants and other hazardous substances (e.g., acids and coating resins for the treatment of corroded parts), which may also reach nearby surface water bodies. The various types of freight that will be transported along the line could also become a source of water contamination, due to potential leaks or accidental spills of hazardous substances (e.g., liquid fuels, solvents, acids, bases, etc.).

Wastewater generated by train passengers, freight trains, workers and visitors at train stations, as well as railway office and administration buildings, would be another potential source of adverse impacts for surface water.

The impact assessment of surface water is expected to be permanent, local, and of **low severity.**

6.5.2.4 Soil

During railway operation, soil may be subject to contamination from the diffuse release of inorganic and organic substances due to leaks of lubricants and greases from passing wagons and locomotives, and metal discharges from abrasion processes in brakes, rails, wheels and contact lines, lubricants and other hazardous substances used for railway maintenance.

The impact assessment of soil is expected to be permanent, local, and of **medium severity.**

6.5.2.5 Hazardous and non-Hazardous Waste

The project is expected to dispose of a relatively small amount of waste during the operation and maintenance phases. Waste expected to be generated on site are:

Solid (Non-Hazardous) waste including steel scrap, wood scrap and domestic waste. Passenger-generated waste (leftover food, paper, plastics, and glass) is expected to be generated on-site during the operation phase.

The non-hazardous wastes generated during the operation phase normally have a high recycling potential. If not recycled, they should be sent to a specialized contractor or a controlled dumping site.

Liquid Waste Wash water for the train wagons after finishing the trips as well as the sewage generated from the passengers.

Hazardous waste including Waste Electrical and Electronic Equipment (WEEE), empty containers of chemicals, spent lubricating oils, and paint used for maintenance works, ballast and sleepers if contaminated with oil. Improper handling and storage of hazardous substances and/or waste, would result in environmental contamination.

All considered hazardous waste have to be collected via a licensed contractor and sent to a landfill site.

The storage and disposal of hazardous waste streams have to be carefully performed to comply with the regulatory framework. Such hazardous waste can have major, irreversible effects if not properly handled, stored, and safely disposed of, as follows:

- Mishandling and uncontrolled disposal of hazardous liquid and solid waste can have major health impacts for inhabitants in the project's area of influence; i.e., people who get in contact with waste during transport and disposal;
- Air quality could also be affected, since uncontrolled dumping of hazardous materials would result in most cases in open burning and the potential release of toxic emissions; and

- Uncontrolled disposal of hazardous liquid waste can cause soil contamination through direct contact or leaching.

The impact assessment of hazardous and non-hazardous waste is expected to be permanent, local, and of **medium severity.**

6.5.2.6 Biodiversity (Ecological System)

There is no indication that the subsequent operation of the double-line between El Mansoura – Damietta will have any irreversible or significant adverse impacts on fauna/flora in the areas adjacent to the project area.

In addition, the railroad is part of the man-made landscape, and will continue to be so after the modernization of the signalling system from Tanta to Damietta, as well as the doubling of the single-track between El-Mansoura and Damietta.

The impact assessment of the biodiversity is expected to be **Negligible**.

6.5.2.7 Visual Impacts

The alteration of landscape scenery will be affected by the presence of the new CTC building and the new double railway track objects between El Mansoura and Damietta. However, the visual evidence of these facilities cannot be completely avoided, reduced, nor concealed.

The impact should be considered of Low Significance. The impact of visual intrusion is expected to be fully controlled by implementing the mitigation measures.

The impact assessment of Visual Impacts is expected to be permanent, local, and of **low severity.**

6.5.2.8 Traffic

There is no indication that the subsequent operation of the double line between El Mansoura – Damietta will have any irreversible or significant adverse impacts on traffic in areas adjacent to the project area.

Accordingly, there is no impact on traffic during the operation phase.

The impact assessment of Traffic is expected to be Negligible

6.5.2.9 Occupational Health and Safety

Possible impacts on health and safety during operations include accidental injury to workers who maintain the crossings and the railways. Health and safety issues also encompass working around energized equipment and possible contact with natural hazards. However, during the operation and maintenance phase, the impacts on workers tend to be of Medium Significance.

The impact assessment of OHS is expected to be temporary, local, and of **Medium severity.**

6.5.2.10 Community Health and Safety

Stakeholders indirectly affected by the project impacts are:

Following the completion of the upgrading project (signalling system Modernization for Tanta- El Mansoura – Damietta as well as the Doubling of El Mansoura – Damietta Single-Track), it is expected that more trains will operate at increased travel speeds, which in turn is expected to increase the risk of accidents at level crossings. Risk of accidents will particularly increase to pedestrians crossing at

informal crossings, located in many places all along the lines. The line is also unprotected on most of the alignment, including in settlements and agricultural areas. It is likely that there are quite a few crossings by pedestrians and animals outside of level crossings currently; with increased traffic this could become a problem.

In these places, users of informal crossings, who have become accustomed to slow train speeds, would be subjected to a high risk from unexpectedly fast trains. An awareness-raising effort will be essential for reducing this risk.

In addition to a full array of safety and emergency precautions to be undertaken by ENR and the contractor, passenger and crossing users' safety is to be prioritized by stating emergency precautions.

Impacts on user health and safety may occur through improper management of the crossing and the signalling system, which can result from lack of awareness, illiteracy, or failure of the signalling system.

Accidents and death incidents were reported in some areas along the railway route. Pedestrians are accustomed to cross train crossings as trains are passing.

The impact assessment of CHS is expected to be temporary, local, and of **Medium severity.**

6.5.2.11 Impacts on land use

There is no indication that the subsequent operation of the double line between El Mansoura – Damietta will have any irreversible or significant adverse impacts on land use in areas adjacent to the project area.

Accordingly, there is no impact on land use during the operation phase.

The impact assessment of Land use is expected to be Negligible

6.5.3 Summary of Impacts during Construction and Operation Phases

The following tables present a summary of the anticipated impacts that might arise during the construction and operation phases along with an impact evaluation based on the methodology discussed in **Section 6.2**

Table 6-5: Potential Environmental and Social Impacts during Construction Phase

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Gaseous and Dust Emissions	**Air Emissions:** The following air pollutants are foreseeable for most of the construction activities: • Particulate matter and suspended solids; • Possible dispersion from stockpiles of soil and sand used for backfilling; • Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO_x, NO_x, CO, VOCs, etc. • Exhaust of power generators and vehicles transferring raw materials and/or those disposing of excavated soil and construction waste. • Fugitive dust emissions (PM_{10}, $PM_{2.5}$).	Low	Low	Medium	Medium	**Medium**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Noise and Vibration	Noise will mainly be resulted from the following activities: • Equipment mobilization, site preparation, excavation and trenching works needed to install the new signalling system; • Dismantlement activities of the existing signalling system Lifting the damaged rails and concrete sleepers; • Construction activities needed for the CTC, main and secondary technical buildings, doubling of the single-track and enlarging of the single railway stations; • Operation and movement of construction machines/equipment; • Construction works of culverts nearby the water canals; • Loading and erecting the new double railway rails, concrete sleepers as well as wooden sleepers in the intersections; • Unloading the ballast for the new double track; • Thermal welding as well as iron drawing activities.	Low	Low	Medium	Medium	**Medium**
Water Resources	**Surface Water:** Covering the agriculture drains and upgrading the culverts crossing the railway line will have an impact on the surface water quality. In addition, there will be a potential to introduce pollutants into surface waters including sediment, oil and lubricants. These compounds directly impact the physical and chemical quality of the water, and indirectly impact living organisms.	Low	Low	Medium	Medium	**Medium**
	Ground Water: There might be a minor leakage from the wastewater holding tanks. Consequently, domestic sewage could be highly significant if not well managed and controlled, and could possibly pollute the ground water.	Low	Low	Medium	Low	**Low**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Energy Efficiency and GHGs	The project activities do not generally involve consumption of electricity or fuel since it adopts manual digging, except for the following: • Fuel consumed by vehicles transporting raw materials and/or collecting waste for disposal; • Fuel consumed by diesel generators; • Electricity consumed by the temporary site offices; • Track laying activities; for those activities small and heavy machines will be used; and • Fuel consumed by staff and workers commuting to the site.	Low	Low	Medium	Low	**Low**
Soil	The construction activities will result in disturbance of the soil and geological characteristics causing a physical breakdown of soil particles potentially destabilizing the soil structure especially in the doubling area between El Mansoura and Damietta. Inappropriate management and disposal of hazardous and non-hazardous waste (uncontrolled management system) will cause soil contamination.	Low	Low	Medium	Medium	**Medium**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Hazardous and Non-Hazardous Waste	**Non-Hazardous Solid Wastes** The following are the types of solid non-hazardous waste expected to be generated on-site during the construction phase: • Excavated soil due to trenching activities; • Construction and Demolition waste (concrete, debris, bricks, sand and gravel); • Damaged concrete sleepers, old rails, fastenings, turnouts and old un-contaminated ballast; • Steel, metals, wood, empty cement sacks, wires, cables and all materials from the old signalling system that will be replaced; and • Domestic waste resulting from workers' accommodation (food remains, paper, plastics, and glass). **Solid Hazardous Waste** Solid hazardous wastes expected to be generated include waste electrical and electronic equipment (WEEE), leakages from temporary petrol tanks, empty containers of chemicals, spent lubricating oils, and paint used for construction machinery, contaminated (ballast, sleepers and soil), spent welding materials, etc. **Liquid Waste** Liquid waste expected to be generated from domestic wastewater of construction workers.	Low	Low	Medium	Medium	**Medium**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Biodiversity (Flora and Fauna)	Important species are not expected to occur within the project route and its close hinterland as the project is mainly located in intensely populated urban areas. Flora is mainly introduced and fauna is almost entirely composed of commensal species, able to tolerate the presence of man and his activities. The upgrading of the signalling system between Tanta – El Mansoura – Damietta will not affect local habitats; however, the construction works for the doubling of the single-track railway between El Mansoura and Damietta will result in the destruction of the vegetation cover along the land strip to be occupied by the new railway track. Some animals become accustomed to noise, including rats and many commensal birds. Clearance, levelling and excavation works pose the main source of direct impacts to floral and faunal species as these activities involve physical destruction of habitats. Although 'fauna is almost entirely composed of commensal species', there might be impacts on fauna such as construction during nesting and spawning seasons and increase in turbidity of water in canals and ditches.	Low	Low	Medium	Medium	**Medium**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Cultural Heritage	Many of the construction activities will be carried out on the railway land on the same site as the old buildings, and the trenching activities will be carried out parallel to the railway line. In addition, no deep excavations will be carried out, so there is no possibility of finding artefacts. Cultural heritage will be impacted in a minor way in cases where construction activities take place near some mosques at the level crossings and a cemetery, as a result of the project; they are of spiritual and/or religious significance as buildings of great value to community members.	Low	Low	Medium	Medium	**Medium**
Occupational Health and safety	Construction phase of the project will encompass different activities, which are expected to affect occupational health and safety for workers. In addition to the risk of train / worker accidents. Train/ worker accidents are generated from railway workers being in the vicinity of rail lines are exposed to moving trains is one of the major risks. Also listed below the main six construction site hazards identified by the Occupational Safety and Health Administration (OSHA), all of which will be encountered during the construction of the different components of the project	Low	Low	High	High	**High**
Community Health and safety	Impacts on community health and safety are expected to result from emissions of gaseous pollutants and dust, increased background noise levels, and uncontrolled dumping of construction waste, in addition to: • Safety risks to the public at or near the construction sites. • Accidents, loss of lives and properties. • Longer train trip time and train delays.	Low	Low	High	High	**High**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Reduced accessibility to various facilities around the construction sites	Level crossings represent high-risk accident locations for railways. Also, construction activities at level crossings will lead to complete or partial closure of the crossings to pedestrian and vehicles, causing increased traffic congestion, which reduced accessibility to various facilities around the construction sites.	Low	Low	Moderate	Medium	**High**
Traffic	- Increased traffic flow on roads leading to and from the construction site - Traffic jams and increased exposure of travellers and road users to exhaust and associated noise and possible accidents. - Blocked roads as a result of the construction works, inadequate storage of excavated soil, trenching activities, etc…	Low	Low	Moderate	Medium	**Medium**
Visual Impacts	Project activities will entail the piling up of sand and movement of vehicles in various construction sites. Moreover, temporary storage areas will be used to store construction materials, which will result in a significant visual intrusion impact. However, the duration of visual intrusion impacts will be limited.	Low	Low	Moderate	Low	**Low**
Child Labour	Child labour is a common practice in Egypt at large, the project in particular, considering constructions, primary supply; service provisions around stations. According to Egyptian Labour Law No.12/2003, child labour should be prohibited especially in dangerous works. Children below 18 are favourable labour as they receive low salaries and they are less demanding.	Low	Low	Moderate	Medium	**Medium**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Labour influx GBV	The project shall recruit a number of workers and technicians during the construction phase. If not managed properly, the recruited workers' interactions with the local community may result in inconvenient, inappropriate and unappreciated acts, negative impacts on privacy or may even result in serious misconducts (e.g., harassment) or inappropriate behaviors that could affect different groups, including women. Although it is not that much expected in the project, In the meantime, the increase in the number of workers might engender in some areas an influx of additional population and put increased pressure on local resources, prices of commodities, accommodation and rents.	Low	Low	Moderate	Medium	**Medium**
Land use Impacts	The Resettlement Action Plan (RAP) data will include all impacts on lands and livelihoods (formal and informal) as a result of the project's construction activities. The affected land users that will be impacted by the construction of: - The doubling of El Mansoura – Damietta single-track and the storage areas needed for equipment and construction materials; - The new technical buildings along the railway line MTB and STB, - Informal economic activities that are located on the ENR RoW	Low	Low	Moderate	Medium	**High**

Table 6-6: Potential Environmental and Social Impacts during Operation and Maintenance Phases

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Air Quality	The main and only atmospheric pollution during the operating phase will result from: • The operation of more locomotives on the new double track between El-Mansoura and Damietta. • Increase in the traffic density on Tanta-El Mansoura as a result of the signalling improvements. The emissions produced by the railway arise from the combustion of fuel inside an internal combustion engine. However, the emissions from the railway operations are not expected to exceed the regulatory law limits. In addition, the considerable fuel saving resulting from the diversion of road traffic to rail will help to improve air quality conditions overall.	Low	Low	Medium	Low	**Low**
Noise and Vibration	The most important source of noise is rolling noise caused by wheel and rail vibrations induced at the wheel/rail contact. Irregularities on the wheels and rail running surfaces induces vertical vibration of the wheel and rail systems according to their dynamic properties. The poor maintenance of the railway tracks could cause rough rails, thereby further increasing the noise level. Other sources of railway noise include warning signals from trains (horns) and fixed installations (level crossings), track maintenance equipment, and shunting noise (noise from impacts between vehicles).	Low	Low	Medium	Medium	**Medium**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Surface Water	Maintenance activities of the elements of the railway line involve the use of lubricants and other hazardous substances, which may also reach nearby surface water bodies. The various types of freight that will be transported along the line could also become a source of water contamination, due to potential leaks or accidental spills of hazardous substances. Wastewater generated by train passengers, freight trains, workers and visitors at train stations, as well as railway office and administration buildings, would be another potential source of adverse impacts for surface water.	Low	Low	Medium	Low	**Low**
Soil	Soil may be subject to contamination from the diffuse release of inorganic and organic substances due to leaks of lubricants and greases from passing wagons and locomotives, and other hazardous substances used for railway maintenance.	Low	Low	Medium	Medium	**Medium**
Hazardous and non-Hazardous Waste	**Solid (Non-Hazardous):** waste including steel scrap, wood scrap and domestic waste. Passenger-generated waste (leftover food, paper, plastics, and glass) is expected to be generated on-site during the operation phase. **Liquid waste:** Wash water for the train wagons after finishing the trips as well as the sewage generated from the passengers. **Hazardous waste:** including Waste Electrical and Electronic Equipment (WEEE), empty containers of chemicals, spent lubricating oils, and paint used for maintenance works, ballast and sleepers if contaminated with oil.	Low	Low	Medium	Medium	**Medium**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Biodiversity (Ecological System)	There is no indication that the subsequent operation of the double-line between El Mansoura – Damietta will have any irreversible or significantly adverse impacts on fauna/flora in the areas adjacent to the project area. In addition, the railroad is part of the man-made landscape, and will continue to be so after the modernization of the signalling system from Tanta to Damietta, as well as the doubling of the single-track between El-Mansoura and Damietta.	----------	----------	----------	----------	**Negligible**
Occupational Health and safety	Possible impacts to health and safety during operations include accidental injury to workers who maintain the crossings and the railways. Health and safety issues also encompass working around energized equipment and possible contact with natural hazards. However, during the operation and maintenance phase, the impacts on workers tend to be of Medium Significance.	Low	Low	Moderate	Medium	**Medium**
Impacts on land use	There is no indication that the subsequent operation of the double line between El Mansoura – Damietta will have any irreversible or significantly adverse impacts on land use in areas adjacent to the project area. Accordingly, there is no impact on land use during the operation phase.	----------	----------	----------	----------	**Negligible**

Receptor/ EHS Aspect	Potential Impacts	Duration	Spatial	Magnitude	Sensitivity of Receptor	Impact Significance
Community Health and safety	Stakeholders indirectly affected by the project impacts are: It is expected that more trains will operate at increased travel speeds, which in turn is expected to increase the risk of accidents at level crossings. In addition to a full array of safety and emergency precautions to be undertaken by ENR and the contractor, passenger and crossing users' safety is to be prioritized by stating emergency precautions. Impacts on user health and safety may occur through improper management of the crossing and the signalling system, which can result from lack of awareness, illiteracy, or failure of the signalling system.	Low	Low	Moderate	Medium	**Medium**
Traffic	There is no indication that the subsequent operation of the double line between El Mansoura – Damietta will have any irreversible or significantly adverse impacts on traffic in areas adjacent to the project area. Accordingly, there is no impact on traffic during the operation phase.	----------	----------	----------	----------	**Negligible**
Visual Impacts	The alteration of landscape scenery will be affected by the presence of the new CTC building and the new double railway track objects between El Mansoura and Damietta. However, the visual evidence of these facilities cannot be completely avoided, reduced, nor concealed. The impact should be considered of Low Significance. The impact of visual intrusion is expected to be fully controlled by implementing the mitigation measures.	Low	Low	Moderate	Low	**Low**

6.6 Impacts of Natural Environmental Disaster Risks on the Project

6.6.1 Seismic Risk

Seismic activity can pose potentially negative impacts on the time schedule of the construction activities in addition to possible injuries or fatalities to the workers during the construction phase. While, in the operational phase, such events may cause health hazards to the workers, community.

The impact significance from seismic activities is expected to be unlikely, short-term, irreversible and of **medium severity.**

6.6.2 Flood Risk

Flood events can result in the following risks:

- Submersion of stations platforms: some stations cannot be served and/or accessed by passengers; the line may not work on its entire itinerary;
- Flooding of man holes for accessing cable ducts: cables will resist a couple of days but can be damaged if they are in water for more than a week;
- Water seepage into the trackway structure: during flooding the natural water drainage is hampered, there is a risk of structural deformation for the infrastructure;
- The trackway covering, depending on its type, can be damaged by flooding. The rails themselves will resist to water for a couple of days, only cleaning will be required before restarting operations;
- Devices for manoeuvring switches (motors and command devices) are particularly vulnerable to water, if they are out of order, the whole line might have to be stopped or operate with higher headways;
- Signaling and train control are vulnerable to flooding, if they are out of order, the whole line might have to be stopped or operate with higher headways;
- The flooding of the main and secondary technical buildings will impact the railway operation;
- The rolling stock can operate with a water level up to 10 cm; above this the rolling stock should be withdrawn from operation; and
- If the rolling stock is flooded, its structure can be altered if infiltrated by polluted water.

The impact significance from flood risks is expected to be temporary, short-term, irreversible and of **medium severity.**

6.7 Carbon Footprint Assessment

6.7.1 Introduction

As part of the Kyoto agreement, the EU has set targets for the reduction of greenhouse gasses (GHG) mainly CO_2. For 2050, the EU's objective is to reduce Europe's GHG emissions by 80-95% compared to 1990 levels.

In terms of carbon emissions, rail movement can be somewhere between two and five times more energy-efficient than road transport with reasonable occupancy and load factors. Rail's share of transport GHG emissions is 2%, while rail's market share is 6% (passenger) and 10% (freight).

A carbon footprint assessment is needed for all the investment projects financed by the EIB. In this project, a carbon footprint assessment is conducted for the railway line starting from El Mansoura to Damietta as per the EIB guidelines. The greenhouse gases (GHGs) included in the footprint include the seven gases listed in the Kyoto Protocol, namely: carbon dioxide (CO_2); methane (CH_4); Nitrous Oxide (N_2O), Hydro-Fluorocarbons (HFCs), Per-Fluoro-Carbons (PFCs), Sulphur Hexa-Fluoride (SF6), and Nitrogen Tri-Fluoride (NF_3). The GHG emissions quantification process converts all GHG emissions into tonnes of carbon dioxide called CO_2 (equivalent) using Global Warming Potentials (GWP).

6.7.2 Project carbon footprint

The project's carbon footprint comprises by defining the calculation of the absolute (with project) emissions, the baseline emissions (without project), and the relative emissions which are the difference between the absolute and baseline emissions taking into account the modal shift effects. The methodology of calculating the project's carbon footprint is different from the methodologies used in calculating the carbon emissions in the GHG inventory process.

6.7.3 Methodology

Latest EIB methodology Version 11.1, July 2020 was used to calculate the project's carbon footprint. The methodology of calculation comprises of the following main steps:

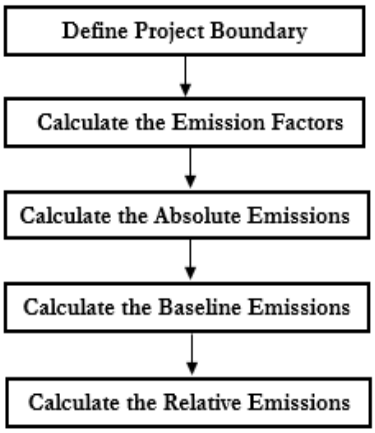

Figure 6-7: Project carbon footprint calculation flow

6.7.3.1 Sources of data used in the calculations

- Tetra Tech feasibility study (Activity 2 Report) mentioned the number of passenger and freight trains for reference year (2019) in table (4-6). Also, it mentioned the number of expected numbers of passenger and freight trains for the project year (2028) in Table 4-17. The source of emission factors is EIB methodology according to type of fuel used nationally.
- The data on fuel consumption of passenger and freight trains from Activity 2 report.
- The data on fuel consumption and modal share of road transport is extracted from Activity 2 report, EIB methodology, CAPMAS data and national reports report.

6.7.4 Project boundaries

6.7.4.1 Defining the project boundaries

The project boundary defines what is to be included in the calculation of the absolute and relative Emissions as follows:

Direct GHG emissions: Direct GHG emissions physically occur from sources that are operated by the project.

Indirect GHG emissions: Indirect GHG emissions associated with energy consumption consumed but not produced by the project.

Other indirect GHG emissions: All other indirect emissions that can be considered as a consequence of the activities of the project. GHG relative emissions are calculated for transport projects based on the displacement of passengers from one type of transport to another (modal shift effects), shifts in travel patterns, and the induced increase in passengers /traffic. If the project includes the replacement of rolling stock, the savings in emissions from this intervention should also be taken into account.

6.7.4.2 Project boundaries for the doubling of El Mansoura-Damietta railway:

- The Doubling of El Mansoura -Damietta railway section (65 Km).
- Upgraded Tanta-El Mansoura-Damietta railway line.

For this project, the absolute and baseline emissions calculations will have different boundaries.

6.7.4.3 Absolute emissions

Based on a project boundary that includes the upgrade of the whole section length of the Tanta-El Mansoura-Damietta railway line as defined in Activity 2 report, so the project and the calculation of absolute emissions would cover the GHG emissions of passenger and freight trains of the whole railway line in a typical year (2028).

6.7.4.4 Baseline emissions

Baseline emissions are based on a project boundary that adequately covers the “with” and “without” project scenarios. It includes all significant emissions (as applicable), so it will require a boundary outside the physical limits of the project to adequately represent the modal shift of other transport means. In this project, GHG relative emissions are calculated based on the displacement of passengers

and freight goods from one type of transport (road transport i.e., cars, buses, and trucks) to another (rail transport i.e., passenger trains and freight trains) which is mentioned as modal shift effects that include shifts in travel patterns and the induced increase in passengers /traffic.

6.7.5 Greenhouse gases included in the carbon footprint

The greenhouse gases (GHGs) included in the footprint include the seven gases listed in the Kyoto Protocol, namely: carbon dioxide (CO_2); methane (CH_4); Nitrous Oxide (N_2O), Hydro-Fluoro Carbons (HFCs), Per-Fluoro-Carbons (PFCs), Sulphur Hexa-Fluoride (SF6), and Nitrogen Tri-Fluoride (NF_3). The GHG emissions quantification process converts all GHG emissions into tonnes of carbon dioxide called CO_2e (equivalent) using Global Warming Potentials (GWP), which can be found in Table A1.9 in the Annex in EIB methodology.

All footprints of the EIB, absolute and relative, include these seven GHGs and are expressed in tonnes CO_2e. The following processes/activities usually generate GHGs that may be accounted for using the methodologies:

- CO_2 – stationary combustion of fossil fuels, indirect use of electricity, oil/gas production and processing, flue gas desulphurisation (limestone based), aluminium production, iron and steel production, nitric acid production, ammonia production, Adipic acid production, cement production, lime production, glass manufacture, municipal solid waste incineration, and transport (mobile combustion);
- CH_4 – biomass decomposition, oil/gas production and processing, coal mining, municipal solid waste landfill, municipal wastewater treatment
- N_2O – stationary combustion of fossil fuels/biomass, nitric acid production, Adipic acid production, municipal solid waste incineration, municipal wastewater treatment, transport (mobile combustion)
- HFCs – refrigeration / air conditioning / insulation industry
- PFCs – aluminium production
- SF_6 – electricity transmission systems, specific electronics industries (e.g., LCDs manufacture)
- NF_3 – plasma and thermal cleaning of CVD reactors.

6.7.6 Emission Factors

- **Estimation of the average fuel consumption of road transport (cars, buses, and trucks);** see tables (i), (ii), (iii) in the report annex (5) for road transport from which it is found that the Average fuel consumption for cars is 0.084 lit. /km and for buses is 0.247 lit. /km and for trucks is 0.31 lit. /km.
- **Estimation of the average fuel consumption and Emission factors;** see table (iv) in the report annex (5) for railway transport in the Appendix from which it is found that the average fuel consumption for passenger trains is 3.5 lit. /km and for freight trains is 4.8 lit. /km.
- **Emission factors: default emission factors in Kg CO_2 / TJ calculated from the total energy content in TJ/ kg fuel;** see tables (v), (iv) in the report annex (5) for road and railway transport in the Appendix from which it is found that 1-ton fuel gives 0.043 TJ for diesel fuel and 0.0443 TJ for gasoline, also 1 TJ from gasoline fuel produces 69,300 kg CO_2, 3 kg CH_4 and 0.6 kg N_2O while 1 TJ from diesel fuel produces 74,100 kg CO_2, 3 kg CH_4 and 0.6 kg N_2O.

6.7.7 Absolute emissions calculations (Project emissions) at year 2028

A project's absolute emissions (gross emissions) will be quantified and included in the footprint if the emissions are greater than positive or negative 20,000 tonnes CO_2e/year (as defined in section 5/EIB methodology). Absolute emissions concern a project's emissions during a typical year of operation i.e., not including commissioning or unplanned shutdowns. The appraisal team calculates and reports the project's absolute emissions even though EIB is only contributing a part of the total financing plan.

The absolute emissions should be calculated based on project-specific data. Where project-specific data is not available, it is good practice to use default factors based on sector-specific activity data, and through the application of documented emission factors.

The default methodology used in this project is fuel emissions (fuel combustion methodology). Emissions will be estimated by multiplying activity data, such as the volume/weight or energy content of fuel used by a project-specific default emission factor.

6.7.7.1 Project-specific data

Table 6-7: Characteristics of future transport network (reference: Tetra Tech Study)

Railway Line Section	Modelled Speed (km / h)		Expected Capacity (no. of trains)	
	PAX	**FR**	**PAX**	**FR**
Tanta- El Mansoura	100	80	68	12
El Mansoura- Damietta	100	80	64	16

6.7.7.2 Validation of data used in absolute (Abs) emissions calculations

Passenger trains: According to ENR, the passenger train has fuel consumption of 3.5 liter /km.
Freight trains: As per ENR (projects department), the freight trains have fuel consumption of 4.8 liter/km

Table 6-8: The absolute GHG emissions

passengers	Emission Kg CO_2/year	Emission Kg CH_4/year	Emission Kg N_2O/year	Total kg CO_2 eq/year	Total ton CO_2 eq
Section Tanta-El Mansoura	12,555,370.44	508.31	101.66	12,596,543.92	12,596.54
Section El Mansoura-Damietta	14,223,949.08	575.86	115.17	14,270,594.42	14,270.59
total passenger	26,779,319.53	1,084.18	216.83	26,867,138.35	26,867.13
Section Tanta-El Mansoura	3,038,610.66	123.02	24.6	3,048,575.33	3,048.57
Section El Mansoura-Damietta	4,876,782.54	197.44	39.48	4,892,775.23	4,892.77

Total freight Train	**7,941.35**
Total absolute emission	**34,808.48**

6.7.8 Baseline emissions calculations (BAU/ without project) - at year 2028

This will include the existing baseline emissions plus the total modal shift effects for both diverted passenger and freight traffic in addition to generated traffic passenger emissions.

Table 6-9: Existing capacity of railway trains for Tanta- El Mansoura- Damietta Section

Railway Line Section	Current Capacity (no. of trains)	
	PAX	FR
Tanta- El Mansoura	52	4
El Mansoura- Damietta	28	4

6.7.8.1 Modal shift effect for passenger trains

- Modal share: from the reported data in Activity 2 report regarding the road transport in Egypt and in the study area including passenger transport (private cares, Taxi and Buses),
- Number of passengers.km (Pax.km) diverted from road transport (cars, taxis and buses) in baseline to train transport in project = 8,336,000 (reference: Activity 2 Study report). The generated traffic passenger (Pax.km) = **24,496,608**. So, according to the estimated modal share mentioned above the transport modal shift effect from baseline (WO) to Project is as follows:

6.7.8.2 Modal shift effect for freight trains

Freight trucks modal shift: According to Activity 2 report regarding the freight transport (light trucks, medium, and heavy trucks) the expert found that modal share of freight transport is 43.94 % for light trucks, 50% for medium trucks and 6.06 % for heavy trucks (different types).
Number of ton Km diverted from freight road transport (light, medium, and heavy trucks) in baseline to train transport in project = **45,827,013** ton/ km (reference: Activity 2 report).

So according to the estimated modal share mentioned above the transport modal shift effect (diverted freight traffic) from baseline (without project/WO) to Project is as follows:

6.7.8.3 Diverted freight traffic

The difference in freight ton.km between project and baseline= 45,827,013 ton/km. This amount of freight will be diverted from freight road trucks (baseline) to freight trains (project) due to modal shift (split).

Estimated average loading capacity of trucks is 2, 10, and 23 ton/veh. for light, medium, and heavy trucks respectively (Activity 2 report)- So the number of veh.km/year for each type of road freight transport mean (trucks) is calculated through the multiplying its percentage modal share by the diverted freight ton/km.

Table 6-10 the baseline emissions (without project) - – year 2028

Passenger Train	Emission Kg CO_2/year	Emission Kg CH_4 /year	Emission Kg N_2O/year	Total Kg CO_2 eq/year	Total ton CO_2 eq
Section Tanta-El Mansoura	9,601,165.63	388.71	77.74	9,632,651.23	9,632.65
Section El Mansoura-Damietta	6,222,977.72	251.94	50.38	6,243,385.06	6,243.38
total passenger Train	15,824,143.36	640.65	128.13	15,876,036.3	15,876.03
Diverted traffic road cars	4,265,889.33	184.67	36.93	4,280,847.64	4,280.84
Diverted traffic road buses	1,259,820.64	51.0	10.20	1,263,952.037	1,263.95
Diverted traffic shared taxi	13,650,845.87	590.94	118.18	13,698,712.47	13,698.71
Generated traffic road cars	434,702.59	18.81	3.76	436,227.68	436.22
Generated traffic road buses	412,193.62	17.84	3.56	27,973.77	27.97
Generated traffic shared taxi	191,095.008	7.73	1.54	413,638.98	413.63
Total passenger emission					**35,997.38**
freight train	**Emission Kg CO_2/year**	**Emission Kg CH_4 /year**	**Emission Kg N_2O/year**	**Total Kg CO_2 eq/year**	**Total ton CO_2 eq**
Section Tanta-El Mansoura	1,012,870.22	41.00	8.20	1,016,191.77	1,016.19
Section El Mansoura-Damietta	1,219,195.63	49.36	9.87	1,223,193.80	1,223.19
Total freight train emission					**2,239.38**
Diverted light trucks	8,353,707.24	338.20	67.64	8,381,101.99	8,381.10
Diverted Medium trucks	1,901,162.32	76.97	15.39	1,907,396.90	1,907.39
Diverted Heavy trucks	100,182.98	4.05	0.81	100,511.52	100.51
Total diverted traffic trucks emission					**10,389.01**
Total baseline emission					**48,625.78**

6.7.9 Relative Emissions

- Absolute emission = 34,808.48 tone CO_2 eq/ year
- Baseline emission = 48,625.78 tone CO_2 eq/ year
- Relative emission = - 13,817.29
- Relative emissions = minus 13,817.29 ton CO2eq /year Results and analysis

The relative emission of the upgrading project of Tanta-El Mansoura-Damietta railway project is minus 12,939.4 ton CO_2eq /year, according to the "EIB" methodology not all investment projects need to be included in the GHG footprint and only investment projects with significant emissions are to be assessed.

Assessment of the results shows that the absolute emissions reach the EIB threshold value for reporting which is **20,000 ton CO_2eq. /year,** also the increase numbers of trains lead to potential reduction of carbon emissions from baseline due to modal shift of road transport the percentage of reduction of carbon emissions; nearly 27 %, will lead to demonstrated improvement of air quality as health benefits due to reduction of air pollutants associated with fuel combustion in addition to the economic benefits through saving of fuel consumption. There are many other co-benefits such as savings in travel time and cost, activation of the 3 new population centres and the trade from and to Damietta port…..etc.

Annex (5) shows the full carbon foot print assessment updated report.

7 Environmental and Social Management AND Monitoring Plans (ESMP and ESMMP)

7.1 Environmental and Social Management Plan

During the design phase, the following aspects should be considered as obligations to the designers.

- The Climate Risk Vulnerability Assessment (CRVA) should be prepared and the adaptation measures which will result from it should be part of the final design documents;
- Vibration measurements and vibration modelling should be conducted and based on the results of the modelling; mitigation measures will be included in the design of the superstructure. Possible mitigation measures are under sleeper pads or under the ballast mats.

Once the measures are identified, an updated ESMP will be prepared corresponding the design stage.

Table 7-1 Environmental and Social Management Plan during Construction Phase

Aspect	Impact	Mitigation Measures	Residual impact	Responsibility		Estimated Cost
				Implementation	Supervision	
Gaseous and dust emissions	- Particulate matter and suspended solids; - Possible dispersion from stockpiles of soil used for backfilling. - Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing	**Implement a construction site management plan including the following measures:** o o **Transportation of excavation/construction material or/and waste** should be through licensed and sufficiently equipped vehicles with a suitable special box or provided with a cover to prevent loose particles from escaping into the air or dropping on the road (article 39 of the Law and 41 of the environmental law);	Low	Contractor	Environmental Affairs Department (EAD) of ENR	Included in Contractor Cost

	SOx, NOx, CO, VOCs, etc. - Exhaust of power generators and vehicles transferring raw materials and/or those disposing of excavated soil and construction waste. - Fugitive dust emissions (PM_{10}, $PM_{2.5}$).	o **Excavated soil stockpiles** should be covered with appropriate covering material[36], such as polyethylene or textile sheets to avoid soil dispersion; o **Storage of construction materials/waste** should be allowed only at ENR-designated sites or ENR's storage yards, and in a way that will neither affect traffic, nor pose any risk to communities adjacent to the railway corridor; o Install a **solid fence around the excavation site** in all areas adjacent to residential areas, public roads, water bodies and agricultural lands; o Unloading the new ballast material should maintain the **lowest possible** fall height to reduce noise and dust generation; o **Cutting or welding** should be conducted within an enclosed and ventilated area wherever possible, to limit the discharge of volatile substances, fumes and dust suspension into the atmosphere; o Ensuring that the vehicles travel on paved routes whenever possible; o **Unpaved roads**, which may be utilized for the movement of vehicles should be watered regularly to reduce dust emissions; o **Engines** of vehicles and other machinery should keep turned on only if necessary, to avoid unnecessary emissions; o All equipment, machinery, and vehicles used on site should be **maintained** in good working condition at all times to ensure minimal fuel consumption and smoky exhausts. This applies to buses used for transporting labours to the site, as well as earthmoving equipment and other vehicles; o Regulation of vehicles speed to a suitable speed (20 km/h) for all vehicles entering the site's boundaries.				
Noise and Vibration	Noise will mainly be resulted from the following activities:	- Construction activities generating excessive noise will be limited to daytime in compliance with local legislation. This	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost

[36] Sufficient sheets should accompany work groups during the construction phase.

	- Equipment mobilization, site preparation, excavation and trenching works needed to install the new signalling system; - Dismantlement activities of the existing signalling system Lifting the damaged rails and concrete sleepers; - Construction activities needed for the CTC, main and secondary technical buildings, doubling of the single-track and enlarging of the single railway stations; - Operation and movement of construction machines/equipment	will greatly minimize the noise disturbance to communities near work sites; - Workers exposed to noise exceeding permissible levels (e.g., ballast unloading) should wear hearing protection; - Noise and vibration exposure periods should be minimized for workers so as not to exceed the safe limits as described by Labour Law No.12/2003, in addition to the occupational health and safety standards; - Equipment must be kept in good working order and where appropriate fitted with silencers; - Regular maintenance for all equipment and vehicles used in the construction activities to maintain the levels of noise and vibration within the allowable levels. - Equipment to run only when necessary to control noise; - Restricting the movement of lorry cars to prevent noise in the early morning and late evening periods; - All machines and vehicles must be stopped when not in use; - Communicate the construction schedule with neighboring communities and sensitive receptors; and - All noise or vibration complaints will be investigated and addressed appropriately.				

Surface Water	Covering the agriculture drains and upgrading the culverts crossing the railway line will have an impact on the surface water quality. In addition, there will be a potential to introduce pollutants into surface waters including sediment, oil and lubricants. These compounds directly impact the physical and chemical quality of the water, and indirectly impact living organisms.	- Prevent discharge of contaminants and wastewater streams to ground; - Adequate management and proper handling and storage of construction materials, oils and fuel, to avoid spillages; - Avoid washing of equipment or construction vehicles near water bodies. - Prevent discharge of sediments in nearby waterways; - There also should be designated waterproofed pits for washing machineries especially concrete trucks barrel.	Low	Contractor	Environmental Affairs Department (EAD) of ENR	Included in Contractor Cost
Ground Water	Inappropriate management of domestic wastewater generated from workers' caravan's area.	- Sewage holding tanks should be evacuated as frequently as-required, to prevent over flow. A schedule for regular sewage tanker evacuation of sewage holding tanks should be established; - Conduct regular maintenance and inspection on the sewage holding tanks, plumbing and associated wastewater facilities to ensure good sanitary conditions; and - All tanks, drums, pipes and sewage holding tanks should be decommissioned and removed upon demobilization from the site.	Negligible	Contractor	Environmental Affairs Department (EAD) of ENR	Included in Contractor Cost
Energy Efficiency and GHGs	The project activities do not generally involve consumption of electricity or fuel since it adopts manual digging, except for the following: • Fuel consumed by vehicles transporting	Opportunities for reducing GHG emissions, to be adopted by the contractor where technically and financially feasible: - Adjust work schedule to daytime as much as possible; - Apply energy conservation measures when possible.	Negligible	Contractor	Environmental Affairs Department (EAD) of ENR	Included in Contractor Cost

	raw materials and/or collecting waste for disposal; • Fuel consumed by diesel generators; • Electricity consumed by the temporary site offices • track laying activities; for those activities small and heavy machines will be used; and • Fuel consumed by staff and workers commuting to the site.					
Soil	The construction activities will result in disturbance of the soil and geological characteristics causing a physical breakdown of soil particles potentially destabilizing the soil structure especially in the doubling area between El Mansoura and Damietta. Inappropriate management and disposal of hazardous and non-hazardous waste (uncontrolled management system)	- Good housekeeping to minimize spills/leaks. - Disposal of un-contaminated old ballast as well as other wastes should be conducted through the designated disposal site. - Proper handling and management of the excavated contaminated soil/ballast and safe disposal via approved waste landfill; - Waste will be stored within waste skip bins or containers, and not directly on the ground; - All fuels and liquid chemicals will be kept in sealed containers, drums or tanks; - Drums and containers used for fuel or liquid chemical storage will be in good condition, free from rust or damage and should be placed above-ground; and - Routine maintenance and repair of mobile equipment/vehicles must be done in a workshop. - Conducting awareness campaign and formal training to prevent oil and petrol spills and leaks.	Low	Contractor	Environmental Affairs Department (EAD) of ENR	Included in Contractor Cost

	will cause soil contamination.					
Solid and Hazardous materials and Waste	- Inappropriate handling of solid, liquid and hazardous waste, leading to soil, and potentially groundwater, contamination. - Generate scrap waste as a result of the dismantlement of the mechanical signalling system components.	**Waste Minimization** - Materials will be purchased in the exact quantity required for the contract, to minimize unused left-overs. - As much as practically feasible, pre-welded track sections should be used to minimize on-site generation of hazardous waste as well as control gaseous emissions in the doubling area. - Maximize re-use of excavation waste as backfill. **Waste Re-use and Recycling** - Implement a segregation system based on compatibility of different waste streams during each phase of project implementation. - Whenever feasible the contractor will reuse and recycle viable materials. - Hydrocarbon wastes, including lube oils, must be collected for safe transport off-site for reuse, recycling, transport or disposal at designated sites. - Spent oils shall be collected, stored in sealed containers and recycled using a licensed company which also has to be identified by the contractor. - Prevent open burning of non-hazardous waste to avoid release of toxic pollutants into the ambient air through closing the informal openings that are used by people living in the surrounding to throw out their garbage. **Waste Storage and Handling** - Assigning certain areas, for stockpiling soil and construction waste, these areas should be secured and protected to avoid any possible theft; - Stockpiling if soil is prohibited on the banks of waterways; - Waste will be stored in containers or skip bins. It will not be stockpiled directly on unsealed ground;	Low	Contractor	Environmental Affairs Department (EAD) of ENR	Included in Contractor Cost

		- Recycling waste will be stored in separated areas or containers, and not mixed with other waste types; - Segregate waste streams to the maximum possible extent to facilitate re-use/recycling, if applicable. - All hazardous wastes must be appropriately stored in bounded areas and should be clearly identified as “hazardous”; - Waste removal from the site will be scheduled, to always have a waste skip available for use on site, and to ensure that waste skips/containers are not overfilled; - Any temporary waste storage areas (not contained in bins or containers) will be covered and/or surrounded by a screen mesh fence to prevent it being wind-blown across the site; - Ensure hazardous liquid material/waste containers are always sealed properly and secured from tipping/falling/damage/direct sunlight during transportation and storage. - In case of spillage: - Avoid inhalation and sources of ignition. - Cover and mix with sufficient amounts of sand using PPE. - Collect contaminated sand in clearly marked secure containers/bags. **Waste Disposal** - The disposal of all the solid wastes generated during the construction phase is the responsibility of the contractor and should be disposed through specialized and certified solid waste contractors in public dumpsites. - For the disposal of the old track components (rails, fastenings, etc.), it will undergo quality control check and it could be either reused in other railway lines or to be sold as scrap in auction. - While the disposal of the wooden sleepers, it should be disposed in a hazardous landfill.				

		- The old ballast will be sieved and screened and if contaminated, it will be disposed in a hazardous landfill and if not, it will be reused onsite. - ENR Museum will send a technical committee to check all the dismantled parts and choose which parts they will utilize in the museum. However, the other parts will be stored in ENR storage area to be reused in other lines if needed. - The different types of hazardous wastes should not be mixed. - All types of hazardous waste can only be transported by licensed hazardous waste service providers and disposed of in licensed landfill. Both, the service providers and disposal sites have to be identified at the beginning of construction works. - Transportation and disposal of hazardous wastes is the responsibility of the contractor and should be done through licensed and approved hazardous waste contractors and in compliance with the legal requirements and instructions to be disposed to the approved landfill. The chosen landfill should: - Accept and treat the different types of hazardous waste generated; - Have the adequate capacity to deal with the hazardous wastes generated; - Far from any protected areas or residential communities; - Be authorized and licensed from the competent authority (EEAA). - The domestic wastewater generated during the construction phase will be collected in holding tanks and evacuated regularly and transported to the nearest wastewater treatment plant or sewage pumping station. **Record Keeping**				

		- Register the amounts of disposed wastes and keep waste disposal and transportation receipts/manifests; - All waste removal records will be maintained, and reported as required in the monthly environmental performance report; - The aforementioned records will be kept in a Waste Register, which records collection dates, type of waste, quantities, waste transport company, destination, and signature of an authorized person.				
Biodiversity (Flora and Fauna)	The upgrading of the signalling system between Tanta – El Mansoura – Damietta will not affect local habitats; however, the construction works for the doubling of the single-track railway between El Mansoura and Damietta will result in the destruction of the vegetation cover along the land strip to be occupied by the railway track.	- Avoid, as much as possible, excavation works in vegetated areas. - If excavation is necessary, control excavation works to limit the area wherein removal of vegetation must occur; - Implement the mitigation measures proposed to reduce emissions, noise and vibrations, as detailed in the previous sections. - To consider stopping certain construction activities during bird nesting and fish spawning seasons as much as possible.	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost
Cultural Heritage	Cultural heritage will be impacted in a minor way in cases where construction activities take place near some mosques at the level	Cultural heritage will be impacted in a minor way in cases where construction activities take place near some mosques at the level crossings and a cemetery, as a result of the project; they are spiritual and/or religious significance as are buildings of great value to community members.	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost

	crossings, as a result of the project; mosques and the cemetery are buildings of great value to community members.	• The ENR Authority will coordinate with the Ministry of Awqaf (the responsible ministry for the Islamic houses of worship in Egypt) and the Ministry of Housing and Utilities (the ministry responsible for allocation of cemetery land in Egypt) to avoid any problems that may arise as a result of removing some of these facilities. ENR will coordinate with them in case of removing mosques and a cemetery and for the establishment of another alternative. • Coordination includes: ▪ Conducting consultation activities with community members, ▪ Establishing alternative mosques and cemetery or contributing to the establishment and expansion of mosques already existed; as appropriate and appropriate compensation from members of the local community. This should be done before construction begins.				
Occupational Health and safety	The risk of train / worker accidents. Also, the main six construction site hazards identified by the Occupational Safety and Health Administration (OSHA),	The Contractor shall adopt an Occupational Health and Safety Plan and job hazard analysis during the construction phase. The plan will include measures to protect workers from COVID-19 infection, and all national health regulations will be followed. According to WBG EHS Guidelines and OHSA standards the main mitigations measures to prevent common construction hazards are: - Main contractor should submit a Job Hazard Analysis for all activities on site. An OHS plan/Manual for risk management specific to the site and the foreseen activities, and following the risk control hierarchy, should be submitted, reviewed and approved by the PMT (or Owner Engineer) prior to commencement of construction. - All workers, especially working in hazard jobs, should be physically fit for the job. Evidence of their physical fitness	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost

		should be carried out by specialized labs/centers every six months. Records of workers' physical fitness should be maintained. - Workers should be trained to identify and evaluate fall hazards and be fully aware of how to control exposure to such risks as well as know how to use fall protection equipment properly. - Workers must comply with WBG EHS Guidelines and OHSA's general rule for the safe use of ladders and stairways - The contractual agreement with the contractor should include rigid commitments to apply the OHSP that should be prepared in full compliance with the WB EHS requirements. - The health and safety risk on the workers should be Coverage with appropriate insurance schemes for all the types of workers. In addition, the Insurance should be covering work related accidents (injuries and fatalities), as well as insurance for third party. - The contractor also will be obliged to maintain daily attendance sheets in order to verify the attendance of workers in case of accidents and provide the injured persons with proper health insurance to prevent Heavy Construction Equipment risk, workers should follow all construction safety guidelines necessary to eliminate the exposure to such injuries and accidents - The best way to prevent Electrical hazard is for workers to be at a safe working distance from the power lines. Other precautionary measures include guarding and insulating of the vehicle from which they might work. This would help prevent electrical hazards from injuring them while working. - Rigid obligations and penalties will be added to the contractor/subcontractors' ToR in order to warrantee no child labour is occurred in the project - Sufficient number of OHS supervisors should be assigned in order to minimize the breaching of OHS requirements - Daily toolbox should be given to workers in order to share any information about OHS				

		- A worker's complaint system must be made available to workers on site
		The contractor should prepare and implement a COVID-19 and communicable diseases Management Plan (to be approved by the supervising Consultant and the environmental affairs department (EAD)) including but not limited to
		- Develop, communicate and implement measures to protect workers from COVID-19 under the health and safety monitoring plan; including but not limited to:
		  - Body-temperature measurements at the entrance of the site
		  - Face-masks are mandatory
		  - Prohibit gathering and smoking at closed areas.
		  - Provide soap, water and disinfectants at the site.
		  - Apply mandatory quarantine procedures for at least 14 days for the suspected cases not counted from their vacations.
		- 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).				

Community Health and safety	- Safety risks to the public at or near the construction sites. - Accidents, loss of lives and properties. - Longer train trip time and train delays. - Level Crossings Safety.	The contractor should prepare and implement a Community Health and Safety Management Plan including but not limited to: - Information related to community health and safety to be shared regularly and systematically - Awareness raising campaigns should be tailored in cooperation with the community-based organization. Securely surround the trench with a solid fence when working adjacent to residential clusters or any area where children are suspected to be present. - The contractor should submit a Job Hazard Analysis for all activities on site. An OHS plan/Manual for risk management specific to the site and the foreseen	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost

		activities, and following the risk control hierarchy, should be submitted, - Development and implementation of a Traffic Management Plan (including routes and alternative routes, truck movements, transport of workers, and short-term closure of roads - 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 For Pedestrian Safety, the proposed mitigation measures are as follows: - Posting of clear and prominent warning signage at potential points of entry to track areas (e.g., stations and level crossings); - Installation of fencing or other barriers at station ends and other locations to prevent access to tracks by unauthorized persons; - Local education, especially to young people, regarding the dangers of trespassing; - Designing stations to ensure the authorized route is safe, clearly indicated, and easy to use; - Use of closed-circuit television to monitor rail stations and other areas where trespassing occurs frequently, with a voice alarm system to deter trespassers.				
Reduced accessibility to various	construction activities at level crossings will lead to complete or partial	For Level Crossings Safety, the proposed mitigation measures are as follows: - Working during the closure of shops, especially at night, in locations far from residential areas and near	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost

	closure of the crossings to pedestrian and vehicles, causing increased traffic congestion, which reduced accessibility to various facilities around the construction sites.	to level crossings, in order to avoid any accidents during construction near the level crossings. - Installation of automatic gates at all level crossings, and regular inspection/maintenance to ensure proper operation. - Prepare a clear plan that includes construction dates at the level crossings, to coordinate with local authorities before construction, to avoid reducing the accessibility to various facilities around the construction sites; - Preparing a schedule of construction dates at the main crossings and entrances to local communities, and informing the communities and local units of construction dates, well in advance of the start of the construction activities; and - An appropriate grievances mechanism to receive complaints from the local community. - The contractor should put in place temporary crossings during construction - The three pedestrian bridges of El Sahel canal should be maintained during construction				
Traffic	- Increased traffic flow on roads leading to and from the construction site - Traffic jams and increased exposure of travellers and road users - Blocked roads as a result of the	- A traffic plan should be developed to provide the maximum safety to the population and project personnel and alternative roads. - Target signage and outreach activities to improve public awareness of traffic changes and potential hazards - Provide and identify alternative access routes, if necessary, with coordination between the local authorities and community leaders in the project area and inform the residents about the alternative routes before construction begins - Ensure vehicle safety and regular maintenance	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost

	construction works,	- Review any complaints related to traffic and accidents				
Visual Impacts	- Temporary storage areas will be used to store construction materials, which will result in a significant visual intrusion impact.	Visual intrusion impacts cannot be avoided. However, below are the mitigation measures to be adhered to: - Construction materials should be properly piled; - Sand accumulation should be on-site for a limited time duration; - Workshops should be maintained clean and in an orderly manner; and - Paint boxes should be stored in closed areas.	Negligible	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost
Child Labour	- Children below 18 are favourable labour as they receive low salaries and they are less demanding.	- The contract to be prepared for contractor, subcontractors, primary suppliers and service provisions will prohibit any kind of hiring minors in the project (Children below 18 years) - The contract also will oblige the contractor/subcontractor, primary suppliers and service provisions to keep a copy of IDs of labourers in order to facilitate the monitoring of the presence of hired staff below 18 years - The contractor /subcontractor, primary suppliers and service provisions; so, will be obliged to maintain daily attendance sheets in order to verify the attendance of workers not include staff below 18 years' old. - Rigid obligations and penalties will be added to the contractor/subcontractors' ToR in order to warrantee no child labour is occurred in the project	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost
Labour influx GBV	- The increase in the number of workers might engender in some areas an influx of additional population and put increased pressure	In order to minimize impacts pertaining to labour influx the following should be thoroughly implemented: - A code of conduct for workers should be developed, all workers should be trained on. All types of inappropriate behaviour of workers should be identified, and the importance of adhering to the code of conduct is emphasized.	Low	Contractor	Environmental Affairs Department (EAD) of ENR	No additional cost

	on local resources, prices of commodities, accommodation and rents.	- 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. - All workers should be trained on the Code of Conduct - Code of conduct induction to be done every 2 weeks for the recurrent workers and the new comers before starting work. - Apply penalties to workers violating the code of conduct - Raising awareness of the local populations about the project commitment towards communities' and the measures taken for that. - Apply the full requirements related to operating the grievance mechanism including anonymous channels				
Land use Impacts	The affected land users that will be impacted by the construction of: The doubling of El Mansoura – Damietta single-track and the storage areas needed for equipment and construction materials; The new technical buildings along the railway line MTB and STB, Informal economic activities that are	In cases of repossession of the leased lands ownership "ENR property" that is used or occupied by individuals for agriculture or any economic activities; - ENR should form a committee to estimate the magnitude of the impact on the PAPs as a result of loss of income - Consulting with PAPs who are tenants about their needs, giving them sufficient warning, letting them harvest crops if possible, updating their leases in case of partial re-possession. - Ensure that the land is free of any crops or trees, otherwise compensation must be paid for it, - ENR should be offered alternative land of better or equal quality, as much as possible - The rental value of the land that has been deducted for the benefit of the project must be dropped before recovering the land,	Low	ENR Contractor	Environmental Affairs Department (EAD) of ENR	The compensation budget is allocated according to the compensation values and to be added to the RAP study

	located on the ENR RoW	- ENR should be ensured that there are alternative sources of income for the tenants (agricultural land, trade, employment, etc.) other than the acquired land. - All activities under the project need to be screened. For the new segment, ENR should prepare a Master list to be able to track land issues and apply the checklist/screening tool for all land plots and if any land will require acquisition, on a case-by-case basis either the checklist will be enough or RP will be prepared. - Coordination with Land officers, contractors, LDUs is needed - The tender documents must include a commitment from the project owner that the part to be handed over to the contractor must have completed all resettlement activities associated with it. In the case that ENR have to pay compensation for agricultural losses (crops and trees): - Develop a Resettlement Plan (RAP) compliant with EIB ESS and WB's ESS5; that will shed light on all activities related to land acquisition and propose an avoidance mechanism. In cases the land acquisition is un-avoidable, the RAP will propose corrective measures. - Discuss the corrective and remedial actions with the PAPs as well as local authorities and all relevant stakeholders, and share information about the compensation and economic restorations plan. - A GRM should be made available to all PAPs, it will be part of the RAP. - The number, status and eligibility of PAPs should be analyzed in the RP once the footprint of the project (including additional infrastructure, access road) is better defined.				

		- Impact related to temporary land use; in case that the contractor needs land to store equipment and building materials that do not have space on the construction site; - Contractor are renting land plots from tenants to store their materials in some cases. It should be done according to the market price in the area.				
Impacts of natural environmental disaster risks	• Seismic Risks • Flood Risks	**Seismic Risks mitigation measures:** - Integration of safety engineering criteria in the design of the project to prevent failures due to earthquakes. - It is necessary that responsible employees and workers of the contractor are trained to deal with such events and that such risks are incorporated in the contractor's emergency response plan. **Flood Risks mitigation measures:** - Understand the expected weather conditions at the Project location and in particular unseasonal and severe weather conditions in order to schedule activities that can be impacted by rain, such as earthworks, to occur outside of the rainy season; - Understand the expected weather conditions and allow additional time in the schedule to compensate for delays caused by inclement weather; - Open-cut storm drains to collect rainwater and discharge it away from work areas; - Avoid low lying areas on the worksite which can become flooded; - Ensure that material storage places are adequately drained; - Adequate plastic sheeting to cover recently completed work and unfinished work that can be damaged by rain;	Low	Contractor	Environmental Affairs Department (EAD) of ENR	Included in contractor cost

		- Have adequate water pumps for dewatering on-site and have a system in place to dispose of stormwater and discharge it.				
Table 7-2 Environmental and Social Management Plan during Operation Phase						
Air Quality	Degradation of local air quality due to increased train traffic in the new double track between El-Mansoura and Damietta.	Regular maintenance of diesel locomotives to keep them in optimal working conditions, including the achievement of the minimal level of air emissions, as set by the manufacturer. Accelerate the decommissioning of the locomotives with more than 20 years old. Use as long as possible clean fuel with lowest sulphur content.	Negligible	- Signalling directorate for Component A - Permanent railway directorate for Component B	Environmental Affairs Department (EAD) of ENR	Included in the operation cost of ENR
Noise and Vibration	Noise levels measured at the specified locations of the baseline are exceeding the allowable levels therefore the project activities will create	The proposed noise-mitigation measures leading to the decrease of noise exposure include measures implemented at the noise source and measures that intercept the noise between the source and the receptor, as follows: **At Source:** - Retrofitting trains with composite brake blocks, with noise-reduction potential.	**Low**	- Signalling directorate for Component A - Permanent railway directorate for Component B	Environmental Affairs Department (EAD) of ENR	Included in the operation cost of ENR

	more discomfort for the local people.	- Using wheel- and track-absorbers, with noise-reduction potential. - Using welding tracks and especially welding of turnouts; - Movable frogs can be used for turnouts and crossovers instead of the classical frogs will lead to a considerable reduction in noise levels; - Elastic mats should be placed beneath ballast section to reduce and control the noise levels. **Between Source and Receptor:** - Selecting vehicle characteristics for reduced generation of vibrations and improved maintenance of wheels. - Adopt a regular maintenance strategy for track and rolling stock, with the aim lowering vibration levels.				
Surface Water	Maintenance activities for the elements of the railway line as well as the wastewater generated by train passengers, freight trains, workers and visitors at train stations would be potential source of adverse impacts for surface water.	- Ensure good management and control of domestic wastewater, as well as wagons' wash water. - Develop a management program for chemical accidents and spills for the railway operation, to prevent and mitigate negative impacts to surface water and groundwater, which could arise from potential railway accidents and spills involving hazardous substances; - Initiate a programme of retrofitting trains with sewage collection tanks to be pumped out at collection stations for delivery to sewage treatment plants. - Ensure that the trains after completing their assigned trips are cleaned in central cleaning stations to treat	**Negligible**	- Signalling directorate for Component A - Permanent railway directorate for Component B	Environmental Affairs Department (EAD) of ENR	No cost is needed

		wash water before being disposed and to ensure full compliance with the national regulations.				
Soil	- Possibility of Soil contamination from the possible leaks of lubricants and greases from passing wagons and locomotives; - Inappropriate handling of solid and hazardous waste.	- Develop a management program for chemical accidents and spills for the railway operation, to prevent and mitigate negative impacts to soil, surface water and groundwater, which could arise from potential railway accidents and spills involving hazardous substances; - Ensure appropriate storage and handling of chemicals used for everyday train operation (fuel, lubricant oils, solvents, grease) in a specific area designed for such purpose; - Maintenance of trains shall be conducted on a regular basis in order to avoid leakage and spilling of hazardous materials; and - Good housekeeping to minimize spills/leaks.	**Low**	- Signalling directorate for Component A - Permanent railway directorate for Component B	Environmental Affairs Department (EAD) of ENR	Included in the operation cost of ENR
Hazardous and non-hazardous waste	**Solid waste (Non-Hazardous):** Waste including steel scrap, wood scrap and domestic waste. Passenger-generated waste (leftover food, paper, plastics, and glass) is expected to be generated on-site during the operation phase. **Liquid waste:**	**Non-hazardous waste:** - Prevent open burning of non-hazardous waste to avoid release of toxic pollutants into the ambient air. - Continuous follow-up and coordination with the local administration units to ensure that the waste is removed from the railway corridor on a regular basis. - The illegal openings along the railway corridor should be closed from ENR side. This will prevent people from accessing the railway corridor and throwing their waste. - Segregate waste streams to the maximum possible extent to facilitate re-use/recycling, if applicable. - Provide adequate waste bins and waste biodegradable waste bags on trains.	**Low**	- Signalling directorate for Component A Permanent railway directorate for Component B	Environmental Affairs Department (EAD) of ENR	Included in the operation cost of ENR

	Wash water for the train wagons after finishing the trips as well as the sewage generated from the passengers. **<u>Hazardous waste:</u>** Hazardous waste resulted from the maintenance activities. Improper handling and storage of hazardous substances and/or waste, would result in environmental contamination.	- Establish strict fines for garbage throwing and provide abundant bins on trains and signs. - The disposal of solid waste generated from the train wagons will be carried out by ENR Integrated Services - Initiate a programme of retrofitting trains with sewage collection tanks to be pumped out at collection stations for delivery to sewage treatment plants. - Ensure that the trains after completing their assigned trips are cleaned in central cleaning stations to treat wash water before being disposed and to ensure full compliance with the national regulations. **<u>Hazardous waste:</u>** - The different types of hazardous wastes should not be mixed; - Spent mineral oils shall be collected, stored in sealed containers, and recycled using a licensed company; - All types of hazardous waste can only be transported by licensed hazardous waste service providers and disposed of in a licensed landfill. - Temporary storage is to take place in areas with impervious flooring. - In case of spillage: o Avoid inhalation and sources of ignition. o Cover and mix with sufficient amounts of sand using PPE. - Collect contaminated sand in clearly marked secure containers/bags.				

Occupational Health and safety	Possible impacts to health and safety during operations include accidental injury to workers who maintain the crossings and the railways. Health and safety issues also encompass working around energized equipment and possible contact with natural hazards.	**Train / Worker Accidents** Recommended management strategies include: - Training workers in personal track safety procedures; - Blocking train traffic on lines where maintenance is occurring ("green zone working") or, if blocking the line is not feasible, use of an automatic warning system or, as a last resort, human lookouts; - Design and construction of rail lines with adequate clearance for workers; - Segregation of stabling, marshalling, and maintenance areas from the running lines. - Implement an OHS management system. - Conduct health and safety training for all workers assigned to this project.	**Low**	- Signalling directorate for Component A Permanent railway directorate for Component B	Environmental Affairs Department (EAD) of ENR	Included in the operation cost of ENR
Community Health and safety	It is expected that more trains will operate at increased travel speeds, Impacts on user health and safety may occur through improper management of the crossing and the signalling system, which can result from lack of awareness, illiteracy, or failure of the signalling system.	- Awareness raising campaigns must be tailored in cooperation with community-based organizations. - Using caution tapes that help keep people away from the site during maintenance activities. - Sufficient pedestrian paths must be made available to the locals for crossing the railways. - Prohibit any railway crossing other than from pedestrian areas. - Consider placing fences alongside the line at least in the most critical urban parts. - Maintenance of the facilities attached to the stations (public toilets), which must be open and in good condition so that the train passengers can use them. The drivers/staff should be trained to slow in residential areas, especially before the entrance to the station with enough distance, in addition to adhering to the driving instructions that require not to be busy without driving	**Low**	Environmental Affairs Department of ENR	Environmental Affairs Directorate (EAD) of ENR	Included in the operation Cost

		(talking, calling, drinking tea and so on); to avoid random crossings accidents as much as possible.				
Visual Impacts	The alteration of landscape scenery will be affected by the presence of the new CTC building and the new double railway track objects between El Mansoura and Damietta. However, the visual evidence of these facilities cannot be completely avoided, reduced, nor concealed.	Visual intrusion impacts can't be avoided. However, re-greening along the railway corridor with domestic plants can be adopted.	**Negligible**	Environmental Affairs Department of ENR	Environmental Affairs Directorate (EAD) of ENR	Included in the operation Cost
Impacts of natural environmental disaster risks	• Seismic Risks • Flood Risks	**Seismic Risks mitigation measures:** - It is necessary that responsible employees and workers from ENR are trained to deal with such events. **Flood risks mitigation measures:** - Main and Secondary technical buildings for signaling should be positioned at locations where the flooding risk is limited.	**Low**	Environmental Affairs Department of ENR	Environmental Affairs Directorate (EAD) of ENR	No additional cost

		- The operator can switch off power on one specific section of the line. In that case the operation can be maintained on the remaining part of the line. - Specific measures can be included in the specifications of the new rolling stock such as waterproofing devices for sensitive equipment - Elevating the track level between El Mansoura and Damietta (To be confirmed after carrying out the Climate Risk Vulnerability Assessment Study). - Consider the flooding risk in the sizing of the drainage system.				

7.2 Environmental and Social Monitoring Plan

Table 7-3 Environmental and Social Monitoring Plan during the construction phase

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Gaseous and Dust Emissions	- Number of complaints related to air quality. - Equipment performance and maintenance frequency. - Results of measurements and % not compliant with applicable legal standards including reasons for non-compliance.	Contractor and Environmental Affairs Department of ENR	On monthly basis	Construction Sites at nearest sensitive receptor	• Site inspection including photo documentation • Measure ambient air quality parameters (PM_{10}, NOx, SO_2, CO and TSP) • Visual Inspection of the site, workers, equipment and vehicles • Complaints log	Included in the contractor cost
Noise and Vibration	- Number of complaints related to noise level. - Equipment performance and maintenance frequency. - Results of noise ambient measurements including reasons for non-compliance.	Contractor and Environmental Affairs Department of ENR	On monthly basis	Construction Sites at nearest sensitive receptor	• Site inspection including photo documentation; • Measure ambient Noise (in case of use of mechanical/electrical digging equipment and machinery) • Inspecting maintenance records. • Complaints log	Included in the contractor cost
Surface Water	Weekly site inspection during rainy season. Bi-weekly site inspection during dry seasons: - Signs of spillage of hazardous materials	Contractor and Environmental Affairs Department of ENR	Weekly	Construction Sites and nearby the water bodies	• Site inspection with photo documentation	No additional costs

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
	- Testing in case of accidental spills of hazardous					
Soil	- Observation of spillage and accumulated wastes - Signs of soil erosion - Observation of piling of hazardous materials - Evidence of fuel spills and lubricants	Contractor and Environmental Affairs Department of ENR	Bi-weekly	Construction Sites	• Site inspection with photo documentation	No additional costs
Solid and Hazardous materials and Waste	- Observation of accumulated waste piles - Storage conditions of hazardous materials; - Disposal at designated sites.	Contractor and Environmental Affairs Department of ENR	Bi-weekly	Construction Sites	• Site inspections • Maintaining a record of type, quantity, and disposal location of solid and liquid waste generation;	No additional costs
Cultural Heritage	- Duration, number of mosques along railway line that need displacement, Discovery of archaeological sites, historical sites, remains and objects	Contractor (HSE manager) and Environmental Affairs Department of ENR	During trenching and building MTBs	Construction Sites	• Supervision on the contractor during construction to ensure that construction activities is taking place without any discovery of archaeological sites, historical sites, remains and objects	No additional costs
Occupational Health and safety	- Occupational health and safety Incident reports - Medical reporting on received cases - No accidents	Contractor (HSE manager) and Environmental Affairs Department of ENR	Bi-weekly during construction .	Construction Sites	• Inspection of complaints • Inspection of Human Resources Policy • Inspection of employment contracts	No additional costs

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
	- 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. - OHS Plans - Trainings performed and recorded - PPE used by workers				• 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 • Medical and routine check-up of staff and workers • Check that the signed code of conduct is in place. • Monitoring of labour working conditions according to the above-mentioned mitigation measures	
Community Health and safety	- Number of reported complaints from the community - Community members aware of the activities conducted and the messages shared/discussed (through the beneficiary feedback survey) - Number of accidents/ injuries	Contractor (HSE manager) and ENR Social Development Officer	Monthly	Construction Sites	• Community grievance log • Reviewing community consultation reports • Interview with community members • Project details as well as grievance mechanism details available on site.	No additional costs

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Reduced accessibility to various facilities around the construction sites	- Community members aware of the activities conducted and the messages shared/discussed (through the beneficiary feedback survey) - Number of accidents/ injuries - Number of complaints received	Contractor (HSE manager) and ENR (officers)	Bi-weekly during construction.	Surrounding roads Construction Sites	• Reviewing community consultation reports • Interview with community members • Project details as well as grievance mechanism details available on-site Grievance log	No additional costs
Traffic	- 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	Contractor (HSE manager) and Environmental Affairs Department of ENR	Bi-weekly during construction.	Surrounding roads Construction Sites	• Maintaining and controlling traffic on and to the site by inspection of Traffic Management Plan or traffic complaints from workers or community • Grievance log	No additional costs
Visual Impacts	- No complaints from community - Number of unresolved complaints	Contractor (HSE manager) and Environmental Affairs Department of ENR	Monthly	Construction Sites	• Grievance log • Verifying contracts • Inspection of complaints	No additional costs

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Child Labour	- No complaints from community - No children on site - The monitoring of child labour will be intensively presented in the OHS manual to be implemented during the different phases of the project	Contractor (HSE manager) and Environmental Affairs Department of ENR	Continuously during construction	Construction Sites	• Verifying contracts • Inspection of complaints • Inspection of Human Resources Policy • Inspection of employment contracts • Inspection of attendance sheets and ID copies • Grievance log	No additional costs
Labour influx GBV	- The Code of Conduct has been prepared and formally adopted - Training records on Code of Conduct - All mitigation measures have been implemented (in specific those related to the code of conduct including GBV and other labour influx risks) - % of workers trained on Code of Conduct - % of workers trained on GBV - Documentation of Corrective measures adopted. - Number and documentation of	Contractor (HSE manager) and Environmental Affairs Department of ENR	Continuously during construction	Construction Sites	• Grievance log • Regular reporting of any accidents, as well as records and reports on health, safety and welfare of workers • Check that the signed code of conduct is in place • Interview with community members • Inspection of drug tests and alcohol tests conducted • Numbers of penalties applied	No additional costs

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
	awareness raising activities and stakeholder engagement activities					
Land use Impacts	- Documentation of the stakeholder sessions and consultations - GRM in place and known to local community - - Number of complaints that were resolved and the time it took to resolve them - Number of unresolved complaints - Preliminary assessment report of land and livelihoods/assets loss for selected locations for technical buildings - Resettlement Plan	Contractor (HSE manager) and ENR Social Development Officer	At the beginning of the construction phase then weekly	Construction Sites	• Review and assurance of Contractors reports • performance and ensuring the correct implementation of the mitigation and monitoring measures • Review and audit • Grievance log • RAP preparations	Included in Construction costs

Table 7-4 Environmental and Social Monitoring Plan during the operation and maintenance phases

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Air Quality	- Number of complaints related to air quality. - Ambient air quality levels	Environmental Affairs Department of ENR	Twice per year	At the same locations defined in the baseline	• Site inspection including photo documentation; • Complaints log; • Measure ambient air quality parameters (PM_{10}, NOx, SO_2, CO and TSP).	Included in the operation cost of ENR
Noise and Vibration	- Number of complaints related to Noise. - Ambient noise and vibration levels	Environmental Affairs Department of ENR	On monthly basis	At the same locations defined in the baseline	• Complaints log; • Measure noise and vibration levels.	Included in the operation cost of ENR
Soil	- Observation of spillage and accumulated wastes - Observation of piling of hazardous materials - Signs of soil erosion, - Evidence of spills of fuel and lubricants	Environmental Affairs Department of ENR	On monthly basis	Along the whole railway line	Site inspection with photo documentation	No additional costs
Hazardous and non-hazardous waste	- Observation of accumulated waste piles. - spillage/leakage from oils, chemicals, fuel … etc	Environmental Affairs Department of ENR	Bi-annually (During maintenance activities)	Along the whole railway line	Documentation in Hands monthly reports Site inspection and document inspection Observation and documentation	No additional costs

Occupational Health and safety	- The OHS and EPRP have been prepared and formally adopted - All mitigation measures have been implemented Undertake checks on workers right to work (including work permits, age etc.); - Reports on any accidents, hazardous events, as well as records and reports on health, safety and welfare of workers - Condition of fire extinguishing instruments - Condition of flammable material containers and storage - Availability and usage of PPEs - Condition of Rest Facilities - Workers right to work - % of employees trained on OHS, emergency procedures and GRM - OHS statistics such as fatalities, injuries, lost time incidents, first aid cases.	Environmental Affairs Department of ENR	On monthly basis	Along the whole railway line (tracks, MTBs, STBs, and stations)	• Visual Inspection • Regular tracks audits • Record Keeping • Ensuring the correct implementation of the mitigation and monitoring measures • Keeping record of incident report and accidents • No. of training sessions held	Included in the operation cost

Receptor / EHS Aspect	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
	- Number of complaints received, solved and unsolved complaints - Social and medical insurance applied					
Community Health and safety	- No complaints from community - No accidents - Community members aware of the activities conducted and the messages shared/discussed	ENR Social development officer	On monthly basis	Train stations and cars	• Inspection of complaints • Number and documentation of awareness raising activities and stakeholder engagement activities • Interview with community members • Numbers of penalties applied	Included in the operation cost

8 Project stakeholders and consultation

This Chapter discusses the stakeholder consultation and engagement plans undertaken as part of the ESIA process for the project and provides an overview of the findings. In addition, this Chapter also discusses the future stakeholder consultation and engagement plans which are to take place at a later stage of the ESIA process as well the project development.

8.1 Introduction

Stakeholder engagement is an integral part of ESIA good practice and is a statutory requirement of the national EIA legal framework in Egypt and within good international practice, to include IFC/EIB/WB requirements. The project owner is committed to a technically and culturally-appropriate approach to consultation and engagement with all stakeholders affected either directly or indirectly by the project. The consultation program for the project is based on informed consultation and participation in line with good international practice requirements with affected people, and is designed to be both fair and inclusive. Consultation activities have been an ongoing process since the commencement of the ESIA study in August – November 2020.

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.

Stakeholders may include: 1. locally affected communities or individuals and their formal and informal representatives, 2. national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, 3. the academic community, or other businesses.

Stakeholder consultation is an inclusive process for sharing information that enables stakeholders to understand the risks, impacts, and opportunities of a development or project, allowing them to express their views and articulate their perceptions towards it.

8.2 Objectives

The objective of stakeholder consultation is to ensure that a participatory approach takes place, which in turn documents concerns of all stakeholder groups and makes sure that such concerns are considered, responded to, and incorporated into the decision-making process of the development. Stakeholder consultation needs to be a two-way communication process that imparts information to stakeholders, but also obtains additional and on-the-ground information from them. Stakeholder consultation and engagement must take place at the inception phase of the ESIA process and implemented all through the study period.

The specific objectives of this chapter are to:

- Summarise national and international legal and policy requirements for stakeholder engagement;
- Describe and identify the stakeholders affected and/or with an interest in the project;

- Summarise stakeholder engagement and consultation conducted to date. In addition, describe how the views and issues raised have informed and influenced the development of the project; and
- Outline the future plans and approach to stakeholder engagement.

8.3 Stakeholder Engagement Plan (SEP)

8.3.1 Requirements for Stakeholder Engagement

- **Egyptian Legislation Requirements**

For category C projects only, the Egyptian legislative requirements for stakeholder engagement are mainly included within the undertaking of the ESIA. The "Environment Law No. 4 of 1994 and subsequent amendments" require that an ESIA study shall be undertaken for projects with significance impacts, including two phases of stakeholder consultation: scoping and public consultation. However, there are no requirements in the EIA Guidelines issued by EEAA for category B Scoped projects.

- **Financing Requirements, EIB and WB**

The stakeholder engagement activities were conducted with reference to Standard No. 10: Stakeholder Engagement of the Environmental and Social Standards of EIB[37], and WB ESS10: Stakeholder Engagement and Information Disclosure[38], "Stakeholder Engagement and Information Disclosure", recognizes "the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice". Specifically, the requirements set out by ESS10 are the following:

- Promoter will engage with stakeholders throughout the project life cycle, commencing such engagement as early as possible in the project development process and in a timeframe that enables meaningful consultations with stakeholders on project design. The nature, scope and frequency of stakeholder engagement will be proportionate to the nature and scale of the project and its potential risks and impacts.
- Promoter will engage in meaningful consultations with all stakeholders. Borrowers will provide stakeholders with timely, relevant, understandable and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination and intimidation.
- The process of stakeholder engagement will involve the following, as set out in further detail in this ESS: (i) stakeholder identification and analysis; (ii) planning how the engagement with stakeholders will take place; (iii) disclosure of information; (iv) consultation with stakeholders; (v) addressing and responding to grievances; and (vi) reporting to stakeholders.
- Stakeholders' inputs will be documented and carefully considered throughout the project preparation and implementation phases.

[37] http://www.eib.org/attachments/strategies/environmental_and_social_overview_en.pdf, https://www.eib.org/attachments/strategies/environmental_and_social_practices_handbook_en.pdf
[38] https://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards#ess10

- Stakeholder engagement, including disclosure and dissemination of information, will be planned for and carried out in line with the principles of prior, informed and free engagement and informed participation, in order to lead to broad community support by the affected communities and longer-term sustainability of the project's activities. In the event that broad community support is not attained, the promoter is expected to dedicate all necessary resources and time to additional community engagement and public consultation initiatives, as is required.
- According to ESS10, the promoter should also propose and implement a grievance mechanism to receive and facilitate the resolution of concerns and grievances of project-affected parties related to the environmental and social performance of the project in a timely manner.
- In addition, consultation activities will follow the EIB Guidance note to promoters on environmental and social performance, in EIB-financed operations in response to the COVID-19 outbreak crisis Annex 4 – Stakeholders engagement May 2020, and WB Guidance In this regard.

8.3.2 Stakeholder Identification

The first step in the process of stakeholder engagement is stakeholder identification; that is, determining the various categories of project stakeholders, and their needs. According to the EIB and WB Environmental and Social Standard ESS 10, stakeholder refers to "individuals or groups who: (a) are affected or likely to be affected directly by the project (those will be categorized below under project- Primary stakeholders); and (b) those parties who have influence on the project and/or interested in the project, but are not necessarily directly impacted by the project (those will be categorized below under other Secondary stakeholders)". Most importantly, identifying stakeholder representatives is key to carrying out effective stakeholder engagement activities. 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 groups and receive feedback from them.

Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts. Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism and ongoing reporting to the project-affected parties and other interested parties, etc. The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development.

The following table includes the key stakeholders who will be playing a direct role in the project and is presenting their anticipated roles as well as their expected needs.

Consultation and community engagement activities should take place according to EIB and WB Environmental and Social Standards ESS10. The Stakeholder Engagement Plan SEP should include a consulting plan for groups affected by the land acquisition and displacement including potential vulnerable groups. The following table represents all potential project stakeholders:

Table 8-1 Detailed list of stakeholders

Categories	Stakeholder Groups	Role
Primary stakeholders		
Potential Affected Communities	Residents and commercial activities in the communities within the project area Local communities near to the MTB, STB and doubling area, as it is the main construction site. Communities near the main crossings. People affected (formal / Informal) by the construction of doubling area (land related impact).	• Residents are more likely to be adversely affected by environmental and social impacts. For example, due to traffic during construction and other impacts relating to community health and safety. • Residents of local communities will also potentially benefit from job opportunities or other positive economic outcomes, particularly, from safe crossings. • Formal/ Informal economic activities that are located on the ENR RoW
	Train users	• Train users are more likely to be adversely affected by social impacts. For example, due to delays in trains.
	Women, including Female Train Users	• Women living in neighboring areas to the construction sites may be differently affected by the project if safety and security concerns/mitigation measures are not considered. Moreover, if safety issues are not considered in the stations, female rail users may not benefit as much from the project.
	Persons with disabilities	• If accessibility concerns are not included in the stations, persons with disabilities may not benefit from the project.
	Land users and land tenants along the right of way of the railway corridor	• In some cases, land user/tenants use the right of way of the railway corridor against a monthly fee. Some of those land users are paying a monthly fee while the initial contract is not under their name but the name of a parent. In many cases, this arrangement has been ongoing for decades and this is their only source of livelihood.

Categories	Stakeholder Groups	Role
	Vulnerable groups	• Vulnerable groups may likely be adversely affected by environmental and social impacts, while also being least likely to benefit from the project. The vulnerable groups here include persons with disabilities, women, including female rail users, street vendor and land users of the right of way of the rail corridor.
Secondary stakeholders		
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. • Responsible for reviewing and approving EIA, and monitoring implementation of the Environmental Management Plan.
	Environmental Office within the Governorates	• Responsible for monitoring compliance to environmental requirements.
Line ministries	Ministry of Finance	• They are to cooperate with the International Financial Institutions (EIB and AfD) in financing the project
	Ministry of International Cooperation	• Responsible for directing the dealings with donors for development projects in the government sector.
Local Governmental Entities	Governorates (Gharbia, Dakahlia, Damietta)	• The main role of the Governorate is supporting the project by providing the various permits required, and infrastructure maps, if needed.
	Local units in the Governorates	• The main role of the district authority is the provision of support to the project through mobilizing people to gain information about the project. • Permits for the lands needed for should be prepared by the Governorate and approved by the LGU.

Categories	Stakeholder Groups	Role
		• Rehabilitation of roads, which is one of the major issues raised by the community, will be performed by the LGU.
Project Owner	Egyptian National Railways (ENR)	• Implementing agency overseeing activities of the Environmental and Social Management Plan
	Ministry of Transport	• ENR is affiliated to the Ministry of Transport;
Other Governmental Entities	General Authority for Roads, Bridges and Land Transport	• Responsible for permitting related to any road work for the project (e.g., road cutting)
	Ministry of Irrigation	• The Ministry of Irrigation, along with ENR, share some parts of the RoW in terms of canals and drains. They should be involved in coordinating construction of the doubling.
	Ministry of Awqaf	• The Ministry is responsible for Islamic houses of worship in Egypt. Coordinate with the Ministry in the case of demolition of mosques and the establishment of other alternatives during expansion works at the stations.
	Agricultural Directorates in the Governorates	• Is responsible for determining the prices of agricultural crops and trees. Coordinate with the Ministry in the case of compensation for any agricultural lands.
	The National Council for Women	• Cooperating with the ENR in managing awareness campaigns against harassment (Safe Rail Campaign حملة السكة امان)
Civil Society	Local NGOs in the regional and headquarter levels, as well as the local Community Development Associations (CDAs) Grassroots Community- Based Organizations (CBOs)	• They are responsible for sharing information with the community, in practical terms, the safe crossing • 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.

Categories	Stakeholder Groups	Role
		• Responsible of sharing information with the community • In the case of this project, it may be useful to engage specifically with NGOs and CDAs focusing and women related issues as well as persons with disabilities.
Media	• The press • Printed journalism • Online journalism	• Disclosure of information about the project. • Publicize awareness raising campaigns
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.
Contractors	• Existing contractors on sites under construction • Future contractors not yet identified	• Civil subcontractor • Modernization of signalling (related power supply/ telecommunications)
International Financial Institutions, Development partners	EIB, AfD	• Provide financing and technical assistance

Further to the above, a Preliminary Stakeholder Analysis is undertaken below to clarify stakeholders' interest in the project and their ability to impact the project's development. Accordingly, a priority contact list is identified.

High rating for priority contact list indicates the importance of continuous and regular consultation and engagement. On the other hand, medium rating for priority contact list does not reduce the importance of the entity as a stakeholder but indicates that their engagement is required at specific stages or milestones of the project (i.e., when the involvement of these entities is triggered for a specific purpose such as obtaining a specific service).

Table 8-2: Preliminary Stakeholder Analysis and Priority Contact List for the project

#	Stakeholder Group	Level of Interest			Ability to Impact			Priority		
		Low	Medium	High	Low	Medium	High	Low	Medium	High
1.	**Stakeholders who may be directly or indirectly affected by the project**									

#	Stakeholder Group	Level of Interest			Ability to Impact			Priority		
		Low	Medium	High	Low	Medium	High	Low	Medium	High
	▪ Residents and commercial activities in the communities within project area			√			√			√
	▪ People affected (formal/ Informal) by the construction of doubling area (land related impact).			√			√			√
	▪ Train users			√			√			√
	▪ Land users and land tenants along the right of way of the railway corridor			√			√			√
	▪ Vulnerable groups			√			√			√
2.	**Secondary Interested Parties/Stakeholders**									
	- Ministry of Environment - Egyptian Environmental Affairs Agency (EEAA)			√			√			√
	- Environmental Office within the Governorates			√		√			√	
	- Ministry of Finance			√		√			√	
	- Ministry of International Cooperation			√	√				√	
	- Local Governmental Entities			√		√			√	
	- Egyptian National Railways (ENR)			√			√			√
	- Ministry of Transport		√			√			√	
	- General Authority for Roads, Bridges and Land Transport			√		√			√	
	- Ministry of Irrigation		√				√		√	
	- Ministry of Awqaf		√				√		√	
	- Agricultural Directorates in the Governorates		√			√			√	
	- The National Council for Women		√			√			√	
	- Non-governmental Organizations (NGOs)			√		√			√	

#	Stakeholder Group	Level of Interest			Ability to Impact			Priority		
		Low	Medium	High	Low	Medium	High	Low	Medium	High
	and Community Based Organizations (CBOs)									
	- Media	√			√			√		
	- Contractors			√		√			√	
	- Suppliers and Traders		√			√			√	
	- International Financial Institutions, Development partners		√			√			√	

8.3.3 Stakeholder Engagement Program

8.3.3.1 Purpose and timing of stakeholder engagement program

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, 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.

Implementation of the stakeholder engagement plan will depend on a proactive approach; before the implementation of each of the project components/ activities, appropriate engagement will stakeholders will be conducted whether through consultations, focus group, dissemination of information through social media platforms, brochures, media, billboards at project location, etc. Stakeholder engagement will continue throughout the project life cycle in a regular manner.

Due to the current COVID-19 crisis, the project will take the precautionary approach for as long as the risk exists, to minimize the risk of COVID-19 transmission during information disclosure, by disseminating information through a digital platform (where available) and traditional means of communications.

8.3.3.2 Proposed strategy for information disclosure

ENR will disclose project information to allow stakeholders to understand the risks and impacts of the project, and potential opportunities. And will provide stakeholders with access to the project information, as early as possible before, and in a timeframe that enables meaningful consultations with stakeholders on project.

The final ESIA, Non-Technical Summary (NTS), the SEP and RAP will be disclosed on the ENR's website. Such documents will be disclosed to allow any stakeholder to review the studies and comment on the scope of work undertaken, key issues identified and any other issues of concern they might have. At the end of the disclosure, all received comments will be addressed and taken into account and an updated ESIA will be provided.

According to EIB standards the objective of the disclosure includes clarification of the following information to all identified stakeholders who are likely to be affected by adverse environmental or social impacts from the project: a) the purpose nature, objectives and scale of the project; b) the duration of proposed project activities; c) any risks to and potential adverse impacts with regard to the environment, land tenure changes (resettlement, land acquisition or expropriation), occupational and community health, safety and security, and any other potential adverse impact on communities arising from the project; d) the proposed mitigation plans and associated budget; e) the available grievance mechanisms; f) any added value and opportunities for benefit-sharing; g) the envisaged consultation process, if any, and opportunities and ways in which the public can participate; and, h) time and venue of any envisaged public meetings, and the process by which meetings are notified, summarised, and reported (EIB ESS, 2018, 79).

The following Table describe the stakeholder engagement program during the construction and operation phases of the two project components:

- **Component (A):** Modernization of Signalling System between Tanta and Damietta Railway Line.
- **Component (B):** Doubling of the Single-Track Railway line between El Mansoura and Damietta.

Table 8-3- Stakeholder Engagement Program

Stakeholder Groups		Methods proposed	Timeframe	Language	Information to be disclosed and Objective	Responsibilities
Primary stakeholders						
Project Affected Communities	Residents and commercial activities in the communities within project area Local communities near to the construction site. Train users Women, including Female Train Users Land users and land tenants along the right	ENR / project website Premises of different entities at the central and local levels, as well as in public places and local government units Construction signs and warnings Meeting in their location/or at the stations FGD	Before project appraisal Prior to and during construction During operation[39] The affected communities should be consulted regularly, especially the vulnerable groups. So that the times of consultation are not less	Arabic	Provide access to grievance mechanism Address complaints in a transparent and appropriate manner Determine the contractor's consultation procedures Non-technical Summaries Project implementation schedule including any affected train stations or schedules RAP prepared Employment opportunities Project activities details including climate change mitigation measures benefits	Project Management Unit (PIU) in ENR; Environmental Affairs Department (EAD) Environmental Social Specialist local Governorates cooperation with NGOs; environmental and social specialists; Contractors ENR will be responsible for: seting the requirements, Be present. lead any land discussions

[39] Consultation activities will continue during the operation phase according to the operational and follow-up phases, with no less than one time for each governorate at the start of the operation

Stakeholder Groups		Methods proposed	Timeframe	Language	Information to be disclosed and Objective	Responsibilities
	of way of the railway corridor Vulnerable groups	Local media, including radio programs Awareness campaigns	than twice for each Governorate before the start of the project.			Should have broader messaging about the objectives and benefits of the project Should inform the public about the GRM, Should disclose all relevant EandS assessments in Arabic on their website and distribute to the local Governorates, Should do on going consultations to monitor performance. All project engagements activities and recording should be in a systematic manner.
Secondary stakeholders						
Environmental Sector	Ministry of Environment - Egyptian Environmental Affairs Agency (EEAA)	Face-to-face meetings, official communication Fax	Before project appraisal Prior to and during construction	Arabic	EIA - anticipated construction and operation impacts and mitigation measures Environmental register	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD)

Stakeholder Groups		Methods proposed	Timeframe	Language	Information to be disclosed and Objective	Responsibilities
	Environmental Office within the Governorates	Email				Environmental Social Specialist
Line ministries	Ministry of Finance Ministry of International Cooperation	Fax Post Mail Email Formal meetings, official communication	Before project appraisal Prior to and during construction During operation	Arabic Arabic/ English	Schedule of preparation and construction Documentation required	Project Implementation Unit (PIU) in ENR Minister's Office
Local Governmental Entities	Governorates Local units in the Governorates Railway workers in the local area	Face-to-face meetings, official communication Fax Email Post Mail	Before project appraisal Prior to and during construction During operation	Arabic	Schedule of preparation and construction Documentation required for permitting Project activities details including climate change mitigation measures benefits	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD) Environmental Social Specialist

Stakeholder Groups		Methods proposed	Timeframe	Language	Information to be disclosed and Objective	Responsibilities
Project Owner	Egyptian National Railways (ENR) Ministry of Transport	Face-to-face meetings, official communication Fax Email Phone calls Periodic meetings	Before project appraisal Prior to and during construction During operation	Arabic	Coordination between different departments during the life stages of the project Schedule of preparation and construction Conditions of the contract Supervision and follow-up Project implementation schedule including any affected train stations or schedules	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD) Environmental Social Specialist
Other Governmental Entities	General Authority for Roads, Bridges and Land Transport Ministry of Irrigation Ministry of Awqaf Agricultural Directorates in	Fax Post Mail Email Formal meetings, official communication	Prior to and during construction During operation	Arabic	Non-technical Summaries Resettlement Plans prepared Schedule of preparation and construction Documentation required for permitting	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD) Environmental Social Specialist

Stakeholder Groups		Methods proposed	Timeframe	Language	Information to be disclosed and Objective	Responsibilities
	the Governorates Ministry of Interior					
	The National Council for Women	Face-to-face meetings, official communication Fax Email Periodic meetings Surveys Awareness campaigns	Prior to and during construction During operation	Arabic/ English	Awareness campaign coordination against harassment (Safe Rail Campaignحملة السكة امان)	Project Implementation Unit (PIU) in ENR Environmental Social Specialist
Civil Society	Local NGOs local Community Development Associations (CDAs)	Email, workshops, surveys	during construction During operation	Arabic/ English	Disclose project design plans and high-level Project environmental and social impacts and mitigation Construction progress	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD) Environmental Social Specialist

Stakeholder Groups		Methods proposed	Timeframe	Language	Information to be disclosed and Objective	Responsibilities
	Based Organizations (CBOs)				Disclosure of awareness campaigns and grievances mechanism Project activities details including climate change mitigation measures benefits	
Media	• Television • Newspaper • Websites editors • Online journalism	Email, press conference, field visits	during construction During operation	Arabic	Disclose project design plans and high-level Project environmental and social impacts and mitigation Construction progress Disclosure of awareness campaigns	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD) Environmental Social Specialist
Contractors	Existing contractors on sites under construction Future contractors not yet identified	Contracts Email Meetings Telephone ENR/ Ministry website Fax	Before project appraisal Prior to and during construction During operation	Arabic/ English	Schedule of preparation and construction HR Policy Communication of grievance mechanism Environmental and social management plan Sample employment contract Working hours	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD) Environmental Social Specialist

Stakeholder Groups		Methods proposed	Timeframe	Language	Information to be disclosed and Objective	Responsibilities
					Annual EandS Performance Report Familiarize workforce with ENR's policies Avoid violations of Egyptian environmental and social laws and regulations Address complaints in a transparent and appropriate manner	
International Financial Institutions, Development partners	EIB and AfD	Face-to-face meetings, ENR/ Ministry website Email Meetings Telephone	Bi-annual In the event of major incidents/non-compliances During construction During operation	English	Reporting on construction progress Major incidents/non-compliances with ESS ESP Annual EandS Performance Report	Project Implementation Unit (PIU) in ENR Environmental Affairs Department (EAD) Environmental Social Specialist

8.3.4 Management functions and responsibilities

ENR under the Ministry of Transport is responsible for railway construction and operation. A dedicated unit, Station Implementation Unit, is responsible for the management and maintenance of train stations.

A dedicated Project Implementation Unit (PIU) will be established within ENR to coordinate and implement project activities and to liaise with the Bank. The PIU is headed by a director, who reports directly to ENR's Chairman and General Manager. The PIU will include a Social Specialist that will support the implementation of the SEP.

The PIU's setup basically supports finance, procurement, environment, social and reporting. Under the ENR, the EAD has already been set up, and it was locally approved by the ENR. It is already practicing its tasks but still needs the final approval from the organization and management affairs. Currently, there are about six environmental specialists in EAD. Although the structure of EAD did not include any position for a staff member responsible for the social aspects related to the project nonetheless, this position has been now filled by ENR and two social specialists were assigned to the PIU in November 2017.

The role of the social officer will be critical in reaching out to the locations, conducting consultations, monitoring the implementation of all the social measure associated with the ESMP, ensuring the grievance system is operational, and participating in the process of the RAP/ARAP preparation and monitoring. The social officer will continue to monitor the complaints received from PAPs and ensure that prompt response is offered to deal with their concerns.

The main tasks of the social officer include:

- Conduct consultations and information sharing sessions with the communities and other stakeholders adjacent to the project sites,
- Monitor the implementation of all the social measure associated with the ESMP
- Help in designing and operationalizing the grievance redress system related to the project
- Ensure that key project information and safeguards requirements are disclosed transparently on the local level
- Consult with PAPs to discuss and agree on the alternatives and the type of compensation that is convenient for both PAPs and ENR
- Participate in the process of disbursing compensations and keep track record of the compensation process documentation
- Handle grievance and respond to complaints of PAPs
- Monitor implementation of the resettlement activities
- Propose and take appropriate corrective actions as needed during the course of implementing the resettlement plan

8.3.5 Monitoring and Reporting

This SEP shall be periodically revised and updated as necessary during Project implementation and as a minimum prior to the operation. This will help ensure the validity and adequacy of the information presented herein, and that the identified methods of engagement remain appropriate in relation to the legislative requirements or standards and specific activities of ENR. Any major alterations to ENR activities shall be duly reflected in the SEP in future.

The focal point shall compile quarterly summary reports for the project Implementation Unit on all of the engagement activities held by ENR during the reporting period. The report shall include:

- Summary of engagement activities with local communities, entities and non-governmental organizations;
- Summary of contacts with authorities and nature of such contacts;

- Summary of press statements released and other contacts with media (e.g., interviews or TV entries regarding ENR);
- Number of grievances received, their nature and progress on their resolution if appropriate corrective measure were agreed to be taken.

ENR shall also report biannually on progress on environmental and social performance, which shall include a description of engagement activities and effectiveness of the grievance mechanism.

8.3.6 Future Stakeholder Engagement and Consultation

Future stakeholder engagement and consultations will mainly include the following, each of which is discussed in further details below: (i) disclosure of the EandS documents; (ii) public disclosure session; and (iii) implementation of the Stakeholder Engagement Plan (SEP) by the promoter.

8.4 Stakeholder Consultation and Engagement during the ESIA preparation

8.4.1 Consultation Methodology and Activities

In terms of methodology, the consultation activities were conducted through the following methods:

- Scoping Consultation Activities in August - November 2020
- A public consultation session was held on September 22, 2021 with concerned authorities and project stakeholder.

8.4.2 Scoping Consultation Activities

The Consultant carried out stakeholder engagement activities throw the community engagement plan that has been developed for different Stakeholders which is represented in the consultation activities. The consultation activities started in August 2020 and ended in November 2020.

The Consultant conducted consultation activities with the local communities close to the project site

- The residents in the surrounding project areas
- Railway users
- Informal Economic Activities
- Governmental Authorities including:
  - Local units in the three Governorates Gharbia, Dakahlia, Damietta.
  - Environmental departments in the three Governorates

The study team conducted multiple site visits to the project area. In addition, field observations were organized at project activities points to define various stakeholders, and the potential impacts of the project, and carried out stakeholder engagement activities through the following methods: Focus Group Discussions (FGDs), as well as Semi-Structured Interviews.

The aim of the consultation activities was:

- The study team conducted multiple site visits to the railway route. In addition, field observations were organized at informal crossing points to define various stakeholders, and the potential impacts of the project.
- Publish comprehensive information on the project, in order to enable the competent stakeholders to determine the concerns, requirements, and recommendations.
- The Consultant conducted interviews with railway users and local communities to receive feedback about the project as well as concerns, requirements, and recommendations.

Table 8-4: Summary of the consultation activities that were conducted in project area

Stakeholders		Number		Method
		Males	Females	
Residents in the surrounding project areas		46	31	FGDs/ Interviews
Informal Economic Activities	Kiosks	6	2	Interviews
	Street Vendors	7	1	Interviews
Railway users		42	27	FGDs/ Interviews
Governmental Authorities		4	3	Interviews
Total		105	64	169

The following table represents all the TA Consultant's stakeholder engagement activities, and the key outcomes obtained.

Table 8-5- Key comments and concerns raised during the consultations

Stakeholder	Key Outcomes
Residents in the surrounding project areas	- Residents in neighbouring areas have stated that the train does not inconvenience them, as it is a component of their daily life, and represents transitioning from one area to another. - For neighbouring communities, the presence of trains provides a viable transportation option for everyone, including schoolchildren. - Stores and establishments near the train stations are considered a popular option, due to their convenience and demand in vital areas. - Community members, residents and shop owners endorse the project, citing the importance of developing a train system with a more reliable schedule. Moreover, a resident expressed their current frustration with seeking alternative transportation, in order to avoid delays at work. - Residents have expressed concerns over the train's close proximity to their homes. In some areas, such as the villages of Hajj Khalil, Saadia and Ras Al Khaleej the train line is located approximately 8.5 meters from the right, and 4.5 meters from the left. - Residents expressed their support for the project, citing trains as the main mode of transportation for them and their children. However, they have expressed concern over their safety at home in the event of accidents, as the train line is close to the residential areas. - The community's residents raised the below question about households and establishments will be forced to relocate for the development of the project, or will it take place within the existing train locations - Illegal pedestrian crossing points are common, and spread along the railway route. In interviews conducted by the study team with residents to assess the danger of these areas, communities noted their reliance on the crossing points in their daily lives. - Residents have highlighted their awareness of the dangers associated with the current crossing points, but still consider them more convenient than pedestrian bridges.
Informal Economic Activities along the railway route	Interviews with individuals heading informal economic activities along the railway route shed light on the below:

Stakeholder	Key Outcomes
	- Trespassers are aware they are informally using land. However, some individuals have sought to use official permits from local units, and those attempts were not rejected. - Local units have attempted to prevent economic activities in the area through fines. However, people return to the area and resume activities. - In some property, areas, such as the Ministry of Irrigation and the General Authority for Roads, overlap with railway properties.
Railway users	Both men and women indicated their dependence on the train as their main mode of transportation. Despite the challenges associated with the train, it is still the most convenient due to being: - Cost efficient, particularly for large groups, families, university students, the elderly and female market sellers. - Many girls have stated that the train provides a cost-efficient mode of transportation from their village to the city centre, particularly in comparison to crowded minibuses, - Many women in rural areas rely on the train system for transportation to reach traditional markers and sell their farmed produce (eggs, milk etc.). Railway users have highlighted the below concerns associated with the current train system: - Regular and extensive delays, which prompt users to seek out a more costly alternative to reach their desired destination. - Users emphasized the necessity to introduce more regular train services, to enhance the train usage experience. - During peak hours, both the elderly and women avoid the train, as it poses a variety of dangers on them due to overcrowding. - Women in particular, expressed safety concerns associated with the overcrowding of trains. Harassment and robberies are the two most concerns, despite never having been robbed. - Users have also emphasized the importance of also developing the train's services such as the toilets, which are often times closed off to the public entirely.
Governmental Authorities	- Officials praised the project, expressing the need to develop the current train system, which is not sufficiently equipped to support speedy journeys, large groups and suffers from delays. - Officials also emphasized the importance of enhancing the train system, as for many communities in villages and the Damietta and Dakahlia Governorates; the train is their only cost-effective mode of transportation. - Road officials affirmed their keenness to cooperate with project authorities to reduce traffic concerns (near crossings, as well) during construction. They have also stated their willingness to cooperate with the contractor involved to avoid peak hours, as traffic is moderate in the Mansoura Damietta area.

Figure 8-1: Photos of the community consultation activities

8.4.3 Public Disclosure Session

The Egyptian National Railways (ENR) conducted a public consultation in accordance with the IFIs Standards[40] and Disclosure Requirements for the Project Environmental and Social Impact Assessment (ESIA). The online consultation session was held after preparing and publishing the Environmental and Social Impact Assessment

[40] The public disclosure session was held online according to the *EIB Guidance note to promoters on environmental and social performance, in EIB-financed operations in response to the COVID-19 outbreak crisis Annex 4 – Stakeholders engagement May 2020.*

study and the resettlement framework study for the project on the National Tunnels Authority website. The consultation session was held on September 22, 2021.

8.4.3.1 The objective of the session

- Introduce the project to stakeholders;
- Identify the key anticipated impacts;
- Present the methodology for the ESIA study;
- Present key outcomes and conclusions; and
- Allow interested stakeholders to comment on the scope of work undertaken, key issues identified and any other issues of concern they might have.

8.4.3.2 Announcement of the Session

In cooperation between the consultant and the ENR Environmental Department, the invitees were informed of the time and place of the public consultation session month before it was held, through:

- Sending a fax to the Secretary General of Gharbia, Dakahlia and Damietta governorates to invite all the project concerned parties from the governorates, including government agencies, representatives of the People's Assembly and Senate, representatives of local communities in the project areas, and active civil associations in the governorates;
- Sending a fax to the Egyptian Environmental Affairs Agency (EEAA) as well as the regional branch offices in the governorates;
- Publication of the session announcement through ENR website (the announcement was published on August 22nd);
- Sending emails and phone calls to invite NGOs and specialized academics.

All previous announcements methodes for the session included a non-technical executive summary in Arabic for the ESIA.

دعوة

تتشرف الهيئة القومية لسكك حديد مصر
بدعوة سيادتكم للمشاركة في جلسة التشاور الجماهيرية
الخاصة بعرض نتائج دراسة تقييم الأثر البيئي والاجتماعي لمشروع تحديث
خط سكة حديد طنطا -المنصورة – دمياط بما في ذلك ازدواج السكة من
المنصورة الى دمياط

وذلك يوم الاربعاء الموافق 22 سبتمبر في تمام الساعة الحادية عشرة صباحاً

ويمكنكم المشاركة بحضور الجلسة من خلال الرابط التالي:
https://us06web.zoom.us/j/84475574287
Meeting ID: 844 7557 4287 - Passcode: 614316

لمزيد من المعلومات برجاء الاتصال بالمكتب الاستشاري – إيكوكنسرف
تليفون 2736-4818 (202) - 2735-9078 (202) .
فاكس: 2736-5397 (202)
genena@ecoconserv.com

Figure 8-2 Invitation session that was sent by e-mail and fax

تتشرف
الهيئة القومية لسكك حديد مصر
بالتعاون مع
شركة إيكوكنسرف للحلول البيئية
بدعوة سيادتكم لحضور
جلسة التشاور الخاصة بعرض نتائج دراسة تقييم الأثر البيئي
والاجتماعي
لمشروع تحديث خط سكة حديد طنطا -المنصورة – دمياط
بما في ذلك ازدواج السكة من المنصورة الى دمياط
سيتم عقد جلسة التشاور يوم الاربعاء الموافق 22 سبتمبر 2021
في تمام الساعة الحادية عشرة صباحاً
ويمكنكم المشاركة بحضور الجلسة من خلال الرابط التالي:
https://us06web.zoom.us/j/84475574287
للمزيد من المعلومات برجاء الاتصال بالمكتب الاستشاري – إيكوكنسرف للحلول البيئية
تليفون: 02-27364818 / 02-27359078 فاكس: 02-27365397
بريد إلكتروني: genena@ecoconserv.com

Figure 8-3 Announcement of the session that was published on the ENR's website

8.4.3.3 Characterization of Participants

There was a total of 86 participants summing up those accessing the session link directly, and their relatives and close social circle, with 48 males and 38 females. The session was managed in the attendance of:

- Three representatives from the Consultant EcoConServ (Two environmental and One social)
- Representatives for the The Egyptian National Railways Authority (ENR)

The attendees included a representative of the Environmental office of the Governorates, NGOs, Governmental Agencies, Community Leaders and a number of ordinary citizens (Annex 8 includes a list of the attendees)

Table 8-6- Distribution of Participants

Distribution of Participants based on their background/entity	Number
Governmental Authorities	6
The Egyptian National Railways Authority (ENR)	12
ENR Contractors	3
Ministry of Environment – Egyptian Environmental Affairs Agency	2
Local Communities	43
Academics	5
NGOs	3
European Investment Bank (EIB) Agence Française de Développement (AFD)	5
ENR Consultant	2
ESIA Consultant	5
Total	86

8.4.3.4 Summary of Discussions

Eng. Nagwa Monsef, Environmental Specialist at EcoConServ Environmental Solutions (environmental consultant for the project), presented the purpose of the consultation session and provided a background of the upgrading Tanta-El Mansoura-Damietta railway line project. This included a quick snapshot of the railway line, a description of the project components, construction and operation activities, and the Environmental and Social Impact Assessment Study that was conducted for the project. The methodology adopted for the ESIA study was presented, along with a description of the impacts that will result from the project and methods to mitigate those impacts.

Dr. Anan Mohamed, Social Specialist at EcoConServ Environmental Solutions, elaborated on the environmental and social management plan for the potential impacts of the project and the monitoring and follow-up plan during the various phases of the project, in addition to an explanation of the consultation and disclosure activities carried out by the consultant while determining the scope of the project, and the goal of preparing a Resettlement Framework for the project.

After the presentation of the project description and the ESIA study, an open discussion took place where attendees were given the opportunity to provide their feedback on the ESIA study and issues related to the project.

Table 8-7- Comments and concerns raised during the consultation session

Topic	Question and Comments	Response	Reflection of Comment in Report
Negative Impactes during construction and operation - **Air quality** - **Ground water pollution** - **Capacity building and recruitment**	*Dr. Wafaa Aranda from the National Center for Housing and Building Research* How the dust resulting from the drilling process be dealt with during construction, will water be sprayed periodically to reduce dust, will this mitigating measure cause pollution to the groundwater in the project area?	The process of spraying water to deal with dust resulting from construction activities is in simple proportions. It is just a "mist" that calms dust only and moistens the surface layer of the soil, and does not result in groundwater pollution; Where water does not exceed the surface layer of the soil only.	Included in: • Chapter 6 (Impacts during construction) • Chapter 7 (ESMP for the Construction)
	Changing the system of signals and transfers requires rehabilitating the workers on the current system and raising their efficiency. Have qualification programs been taken into account for the categories that operate trains in the proposed project path? Given their limited possibilities for the use of technology?	The modernization of the signaling system that is currently being carried out in railway projects and which has been approved in the tracks of other projects in the authority, is not new to the railways, and it is not related to any reduction of workers at the present time for the railways. Workers on the old system will not be replaced with qualifications of different technical quality. . The railways have technicians and consultants from specialized institutes that rely on them to raise the efficiency of workers, so that they can operate the trains with modern systems. Also added Dr. Ahmed Khalil Professor of Railways and Transportation one of the project consultant; When preparing the tender documents, the contract stipulates that all the companies that will work in the project will train the workers, the company that will update the signals must work to raise the efficiency of the current train operators "techniques" by teaching them the new techniques in operation before applying and using them,	

Topic	Question and Comments	Response	Reflection of Comment in Report
		therefore there is training for all workers, whether on the tracks, signals, in operation or in any field in which an update will be made.	
Project Positive impact **Construction period**	*Engineer Riham Rifai "Environmental Protection Department" Damietta Port* The part of the doubling area on the railway track between Mansoura and Damietta, will certainly serve the Damietta port in transporting goods in larger quantities; When will the construction activities be completed and the new track will be used?	The construction phase will start from the beginning of the actual project implementation time, and the implementation period is four years, then the line will be used to transport goods.	Included in: • Chapter 6 (Positive impacts during construction and operation)
Negative impact on land use and livelihoods during construction Resettlement Action Plan RAP	*Ola Al Wakel AFD* With regard to the Resettlement Action Plan, will a recommendation be made for the timing of the preparation of the RAP, and will it be prepared according to the stages of construction "it will be prepared in the form of sections, or will it be prepared once for all the project design"? Will this be reflected in the contracts? Meaning, will it be written in the contract between ENR and the construction contractor or in the "tender documents" how to ensure the completion of all resettlement activities before the contractor receives the construction area, how do we ensure commitment to implementation and follow-up?	According to the various interviews that the consultant conducted with ENR officials, they explained that the construction activities will take place in the form of sections and according to the nature of the construction, whether for the technical buildings or the doubling area, all of this is related to the final design and the mechanism which the construction contractor will work; However, ENR is the responsible for preparing the RAP study and paying the compensation before construction activities begin. A recommendation may be added that includes "the commitment of the project owner that the part to be handed over to the contractor must have completed all resettlement activities associated with it.". First, implementation is one of the ENR's competences, meaning resettlement activities and compensation are all within the competences of the project owner (ENR). It is possible that the contractor's contract includes "not receiving the section/ part designated for construction	Included in: • Chapter 7 (ESMP for the Construction)

Topic	Question and Comments	Response	Reflection of Comment in Report
	The main objective is to ensure during the implementation of any stage that work does not start and the "survey" has not been applied. What is required is a clear "monitoring" mechanism, and its presence in the contract allows the two parties (the contractor and ENR) to be aware from the beginning that this commitment has been made sign it.	until confirming the completion of all resettlement activities, or confirming that the site is free of any land use resulting from PAPs or related to compensation. The consultant also added that, according to the ENR's previous experience in other projects with the World Bank, the officials in the Environmental Department survey each part before handing it over to the contractor, and use a questionnaire to determine all the impactes related to land use or compensation, and the construction part is handed over to the contractor ready for construction. Currently, this commitment is present in the Resettlement Framework (RF) that has been prepared for the project, but adding it in the contractual forms will constitute awareness for the contractor with the importance of commitment to good implementation with regard to resettlement.	
Modernization and the needs of the disabled	*Mahmoud from the Al-Hassan Foundation, affiliated with the Ministry of Solidarity, serves people with physical disabilities* Will wheelchair users be taken into consideration during the construction or modernization of railways so that they can ride the train on their own without the help of others?	During the site visits that were made to the track and train stations, it was noted that the trains used on the line at the present time are not eligible for wheelchair users to be able to use the train on their own, but the renewal of the sidewalks must take into account the safe distance of the train and platform height to suit wheelchair users and the elderly. Recently, ENR has been working on a number of studies that concern the vulnerable groups of railway users, whether the disabled, women, and the elderly, and there are some stations equipped with a "ramp" for wheelchairs. The width of the sidewalk in the part designated for passenger boarding is suitable for wheelchairs. It should be taken into account that the	Included in: • Chapter 6 (Positive impacts during operation)

Topic	Question and Comments	Response	Reflection of Comment in Report
		development of sidewalks and stations should take into account the design of the disabled and wheelchair users.	
Project Positive impact **Job opportunities**	*Adel Al Ghazawi Local Community Development Association in Talkha* Priority for job opportunities for residents of the project area When will the project start?	The consultant explained that according to the positive effects of the project, the priority in job opportunities for members of the surrounding local community will be. With the project's labor needs. In addition to the contractor's needs for supplies such as building materials and equipment, he must rely on sales outlets and merchants located in the region in order to reduce the cost of transportation across governorates, and reduce the use of roads; Which helps the economic boom in the region. Non-technical or unskilled labor has very large opportunities for employment in the construction phase. The date of the start of the construction work has not been determined because the next stage is linked to the final design, and before the start of construction, it will be disclosed through the local units.	Included in: Chapter 6 (Positive impacts during construction)
Illegal crossings	*Ayman Masoud Abdel Azim (Director of Risk Assessment Department in the Safety and Quality Sector)* Has a study been conducted on securing the line from illegal crossings, such as constructing fences, and finding solutions to prevent the construction of new crossings?	There are parts of the path that do not have a fence, and in some areas there are illegal crossings "a hole in the fence", specifically in the Mahalla al-Kubra area. There are tunnels and overhead bridges for pedestrian crossing. ENR should follow up with neighborhoods and local units to control illegal crossings, and maintain pedestrian crossing bridges and tunnels to encourage their use instead of illegal crossings, especially in residential areas. The existing crossings will be developed, some of the crossings have been developed and the rest are under development to be safer, whether for pedestrians or cars.	Included in: • Chapter 6 (Impacts during construction and operation) • Chapter 7 (ESMP for the Construction and operation)

Topic	Question and Comments	Response	Reflection of Comment in Report
Negative Impactes during construction - **Traffic flow** - **Air quality** - **Construction waste**	*Medhat Abu Bakr (Occupational Health and Safety) Systra* Did the environmental study take into account the emissions of trucks that will transport building materials, specifically sand, because emissions have an impact on the climate in general?	It was taken into consideration and mitigation measures were put in place, including that the trucks that will transport construction materials and sand are equipped and covered as much as possible, and that periodic maintenance is done for these trucks to prevent gas emissions. All this will be binding on the contractor. Construction contractors, as much as possible, make use of the available resources in the local communities near the railway and rely on the supply of building materials from the areas close to the construction areas to reduce the movement of transport because the main roads surrounding the railway have high traffic.	Included in: • Chapter 6 (Impacts during construction) • Chapter 7 (ESMP for the Construction)
Project Positive impact **Job opportunities**	*Farah Sadek from Caritas Association* How will the project achieve economic benefits in the area	The project will have positive impact during the construction and operation period. The direct economic benefits to the surrounding community will be temporary during construction, represented in job opportunities and economic prosperity for the presence of workers in the surrounding areas, and the project's dependence on local traders and suppliers to provide all the project's needs during the construction. The operating stage, the doubling part, will increase the movement of trains at the port of Damietta, and thus will increase the dependence on the freight train, and this in itself has an economic return.	Included in: • Chapter 6 (Positive impacts during construction)

9 Grievance redress mechanism

9.1 Objectives

The objective of a grievance procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner.

Both ENR and contractors must be committed to avoiding, reducing, limiting and, if necessary, remedying any adverse impacts caused by their activities on local populations and on their social and physical environment. One of the tools for identifying, preventing and managing unanticipated impacts is a Grievance Mechanism (GRM).

The current grievance mechanism in ENR is implemented through two levels: the one assigned to the project at the local level (project-level GRM).

The second level of the grievance mechanism is the central level for all railway lines and sectors, which is proper to ENR as an institution.

9.2 The project level GRM

ENR has developed a mechanism for handling grievance to ensure that all complaints that may be related to project activities are addressed in a timely and transparent manner. The project GRM is designed to accept grievances and feedback from all project stakeholders. The project has a separate GRM that is for project workers, including any civil servants assigned to the project.

9.2.1 Grievance Channels at the project level

- Complaint boxes at the entrance of the construction site, where community members/ workers can drop their complaints;
- Submit an oral complaint to the site manager or contractor official
- A complaints form is available near the complaints box for submitting a written complaint;
- (Annex 6 Complaints form that was developed for the project)
- Phone number: The complaint can be submitted via a phone call from the complaints number (written on the project identification board at the entrance to the construction site). There are two numbers for submitting complaints:
  - One of which is for the contractor's official, and it changes from one site to another.
  - The other is for the ENR official (from ENR Environment Department).
  - Those channels are widely used by persons having issues related to trains' operation or internal issues related to ENR.

Those channels are widely used by persons having issues related to construction site. The contractor is responsible for receiving, following up and resolving complaints, and ENR is responsible for monitoring.

Grievances are documented through the grievance log, which is designed for this project to ensure documentation and follow-up (see Annex 7 Grievance Log).

9.3 Current GRM Central/ Institution level utilized by ENR

The management and operation of the Grievance Mechanism is the responsibility of the Complaints and Customer Service Directorate, which is affiliated to the Presidential Affairs Central Directorate. Below are the main channels for complaints:

9.3.1 Grievance Channels at the central level

Complaints could be submitted by multiple intake points, including submission by hand, telephone, or by email. The petitioner, through the use of the complaint tracking number, can follow up on their complaints through a range of methods including postal mail, e-mail, and phone or, by visiting the person in charge, as indicated below. The petitioner is free to submit his/her complaint to one or more of the three tiers above-mentioned. A grievance form will be made available to complainants. Below are the main channels for complaints:

- A group on What's App with the Ministry of Transport and journalists (used both for distribution of news and receipt of urgent complaints);
- A group on What's App with journalists (used both for distribution of news and receipt of urgent complaints);
- Complaint boxes in all railway stations, where people can drop their complaints;
- An email address linked to the ENR website (support@enr.gov.eg);
- A landline on the ENR website (+2 02 25748279) and 02 25748279;
- A digital complaint form linked to the website of the Ministry of Transport, where people type in their complaint or suggestions and register their names, contacts (phone number and email address), the sector, the complaint/suggestion, and other details; and
- ENR has also dedicated two telephone lines (01274422925 - 0225753555), in addition to a hotline (15047), for receiving complaints related to ENR in general.

Those channels are widely used by persons having issues related to trains' operation or internal issues related to ENR. Since the project's geographic scope will be extended, a multistage mechanism will be adopted.

9.4 Grievances' Tiers Composition

Various tiers of grievances should be adopted by the ENR. The petitioner can target his/her complaint to one or more tiers at the same time. Following are the proposed tiers of grievances:

- **Tier 1:** Contractor and/or site engineer during construction and station Manager during operation at the local level; Grievances in this tier are handled at the project level by the contractor and the environmental affairs department of ENR, which directs the contractor to the used mechanism, as well as monitoring and monitoring;
- **Tier 2:** The Social Officer at Headquarters in Cairo (customer's service);
- **Tier 3:** Through the Ministry of Transport website.

All complaints are anticipated to be solved on the site level; however, for those who want to escalate their complaint to a higher level, they will able to resort to the third level. (Go to court to pursue a court case).

One of the project's functions is to provide aggrieved people with an avenue for amicable settlement without necessarily having to pursue a court case. The aggrieved person has to receive the response to his/her complaint within 10 - 15 days; 10 days for the first tier and 15 days for the second tier.

The complaint should be investigated in 10 working days from the date of submission and the aggrieved person should be responded to within 15 working days. All activities should be properly documented in order to facilitate monitoring activities. It is essential to communicate with the third level in order to facilitate collecting all complaints raised.

Concerning compensation activities, the PAPs have the full right to communicate with the contractor. It will be useful to disclose a unified cell phone number for receiving complaints on.

If the grievance mechanism, was not properly re-solved, the aggrieved persons are entitled to raise their complaint to higher level.

The following paragraphs describe a grievance mechanism that is consistent with previous levels and EIB/ WB ESS10.

9.5 Grievance Cycle

The grievance received via any communication channel or tiers will follow the following cycle: The petitioner has the full right to submit his grievance to any of the assigned tiers. The petitioner also has the full right to submit his grievance to any entity he/she prefers, i.e., the Minister of Transport, the Governmental Complaint Portal, the Governorate, etc.

9.5.1 Response to Grievances

All comments and complaints will be responded to either verbally or in writing, in accordance with the preferred method of communication specified by the complainant. Comments will be reviewed and taken into account in the project preparation; however, they may not receive an individual response (unless it is required).

9.5.2 Registration of Complaints

All grievances will be registered and acknowledged, and responded to between 10-15 business days (depending on the nature of the grievance). The project management will keep a grievance log and report on grievance management, this should be reported quarterly to the bank and monthly basis from contractor to ENR.

9.5.3 Confidentiality

Individuals who submit their comments or grievances have the right to request anonymity, although this may render the Social Development Officer (SDO) unable to provide feedback on how the grievance is to be addressed. Confidentiality should be declared during the process of disseminating GRM information. The aggrieved person can stay anonymous but still reachable by phone number or any channel of communication preferred.

9.5.4 Management of GRM

During construction and operation phases, grievances in relation to construction activities will be managed by the social officer at the EAD in ENR and the construction contractor(s). With regard to complaints submitted through GRM Central/ Institution level channels, each channel has a number of employees working to receive complaints, record them and transfer them to the competent departments. The ENR receives from 1-5 complaints per day, and complaints per month reach 70-80 complaints. The statistics do not show the percentage of closed complaints that have been resolved and complaints that are still not resolved.

9.5.5 Monitoring of Grievances

All grievances should be monitored by the ENR in order to verify the process. Monitoring will be carried out for the following indicators:

1. Number of monthly received grievances (channel, gender, age, and basic economic status of the complainants should be mentioned);

2. Type of grievance received (according to the topic of the complaint);
3. Number of grievances resolved;
4. Number of unresolved complaints;
5. Dissemination activities implemented;
6. Level of satisfaction with solutions;
7. Documentation efficiency; and
8. Efficiency of response provided to grievance.

Quarterly Grievance Monitoring Report should be developed to keep track of all grievances submitted. The report should be developed by the Monitoring and Evaluation staff at ENR headquarters.

A separate grievance mechanism will be available in the same manner for workers, including employees of both the ENR employed and the contractors.

9.5.6 Disclosure of grievances

All grievances activities should be disclosed. An annual report should be prepared for the most frequent grievances faced and how they were solved.

A best practice standard is to acknowledge all complaints within 15 calendar days. Due to the complexity of some of the complaints, not all of them can be resolved immediately. In this case medium or long-term corrective actions are required, which need a formal procedure recommended to be implemented within 30 calendar days:

- The aggrieved person has to be informed of the proposed corrective measure.
- In case no corrective action is required, the petitioner should also be informed accordingly.
- Implementation of the corrective measure and its follow up has to be communicated to the complainant and recorded in the grievance register.

All grievances and communications, received by the PIU Social Specialist, will be registered and the actions taken/responses given will be tracked and recorded for each. Proper administration and internal records of stakeholder complaints and communications are essential for transparency and quality of ENR responsiveness and reporting to stakeholders on the resolution of grievances.

The objective will be to respond to the complaints of the PAPs and any relevant stakeholders on a timely fashion and in a transparent manner, without resorting to complicated formal channels to the extent possible. It is worth noting that considering the anonymity of grievances all disclosed grievances should be kept anonymous and/or only an analysis of the grievance report should be disclosed.

9.6 GBV Grievance mechanism

Gender-based violence is an issue that concerns railway users. As such, the National Council for Women launched an EBRD funded campaign titled “The Journey Is Safe” (السكة امان), in collaboration with the Egyptian National Railways (ENR).

The campaign, which was announced on the Ministry of Transportation’s official website on December 2nd, aims to develop the awareness of railway users on combatting sexual harassment, as well as encourage members to seek support and submit their complaints via the ENR’s hotline (15047). A survey was conducted across eight stations over the course of two weeks to uncover the concerns of passengers, and a second will take place following afterwards to evaluate the activities and receive feedback.

Complaints are documented through a customer service form, prepared for the campaign in specific as well as through an additional form for those seeking to register their complaints in person via the customer service office. The office is able to respond to all complainants, with the exception of those who are unable to provide their contact information. In addition, transportation inspectors are responsible for responding to passenger complaints on trains and at station entrances.

The Egyptian National Railways employs a limited number of staff in its customer service office, with four female employees whose working hours are 8:00 am until 3:00 pm, and one employee until the next morning. Furthermore, the devices currently being utilized by the customer service office do not enable workers to respond to more than one call at a time. However, all complaints received via phone are tracked and resolved in a timely manner. As such, the role of customer service staff is limited to receiving a complaint via phone, documenting complaint form or directing the complainant to another relevant authority to respond appropriately and address complaints.

The campaign marks the start of a holistic awareness and support system dedicated to gender-based violence complaints in the transportation sector, and may be developed further to launch across other stations.

9.7 Workers Grievance Mechanism

A well-communicated and easily accessible grievance mechanism will be provided for all Direct and contracted (and Sub-contracted) Project Workers to raise workplace concerns related to recruitment process and/or workplace conditions. This grievance mechanism for workers shall be provided separately than the one provided for other stakeholders as described in the Stakeholder Engagement Plan. Workers will be informed of the grievance mechanism at the time of recruitment and the measures put in place to protect them against reprisal for its use.

The workplace grievance mechanism will be designed to be easily understandable, clear, and transparent and to provide timely feedback. The policy of confidentiality and non-retribution will be reinforced, along with ability to raise anonymous grievances.

9.7.1 Grievance Channels

Contracted Workers can submit grievances either to the Site Manager (Contractor) or to the PIU Director. Direct workers should submit grievances to the PIU Director. Additional uptake channels such as an email address; phone number; and a physical address for handing the complaints and grievances in person, will be finalized and will be disseminated prior to the launch of any contracts signatures and all contractors will be aware that those are systems related to the project that they need to comply to. Workers will have the freedom to pick the one they are comfortable using.

The workplace grievance mechanism will not impede access to other judicial or administrative remedies that are available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

9.7.2 Grievances' Tiers

The petitioner can target his/her complaint to one or more tiers at the same time. Following are the proposed tiers of grievances:

- **Tier 1:** Contractor environmental and social officer and/or site engineer during construction and station Manager during operation at the local level; Grievances in this tier are handled at the project level by the contractor and the environmental department of ENR, which directs the contractor to the used mechanism, as well as monitoring and monitoring;
- **Tier 2:** The Social Officer at Headquarters in Cairo; The current procedures followed at ENR that employees submit their complains / grievances to their direct manager,department manager or the chief of railway authority by a written complaint or a verbal one.
- **Tier 3:** Through the Ministry of Transport website

9.7.3 Procedures

Workers will be encouraged to discuss their grievance and complaint informally with their direct managers. In cases where the direct manager is related to the subject of the complaint, the employee would most probably choose to directly submit a formal grievance. For all cases where the employees decide to submit a formal grievance, the following provides details about the step-step procedure they will be using:

- The worker will submit the grievance through one of the dedicated channels indicated above.
- The worker will be requested to use to the extent possible a grievance template which will be shared with all workers in hard/soft copies /available to download from the website.
- If the worker wishes to submit the grievance orally via phone or in person, the project staff will lodge the complaint on their behalf, and it will be processed through the same channels.
- All received grievances shall be logged into the workplace grievance log.
- In all cases, the staff in charge should provide a timely communication back to the complainant(s) that their grievance has been received, will be logged and reviewed for eligibility and provide them with the registration number. Clean and announced standards for the time frame of the response should be established, announced and adhered to.

ANNEXES

Annex (1): Layout of the main technical buildings

This annex presents a copy of the proposed location for 12 confirmed locations out of the 14 locations of the main technical buildings. It contains sketch for the location of the main technical building, dimensions of the main technical building, date of site visit inspection, signature for all the committee members.

[to be provided as a separate document]

Annex (2): Air and Noise baseline measurements Report- Daytime

[to be provided as a separate document]

Annex (3): Air and Noise baseline measurements Report – Night time

[to be provided as a separate document]

Annex (4): Soil Contamination Report

[to be provided as a separate document]

Annex (5): Carbon Foot Print Assessment Report

[to be provided as a separate document]

Annex (6): Complain Form

[to be provided as a separate document]

Annex (7): Grievance Log

[to be provided as a separate document]

Annex (8): PC List of attendance

[to be provided as a separate document]