THE WORLD BANK

EGYPTIAN RAILWAYS

Cairo-Alexandria Trade Logistics Development Project

DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

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LIST OF ACRONYMS

Acronym	Definition
CAA	Competent Administrative Authority
CAPMAS	Central Agency for Public Mobilization and Statistics
CTC	Central Traffic Control Buildings
EAD	Environmental Affairs Directorate
EEAA	Egyptian Environmental Affairs Agency
EHS	Environmental, Health & Safety
EIS	electronic interlocking system
EMF	electric and magnetic fields
EMU	Environmental Management Unit
ENR	Egyptian National Railways
ENRRP	Egypt National Railways Restructuring Project
ESF	Environmental and Social Framework
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standard
ETCS	European Train Control System
FGD	Focus Group Discussions
GARB	General Authority for Road and Bridges
GBV	Gender Based Violence
GM	Grievance Mechanism
HDD	Horizontal Directional Drilling
IFC	International Finance Corporation
LMP	Labor Management Plan
MOT	Ministry of Transport
MSDS	Material Safety Data Sheets
MTB	Main technical Building
NMT	Non-Motorized Transport
OHS	Occupational Health and Safety
PAP	Project Affected Persons
PMU	Project Management Unit
PSP	Private Sector Participation
RF	Resettlement Framework

RP	Resettlement Plan
SEA/SH	Sexual exploitation and abuse and sexual harassment
SEP	Stakeholder Engagement Plan

EXECUTIVE SUMMARY

Introduction

ENR is planning to improve its operational efficiency to accommodate more freight trains. As such, ENR plans to develop a bypass to the congested areas between Imbaba and El Maraziq stations. The Government of Egypt (GOE) is expanding the Egyptian transport infrastructure to account for the expected growth in freight traffic through the construction of distribution centres, road networks, railway networks, container handling terminals and dry ports.

The Cairo Alexandria Trade Logistics Development project (CATLDP) also includes railway sector reform, private sector participation (PSP) for last-mile rail connectivity and freight terminals and decarbonization of the railway sector. These objectives are critical for improving logistics in Egypt, allowing connections to other quadrants of the national railway network, including Sokhna Port, the Suez Canal Economic Zone (SC Zone), and other Egyptian ports on the Mediterranean such as Damietta and Port Said. The main objective of Cairo Alexandria Trade Logistics Development project is to improve the performance and support the decarbonization of the logistics and transport sectors in the Alexandria-6th October-Greater Cairo Area railway corridor.

Cairo Alexandria Trade Logistics Development Project Scope

The Government of Egypt with support from the World Bank will solve the current infrastructure bottleneck by implementing the railway bypass to the Cairo Railway Hub. The railway bypass includes constructing a 68.5 km missing link, associated track and signaling and upgrading track signaling in the other sections to achieve an operational bypass as shown below.

The CATLDP includes two components. Component 1 includes: Railway Sector Reform, Project Delivery, Stakeholder Engagement, (iv) Women's Economic Empowerment and Private Sector Participation in the railway sector activities. Component 2 is relevant to the construction of a new line and creation of parallel tracks on segments of the existing line as well as upgrades of existing tracks and modernization of signaling.

ESIA Study Scope and Project Description

This ESIA (the current document) covers parts of Component 2 hereinafter referred to as "the project" which will embed a safety management culture and physical safety measures to be implemented during all stages of project activities consisting of the construction and operation of the new segment (2.1) and upgrades on existing tracks (2.2):

- **Subcomponent 2.1 Greenfield Link**: Constructing 68.5 km of greenfield track and signaling from the Bashteel–Itay El Baroud section to the Marazeeq-Wahat section, including (a) constructing structures (bridges, viaducts) and laying track foundation; and (b) installation of track and signaling.
- **Subcomponent 2.2 Marazeek – Wahat section**: Upgrading of existing track and signaling modernization from Maraziq to the junction point with the greenfield link.[1]

Component 2 also includes:

- **Subcomponent 2.3 El Bashteel-Itay El Baroud Section**: Upgrading of existing track, construction of a parallel track, and new signaling installation on both tracks on the El Bashteel- El Itihad segment; and upgrading of the existing single track and signaling on the El Itihad-Itay El Baroud segment.
- **Subcomponent 2.4 El Itihad-Tafaroa Section**: Upgrading existing single track and signaling on the El Itihad-Tafaroa section.

Subcomponents 2.1 and 2.2 are the main scope of this ESIA and will be referred to hereafter as segment 1 and segment 2 respectively. Sub-components 2.3 and 2.4. will be covered by sub-sequent ESIAs as per the Environmental and Social Management Framework (ESMF) prepared for the project. Figure 0-1 illustrated the different subcomponents under component 2.

1 The Egyptian National Railway (ENR) built the 1.3 km railway track between km 66 and the entrance to DP6. This track will be operational from December 2021.

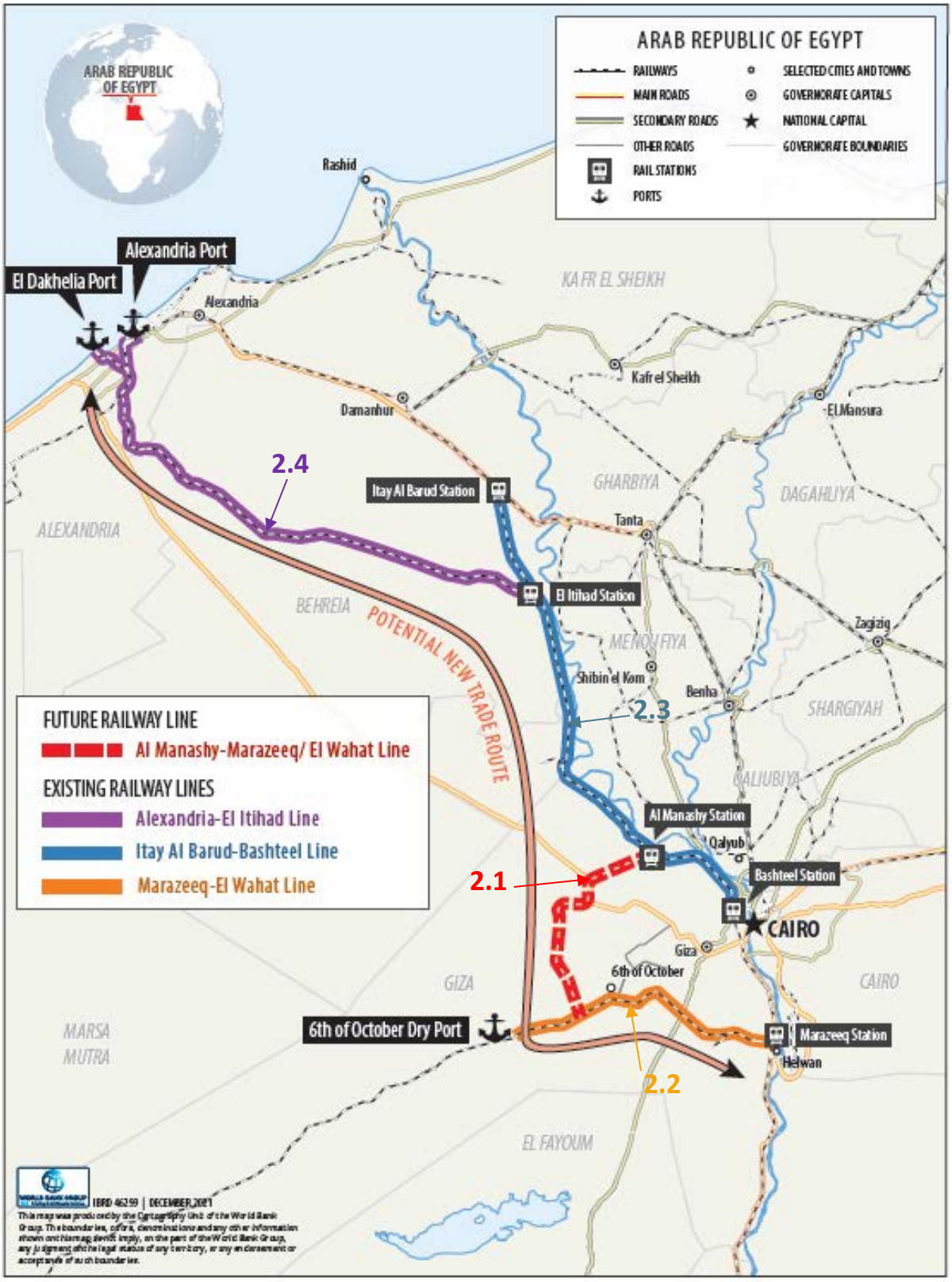


Figure 0-1: Components of CATLDP and main scope of the ESIA

Project Description

The project covers two segments/subcomponents; segment 1 consists of constructing a 68.5 km greenfield single-track railway from Bani Salamah station on the existing track to 6th of October by connecting to the existing Marazeeq- Wahat freight railway track. Segment 1 includes construction of embankment , signaling and track installation works. Segment 2 consists of signaling modernization and selected track improvements on the existing Marazeek-Wahat line from its beginning at Marazeek till km 66 near DP6. The proposed routes for segment 1 and segment 2 are illustrated in Figure 0-2.

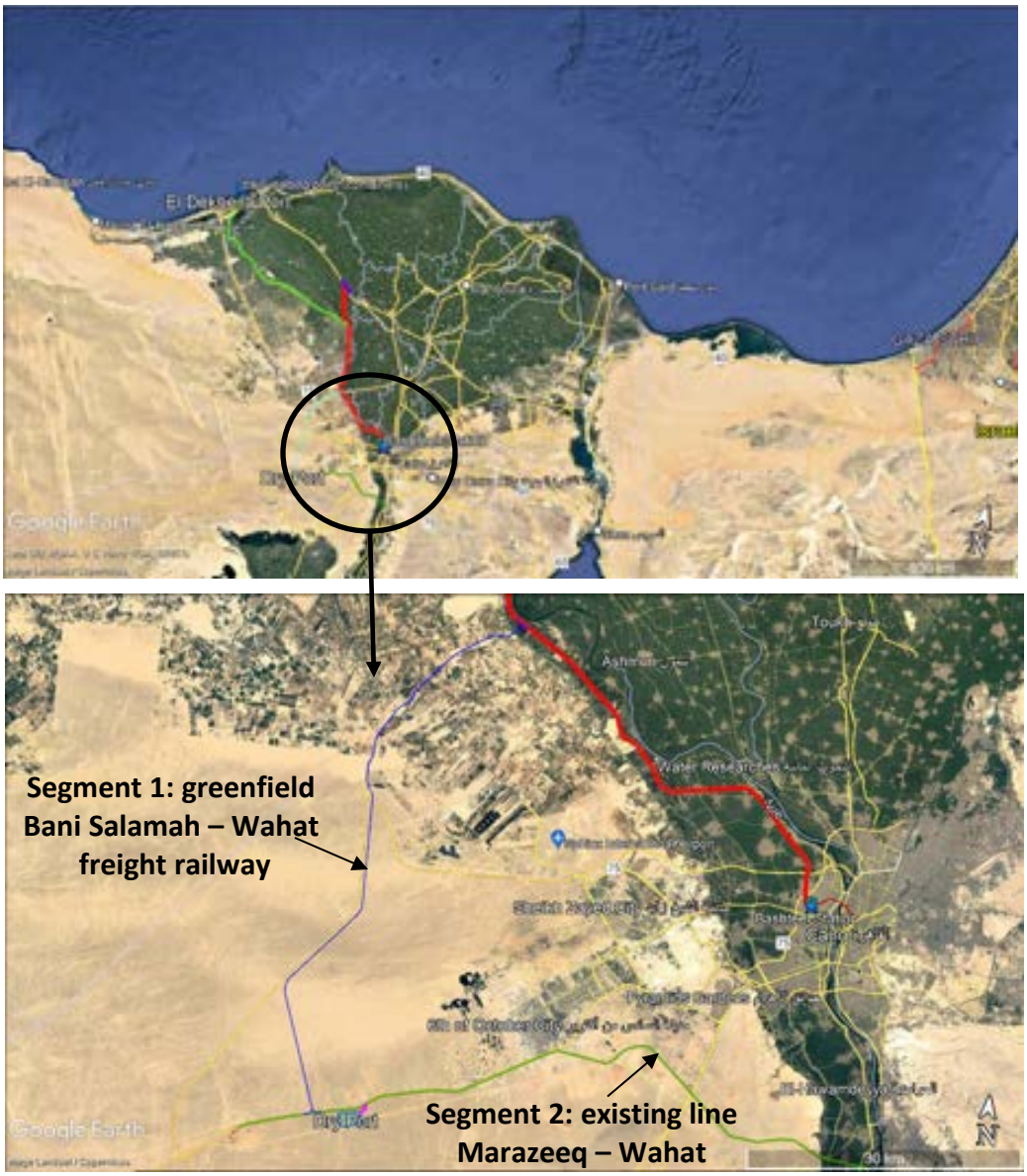


Figure 0-2: Location of proposed route for segment 1 and existing railway track for segment 2

Works planned for Segment 1 include:

The Project activities will involve construction of railway embankments, track and alignment work, installation of signaling and interlocking systems. The Project is expected to have a preliminary construction period estimated at 48 months. According to the feasibility study by Italferr and as indicated by ENR, the line will have the following specs:

1. Design speed: 160 km/hr
2. Maximum axial load: 25 tons
3. Maximum gradient: 12.5Per1000
4. Minimum radius in curves: 1500 m
5. Type of signaling system: EIS
6. Provision for future electrification: Yes

Works planned for Segment 2 include:

ENR has been developing a modernization investment program to finance improvement of signaling and telecommunications facilities and replacing certain sectors of the tracks in Upper and Lower Egypt. A comprehensive study was undertaken in 2006 to define the strategy and scope for the required modernization. The project includes introducing a modern, Solid State, Electronic Interlocking System (EIS) designed in modular systems to replace the existing mechanical system.

The project covers the following basic elements of the signaling systems:

1. New Electronic Interlocking System (EIS)
2. The scope is similar from the railway signaling upgrade perspective which includes:
   - LED signals in order to give indication for the train driver for movement and stopping, with the following signal aspects: Red, Green, Green Flashing, Yellow, Yellow Flashing
   - Automatic block signaling system. The length of block sections: 800÷1200 m in normal direction
   - Track circuits for train detection
   - Powered point machines, electrically controlled via Interlocking or via Local Operation Unit or, manually, via crank handle
3. Level crossing protection system
4. Assembling and laying of signaling cables and cabling equipment related with all signaling and telecommunication systems
5. New Signaling Towers and related Power Supply System in order to host and supply the signaling equipment
6. SCADA System for controlling and monitoring the Power Supply System
7. Electronic Interlocking Systems
8. Centralized operation by Centralized Traffic Control (CTC)
9. Training of operation and maintenance staff

ESIA Study Approach

The preparation of this ESIA study was carried out according to the following approach:

1. Reviewing documents including
    a. National environmental, social and EIA requirements; WB ESF and environmental and social standards; World Bank Group (WBG) Environmental, Health and Safety (EHS) General and Specific Guidelines for Railways (April 2007), ENR OHS policy etc.
    b. Project-related documents:
        i. Feasibility study: Feasibility Study and Demand Assessment for the Construction of a Freight Railway Line Connecting Bani Salamah/Itay Elbaroud Line with the Logistic Port of KM 66, Giza Wahat Line (Prepared in 2021 by Menarail Transport Consultants)
        ii. Previous environmental studies developed for similar projects: Environmental and Social Assessment for Railway Corridor Alexandria - Nag Hammadi Railway Improvement and Safety for Egypt (RISE) Project (Prepared in 2020 by Integral Consult)
2. Screening and validation for requirement of an ESIA and identification of required assessments such as ambient noise and air quality measurements, noise modeling, contamination level analyses
3. Scoping to identify environmental and social sensitive receptors
4. Performing baseline surveys based on site visits, stakeholder consultations including ENR team, and secondary data review (including previous studies developed for the project) to further identify potential sensitive receptors
5. Assessment of significance of environmental and social impacts on identified receptors
6. Defining mitigation measures according to mitigation hierarchy
7. Developing management and monitoring plans for implementation of mitigation measures
8. Extensive consultation process with the project stakeholders that covered range of stakeholders to be affected by the project and other interested groups.

Legal and Regulatory Framework

The proposed risk category is substantial. The national framework relevant to the project includes the Egyptian Environmental Law 4/1994 and all its relevant subsequent amendments and executive regulations. The international framework adopted in this study is the World Bank's ESF criteria which cover key areas for environmental and social aspects to be adhered by any of the projects funded by the WB group such as the proposed project.

Egyptian law provides for environmental compliance procedures and emission limits, which are close to the WBG limits, if not more conservative. The proposed project components must comply with international policies, which stipulate compliance with local laws. If there is a difference between local and WBG standards, the more stringent standards will be adopted.

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

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

A gap analysis was conducted between the main requirements of both Egyptian legislation and the World Bank standards, and the gaps between the two entities' requirements and environmental limits were identified in the Legal and Institutional Framework (Chapter 3).

As indicated in the ESMP, the contractor is to adhere to the environmental and social (E&S) instruments prepared for CATLDP, which include:

- Stakeholder Engagement Plan (SEP)
- Environmental and Social Commitment Plan (ESCP)
- Labor Management Procedures (LMP)

Environmental and Social Baseline

As part of the proposed project, twelve environmental and social baseline elements were considered:

1. Site location
2. Climate (common description applicable to segment 1 and 2)
3. Land environment (includes natural land environment, built infrastructure and utilities and future infrastructural developments)
4. Noise and vibration levels
5. Ambient air quality
6. Geology
7. Earthquakes and seismic activity

8. Ground water
9. Water bodies and surfaces (includes natural and artificial surface water bodies)
10. Hydrology
11. Natural habitat and biodiversity
12. Socio-economic baseline

Potential Environmental and Social Impacts and Mitigation

Main Environmental and Social Risks and Impacts of Construction

The main environmental and social risks and impacts expected during the project pre-construction and construction phases were identified as follows:

1. Employment opportunities (positive)
2. Land acquisition (applicable to segment 1)- For segment 2: the repossession of the use of land
3. Risks of land and asset value depreciation (Segment 1)
4. Impacts on livelihoods
5. Air quality
6. Noise and vibration
7. Soil and geology
8. Hydrology
9. Solid and hazardous waste
10. Occupational Health and safety
11. COVID-19 pandemic
12. Community health and safety
13. Traffic
14. Existing Utilities/Infrastructure
15. Risk of child labor
16. Temporary labor influx
17. Risk of gender-based violence (GBV)

The principal environmental and social negative risks and impacts are for:

Segment 1: Land acquisition and impacts on loss of land economic value associated with presence of train, increased noise and vibration and air pollutants emissions, CHS (impacts of noise and vibration and air emissions) and cumulative impacts due to concurrent large-scale infrastructural works and site location near major highways, labor influx in agricultural areas resulting in GBV risks, improper waste disposal.

Segment 2: the repossession of the use of land and loss of economic livelihood, CHS relating to increased noise and vibration and air emissions during the construction phase and risks of accidents

in communities in close proximity to planned work areas, labor influx in particular in agricultural areas and residential areas, improper waste disposal, and OHS

Mitigation measures are fully described in the following tables, and the ESMP section of this document in Chapter 8.

Main Environmental and Social Risks and Impacts of Operation

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

Positive impacts: Reduction of CO_2 emissions by 12,380 tons/year as a result of modal shift from trucks to rail, reduced traffic in Central Cairo Hub

In addition, the proposed project has many economic, environmental, and social benefits summarized in the following points:

- It will absorb the country's projected increase in export and import (increase of 5.8% and 2.8% up to 2024[2], respectively). Since the Port of Alexandria and El Deikheila receive about 55% of Egypt's containerized gateway traffic, there is a need to distribute the goods to other parts of Egypt.
- The transport of goods from and to Alexandria, Bani Salamah line and DP6 will allow:
    - Saving time by reducing travel time in a short cut, enabling the customers to receive goods at DP6 in the same day
    - Support further development in new urban 6th of October City by attracting new economic interest, business, expansion and generate additional income and tax revenues
    - Provide job opportunities not only in the freight railway but also indirectly in other developments that can appear as a result of the project
    - Facilitate internal and external trade as a result of saving money and time for freight and logistic companies
- Reduce traffic congestion between Alexandria and 6th of October
- Reduce the traffic burden on Cairo Railway Hub that is already congested with passenger traffic

Segment 1: increased noise and vibration and air pollutants emissions, CHS (impacts of noise and vibration and air emissions) and cumulative impacts due to site location near major highways, risks of fire and explosions associated with accidental spills of transported hazardous material (petroleum) during operation, improper waste disposal (e.g., maintenance activities), accidents from crossing the railway, especially in cases where rail is passing through an individual's land

[2] World Economic Outlook (WEO April 2019)

plot (agricultural areas), OHS, risks of land and asset value depreciation, especially in cases where land will be divided in half

Segment 2: positive impacts due to reduced noise and vibration and air pollutants associated with improved tracks, improved safety associated with upgrades of signaling and level crossings.

Mitigation measures for the negative impacts are fully described in the following tables, and the ESMP section of this document in Chapter 7.

Project Alternatives

For segment 1:

- No action alternative
- Road transportation alternative
- Technological and material alternatives
- Alternative alignment/routes

For segment 2:

- No action alternative
- Alternative trenching activities
- Alternative Technologies in Interlocking Systems

Segment 1

No Action

No alternative will mean that all the expected positive impacts will not be attained. Based on the above reasons, the no action alternative is not beneficial.

Road Transportation Alternative

An alternative to the new railway is to upgrade the existing road network between Alexandria and 6th of October city. Rail transportation of goods has more advantages to offer than road due to the following:

- One freight train can transport more TEUs per trip than one truck
- Trains are faster than trucks (It can run at a velocity of 140 km/hr. all the way, truck can't reach this speed)
- Low personnel operating cost
- More affordable to wider population
- Lower GHG emissions

- Safer in terms of accidents and breakdowns

Rail is considered energy efficient in terms of energy consumption per km per tonnage, which is lower than road transportation. The main disadvantage or rail transportation compared to road include the following:

- Higher investment cost in terms of construction and maintenance
- Less flexibility in terms of route and time schedule
- Less flexibility in cargo load, it wouldn't be economical if the it weren't loaded fully

Based on recent assessment conducted by the Consultant with MoT and consultation with ENR, railway consume around 15 ktoe/billion.ton.km. On the other hand, heavy duty trucks consume around 69 ktoe/billion.ton.km. Table 0-1 shows estimation of GHG emissions as a result of using rail as compared to trucks.

Table 0-1 GHG emission comparison between railway and truck

	Distance (km) A	**Tonnage B**	**Billion ton. Km/yr. C= A*B*365/10^9**	**GHG emissions[3] (tCO_2/yr.) D=EF*C*41.86*73**
Railway	68.5	3000[4]	0.07	3,439
Truck				15,818

As it was shown from the previous table, there is significant difference between rail and truck in terms of carbon dioxide emission in favor of railway. In terms of local pollutants, emission factor of some local pollutants such as NOx and PM is higher for railway than trucks as shown in Table 0-2 However, one truck can carry two containers or two TEUs, and one train can carry 50 containers. In order to carry 300 TEUs, it would require 150 trucks but would require only 6 trains. In addition, it would require trucks to travel longer distance to reach destination and subject to traffic. Meanwhile, railway is straightforward and direct. Accordingly, the emission of local pollutants from trucks per trip would be greater than rail.

Table 0-2: Local pollutants emission factor rails compared to trucks

g/bhp-hr	**CO**	**HC**	**NOx**	**PM**
Railway[5]	1.5	0.14	1.3	0.03
HDV[6]	14.4	0.14	0.2	0.01

[3] Emission factor of diesel is taken from IPCC 2006 Guidelines 73 ton/GJ. One ktoe is equivalent to 41.86 GJ
[4] taking max capacity in the operation phase in the future as indicated in the feasibility study of the project
[5] EPA, 2016, Locomotives: Exhaust Emission Standards https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OA09.pdf (accessed in August 2022)
[6] EPA, 2016, Heavy-Duty Highway Spark-Ignition Engines: Exhaust Emission Standards https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OA01.pdf (accessed in August 2022)

Finding: Rail transportation offers more advantages than disadvantages and is the most economical means of transportation.

Technological and Material Alternatives

Locomotive: diesel or electric power

Diesel locomotives are self-powered whilst electric powered locomotives require an overhead line to distribute power.

Electric power locomotives offer better performance in terms of higher acceleration and pollutant emissions. It is lower carbon alternative since the electricity in Egypt rely mainly on Natural gas for almost 80% of the fuel in addition to other renewable sources that are increasing with time and according to Egypt's Integrated Energy Strategy.

ENR currently doesn't have freight fleets operating with electric locomotives. Currently, ENR's priority to provide electric locomotives will be given more to passenger rail fleet more than freight as passenger fleets are used more. The new railway will include in its design future electrification.

Material Choice: Concrete or Wooden Sleepers

To compare between concrete and wooden sleepers as alternative material of the new railway.

Concrete sleepers are heavier and are less susceptible to change by temperature unlike wood, which is less stable with temperature change. Concrete sleepers are also safer in terms of fire hazards. However, wooden sleepers are more flexible to absorb impacts from wheels better than concrete, which is brittle and can crack and need replacement.

Concrete sleepers have longer life than wooden ones and require less maintenance and hence, less closure times. They have been chosen for this project due to their safety and longer lifespan.

Alternative Alignments

ENR takes into consideration several factors for the selection of railway alignment, which include:

- Trip time
- Outcome of hydrological and geological studies
- Locations of flood drainage valleys
- Volume of construction work
- Cost of construction and operation work

Cairo University conducted a study of 5 different alternative alignments as shown in Figure 0-3. The 5th alignment was the one selected following this study.

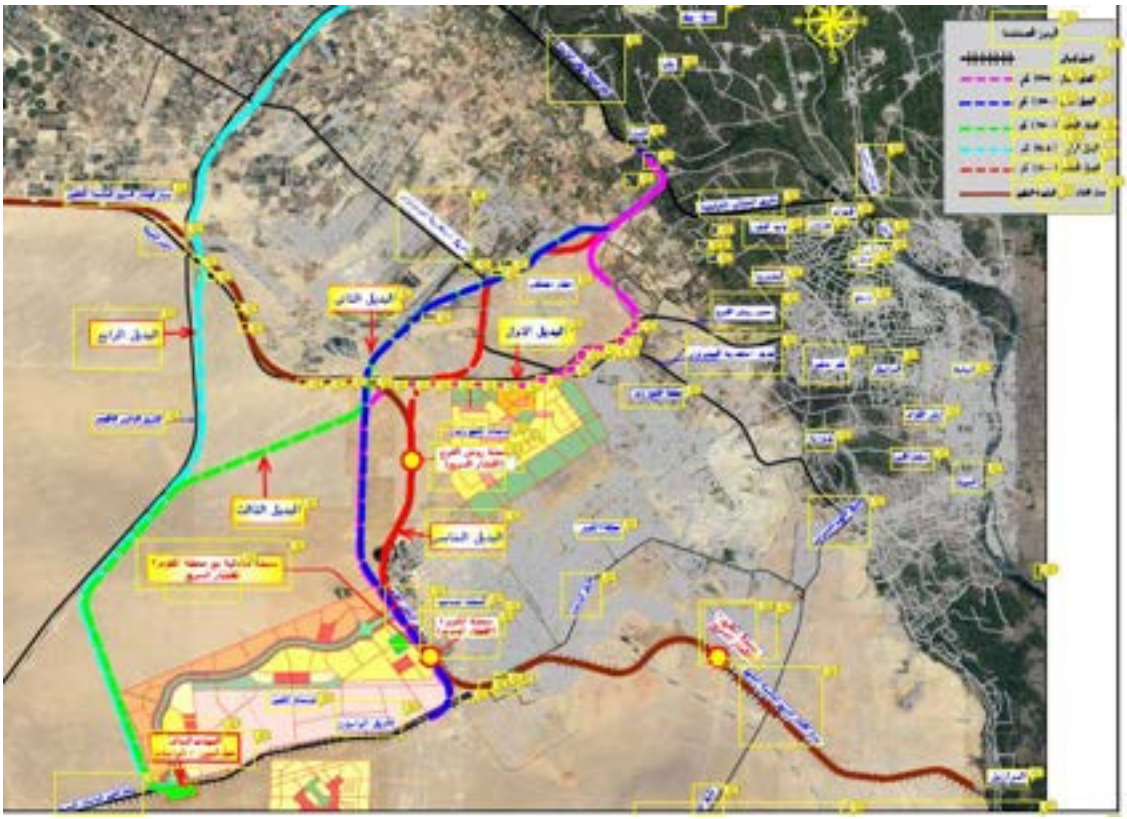


Figure 0-3: The five alignments proposed by Cairo University distinguished by color (the pink line presents the 1st alternative, the blue line presents the second, the green line presents the third, the light blue line presents the fourth and the red line presents the fifth)

Public consultation session was conducted on May 10, 2022, to present the findings of the ESIA studying the 5th alternative alignment (red line). Various stakeholders, including landowners, real estate developers and governmental entities (e.g., New Urban Community Authority (NUCA)) were invited to consult them on the location of the alignment and the environmental and social impacts and risks of this alignment. Details on the attendees and outcome of the public consultation are presented in the Public Consultation and Engagement chapter. The result of the public consultation was very informative, which pointed out social impacts of the 5th alternative that may be difficult to mitigate and avoidance may be the better option. After the public consultation, the 4th alternative was studied, and it was agreed to be the one with the least environmental and social impacts as explained below. Following, numerous consultations activities with governmental entities as well as local residents took place to assess the environmental and social impacts. Changes in sections of the alignment occurred to minimize risks as much as possible. Currently ENR and alignment consultants are finalizing coordination meetings with institutional stakeholders and consultation with all other project stakeholders.

The two alternatives are presented in figure 0-3 Environmental and social impact assessment comparison between alternative 4 and alternative 5 was conducted. The assessment is based on impact severity and frequency. The severity and frequency are based on a scale from 1 to 5, 1

being very low and 5 being very high. The total score was calculated by multiplying the severity times the frequency. The alternative with the highest score has the highest impacts.

Figure 0-3: comparison between different alignments

Recommendation: the 4th alternative has lower impacts than the 5th in terms of:

- Noise & vibration: more than 50% of the alignment passes through desert area planned to be cultivated and parallel to regional ring road (RRR), unlike the 5th alternative which passes near more residential areas.
- Occupational health and safety: avoid sewage ponds, while the 5th alternative passes through large area of sewage ponds
- Land acquisition: It is estimated that around 905,000 m^2 of land plots will need to be expropriated for the proposed alignment, instead of 1.504 million m^2 in case of the 5th alternative.
- Future potential for electrification hence better performance and less GHG emissions, while the 5th alternative cannot be electrified since it passes near Sphinx airport. Electrification can cause disturbance to the communication waves at the airport.

This means it is the recommended alignment. Currently ENR and alignment consultants finalized coordination meetings with institutional stakeholders and consultation with all other project stakeholders.

Segment 2

No Action

Modernization of Signaling System of the Marazeeq-Wahat 66 km

Without the project, the railway service over the Marazeeq-Wahat line will undergo further deterioration affecting millions of users, resulting in operational risks and increased financial burden and train unreliability. Modernization of signaling system provides better safety performance of the train and offers more safety to the surrounding community. No action alternative will deprive the community of attaining the positive impacts of the project.

Track Upgrades

This alternative suggests continuing the operation of the railway tracks with their current condition of signaling system, and deteriorated quality and inefficient operational capabilities. This will cause more financial burden on ENR resulting from the frequent breakdowns, and the low speed motion of trains on those tracks, causing delayed schedules, and further congestion of trains. This will eventually lead to uneconomical use of the lines, decreased reliability of ENR and consumer dissatisfaction without the implementation of the proposed project, and reduced overall railway safety.

Alternative trenching activities

One of the main activities during Signaling Modernization 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 over ground to save the time and resources associated with the digging and backfilling activities. However, installing cables over ground would result in increased risks of asset loss and deterioration. Specifically, exposed cables would be subject to damage due to weather, and material wear and tear and potential increase in cables theft.

Alternative Technologies in Interlocking Systems

This ESIA studies the upgrade of the traditional signaling system of Maraeeq-Wahat line (66 km) from mechanical interlocking to electronic interlocking system. However, there are some different applications of interlocking systems, with different operational characteristics as shown in the table 0-3.

Table 0-3: Comparison between interlocking systems

Mechanical	Relay	Electronic
This mechanical type of interlocking allows capacity of one train per 30-50 minutes depending on track arrangement, due to the fact that train route cannot be preselected and levers have to be manually operated. Also, it contains a high probability of error and malfunction.	Consist of complex circuitry made up of relays in an arrangement of relay logic that ascertain the state or position of each signal appliance. As appliances are operated, their change of position opens some circuits that lock out other appliances that would conflict with the new position. Equipment used for railroad signaling tends to be expensive because of its specialized nature and fail-safe design.	Modern interlockings are generally solid state, where the wired networks of relays are replaced by software logic running on special-purpose control hardware. The fact that the logic is implemented by software rather than hard-wired circuitry greatly facilitates the ability to make modifications when needed by reprogramming rather than rewiring. In many implementations, this vital logic is stored as firmware or in ROM that cannot be easily altered to both resist unsafe modification and meet regulatory safety testing requirements.. Electronic Interlocking are being adopted on a large scale to derive benefits of digital technologies in train operation and to enhance safety.

Therefore, it can be concluded that electronic interlocking systems provide more reliability and safety when it comes to operation as it minimizes the human factor and relies on highly functional computers and telecommunicated signals, creating overall accuracy and precision in operation.

Environmental and Social Management Plan (ESMP)

The ESMP provides:

- Detailed plans for the management of the project's environmental and social risks according to the mitigation hierarchy. .
- Qualified and experienced contractors will be responsible for implementation of the detailed design and construction of the proposed project as well as implementation of the E&S mitigation measures, in the ESMP. Implementation will be enforced and supervised by dedicated HSE manager who will have direct responsibility for the Environment, Safety and Quality Assurance program on site during construction and operation.
- The environmental and social management plan involves a monitoring process that will be the main responsibility of the Environmental, Socialist and OHS Specialists of the PMU.
- The PMU will ensure that site specific plans are integrated in all the contracts under the project and follow up the implementation with the contractors and during the project operation.

- The PMU will be supported by the supervision consultant, the Owner's Representative and the owner's Works Supervisor and Integrator.

The ESMP during the construction and operation phases of Segment 1 and Segment 2 are proposed in chapter 8 of the study. The ESMP includes for each identified impact, the mitigation measures, residual impacts rating, method of monitoring, monitoring indicators, monitoring frequency, monitoring location, responsibility and estimated cost.

Public Consultation and Engagement

The Stakeholder Engagement chapter aims at highlighting the key consultation and community engagement activities conducted and their outcomes. In addition to the procedures that must be taken into consideration when preparing the stakeholder engagement plan (SEP). The stakeholder engagement activities were conducted with reference to ESS10: Stakeholder Engagement and Information Disclosure.[7]

During the ESIA preparation, number of stakeholder engagement activities were conducted, including focus groups discussions, interviews and two public consultation sessions. Throughout the various consultation and engagement activities, the work teams incorporate the views of the different community members and the governmental stakeholders with the purpose of minimizing environmental and social risks and impacts in alignment selection. Two rounds of consultation induced changes of the project alignment.

Based on the changes encountered in the alignment as a result of the above-mentioned stakeholders activities including the public consultation of May 2022, the Project encountered changes in the design, most importantly a change in greenfield alignment (as explained under the project description). Following the update and the finalization of the environmental and social instruments drafts, a public consultation session was held on Thursday the 25th of August, in the Egyptian Railway Club in Nasr City from 11:45 - 14:45. A total of 36 persons attended the public consultation and participated in the discussion. Participants were invited two weeks prior to the event, through various channels including personal invitation letters, personal phone calls, WhatsApp messages and a on ENR official website. The Arabic executive summary of the ESIA was sent with the public invitation and hard copies were made available during the public consultation. The event was also designed to offer virtual opportunity for connection. The Public invitation included a Zoom link which was used by additional stakeholders to connect to the public consultation. Key stakeholders who attended the meeting included but were not limited to:

- Non-Governmental stakeholders (e.g., Stella De Mari Farms, Bani Salama Member of Parliament (Bani Salama-6 October line), and residents from Kafr Dawood (Bashteel-Itay El Baroud line)
- Governmental stakeholders (e.g., MoT, ENR various departments, GARB, October City, Sadat City, Monshaeet El Qanater Markaz, Agriculture Directorate, Ministry of Local Development)

The public consultation entailed detailed non-technical description for the project components including the greenfield alignment which was delivered jointly by ENR and GARB consultant. Findings of the environmental and social instruments particularly the ESIA were presented by

7 http://pubdocs.worldbank.org/en/837721522762050108/Environmental-and-Social-Framework.pdf

ENR consultant. This included summary of the assessments conducted, the identified positive and negative impacts and the proposed mitigation plan. Most of the time of the public consultation was utilized in active engagement from the participants who generally indicated overall support of the project. The following tables present the key conducted consultations with stakeholders and Chapter 9 of the ESIA presents more details on the public consultations' outcome.

Summary of the stakeholders' engagement as part of the first selected greenfield alignment

Date	Stakeholder and location	Main outcome
07/04/2022	ENR at ENR premises E&S specialists and deputies - PMU - Head of implementation Dept. - Engineers	- Engage with ENR - Discuss final route updates - Arrange field work activities and support needed from ENR
07/04/2022	ESM at ENR premises Survey Consultant (GARB)	- Understand land acquisition considerations and avoidance
10/04/2022	GARB at GARB premises General manager of companies & technical office	- Understand previous experience of GARB related to land acquisition procedures
14/04/2022	ENR at ENR premises (property Dept. Head of Central Property Department	- Enquire the estimated number of PAPs around line in subcomponent 4.2 - Collect contacts of field staff responsible for land acquisition
13/04/2022	Madinat El Sadat at the Markaz premises (Monofeya Gov) Head of Markaz and deputies	- Introduce project components - Understand positive & negative impacts - Understand proposed mitigation measures - Arrange further field work in the Markaz
13/04/2022	Badr City at Markaz premises (El Behaira Governorate) Head of Markaz and deputies	- Introduce project components - Understand positive & negative impacts - Understand proposed mitigation measures - Arrange further field work in the Markaz
14/04/2022	Manshaat El Qanater at Markaz premises (Giza Gov) Head of Markaz and deputies	- Introduce project components - Understand positive & negative impacts - Understand proposed mitigation measures - Arrange further field work in the Markaz
23/04/2022	6 October Authority at Authority premises - CEO deputy - Project management Dept. - Information System Dept.	- Collect information on the greenfield area in 6 of October
24/04/2022	Sheikh Zayed Authority at Authority premises CEO deputy - Head of Projects Dept.	- Understand the layout of new development areas of the companies - Discuss perceived impacts and mitigation measures
10/04/2022	Zayed Developers Sodic & Emaar	Both companies rejected the alignment and refused any mitigation measures

Date	Stakeholder and location	Main outcome
	Development Directors through a Zoom meeting	
29/04/2022	Greenbelt (owners & developers) 3 owners met at Public places	- Collect information on the greenfield area in 6 of October
14/04/2022	Monshaeet El Qanater at Markaz premises Markaz & City (Giza Gov.) 7 participants (Civil Society & local residents)	- Understand perceived impact and proposed mitigation measures - No major issues were raised
16/04/2022	El Sadat Markaz at Markaz premises and City (Monofeya Gov.) 10 participants (local residents & leaders)	- Understand perceived impact and proposed mitigation measures - No major issues were raised
18/04/2022	Badr Markaz & City at Markaz premises (El Behaira Gov. 10 participants (local residents & leaders)	- Understand perceived impact and proposed mitigation measures - No major issues were raised
18/04/2022	of Bahteel-Etay line and businesses around stations 79 users representing the entire line met on the train & around stations	- Understand current status and problems with the current single line - Understand perceived impact and proposed mitigation measures of dualization - No major issues were raised
10/05/2022	Public consultation at the Egyptian Railway Club in Nasr City Range of diverse stakeholders	Findings of the draft ESIA Views of the stakeholders Feedback on the views and comments obtained

Summary of the stakeholders' engagement as part of the updated greenfield alignment

Date	Stakeholder and location	Main outcome
04/08/2022 18/08/2022	MoT at MoT premises - Design Consultant - Foreign Finance Consultant	- Understand the new proposed alignment and - Assess LA avoidance
07/08/2022	Bani Salama Local Unit at Local Unit premises - Head - Deputy heads - Agricultural Cooperative	- Agricultural baseline of Bani Salama Local unit - State districts of agricultural lands in Bani Salama - Land tenure of agricultural lands - Perceived positive and negative impacts - Proposed mitigation measures related to expropriation of agricultural lands
18/08/2022	NUCA at NUCA premises General Director of Projects	- Understand land custody authorities for the new proposed alignment
14/08/2022 18/08/2022	New Sphinx Authority at Authority premises - Head	- Discuss the alignment - Positive and negative impacts - Proposed mitigation measures

Date	Stakeholder and location	Main outcome
	- Deputy heads -Urban Development Consultant	
18/08/2022	New October Authority at Authority premises - Head - Deputy heads	- Discuss the alignment - Understand their proposal of a new different alignment - Positive and negative impacts - Proposed mitigation measures The alignment was rejected because it contradicts and challenges the: 1) Urban and Infrastructure Planning of the city and 2) Oil production and development in the area It was advised to consult with the National Company for Oil Production and Development After this meeting which the design consultant has attended, an internal meeting (MoH, MoT, ENR, and WB) took place to change the alignment in the area of New October City to avoid oil production and development works.
09/08/2022	Bani Salama Local Unit at Local Unit premises 13 participants (local residents & local leaders)	-Perceived positive and negative impacts - Proposed mitigation measures related to expropriation of agricultural lands
23/08/2022	National Company for Oil Production and Development at Company premises - CEO deputy -Head of Planning & Monitoring Dept.	- The latest alignment after avoiding the oil production and development works in New October City was disclosed and approved.
24/08/2022	Stella Di Mari CEO deputy through a phone call	-Perceived positive and negative impacts - Proposed mitigation measures related to expropriation of agricultural lands
25/08/2022	Public consultation at the Egyptian Railway Club in Nasr City Range of diverse stakeholders	Findings of the draft revised ESIA including for the greenfield alignment Views of the stakeholders Feedback on the views and comments obtained

Grievance Mechanism (GM)

The objective of a grievance mechanism (GM) 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 commit 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 (GM).

The project will use the project GM (section 9.4.2) that was established as part of ENRRP and being improved as part of RISE. Moreover, linkages to the institutional-level GM of ENR (section 9.4.3) are being considered as per the SEP.

Moreover, the project will have a separate GM that handles project workers complaints and grievances, including civil servants assigned to the project. The GM for project workers is outlined in the project's Labor Management Procedures (LMP).

The Project-level GM

Under RISE, the project is working on improving the grievance mechanism for handling project-level complaints and grievances based on the one that was established under ENRRP with the aim of ensuring that project related complaints are addressed in a timely and transparent manner. The same GM system developed under RISE will be used for CATLDP. Given that the scope of CATLDP has expanded to involve construction of a new line and the construction of parallel trails to the existing ones under the segments in component 2, the project-level GM will be further developed to accommodate the potential grievances expected under the project.

Current GM Central/ Institution Level Utilized by ENR

In the meantime, ENR has a complaints system for passengers and the public. The management and operation of this institutional level GM are the responsibility of the Complaints and Customer Service Directorate, which is affiliated to the Presidential Affairs Central Directorate. ENR's institutional GM is accessible to project beneficiaries and stakeholders, so it is possible that project related complaints are submitted through the institutional channels. Therefore, linkages between the project GM and the institutional GM of ENR will be established.

1 INTRODUCTION

1.1 Cairo Alexandria Trade Logistics Development Project Rationale

According to the World Economic Outlook (WEO April 2019), the IMF projects an average annual increase of Egyptian export volumes of 5.8% and an average increase of import volumes of 3.8% up to 2024. The Greater Port of Alexandria (the ports of Alexandria and El-Dekheila) represents Egypt's primary gateway port and handles about 55% of Egypt's containerized gateway traffic, serving the greater Alexandria area and Egypt's populated north-east region. Without constructing a bypass to the Cairo Railway Hub, the current existing railway network which would need to be used for general freight transport of 1500 ton per day of goods consisting of 87% wheat,10% petroleum, and 3% clay and empty containers would have to go through the Cairo Railway Hub, which is highly congested by passenger traffic and unavailable to freight traffic for most of the day. The bypass includes building a missing link and upgrading other sections to deliver efficient rail connectivity to dry ports and upper Egypt. The current ENR network only allows around 4 trains per day to the Dry port in 6th of October with poor reliability given the bottleneck in the Cairo Railway Hub.

ENR is planning to improve its operational efficiency to accommodate more freight trains. As such, ENR plans to develop a bypass to the congested areas between Imbaba and El Maraziq stations. The Government of Egypt (GOE) is expanding the Egyptian transport infrastructure to account for the expected growth in freight traffic through the construction of distribution centers, road networks, railway networks, container handling terminals and dry ports.

The CATLDP also includes railway sector reform, PSP for last-mile rail connectivity and freight terminals and decarbonization of the railway sector. These objectives are critical for improving logistics in Egypt, allowing connections to other quadrants of the national railway network, including Sokhna Port, the Suez Canal Economic Zone (SC Zone), and other Egyptian ports on the Mediterranean such as Damietta and Port Said. The main objective of Cairo Alexandria Trade Logistics Development project is to improve the performance and lower the greenhouse gas emissions of the logistics and railway sectors in the Alexandria-6th October-GCA railway corridor and generate private sector participation in railway transport in Egypt.

1.2 Cairo Alexandria Trade Logistics Development Project Scope

The Project will build a railway bypass to the congested railway network around greater Cairo. This bypass will improve the efficiency of freight transport between the Alexandria Sea Port and Greater Cairo. Coupled with ongoing improvements to the railway lines between Cairo and Nag Hamadi under the RISE Project, freight trains can reach Upper Egypt. The bypass includes a greenfield segment starting at the Bani Salamah station on the line connecting Bashteel with El

Itihad stations) and the Marazeeq-Wahat line. The bypass also upgrades the signaling on the Marazeeq-Wahat line, between Marazeeq (km 0 point) and the meeting point with the greenfield segment. The Project will also improve access by train for container trains to the 6th of October Dry Port (DP6) which manages only containers and lies along the Marazeeq-Wahat railway line. The Project will also upgrade the railway signaling on the Bashteel-El Itihad (El Bani Salamah segment) and El Itihad-Tafaroa (El Itihad segment) between Greater Cairo Area and Alexandria.

The Project will increase the capacity of the existing railway corridor between Alexandria and Cairo to manage freight trains. The Project will allow, for example, to increase from 4 trains per day bound to DP6 to more than 30 once all the Project is complete. Traffic for other types of freight trains will also increase. Moreover, because of the bypass to the heavily congested area of Greater Cairo, the Project will increase the railway connectivity to Upper Egypt, allowing for a trade and economic corridor to Sudan. Furthermore, the Egyptian railways' network is extensive, so this bypass opens up other parts of the network to railway traffic, including the Damietta Port and Port Said. Other dry ports can also benefit if they build last-mile connectivity to the existing ENR network to take advantage of the projects' benefits.

The Project will also introduce the Infrastructure Access Charge (IAC) regime for railways in Egypt. The IAC allows private railway operators, for example, to run their trains, paying a charge to ENR as the owner of the tracks. The railway bypass to the bottleneck in the GCA increases capacity to allow more trains, including those eventually operated by the private sector. The Project also opens up other private sector participation opportunities in railways.

As part of the project design, all subcomponents embed a zero harm/zero tolerance, safety first" into the upgrade and new works on the tracks, at communities along the tracks, ensuring safety for communities along the tracks, such as fencing, level crossings, and education measures.

The Project has the following components:

- Component 1 includes: Railway Sector Reform, Project Delivery, Stakeholder Engagement, Women's Economic Empowerment and Private Sector Participation in the railway sector activities on).
- Component 2 is relevant to the construction of a new line and creation of parallel tracks on segments of the existing line as well as upgrades of existing tracks and modernization of signaling.

1.3 Scope of ESIA

This ESIA (the current document) covers parts of Component 2 hereinafter referred to as "the project" which will embed a safety management culture and physical safety measures to be implemented during all stages of project activities consisting of the construction and operation of the new segment (2.1) and upgrades on existing tracks (2.2):

- **Subcomponent 2.1 Greenfield Link**: Constructing 68.5 km of greenfield track and signaling from the Bashteel–Itay El Baroud section to the Marazeeq-Wahat section,

including (a) constructing structures (bridges, viaducts) and laying track foundation; and (b) installation of track and signaling.

- **Subcomponent 2.2 Marazeek – Wahat section**: Upgrading of existing track and signaling modernization from Maraziq to the junction point with the greenfield link.[8]

Component 2 also includes:

- **Subcomponent 2.3 El Bashteel-Itay El Baroud Section**: Upgrading of existing track, construction of a parallel track, and new signaling installation on both tracks on the El Bashteel- El Itihad segment; and upgrading of the existing single track and signaling on the El Itihad-Itay El Baroud segment.
- **Subcomponent 2.4 El Itihad-Tafaroa Section**: Upgrading existing single track and signaling on the El Itihad-Tafaroa section.

Subcomponents 2.1 and 2.2 are the main scope of this ESIA and will be referred to hereafter as segment 1 and segment 2 respectively. Sub-components 2.3 and 2.4. will be covered by subsequent ESIAs as per the Environmental and Social Management Framework (ESMF) prepared for the project.

1.3.1 Objectives of ESIA

The main objectives of this ESIA are as follows:

1. Ensure that projects are environmentally and socially sound and sustainable
2. Identify and assess any potentially significant adverse environmental and social impacts associated with the proposed project including the described ancillary and associated facilities
3. Assess compliance with applicable Project's national environmental laws, regulations and policies and the World Bank ESSs
4. Determine the measures needed to prevent or minimize and mitigate the adverse impacts over the project life-cycle in a systematic manner, proportionate to the nature and scale of the project and the potential risks and impact
5. Identify potential environmental and social opportunities, including those that would improve the environmental and social sustainability of the Project
6. Set out the principles, rules, guidelines and procedures to assess the environmental and social risks and impacts of the activities to be implemented

1.3.2 Approach of ESIA

The preparation of this ESIA study was carried out according to the following approach:

8 The Egyptian National Railway (ENR) built the 1.3 km railway track between km 66 and the entrance to DP6. This track will be operational from December 2021.

1. Reviewing documents including
    a. National environmental, social and EIA requirements; WB ESF and environmental and social standards; World Bank Group (WBG) Environmental, Health and Safety (EHS) General and Specific Guidelines for Railways (April 2007), ENR OHS policy etc.
    b. Project-related documents:
        i. Feasibility study: Feasibility Study and Demand Assessment for the Construction of a Freight Railway Line Connecting Bani Salamah/Itay Elbaroud Line with the Logistic Port of KM 66, Giza lahat Line (Prepared in 2021 by Menarail Transport Consultants)
        ii. Previous environmental studies developed for similar projects: Environmental and Social Assessment for Railway Corridor Alexandria - Nag Hammadi Railway Improvement and Safety for Egypt (RISE) Project (Prepared in 2020 by Integral Consult)
2. Screening and validation for requirement of an ESIA and identification of required assessments such as ambient noise and air quality measurements, noise modeling, contamination level analyses
3. Scoping to identify environmental and social sensitive receptors
4. Performing baseline surveys based on site visits, stakeholder consultations including ENR team, and secondary data review (including previous studies developed for the project) to further identify potential sensitive receptors
5. Assessment of significance of environmental and social impacts on identified receptors
6. Defining mitigation measures according to mitigation hierarchy
7. Developing management and monitoring plans for implementation of mitigation measures

2 PROJECT DESCRIPTION

The project covers two segments:

Segment 1 consists of constructing a 68.5 km greenfield single-track railway from Bani Salamah station on the existing track to 6th of October by connecting to the existing Marazeeq- Wahat freight railway track. Segment 1 includes construction of embankment and also includes signaling works.

Segment 2 consists of signaling modernization and selected track improvements on the existing Marazeek-Wahat line from its beginning at Marazeek till km 66 near DP6. The proposed route for segment 1 and segment corresponding to the existing Marazeek-Wahat track are illustrated in Figure 2-1.

The proposed routes for segment 1 and segment 2 are illustrated in Figure 2-1

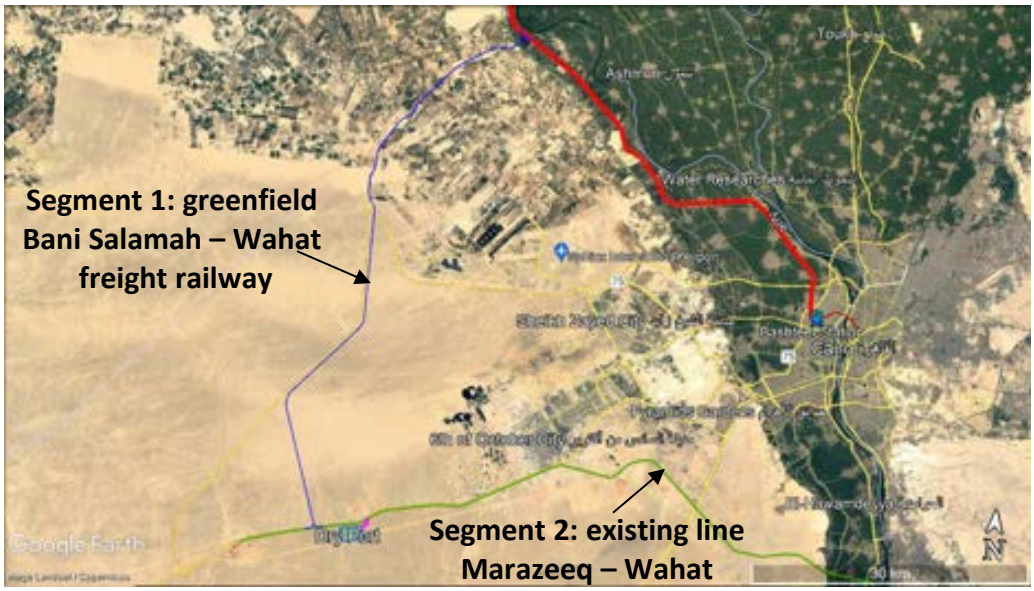


Figure 2-1: Location of proposed route for segment 1 and existing railway track for segment 2 Earth

2.1 Segment 1

The purpose of Bani Salamah - Wahat new line is to divert freight transport away from central Cairo rail hub to reduce the burden on the latter, avoid congestions and meet future increasing demands. The new line will be linked with two existing lines: Bashteel–Itay El Baroud at Bani Salamah station and Marazeek-Wahat line. The proposed route for segment 1 is shown in Figure 2-2.

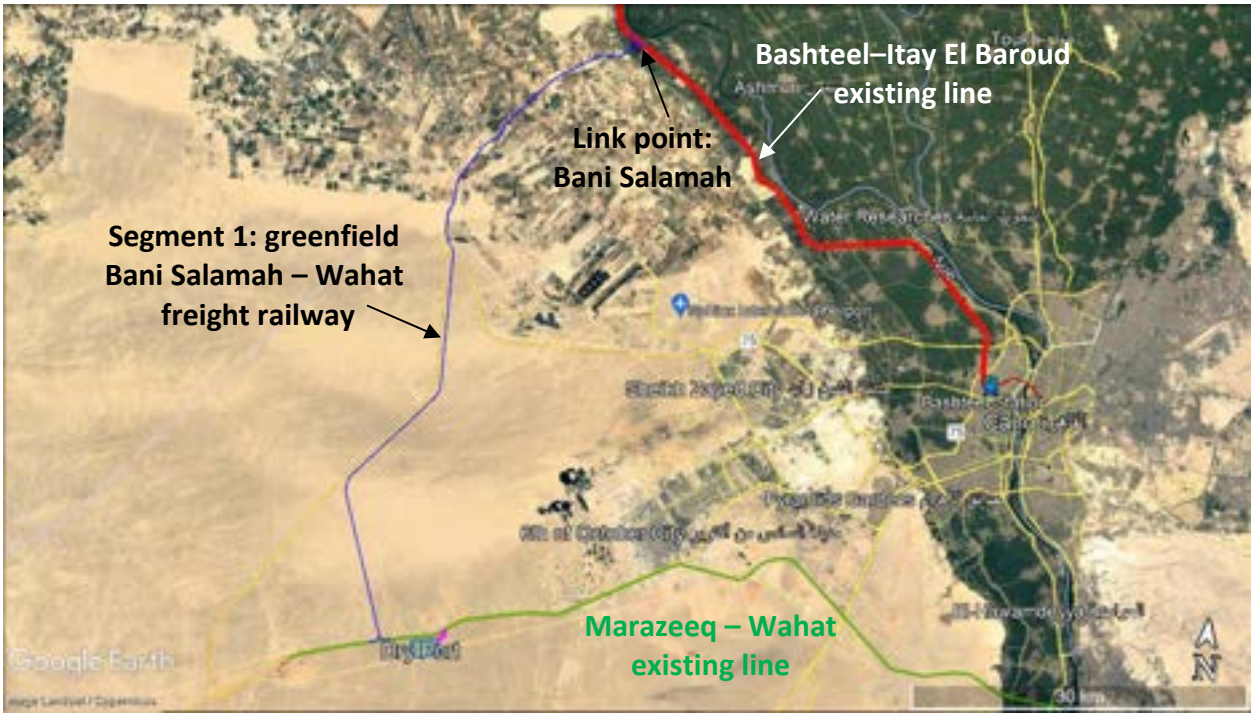


Figure 2-2: Segment 1-Bani Salamah-6th of October new line and link points on Wahat-Marazeek and Itay Al-Barud-Bashteel Lines

The Project activities will involve construction of railway embankments, track and alignment work, installation of signaling and interlocking systems. The Project is expected to have a preliminary construction period estimated at 48 months. According to the feasibility study by Italferr and as indicated by ENR, the line will have the following specs:

1. Design speed: 160 km/hr
2. Maximum axial load: 25 tons
3. Maximum gradient: 12.5Per1000
4. Minimum radius in curves: 1500 m
5. Type of signaling system: EIS
6. Provision for future electrification: Yes

2.1.1 Track and alignment

The line extends over 68.5 kilometers (km) starting from the link points with Marazeek Wahat line. The line passes through several types of land environments: desert land, cultivated desert lands and agriculture land and lastly crosses over Reyah El Nassiri water canal. The proposed rail alignment is described in Table 2-1 and shown in Figure 2-3.

Table 2-1: Description of the alignment

Section	Chainage (km)	Description	**Land custody authority**	**Potential land acquisition**
1	0 to 39.5	Currently Vacant State land planned to be reclaimed in the future. Gannet Masr Project and Mostaqbal Masr Project. The alignment starts at the link point with Marazeeq-Wahat existing freight line near DP6. At the first km, there is intersection with Wahat Road. The proposed railway will pass under Wahat Road. The alignment then continues straight in desert land outside the borders of New October City Authority. The desert land belongs to "Gannet Masr", which is a new agriculture project. It will pass through "Gannet Masr" until km 21.5. There will be service tunnel constructed to connect the land together. The alignment passes through "Mosta'bal Masr", which is also a new agriculture project. There will service tunnel constructed to connect the land together. This area is currently vacant of any structures or plantations; the future plan does not imply selling or leasing the land to investors. It will pass through "Gannet Masr" until km 39.5	Ministry of Defense (MoF) Ganet Masr Project (21.5 km) owned by Egyptian Air Defense Mostaqbal Masr Project (18 km) owned by the Egyptian Air Forces	State land to be reallocated to MoT. Coordination between MoT and MoF in progress

Section	Chainage (km)	Description	**Land custody authority**	**Potential land acquisition**
3	39.5 to 47	Currently these 7.5 km are vacant desert land. The alignment intersects with the El Dabaa Corridor (at km 39.5) using a bridge path currently under design. After this section, the line will cross cultivated desert lands and extends through agriculture area. The new proposed alignment is passing on the western border of lands. Starting km 41.5, the alignment continues parallel to Regional Ring Road (RRR) at a distance of 50m. This way, it is located in the right of way of the RRR which extends for 200 m. There are scattered farms and farm houses east to the rail alignment located around 400 m away from it. At km 43.5, the alignment passes through greenhouse structure. At km 44, there is a vacant steel resembled structure. Both structures are located in the right of way of the RRR and will need to be relocated. The alignment intersects with the new high-speed rail (the administrative capital / Al-Alamein / Al-Ain Sokhna) as well as Sumid pipeline at km 47 using a bridge path currently under design	Sphinx City Authority	State land to be reallocated to MoT. Coordination between Sphinx Authority and MoT in progress. There is one movable greenhouse structure (at km 43.5) and one vacant steel resembled structure (at km 44) need to be relocated. Both structures are located in the RoW of the RRR. They are both serving agriculture purposes and are not inhibited. PAPs not yet identified
4	47 to 52.5	Currently theses 5.5 km are of mixed land use: vacant and agricultural of mixed sizes that used to be desert land The new proposed alignment is passing on the western borders of agricultural lands. At km 50, the alignment will pass under high electricity transmission line. The alignment continues to pass parallel to RRR but at a distance 25 m away to avoid land acquisition of existing assets e.g., electricity station in km 50 of the alignment. There is a power station located at around 500 m away from the alignment. At km 52.5, the alignment intersects with Cairo-Alexandria Desert Road using a bridge path currently under design	Sphinx City Authority	Potential land acquisition on one edge of lands is foreseen. PAPs in this section in particular might have accumulated negative impact, if parcels of their lands have had been expropriated before for the construction of the RRR. PAPs not yet identified

Section	Chainage (km)	Description	Land custody authority	Potential land acquisition
5	52.5 to 68.5	Currently agricultural land (mostly privately owned). The new proposed alignment is passing on the western borders of agricultural lands in about 11.5 km (km 52.5-km 64). At km 59.5, the alignment gets close to gated farmhouse compound, which is located at around 500 m away from it. In another 4 km, the alignment is passing in the middle of agricultural lands (km 64-km 68). The alignment passes near 2 Cemetery areas at km 65.5- 66, which are located at around 180 m away from it. There is also a mosque at km 67 located 180 m away from the alignment. The alignment intersects with Reyah El Nassiri water canal at km 68 to reach its link points at Bani-Salamah station.	Bani Salama Local Unit, Monshaeet El Qanter District, Giza Governorate.	Potential land acquisition on one edge of lands (11.5 km) is foreknown. PAPs in this section in particular might have accumulated negative impact, if parcels of their lands have had been expropriated before for the construction of the Regional Ring Road. Potential land acquisition inside lands (4 km) is foreseen. Segmentation of some lands is expected. PAPs not yet identified.

Section	**Chainage (km)**	**Description**	**Land custody authority**	**Potential land acquisition**
1	0 to 39.5	Currently Vacant State land planned to be reclaimed in the future. Gannet Masr Project and Mostaqbal Masr Project. The alignment starts at the link point with Marazeeq-Wahat existing freight line near DP6. At the first km, there is intersection with Wahat Road. The proposed railway will pass under Wahat Road. The alignment then continues straight in desert land outside the borders of New October City Authority. The desert land belongs to "Gannet Masr", which is a new agriculture project. It will pass through "Gannet Masr" until km 21.5. There will be service tunnel constructed to connect the land together. The alignment passes through "Mosta'bal Masr", which is also a new agriculture project. There will service tunnel constructed to connect the land together. This area is currently	Ministry of Defense (MoF) Ganet Masr Project (21.5 km) owned by Egyptian Air Defense Mostaqbal Masr Project (18 km) owned by the Egyptian Air Forces	State land to be reallocated to MoT. Coordination between MoT and MoF in progress

		vacant of any structures or plantations; the future plan does not imply selling or leasing the land to investors. It will pass through "Gannet Masr" until km 39.5		
2	39.5 to 47	Currently these 7.5 km are vacant desert land. The alignment intersects with the El Dabaa Corridor (at km 39.5) using a bridge path currently under design. After this section, the line will cross cultivated desert lands and extends through agriculture area. The new proposed alignment is passing on the western border of lands. Starting km 41.5, the alignment continues parallel to Regional Ring Road (RRR) at a distance of 50m. This way, it is located in the right of way of the RRR which extends for 200 m. There are scattered farms and farm houses east to the rail alignment located around 400 m away from it. At km 43.5, the alignment passes through greenhouse structure. At km 44, there is a vacant steel resembled structure. Both structures are located in the right of way of the RRR and will need to be relocated. The alignment intersects with the new high-speed rail (the administrative capital / Al-Alamein / Al-Ain Sokhna) as well as Sumid pipeline at km 47 using a bridge path currently under design	Sphinx City Authority	State land to be reallocated to MoT. Coordination between Sphinx Authority and MoT in progress. There is one movable greenhouse structure (at km 43.5) and one vacant steel resembled structure (at km 44) need to be relocated. Both structures are located in the RoW of the RRR. They are both serving agriculture purposes and are not inhibited. PAPs not yet identified
3	47 to 52.5	Currently theses 5.5 km are of mixed land use: vacant and agricultural of mixed sizes that used to be desert land The new proposed alignment is passing on the western borders of agricultural lands. At km 50, the alignment will pass under high electricity transmission line. The alignment continues to pass parallel to RRR but at a distance 25 m away	Sphinx City Authority	Potential land acquisition on one edge of lands is foreseen. PAPs in this section in particular might have accumulated negative impact, if parcels of their lands have had been expropriated before for the construction of the RRR.

		to avoid land acquisition of existing assets e.g., electricity station in km 50 of the alignment. There is a power station located at around 500 m away from the alignment. At km 52.5, the alignment intersects with Cairo-Alexandria Desert Road using a bridge path currently under design		PAPs not yet identified
4	52.5 to 68.5	Currently agricultural land (mostly privately owned). The new proposed alignment is passing on the western borders of agricultural lands in about 11.5 km (km 52.5-km 64). At km 59.5, the alignment gets close to gated farmhouse compound, which is located at around 500 m away from it. In another 4 km, the alignment is passing in the middle of agricultural lands (km 64-km 68). The alignment passes near 2 Cemetery areas at km 65.5- 66, which are located at around 180 m away from it. There is also a mosque at km 67 located 180 m away from the alignment. The alignment intersects with Reyah El Nassiri water canal at km 68 to reach its link points at Bani-Salamah station.	Bani Salama Local Unit, Monshaeet El Qanter District, Giza Governorate.	Potential land acquisition on one edge of lands (11.5 km) is foreknown. PAPs in this section in particular might have accumulated negative impact, if parcels of their lands have had been expropriated before for the construction of the Regional Ring Road. Potential land acquisition inside lands (4 km) is foreseen. Segmentation of some lands is expected. PAPs not yet identified.

Figure 2-3: Description of segment 1 alignment

2.1.2 Easement Width (Right of Way)

The Right of Way (RoW) is the area around the railway track that is required to build and service the railway. It is also called easement width, which is the width of the corridor. ENR authority set 20 m from the center of the line on both sides of railway train as the right of way for both single and double tracks.

The total easement width takes into account the construction of a railway service road, of the drainage ditch and of 1 m distance between this latest and the fence delimiting the RoW, on each side of the rail as indicated in Figure 2-4 and Figure 2-5.

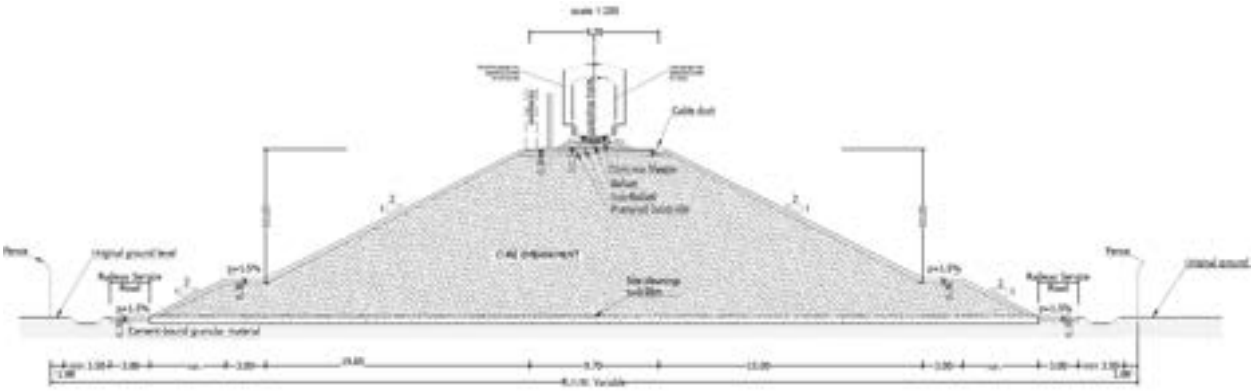


Figure 2-4: Railway platform, embankment for single track, the ROW distance

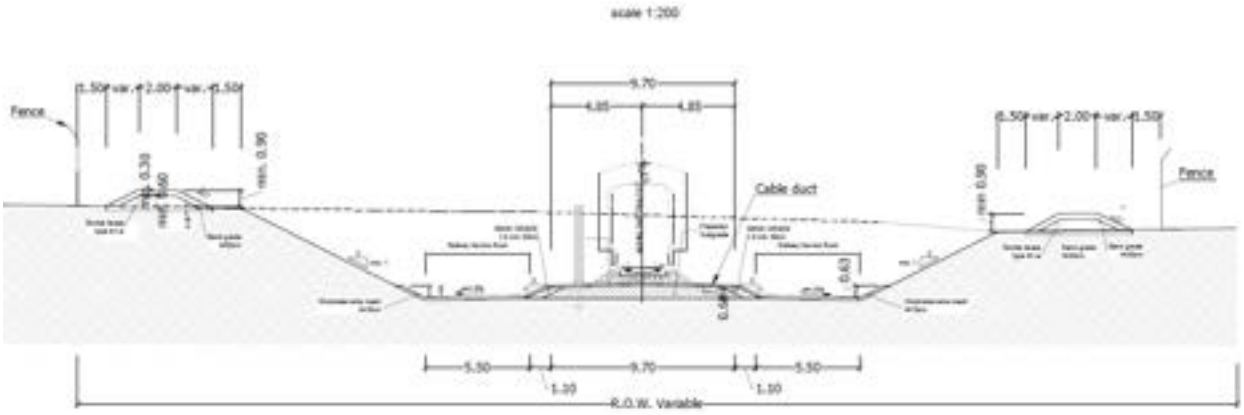


Figure 2-5: Cutting single track, ROW distance

In some cases, along the alignment of the railway, there may not be enough space to have RoW of 20 m on both sides from the center line. As the line extends, it passes in the proximity of different structures and land that could cause constraint such as the Cairo-Alexandria desert road and agriculture land. According to ENR representatives, the ROW can decrease to 9 m from the center line on both sides of the track to provide safe access to the rail for maintenance. With respect to emergency safe access, ENR has Emergency Response Plans specific to each department. In

addition, there are close coordination with relevant authorities and stakeholders in the overlapping between the railway line right of way with the existing mentioned structures, in order to provide solution (such as retaining walls or alignment refinements) to minimize impacts. More details on the alignment/route alternatives are discussed in Analysis of Alternatives chapter.

Based on meetings with the alignment design consultant, the following points were relevant to the right of way in relation to the land needs for the creation of the tracks:

- The RoW of the Regional Ring Road is 200 meters from each side.
- The alignment is 50 meters away from the Regional Ring Road, where a width of 50 meters of the land area confined between the alignment and the Regional Ring Road is kept for future widening works of the Road, except in few areas it will be reduced to 25 meters to avoid land acquisition of existing assets e.g., electricity station in km 50.5 of the alignment. In other areas e.g., close to Cairo-Alexandria Desert Road toll station, this margin for future works will be expanded to 500 meters instead of 50 for about 2.5 kilometers. At the end of the alignment in Bani Salama, the alignment will be 700 meters away from the Regional Ring Road (from km 64-68 of the alignment) to enable the interconnection with final station (Bani Salama).
- More details on the land expected to be acquired is found in section 2.1.9.

2.1.3 Design

Segment 1 Track design will follow the Egyptian code for railways and Good International Industry Practice GIIP. The detailed design will be prepared by the contractors based on the conceptual design of Segment 1. The following description is a very general presentation of the layers of railway infrastructure. The soil investigation will be the essential activity to clarify the specific characteristics of the layers of infrastructure for the freight railway corridor. Figure 2-6 shows layers of the railway infrastructure.

The sub-grade is typically the natural soil that serves as the foundation that supports the rail infrastructure. After removal of topsoil and other organic materials and assuming that the soil is strong, the sub-grade may be stabilized by compaction alone. However, many soils contain clay minerals and are classed as unstable. When it is unavoidable to lay tracks on a very poor (or undesirable) soil, it becomes necessary to improve and strengthen the nature of soil by various methods (e.g., cement grouting, sand piles, use of chemicals).

The geotextiles can be used to improve soil characteristics and can be located between the sub-grade and the sub-ballast (blanket) or between the blanket and the ballast. Geotextiles have several functions, which include filtration, drainage, reinforcement, cushioning, waterproofing and separation. A geotextile is typically defined as any permeable textile material used to increase soil stability, provide erosion control or aid in drainage. Geotextiles can be woven, knitted or non-woven. Nonwoven geotextiles are usually made using synthetic materials such as polyester or polypropylene and they are permeable.

The sub-ballast (blanket) is a layer of coarse-grained material between ballast and sub-grade, spread over entire width. The roles of sub-ballast (blanket) are to prevent mud pumping and fouling of ballast by upward migration of fine particles from the sub-grade. To avoid failure of track formation due to inadequate bearing capacity and to safeguard against swelling and shrinking, adequate blanket thickness must be provided in all cases at the time of construction of new lines. Depending on the type of soils, the thickness of the blanket varies between 45 centimeters and 1 meter. The use of geotextiles can reduce the requirement of thickness of blanket.

The ballast forms the top layer of the substructure, in which the sleepers are embedded and supported. Mainline ballast material is usually large, uniformly graded crushed stone or gravel with desired specifications (there are also other forms of ballasts for specific cases).The main purposes of ballast are to provide levelled bed or support for the railway sleepers, to transfer the load from sleepers to subgrade and to distribute the load uniformly on subgrade, to hold the sleepers in a firm position while the trains pass by, to prevent the longitudinal and lateral movement of sleepers, and to offer good drainage to the track.

The sleepers are rectangular supports for the rails in railroad tracks. Sleepers are laid transversely to hold the rail and transfer loads to the track ballast and subgrade, hold the rails upright and keep them spaced to the correct gauge. The sleepers also avoid both longitudinal and lateral track movement and help to enhance correct line and level of the rails. Presently, the sleepers are pre-stressed concrete elements and are commonly known as Pre-Stressed Concrete (PSC) sleepers.

The fastening system represents all fittings required for fixing the rails to the sleepers in a track.

The turnout is a complex component of the railway track which transfers the rolling stock from one path to another.

The rails for the modern track are typically hot-rolled steel with a profile of an asymmetrical rounded I-beam. Unlike some other uses of iron and steel, railway rails are subject to very high stresses and must be made of very high-quality steel alloy. There are different types of rails, depending on the desired characteristics of the railway networks (e.g., the axle load of trains, the tonnage of trains).

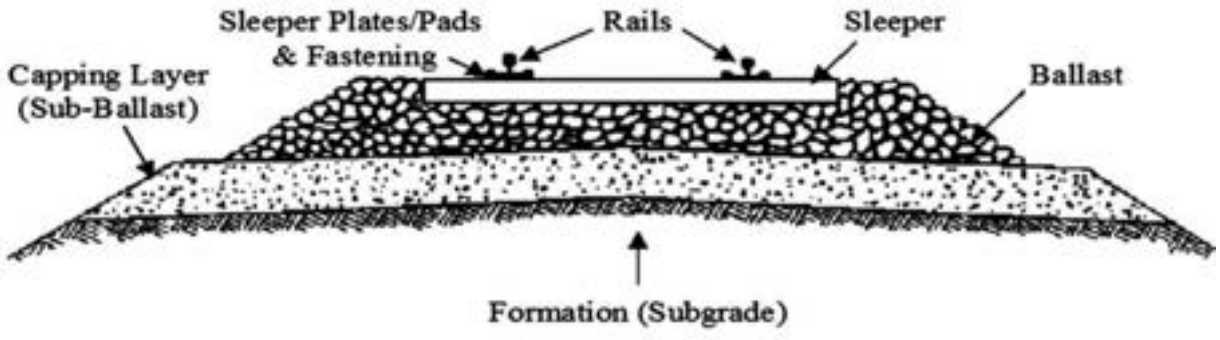


Figure 2-6: Layers of railway infrastructure[9]

2.1.4 Railway Line Structures

As explained in section 2.1.1, the railway line will intersect with a number of roads, which vary in design (Lane system), traffic capacity/traffic volume, locations/functions, and load transported/tonnage. Thus, there are important structures that must support the railway track in order to enable its existing or future hydraulic and infrastructural intersections/crossings. Those structures are:

- Road flyovers
- Road underpasses
- Railway viaducts
- Culvert

Choosing asphalt works would mainly depend on the type of the used structure, that would affect the level of asphalt works, paving materials, manpower, and paving equipment. Structures that will be built are described in the next section.

2.1.4.1 Road Flyovers

The road flyovers solve the crossing of existing roads as shown in Figure 2-7. It is used if the road is at higher level than the railway track. The Bridge height is the distance from existing ground level to underside of the bridge. Th bridge heigh considers a 7.2m clearance from the bridge to the rail to allow space for future electrification. There is temporary realignment of the road to build the bridge abutments and construct ramps onto the bridge.

[9] Elkhoury, Najwa & Hitihamillage, Lalith & Moridpour, Sara & Robert, D.J.. (2018). Degradation Prediction of Rail Tracks: A Review of the Existing Literature. The Open Transportation Journal. 12. 88-104. 10.2174/1874447801812010088.

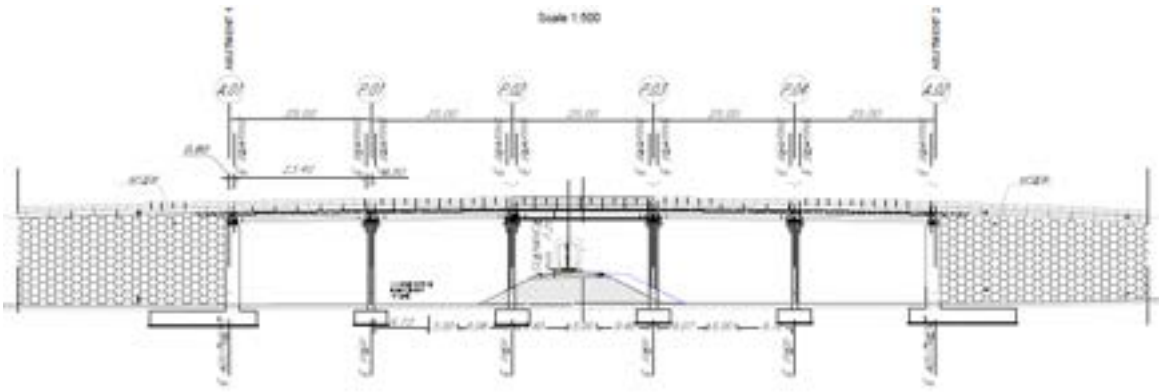


Figure 2-7: Road flyover (source: feasibility study)

According to the design consultant, Wahat Road will be flying over the railway as illustrated in Table 2-2 and Figure 2-8.

Table 2-2: Location of road flyovers

Chainage (km)	Road name	Current status of the road	Bridge height
1	Wahat road	Wahat Road connects Giza to the Western Desert Oases and is 565 km long. It is characterized by having low traffic volumes.	7.5 m

Figure 2-8: Intersection of the railway track with Wahat road, where there will be road flyover

2.1.4.2 Road Underpasses (service tunnels)

Road underpass means the road will pass underneath the railway track. The railway track solution is 'box culvert', which is a simple reinforced concrete structure built in-situ concrete on the line of the railway, as shown in Figure 2-9.

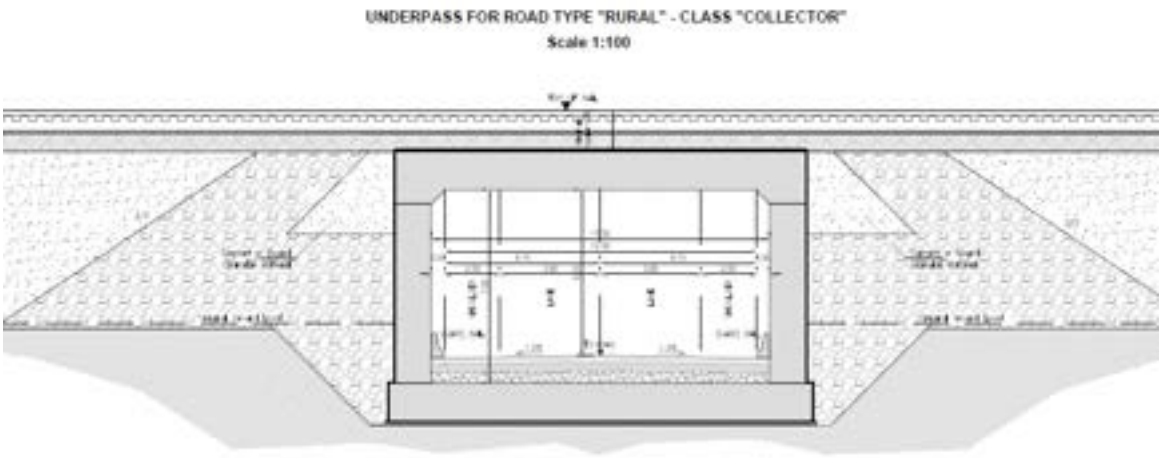


Figure 2-9: Road underpass (source: feasibility study)

There will be 4 service tunnels (underpasses) over agriculture areas. There will be 3 service tunnels over existing asphalt roads as shown in the **Error! Reference source not found.**.

Figure 2-10: Location of 7 service tunnels presented by the orange circles

2.1.4.3 Railway Viaducts

The railway viaduct typical cross section is shown in Figure 2-11. The purpose of a viaduct is to carry a railway over water, a valley, or another road. The viaducts will be constructed for allowing a future potential double track. Viaducts are the method by which the railway is designed to pass over Reyah ElNassiri water canal as shown in Figure 2-12. The viaduct length is yet to be determined. However, on consulting with the alignment consultant, the viaduct would cover the width of the canal, it's estimated to be 500 m and with inclination extending around 300 m.

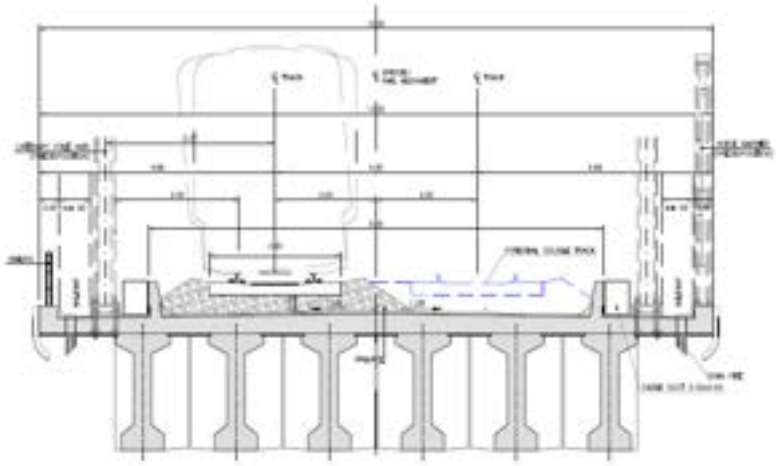


Figure 2-11: Railway viaducts (source: feasibility study)

Figure 2-12: Viaducts are to be constructed so that the railway will pass over Reyah El Nassiri water canal

Table 2-3: Location of viaducts

Chainage (km)	Structure Description
39.5	Railway passes over Daba'a road
47	Railway passes over Sumid pipeline and high-speed rail
52.5	Railway passes over Cairo-Alexandira Desert Road

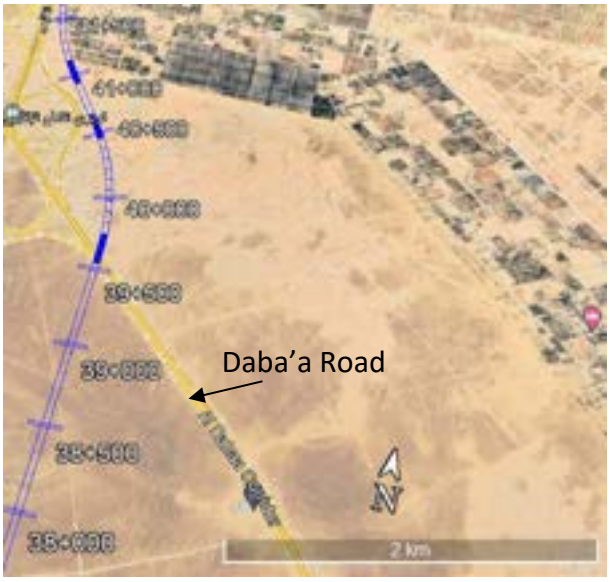


Figure 2-13: Intersection of the line with Daba'a road

Figure 2-14: Intersection of the line with Cairo-Alex Desert Road

Figure 2-15: Intersection with Sumid pipeline and high-speed rail

2.1.4.4 Other Intersections

2.1.4.4.1 High Voltage Transmission lines

The railway will pass underneath transmission lines away from the towers.

2.1.4.5 Culvert

A culvert is a tunnel carrying a stream or open drain under railway. Culverts are needed to prevent flooding and washing out of railway corridor by torrential rain. The hydrological survey

undertaken by Cairo University identified that 7 culverts are needed under the railway in addition to a storage pond. Annex 3 contains the hydrology study conducted by Cairo University including a map of the location of valleys that will affect the railway alignment.

2.1.4.6 Asphalt Works

2.1.4.6.1 Road Flyovers

Temporary realignment of the road:

This type of intersection may require creation of new paved roads (full Flexible Asphalt pavement layers):

- Sub-Grade
- Sub-Base
- Base Course
- Binder Course
- Surface Course (Hot Asphalt)

During this type of intersection, the used pavement equipment would be as following:

- Trucks
- Bulldozers
- Graders
- Vibratory roller machine/Road roller
- Paver
- Pneumatic Tire Roller/Traffic Rolle

After building the bridge abutments and construct ramps onto the bridge, a range of rehabilitation process (Basic Asphalt Replacement Process) will be conducted (for damaged areas only) through:

- Removal/Milling stage: entails the deconstruction and removal of the exciting asphalt using Road Scraping Machine/Road Scraper/Milling Machine/ Pavement Milling
- Grading: to ensure that the Asphalt has a consistent and well compacted granular base that matches the desired slope and thickness
- Paving and compacting
    - Hot tar layer will be added before paving the Surface Course (the Tar enhance the adhesion of the new Asphalt layer)
    - Compacting and cooling of Asphalt

2.1.4.6.2 Road Underpasses

In this structure, pavement activities will be as shown in Figure 2-16.

Figure 2-16: Asphalt works scenario for Road underpass's structure

2.1.4.6.3 Railway Viaducts

In this structure, a range of rehabilitation process (Basic Asphalt Replacement Process) will be conducted (for damaged areas only) through:

- Removal/Milling stage: entails the deconstruction and removal of the exciting asphalt using Road Scraping Machine/Road Scraper/Milling Machine/ Pavement Milling
- Grading: to ensure that the Asphalt has a consistent and well compacted granular base that matches the desired slope and thickness
- Paving and compacting
    - Hot tar layer will be added before paving the Surface Course (the Tar enhance the adhesion of the new Asphalt layer)
    - Compacting and cooling of Asphalt

2.1.4.6.4 Culvert

In this structure, Asphalt works do not apply.

2.1.5 Signaling System

The project entails establishing signaling system for the new proposed line Bani Salamah – 6th of October and modernization of signalizing system Marazeek-Wahat line from its beginning till km 66. Signaling systems improve the safety of operation railways and help reduce accidents caused by human error or failure of existing outdated signaling. It is also expected to allow a much safer operation of the large number of level crossings along the lines.

2.1.5.1 Signaling of Bani Salamah – 6th of October Line

The European Rail Traffic Management System (ERTMS) is a European-led system, which works to facilitate and improve rail transport services within the European Union. There are two components of the ERTMS:

- European Train Control System (ETCS). It is train control system. The main principle of ETC is to provide the train a maximum distance that it can travel, the speed profile of the track ahead and other track information about the route that has been set. The driver can

drive the train normally. However, in case the distance or the speed limit is exceeded or is in danger of being exceeded, the ETCS control the train and stop it if necessary

- Global System for Mobile communications – Railways (GSM-R). This is the telecoms element of ERTMS which, in some application level, carries ETCS data between trains and the trackside infrastructure. It also provides for voice communications. It is based on standard mobile telephone technology, but with a railway reserved frequency band

Since ENR is currently upgrading the railway network with ERTMS level 1 signaling system, the feasibility study proposed using the same system for the new line.

2.1.6 Operation Facilities

2.1.6.1 Stations

Since the new railway is envisaged to serve only freight railway, the planning of stations is not determined at this stage.

2.1.6.2 Level Crossing

ENR is planning to minimize level crossings as much as possible to avoid accidents from residents that sometimes don't follow the rules. It is planned that the proposed railway will not have level crossing. Instead, along the railway alignment, there will be pedestrian bridges or passes at crossings with main roads such as Cairo-Alex desert road and in case of road underpasses as well.

2.1.6.3 Control Buildings

Signaling control directs the overall traffic of trains to allocate space and prevent collisions. The signaling system is still to be determined and designed. As mentioned before, according to the feasibility study, ETCS system will be used for the new railway. Generally, signaling system requires main buildings and secondary buildings to house apparatus and monitors of the railway traffic and serve electronic interlocking system. The number of buildings and their location are still to be determined after finalization of the route.

2.1.6.4 Current ENR Freight Fleet

The railway lines go throughout the Nile Delta and cross the two branches of the Nile in diverse places. ENR provides cargo transportation services via its railway network, which connects the entire valley with a length of 9570 km below and extends within the major transport cities. There are additional 94 stations open for freight transportation along with the network, which is connected to the main ports (Alexandria - Dekheila - Damietta - Port Said West - El Sokhna - Adabeya) via rail. ENR has moved 14,000 containers from seaports to various industrial locations via railway lines since the beginning of the year.

The Ministry of Transport, represented by ENR, intends to boost and improve train freight transportation. This was demonstrated by a contract with the American General Electric Company

to maintain and renew 81 freight locomotives, adding on collaboration with the Arab Organization for Industrialization (AOI) to manufacture 300 new goods wagons that meet the needs of customers, as a new addition to the fleet of rail freight transport.

It was contracted to supply 140 freight wagons from SEMAF Factory for 544 million pounds and transport 3.6 tons of products in order to reinvigorate the freight transportation by rail process and improve ENR income while easing the load on the state budget.

ENR will partner with Military Production to manufacture locomotives locally, using German knowledge, in order to boost the local economy.

2.1.6.5 Maintenance and Workshops

Before the train proceeds with operation every time, maintenance team must undertake inspection check to each locomotive/coach to make sure it is safe to operate. The maintenance team must fill in a designated form that has the numbers for each operating locomotive. The purpose of the form is to prove that the locomotives have been checked and are good to go. In addition, there is periodic maintenance schedule for locomotives to undertake maintenance activities such as change the wheels, lubricating of its parts, etc. The maintenance activities are undertaken in yards affiliated to ENR distributed to serve the railway network. For example, there is a yard in Boulak near Bani Salamah (the final station of the proposed new railway, where it is expected to be maintained). The yards are connected by rail so that the train can park to be checked. The maintenance activities are undertaken by the department of Maintenance and Technical Support in ENR.

2.1.7 Construction Activities

The Project is expected to have a preliminary construction period estimated at 48 months. The number of expected contractors and timeline is still to be determined.

2.1.7.1 Earthworks

Based on horizontal and vertical alignment design of new railway line there will be earthworks that include cutting and filling. The new railway line has embankment that reaches 10 m as shown in Figure 2-17. The proposed embankment will be constructed with suitable fill material. The cut cross section of the railway track is shown in Figure 2-18. According to the feasibility study of the project, earthworks balance for the railway line construction for cut and fill has been conducted. The earthworks balance was based on reliable information of geotechnical characteristics of the design area. The proposed track will require the placement of 5.05 million m3 embankment filling material of sand, earth, brick and embankment and ballast material. Around 40% of the excavated material can be reused for embankment fill. The remaining part of the excavated material that don't have appropriate geotechnical characteristics, will be disposed of in landfills.

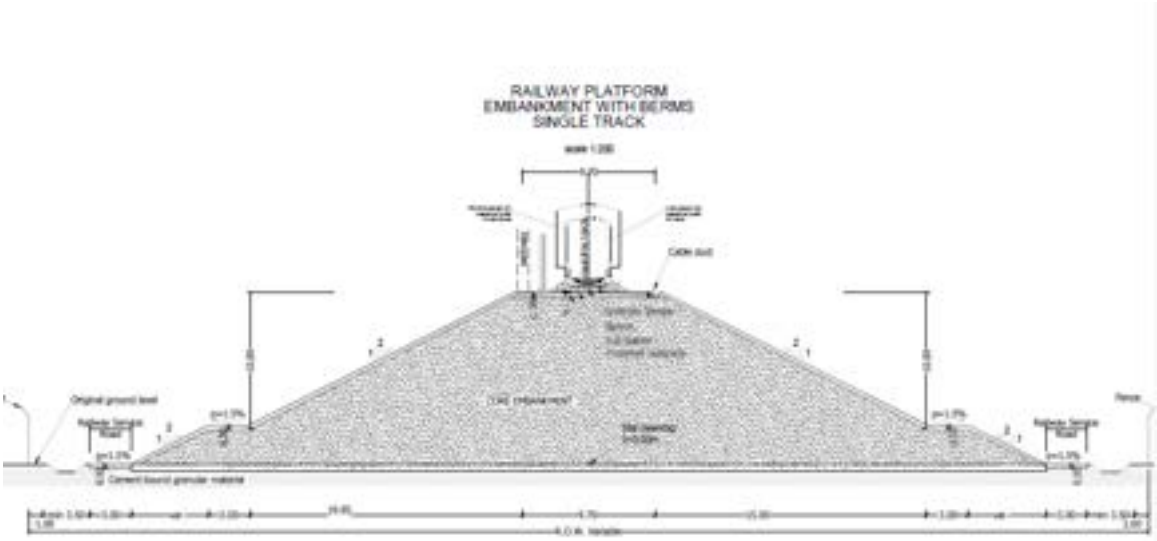


Figure 2-17: Embankment cross-section (source: feasibility study)

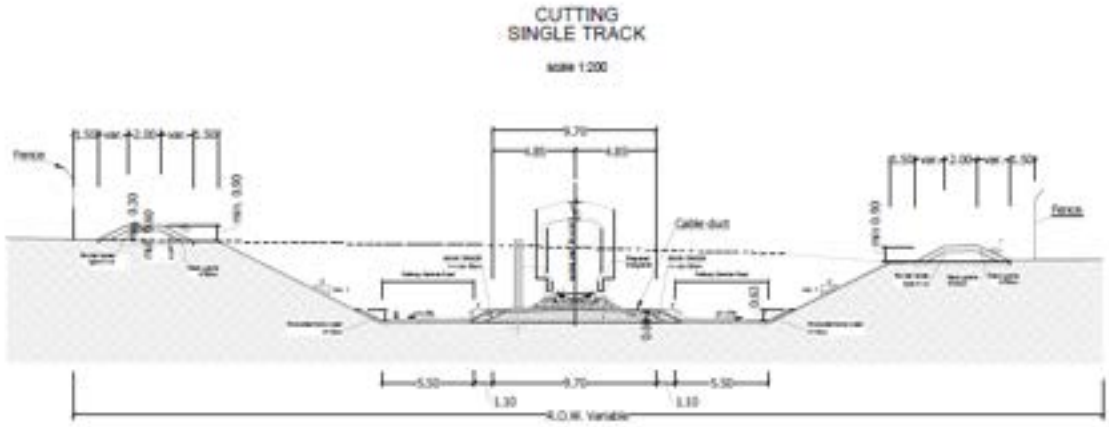


Figure 2-18: Cut cross-section (source: feasibility study)

Roads and Bridges Authority will be responsible for the construction of the cutting and filling earthworks as well as railway line structures at intersections as discussed in section 2.1.4.

2.1.7.2 Use of Resources

According to the feasibility study of the project, earthworks balance for the railway line construction for cut and fill has been conducted. The earthworks balance was based on reliable information of geotechnical characteristics of the design area. The proposed track will require the placement of 5.05 million m^3 embankment filling material of sand, earth, brick and embankment and ballast material.

Railway Tracks consist of steel rails, installed on sleepers (ties) set in ballast, on which the train moves as shown in Figure 2-19.

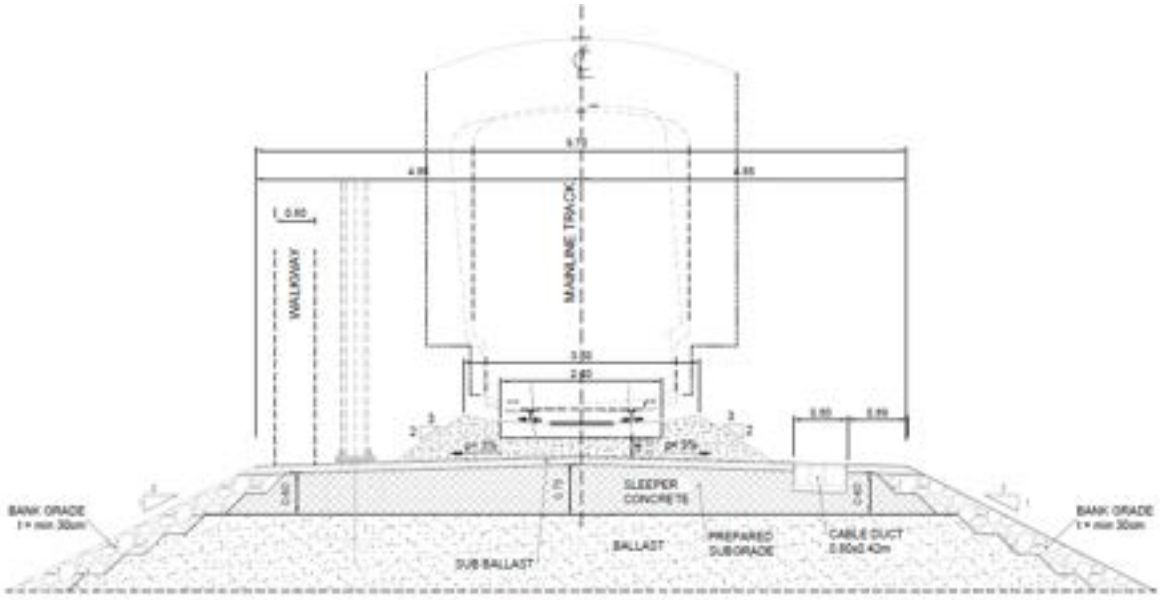


Figure 2-19: Rail structure (source: feasibility study)

Tracks: The rails/tracks are imported and received in Alexandria Port. The rails/tracks will be transported to the project location via freight train in Imbaba-Ittay Elbaroud, where there will be area for assembly and loading of the train to transport the rails/tracks. Impacts on traffic as a result of transporting raw materials are covered in the impacts chapter.

Sleepers/Ties: sleepers or ties are manufactured locally in Egypt. The project will acquire sleepers/ties from the Egyptian Company for Pipes and Cement Products "Siegwart" factory in Helwan City, Cairo. Due to Egypt's expansion in the construction of new railways, Metro and Monorail, Siegwart has been reconstructed to meet the needs of this expansion. The purpose is to avoid relying on imported products and at the same time saving a public company that was suffering from losses. The sleepers are transported using trains to the project site.

Ballast: ballast of basalt gravel will be sourced from quarries and transported by railway. It is estimated that around 2 m^3 per km of ballast will be needed. The project document does not specify the expected source of basalt yet. However, the contractors that will be assigned for the construction of the project will procure ballast from existing licensed quarries using approved permits such as:

- Quarry at km 48 - Oases line
- Quarry at km 66-Oases line

Sand: Sand will be used in the construction of embankments. It will also be used after the cables for signaling are installed, a layer of sand of 15 cm will be placed over the cables as a protection

layer covered by a protection plastic tape. Given the nature of the desert land and near development projects in the project area, sourcing the sand will be locally from licensed quarries.

Water: The water used by workers and in any construction is sourced by daily tanks trucked to the camps. The estimated amount of water needed for construction is around 30,000 m^3 per annum needed for construction and around 8 to 10 m^3/d for workers (drinking, flushing, washing hands, etc.,).

The contractors will be responsible for sourcing the material as locally as possible and will also be responsible for storing and protecting the material against robbery or damage.

Fuel: fuel will be used in generators and construction equipment and machinery, which include the following:

- SUV for construction
- Bus to transport workers
- Truck water tanker
- Excavators
- Generators 120 kW rating
- Compactors
- Tipper truck
- Semi-trailer
- Jaw crusher
- Wheel loader
- Winch truck/cranes

The estimated annual diesel consumption is around 2.5 to 3.5 million liter per year and around 15 thousand liter of gasoline per year[10].

2.1.7.3 Waste Generated

The quantities of waste generated is not yet determined as ENR has not recruited a contractor yet. Waste associated with the project implementation is divided into:

1. Trenching waste from sand and soil. Excavated material, according to the feasibility study of the project, around 40% of the excavated material can be reused for embankment fill. The remaining part of the excavated material that don't have appropriate geotechnical characteristics, will be disposed of in landfills. Also trenching is expected to generate excavated materials to be reused or disposed as well as top soil from RoW clearance
2. Solid wastes such as construction waste/debris, municipal waste, cardboard boxes. Solid wastes will be disposed of in a licensed landfill through certified solid waste contractor per each contractor

[10]Water and fuel Estimate are based on similar railway study and the consultant's experience with similar project in Egypt.

3. Hazardous waste such as paints, oil containers and chemicals. To dispose of hazmat, any hazardous waste generated is collected and transported by a certified hazardous waste contractor, and its records are kept and documented
4. Wastewater, septic tanks will be used on sites since most areas are not connected to a sewage network. A certified contractor is responsible for sludge collection and treatment then final disposal in wastewater network. It is estimated that a worker generates 15-20 liters of wastewater per day (for around 400 workers peak time, the amount of wastewater is estimated to reach 8,000 liter per day).

The contractors will be responsible for handling and disposing of wastes properly and according to their waste management plans.

2.1.7.4 Site Preparation and Access Roads

Site preparation involves various activities carried out by contractors. The contractors create access roads to the alignment location to transport machines, vehicles and machinery. Access roads are created by simple cleaning of the roadbed, leveling and compacting. The raw materials such as ballast and sleepers are transported to the site location as discussed in section 2.1.7.2. Construction activities include ballast laying then installation of concrete sleepers and track laying. Material and equipment are properly stored and managed by the contractors. There are also excavation activities for installing signaling system and preparation of RoW as well as service roads.

2.1.7.5 Work Force

The majority of the work activities will consist of excavation, trenching works, laying cables, construction works installation of new tracks. The contracted workforce will consist of skilled, semiskilled and unskilled labors. Unskilled and semi-skilled labor is generally hired from the local area where the works are occurring. Some of the unskilled labor force is expected to be day-labor; the contractor prepares a local hiring plan, which primarily relies on engagement with the local labor office; additional entities include community liaison desks, or through local NGOs. local advertisements.

At the time of the submission of the report, no contractor had been selected. The number of contracted unskilled and semi-skilled workers estimated for greenfield works and embankment activities and other infrastructural works relevant to 2.1 are estimated to be 400 as per the CATLDP's LMP.

2.1.7.6 Construction Camps and Laydown Areas

The contractors will have movable office spaces along each segment of the line, which will be supplied with a septic tank for sewage. No worker accommodation will be constructed as all workers will be sourced from local communities and neighboring areas. Transportation or transportation allowance can be offered to workers.

Moreover, the contractors will be asked to have an HSE plan that is regularly updated and kept. Any subcontractor who is appointed any role in the project shall wear PPE.

2.1.8 Associated Facilities

According to the World Bank ESF, "Associated Facilities" means facilities or activities that are not funded as part of the project. In order to be considered associated facility (AF), the facility or activity must meet all three criteria, which are:

1. directly and significantly related to the project
2. carried out, or planned to be carried out, contemporaneously with the project
3. necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist.

The WB ESSs are applicable to associated facilities, to the extent that the Borrower has control or influence over such Associated Facilities. Accordingly, whether a project's facility/activity is considered as associated facility is presented in Table 2-4.

Table 2-4: Assessment of facilities/activities based on ESF criteria

Facility/activity	AF criteria	AF criteria fulfillment	Verdict
The Egyptian Company for Pipes and Cement Products "Siegwart" factory that will supply the project with sleepers	directly and significantly related to the project	Yes	Not AF
	carried out, or planned to be carried out, contemporaneously with the project	Yes	
	necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist	No. it would have been constructed even if the project did not exist because of other projects such as Metro and Monorail.	
Fuel storage, maintenance areas, wagon storage sites	directly and significantly related to the project	Yes	Not AF
	carried out, or planned to be carried out, contemporaneously with the project	No. The maintenance areas and wagon storage sites are not specifically made for this project but common areas where trains are maintained.	

	necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist	No. The maintenance activities are undertaken in yards affiliated to ENR distributed to serve the railway network.	
Quarry sites for ballast sourcing	directly and significantly related to the project	Yes	Not AF
	carried out, or planned to be carried out, contemporaneously with the project	Yes	
	necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist	No. The quarries exist naturally long before the project. They are licensed quarries that have been providing material to various construction sites in Egypt.	
Waste disposal sites	directly and significantly related to the project	Yes	Not AF
	carried out, or planned to be carried out, contemporaneously with the project	Yes	
	necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist	No. Solid waste disposal sites exist even if the project doesn't	
Road upgrades of the intersection roads at the same	directly and significantly related to the project	Yes	AF
	carried out, or planned to be carried out,	Yes	

time of the railway construction	contemporaneously with the project		
	necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist	Yes	
Alexandria Port, Dekheila Port and DP6	directly and significantly related to the project	Yes	Not AF
	carried out, or planned to be carried out, contemporaneously with the project	No	
	necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist	No	

As shown from above, the Egyptian Company for Pipes and Cement Products "Siegwart" factory that will supply the project with sleepers is not considered associated facility to the project because it's not exclusive to ENR authority. Quarry sites for ballast sourcing as well as waste disposal sites and ports are not considered associated facilities according to the ESF criteria.

In case there are road upgrades of the intersection roads at the same time of the railway construction, the road upgrades are considered associated facility.

2.1.9 Land Requirements

Based on description of the track and alignment in 2.1.1, it is estimated that around 905,000 m^2 of land plots will need to be expropriated for the proposed alignment as shown in Table 2-5. Owners/users of these lands might be less affected since the expropriation is on the edge of the land and in the RoW of the RRR. Vulnerability element that will need to be examined more carefully once the PAPs are identified, such as the potential experience of an accumulated impact if parcels of their lands were previously expropriated for the construction of the Regional Ring Road alignment. This accumulated impact was discussed during the meetings and group discussions in Beni Salama Local Unit and was confirmed in all discussions to be a potential relevant impact. Upon the completion of the project design stage, the number of project affected

persons (PAPs) will be quantified and accordingly a resettlement plan (RP) will be prepared. However, if there is privately owned land that will be expropriated, procedures will be in compliance with the Egyptian law[11] and ESS5 of the World Bank standards. More information on land requirements is available in the impact assessment chapter and in the CATLDP's resettlement framework (RF).

Table 2-5: Land parcels are subject to potential expropriation

Location from to	Approx. length in km	Approx. width in m	Approximate calculation	Approx. total area in m^2	Approx. total area in feddan
Km 47-52.5	5.5	40	5,500x40	220,000	52
Km 52.5-64	11.5	40	11,500x40	460,000	110
Km 64-68	4	40	4,000x40	160,000	38
2 curves at the northern end of the alignment	1.3 (0.65 km x2)	50	1,300x50	65,000	16
Total	**22.3**			**905,000**	**216**

2.2 Segment 2

Segment 2 pertains to signaling modernization and selected track improvements on the existing Marazeek-Wahat line from its beginning at Marazeek till km 66 near DP6 (Figure 2-20) .

[11] The Ministerial Decree of the Ministry of Water Resources and Irrigation 20/2019 was issued on 19/01/2019 to amend regulations of land acquisition procedures for public interest project (Law10/1990), and to annul the Ministerial Decree of the Ministry of Public Works 319/1990.

Figure 2-20: Segment 2 (subcomponent 2.2) signaling modernization and track upgrade of Marazeeq-Wahat line

2.2.1 Signaling Modernization in Marazeek-Wahat Line

ENR has been developing a modernization investment program to finance improvement of signaling and telecommunications facilities and replacing certain sectors of the tracks in Upper and Lower Egypt. A comprehensive study was undertaken in 2006 to define the strategy and scope for the required modernization. The project includes introducing a modern, Solid State, Electronic Interlocking System (EIS) designed in modular systems to replace the existing mechanical system.

The project covers the following basic elements of the signaling systems:

1. New Electronic Interlocking System (EIS)
2. LED signals in order to give indication for the train driver for movement and stopping, with the following signal aspects: Red, Green, Green Flashing, Yellow, Yellow Flashing
3. Automatic block signaling system. The length of block sections: 800÷1200 m in normal direction
4. Track circuits for train detection
5. Powered point machines, electrically controlled via Interlocking or via Local Operation Unit or, manually, via crank handle
6. Level crossing protection system
7. Assembling and laying of signaling cables and cabling equipment related with all signaling and telecommunication systems
8. New Signaling Towers and related Power Supply System in order to host and supply the signaling equipment
9. SCADA System for controlling and monitoring the Power Supply System
10. Electronic Interlocking Systems
11. Centralized operation by Centralized Traffic Control (CTC)

12. Training of operation and maintenance staff

2.2.1.1 Description of Signaling Activities

Trenching (segment 1&2): the signaling system consist of installing new underground cables along the railway tracks. The process starts by clearing the corridor of any waste and compacting the side roads, if needed, to allow the equipment and safety working conditions for workers. After site clearing, there is excavation, installation of cables and installation of block system and interlocking equipment. Excavation comprises forming a trench of 1.6 meters depth from the top soil and 60 cm width. The trench houses pipes of telecommunication, electrical cables and fiber optics. Excavation is either done manually or by using equipment such as driller. A sand cover of 15 cm covers the pipes and cables then the backfill from the excavated soil follows.

Track upgrades (segment 2): The implementation of the new signaling system requires a good quality of rails and ballast and replacement of old switches with new models which can be remotely controlled by the EIS. The process includes the use of equipment for track renewal to remove the old tracks (rails, sleepers or fasteners). Old tracks (rails, sleepers, etc.) will be removed and loaded on a train of flat cars to ENR storage yards for subsequent storage and selling

2.2.1.2 Workforce

The majority of the work activities will consist of trenching works, laying cables, and railway track upgrades. The contracted workforce will consist of skilled, semiskilled and unskilled labors. Unskilled and semi-skilled labor is generally hired from the local area where the works are occurring. Some of the unskilled labor force is expected to be day-labor through local recruiter agencies or local advertisements.

The estimated contracted workforce for subcomponent 2.2 has been estimated on the basis of previous projects having similar nature, i.e., signaling and track upgrade activities.

Table 2-6 shows the estimated workforce for signaling modernization and track upgrade. Assumptions: Signaling requires approximately 3 workers per km. (12). Track upgrade requires approximately 1 worker per km [13]

Table 2-6: Estimated workforce for signaling modernization and track upgrade

Subcomponent	Length of rail works (km)	Number of workers
2.2 Signaling	66	198
2.2Track upgrade	66	66

[12] based on signaling of 250 km requiring 655 workers reported in RISE LMP
[13] based on track renewal of 760 km requiring 800 workers reported in RISE LMP

2.2.2 Land requirements

According to Marazeek ENR Property Representative (Moawen Amlak), the area consists of desert lands and does not include any crop lands and the number of signalling structures will range from 1-2 signalling towers. The RoW ranges between 10m to 13m. All materials and equipment will be stored in the RoW. According to ENR all the upgrading of the existing track and signalling will be located on the existing RoW.

Activities under this subcomponent are not expected to lead to land acquisition or resettlement.

Refer to the Project's Resettlement Framework for further information about procedures and policies applicable to land management.

2.3 Operation and Maintenance for Segment 1 and 2

2.3.1 Segment 1

According to the marketing study by Italferr for the proposed project, around 1500 tons of dry bulk and 300 Twenty-foot Equivalent units (TEUs) per day per direction are forecasted to be delivered through Bani Salamah - 6th of October line in the opening year. By 2030 the amount could double. The study's forecasts are unconstrained by limits to capacity, which could happen in the high traffic when demand exceeds 1 train/ hour in each direction.

According to Itaferr's final report for the proposed project, locomotives/wagons will be able to undertake a full operation from and to Alexandria Port Authority (APA) and DP6 within a working day. Each train will consist of 50 TEU carried on 25 wagons, with a 90% fill rate. Freight trains will be able to work through the track sections shared with passenger trains (Bani Salamah line and the Coastal line) with minimal delay. Additional infrastructure will be provided on the Bani Salamah line to enable this. Trains can be unloaded and reloaded within 4 hours at APA and DP6.

Simulations in the feasibility study of Italferr show that critical section in 2050 based on traffic forecast will require 35 train per day. Accordingly, there is chance for constructing a double track in the future.

The operation of the proposed project doesn't involve many activities. The signaling system organized the traffic and ensure safe and smooth operation with minimal risks. The operation activities revolve around the following main points[14]:

- Loading and offloading cargo at the ports and loading yards
- Locomotive refueling at the yards affiliated to ENR

[14] The first three points are outside the project boundary and the project have no control on them.

- Locomotive repair and maintenance (such as oil change, mechanical repairs, electrical repairs, painting, welding and fabrication) at yards affiliated to ENR
- Track repair and maintenance (such as ballast refill, vegetation outgrowth clearance, coating track for protection from outwear, lubricating tracks, replacing damaged track sections, realigning misplaced tracks, etc.)

ENR conducts periodic inspection of the railway track. The frequency of inspection depends on the rate of railway operation, it can be daily or monthly. The inspector detects if there are any defects in the track and report back to the maintenance team to take corrective actions.

2.3.2 Segment 1 and 2

The Department of Railway Properties, affiliated to the Central Administration of the Stations, is responsible for monitoring the width of corridor to ensure the right of way of railways are protected. Every segment of the alignment has assigned employees to monitor that there are no one violating the safety distance of at least 9 m. In case of any violation, the employee imposes a fine on the violator and warns him that this land is owned by ENR. This fine has a special receipt called occupation based on violation to document the incident.

2.4 CATLDP implementation timeline

the following Figure 2-21 shows the estimated timeline for implementing the CATLDP with its 2 components.

		CATLDP ImplemenEStion period																													
		Year 0		Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7			
Element	**CAPEX related Tasks**	**Q1**	**Q2**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Greenfield link - Track and Signalling Works (W1)	Procurement of GoE-funded Contractors																														
	Implementation of GoE-funded Works																														
	Procurement of CATLDP ES1 (Integration) Supervision																														
	TD preparation for track and signaling installation																														
	Procurement of WB Contractor W1																														
	Implementation of Works W1																														
Marazik - Wahat (W2)	TD preparation for track and signaling installation																														
	Procurement of WB Contractor W2																														
	Implementation of Works W2																														

Figure 2-21: estimated timeline for implementing the CATLDP

3 LEGAL AND INSTITUTIONAL FRAMEWORK

The legal and institutional framework description that follows is applicable to Component 2.

This ESIA has been developed to meet the requirements of the following:

- Laws, regulations and policies of Egypt pertaining to environmental, health and safety and social impact assessment and risk management
- IBRD's Environments and Social Standards 1 – 10 ("ESS"), dated October 1, 2018
- Good International Industry Practice (GIIP) including the World Bank Group Environmental, Health and Safety General Guidelines ("WBG EHS General Guidelines"), and WBG EHS guidelines for Railways, 2007
- Relevant international conventions and protocols relating to environmental and social issues, as transposed into national legislation

Several national and international laws and policies provide the legal framework for the investigated project. The national framework includes the Egyptian Environmental Law and all its relevant subsequent amendments and executive regulations. The international framework adopted in this study is the World Bank's ESS, the World Bank environmental, health and safety general guidelines and that for railways. These international criteria cover key areas for environmental and social impacts to be adhered to by any of the Foundation's funded projects. This section reviews both national and international policies and their applicability to the project.

Egyptian law provides for environmental compliance procedures and emission limits, which are close to the WBG limits, if not more conservative. The proposed project components must comply with international policies, which stipulate compliance with local laws. If there is a difference between local and WBG standards, the more stringent standards will be adopted.

3.1 National Legal Framework

Annex 1 provides a thorough explanation of the various national laws, regulations and framework related to environmental and social impact assessment studies relevant to this ESIA.

The following paragraphs discuss the legal requirements of the proposed project as the owner of the project under the provisions of these paragraphs in detail and include any relevant standards or specifications, implementing bodies concerned and penalties for infringement and irregularities. The national legal provisions applicable to the proposed project is summarized in Table 3-1.

Table 3-1: The legal framework for the project

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
Pollution of the Environment	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Articles 19, 20, 21, 23, and 33 regarding the performance of environmental impact assessment Articles 22 and 23 regarding the follow-up of the environmental register	Articles 10, 11, 12, 13, 13 bis, 14, 15 and 16 regarding the performance of environmental impact assessment Articles 17 and 18 regarding the follow-up to the environmental register	Appendix 3 of the Executive Regulations of the Law: A Model for the Environmental Register
Hazardous Waste Management	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Articles 29 and 30 regarding hazardous material and waste handling and management		
Waste Management	Law 202 for 2020	Articles 15, 16,20,31, 33,34, 38 for municipal waste and articles 58,60 and 61 for hazardous waste.		
Law 38/1967 (Public Cleanliness Law)	cleanliness law 38/1967 amended by law 31/1976 and its executive regulations			
Air Pollution	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Substances 34 to 39, 42, 43 and 47 bis of the project site, emissions or leaks of air	Articles 34, 35, 36, 37, 38, 41, 44, 45 of the project site and responsibilities,	Appendix 5: Maximum limits of external air pollutants

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
		pollutants, use of engines, dumping or burning of refuse, waste and exhaust of drilling and construction works, noise and internal air quality in order	the permissible limits of air pollutants, exhausts of machinery and engines, open burning and disposal of waste, methods of dealing with waste and exhaust of drilling and construction, permissible noise limits, indoor air quality in order	Appendix 7, Table (3) Maximum noise levels in different areas (rural dwellings, urban dwellings, etc.)
Occupational Health and Safety	Law No. 4/1994 (Environmental Law) Amended by Law No. 9 of 2009	Articles 42, 43, 44, 45, 46 on noise, indoor air quality, temperature and humidity, ventilation and smoking.	Articles 44, 45, 46, 47, 48 on noise, indoor air quality, temperature and humidity, ventilation and smoking respectively	Appendix 7: Permissible limits for indoor and indoor noise levels Appendix 8: Maximum air pollutants within the workplace according to the quality of each industry. Appendix 8, table 4: Quantity of air required to ventilate public areas. Appendix 9: Maximum and

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
				minimum temperature and humidity
	Law No. 137 of 1981 (Labor Law) amended by Decree 12 of 2003			
	Law 203 of 2014 concerning the stimulation of electricity production from renewable energy sources	Articles 10,9,8,7,6,5,4,3,2,1 for the establishment of projects for the construction of electricity from renewable sources of energy.		
Prohibition of GBV (SEA/SH)	Presidential Decree No. 50 of 2014, its amendments in 2017; and recent amendment to law 141/2021 carried out in August 2021 amending including sexploitation.	Some articles of the 58/1937 Penal Law, to increase the penalty for sexual harassment,		
Land Acquisition	Law No. 10 of year 1990 and its amendments by Law No. 187 for the year 2020, Law No. 24 for the year 2018, and Law	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	Ministerial decree 20/2019, new executive regulations for Law No. 10 of 1990 on land acquisition and its amendments,	Provisions on private ownership, right to fair and prompt compensation in the Egyptian Constitution

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
	No. 1 for the year 2015.	expropriation of real estate for the public benefit	serving Law 827 of 1975 on the Egyptian Survey Authority (ESA) and cancelling ministerial decree 319/1990 on the ER for Law No.10 of 1990.	
Public Consultation	Law 4/1994 on Environmental Protection EEAA guidelines related to the Public Consultation	Paragraph 6.4.3.1 Paragraph 6.4.3.2 Paragraph 6.4.3.3 Paragraph 7	Scope of Public Consultation Methodology of Public Consultation Documentation of the Consultation Results Requirement and Scope of the Public Disclosure	
Water resources	Law 48/1982 Regarding the protection of the Nile River and the waterways from pollution Law 147/2021 Regarding the water resources and irrigation	Some Articles in the 147/2021 law regulate the construction near water surface, building of new groundwater wells and the process of closure of groundwater well if needed		

Case	Relevant Law and legislation	Articles applicable to the project	Relevant executive regulations	Standards and specifications provided
Cultural Heritage	Law 3/2010 Antiquities protection law	Articles number 23 and 24 regarding the accidental archaeological findings		
Right of Way	Law 144/2020 on the amendment of some provisions of Law No. 152 of 1980 establishing the Egyptian National Railways Authority ENR.	Article (1) and Article (7)		

3.1.1 Egyptian Law Enforcement Authorities

The staff of Egyptian Environmental Affairs Agency (EEAA) and its branches in the governorates, to be determined by a decision of the Minister of Justice in agreement with the minister concerned with environmental affairs, shall have the status of judicial control officers in proving the crimes committed in violation of the provisions of the law and the decisions executed therefor, Which gives the authority to prove the commission of offenses in violation of the provisions of Law 4/1994 or the decisions issued in implementation thereof.
Traffic Law Enforcement Authority 121/2008 is the traffic police of the Ministry of Interior.

The enforcement authority for Law 93/1962 regarding the discharge of wastewater to the public sewerage system is the Ministry of Housing, in cooperation with the sanitation authorities.

The enforcement authority for Law 48/1982 on the protection of water bodies from pollution is the Ministry of Irrigation.

The Ministerial Decree of the Ministry of Water Resources and Irrigation 20/2019 was issued on 19/01/2019 to amend regulations of land acquisition procedures for public interest project (Law10/1990), and to annul the Ministerial Decree of the Ministry of Public Works 319/1990.

The executive regulation of the Decree includes 14 articles as follows:

Article 1

The Egyptian Survey Authority ESA is the executive entity/authority for land expropriation for public interest projects as per Law 10/1990 and its amendments, Presidential Decree 827/1975 (to establish ESA), and the Presidential Decree of public interest of the project of concern.

Article 2

The ESA is committed/responsible to conduct the field census of assets subject to land expropriation for public interest projects to identify:

1- Borders and description of lands;
2- Census and description of plantations and crops; and
3- Borders and description of buildings, commercial units, buildings, or any other fixed assets on lands.

Article 3

The census survey of buildings and structures to be conducted by a "Census Committee" formulated by a decree issued by the pertinent survey directorate (at governorate level). The Census Committee includes following members:

1- Representative of ESA, head of committee
2- Representative of local municipality, member
3- Other members to be identified as needed

Article 4

The Census Committee starts the field survey after the technical studies/reports are completed. The pertinent survey directorate shall announce date of field surveys at least 15 days before the start of the survey, and to notify apparent owners and right holders of assets about the date of field surveys, as per article 5 in Law 10/1990.

Article 5

The pertinent survey directorate shall notify apparent owners and right holders of assets about the date of field surveys as per article 3 of this executive regulation. Notifications shall be sent via registered official letters to provide guidance to survey directorates about their affected assets. The Committee shall record a memo including names of apparent owners and right holders, addresses of residents, and any other affected persons claiming the use of the same land or assets subject to expropriation. Comments on the findings of the survey shall be also recorded for apparent owners or right holders (names and addresses of residence) who could not be reached during the field survey.

A memo shall be prepared to include all affected assets, names of apparent owners and right holders, addresses of residents to be verified through official real estate records and documents. All members of the Committee and survey team shall sign the prepared census lists and certify the

information included in the lists are correct. If Project Affected Persons PAPs who have attended the field refuse to sign the census list, they have to clarify the reason for that.

Article 6

The pertinent survey directorate shall verify the accuracy of information provided by the Census Committee and review information according to through official real estate records and documents.

Article 7

Compensations shall be valuated through a "Valuation Committee" in each governorate through the Ministry of Water Resources and Irrigation. The Valuation Committee includes the following members:

1- Representative of ESA, head of committee
2- Representative of Ministry of Agriculture, member
3- Representative of Ministry of Housing, Utilities, and Urban Communities; member
4- Representative of Real Estate Tax Directorate at governorate level, member

Members should be first level (b rank) at least, and the committee shall be changed every two years. The Committee might also include any other members to be identified as needed.

Article 8

Amounts of compensations for assets subject to expropriation shall be valuated according to current market value at the time of the issuance of the public interest decree, in addition to 20% of this value.

Article 9

ESA shall inform the owner of the project/the entity requesting land acquisition for its project (ENR) about required compensation amounts to be deposited to a governmental bank account with interest in the name of ESA. Depositing the compensation amounts shall not exceed a month from the date of issuance of the land acquisition decree for the project. The owner/entity requesting expropriation shall notify ESA about the depositing; ESA will then be responsible to issue payment orders for PAPs including payment due date.

Article 10

After depositing the compensation amounts to ESA bank account, pertinent survey directorates shall prepare census lists, as per article 4 of this executive regulation, including building and assets that are surveyed by area, location, description, names of apparent owners or right holders, addresses of residence, and specified valuation of compensation amounts. The survey directorate prepares four copies of census lists that shall be reviewed by the land acquisition office at the

survey directorate, then approved and officially stamped by the head of survey directorate, and finally sent to the pertinent tax authority for the record.

Article 11

In case of partial expropriation of buildings/assets, right holders are entitled to appeal to the authority requesting land expropriation if the remaining part of the affected building/asset will become unusable/un useful within four months after the census lists are disclosed publicly, as per article 9 of Law 10/1990.

Article 12

The Egyptian General Survey Authority is obligated to deposit the forms signed by the stakeholders

stipulated in Article (11) of the aforementioned expropriation law or the ministerial decision issued for expropriation in the event that it is not possible for the concerned parties to sign the forms in the competent land registry office within two years from the date of publishing the public interest decision in the official newspaper,

Otherwise, the decision shall be considered as if it were not for the properties for which the forms or the decision related to them have not been deposited.

Article 13

ESA is responsible to investigate grievances and objections submitted by right holders, either in regard to asset-related information or in regard to ownership conflict. Result of investigation shall be communicated in an officially registered notification within 30 days after the end of periods stipulated in Law10/1990.

Article 14

Survey directorates shall provide pertinent municipalities (governorate or local unit) with a copy of publicly disclosed census lists including assets intersecting with the public interest project to charge project beneficiaries for improvement fees, if applicable.

3.1.2 The Relevant International Treaties Signed by Egypt

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

- International Plant Protection Convention (Rome, 1951)
- African Convention for the Conservation of Nature and Natural Resources (Algeria, 1968)
- UNESCO Convention for the Protection of the World Cultural and Natural Heritage (Paris, 16 November 1972)

- United Nations Convention on Climate Change (New York 1992). The Convention covers measures to control greenhouse gas emissions from various sources, including transportation
- Convention on Biological Diversity (Rio de Janeiro, 1992), covering the conservation of plant and animal species and their habitat, and biological diversity
- Convention on the Protection of the Ozone Layer (Vienna 1985)
- Convention on the Prevention and Control of Occupational Hazards caused by Carcinogenic Substances (Geneva, 1974)
- Convention on the Protection of Workers from Occupational Hazards in the Work Environment due to Air Pollution, Noise and Vibration (Geneva 1977)
- ILO: Basic labor standards to be followed during project implementation. Egypt has been a member of the International Labor Organization (ILO) since 1936 and has signed 64 conventions that regulate labor standards and working conditions. In 1988 Egypt ratified the Occupational Safety and Health Convention of 1979 (No. 152)
- Cultural Heritage: 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
- Consultation, participation and public disclosure: Aarhus regulation promotes transparency of environmental information and involvement of project stakeholders. The consultation identifies and manages any public concern at an early stage. The Regulations include provisions for public disclosure of key project information: such as non-technical summary and environmental impact assessment

3.1.3 Penalties

3.1.3.1 Violations of Law 4/1994 for the Protection of the Environment Amended by Law 9/2009

Chapter 4 (articles 84 to 101) defines the penalties provided for violations of the provisions of the various articles of law.

Article 84: Without prejudice to any more severe punishment provided for in another law, whoever contravenes the provisions of Article (28) of this Law shall be subject to imprisonment and / or fined not less than five thousand pounds and not more than fifty thousand pounds. In all cases, the court shall order the confiscation of seized birds, animals, living organisms, plants and fossils, as well as machinery, weapons, equipment and means of transport used in the commission of the crime.

Article (84): Penalties for violation of the provisions of Articles 22 (Environmental Register), 37 (item A) (open burning of waste), 69 (discharge of untreated waste or liquids) of this law shall be imprisonment for not more than one year and / with a fine of not less than five thousand pounds and not more than one hundred thousand pounds.

Any person who contravenes the provisions of Articles 19 and 23 (environmental declarations for expansions and renewals of an existing establishment) shall be punished by a fine of not less than fifty thousand pounds and not more than one million pounds.

In the event of a return to the offense, the minimum and maximum amount of the fine is doubled, and the maximum period of imprisonment doubled.

In addition to the previous original penalties, there may be penalties for closing the facility, revoking the issued license or suspending the infringing activity.

Article 86: Violation of the provisions of Article 36 (equipment / machinery exceeding permissible air emissions levels) shall be punishable by a fine of not less than 200 pounds and not exceeding 300 pounds. For violations of the provisions of Article 39 of Law 4/1994 and its amendments in Law 9/2009 (Construction and Demolition Activities), the penalty shall be a fine of not less than LE 500 and not more than LE 1000. The court may order a suspension of the license for at least one week and not more than six months. If the offense is returned, the court may revoke the license.

Article 87: Any person who contravenes the provisions of Article 42 by using the loudspeaker with a volume exceeding the permitted levels of sound intensity. He shall be punished by a fine of not less than LE 500 and not more than 2000 LE. The machines and equipment used in the violation shall be confiscated. Violators are subject to the provisions of Articles 35, 37, 40, 43, 44, 45, or 46 to fines not less than 1000 pounds and not more than 20,000 pounds. In the event of a return to the contrary, the fine provided for in the preceding paragraphs shall be doubled.

Article 95: A deliberate violation of the provisions of Law 4/1994 and its amendments in Law 9/2009 shall be punishable by imprisonment for a term not exceeding 10 years if this violation causes permanent disability to an incurable individual. The penalty shall be imprisonment if an offense results in the disability of three or more persons. If the consequences of the offense are the death of a person, the penalty shall be temporary hard labor, and if it results in the death of three or more persons, the penalty shall be permanent hard labor.

3.1.3.2 Violations of relevant articles from law 202/ 2020 for waste management

Chapter 6 (articles 65 to 80) defines the penalties provided for violations of the provisions of the various articles of law.

Article 65: Without prejudice to any severer penalty stipulated in any other law, the acts set forth in the following articles shall be punished with the penalties stipulated therein.

Article (68):

Whoever fails to pay the fees stipulated in Article (34) of this law within fifteen days of being notified personally or in his place of residence to pay, shall be punished with a fine of not less than one thousand pounds and not more than ten thousand pounds. Amount of fee payable.

In the event of recurrence, the fine shall be doubled.

Article 69:

Whoever violates the provisions of Articles (56, 57, 58, 59, 60 first paragraph, and 61) of this law shall be punished by imprisonment for a period of no less than one year and a fine of no less than fifty thousand pounds and not more than one million pounds, or by one of these two penalties.

Article 70:

Whoever violates the provisions of Articles (20 and 63) of this law shall be punished by imprisonment for a period not exceeding one year and a fine of not less than 50,000 pounds and not more than one million pounds, or by one of these two penalties.

Article 71:

A fine of not less than ten thousand pounds and not more than hundred thousand pounds shall be issued to anyone who is found to be:

(A) Throwing or disposing of non-hazardous waste in places or places other than those designated for that purpose

(B) Sorting or treating municipal waste in places other than those designated for that.

(C) Handing over hazardous waste to an unauthorized person or facility.

In the case of recurrence, the penalty is imprisonment or a fine together.

In all cases, the court shall control the confiscation of the means of transport, machinery and equipment used in the commission of the crime, without prejudice to the rights of bona fide third parties, and obligating the convict to dispose of them in an environmentally sound manner at his own expense.

Article 77:

Anyone who commits an act in violation of the provisions of this law shall be punished with imprisonment for a period not exceeding five years, if it results in a person suffering a permanent incurable disability, the penalty shall be imprisonment for a period of no less than five years and not exceeding seven years if the violation results in the injury of three or more persons with this disability, if this act results in the death of a person, the penalty shall be temporary hard labor, and the penalty shall be permanent hard labor if the act results in the death of three or more persons.

Article 78:

The person responsible for the actual management of the legal person who committed one of the crimes stipulated in this law shall be punished with the same penalty if it is proven that he was aware of it, and his breach of the duties imposed on him by the management contributed to the crime.

The legal person shall be jointly liable for the fulfillment of the financial penalties or compensations imposed on him.

Article 79:

The employees of the Agency, whose names and jobs are determined by a decision of the Minister of Justice in agreement with the competent minister, shall have the job of a judicial control officer in proving the crimes that occur in violation of the provisions of this law and the decisions issued in implementation of it.

Article 80:

The competent minister or whomever is delegated may reconcile in the crimes stipulated in Articles Nos. (18, 19, 29, and 71) of this law as follows:

1- Prior to the issuance of a judgment of the person who is final in the case and meets the payment of the violator at the rate of 50 percent of the child fine limit.
2- After the issuance of the ruling after him in the case in return for the violator's fulfillment, but to the maximum fine

Reconciliation results in the expiration of the criminal case and its consequences.

3.1.3.3 Violations of relevant articles from law 137/1981 (Labor Law) amended by Decree 12/2003

Article 237:

Without prejudice to any more severe penalty stipulated in any other law, the penalties provided for in the following articles shall be imposed for the crimes referred to therein.

Article 238:

Whoever violates the provision of the second paragraph of Article (13) of this law shall be punished with a fine of not less than fifty pounds and not more than one hundred pounds, and the fine shall be multiplied by the number of workers in whose respect the crime occurred, and the fine shall be doubled in case of recurrence.

Article 239:

Whoever violates any of the provisions of the first and second paragraphs of Article (15) of this law shall be punished with a fine of not less than two hundred pounds and not more than five thousand pounds.

The minimum fine shall be one thousand pounds when violating any of the provisions of the third paragraph of the article.

Article 240:

Anyone who violates the provisions of the second paragraph of Article (16) of this law shall be punished with a fine of not less than one thousand pounds and not more than five thousand pounds, and the fine shall be multiplied by the number of workers in whose respect the crime occurred. The fine shall be doubled in case of repetition.

Article 241:

Whoever violates any of the provisions of the ministerial decisions implementing Article (26) of this law shall be punished with a fine of not less than fifty pounds and not more than five hundred pounds.

Article 242:

Whoever commits any of the following crimes shall be punished by imprisonment for a period of not less than one month and not exceeding one year and a fine of not less than ten thousand pounds and not more than twenty thousand pounds, or either of these two penalties:

1- Engaging Egyptians to work inside or outside the Arab Republic of Egypt from entities other than those specified in Article (17) of this law without obtaining the license stipulated therein or with a license issued based on incorrect data.
2- Receiving sums of money from the worker in return for joining him to work inside or outside the Arab Republic of Egypt in violation of the provisions of Article (21) of this law or receiving unlawful amounts of the worker's wages or entitlements for his work inside or outside.
3- Violation of the provisions contained in the first paragraph of Article (20) of this law, or submitting incorrect data on agreements or contracts of enrolling Egyptians to work outside the Arab Republic of Egypt, their wages, quality or conditions of work, or any other conditions related to this work to the competent ministry or other competent authorities.

In all cases, it shall be decided to refund the sums that have been received or obtained unlawfully, and the court shall decide - on its own - compensation for the victim of the crime for the damage he sustained as a result of the crime stipulated in Clause (3) of this Article.

Article 243:

Anyone who violates any of the provisions of Article (24) of this law or ministerial decisions issued in implementation thereof shall be punished with a fine of not less than two thousand pounds and not exceeding ten thousand pounds.

Article 244:

In the judgment of conviction in any of the crimes stipulated in the two previous articles, the premises of the facility where the crime was committed shall be closed and the judgment shall be published in two widely circulated daily newspapers at the expense of the convict.

It also requires fines, refunds or compensations to be imposed on the value of the letter of guarantee stipulated in Clause (3) of Article (22) of this law, and the rules established for implementation in excess of that value shall be followed.

Article 245:

Whoever violates any of the provisions of Chapter Two of Part One of Book Two regarding the regulation of the work of foreigners and the ministerial decisions issued in implementation thereof, shall be penalized with a fine of not less than five hundred pounds and not exceeding five thousand pounds.

The fine shall be multiplied by the number of workers in respect of whom the crime occurred, and the fine shall be doubled in case of recurrence.

Article 246:

The employer or his representative on behalf of the establishment who violates the provisions of Article (32) of this law shall be punished with a fine of not less than fifty pounds and not exceeding one hundred pounds.

The fine shall be multiplied by the number of workers in respect of whom the crime occurred, and the fine shall be doubled in case of recurrence.

Article 247:

The employer or his representative on behalf of the establishment shall be punished with a fine of not less than one hundred pounds and not exceeding five hundred pounds if he violates any of the provisions of Articles (33, 35, 37, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48 , 49, 52, 54, 58, 59, 61, 62, 63, 64, 65, 66, 67, 68) of this law and the ministerial decisions implementing it.

The fine shall be multiplied by the number of workers in respect of whom the crime occurred, and the fine shall be doubled in case of recurrence.

Article 248:

The employer or his representative on behalf of the facility who violates any of the provisions of Articles 73 (Second Paragraph), 74, 75, 89, 90, 98, 99, 100, 101, 102 of this law and the ministerial decisions implementing it shall be punished with a fine of no less than five hundred pounds. It shall not exceed one thousand pounds, and the fine shall be multiplied by the number of workers in respect of whom the crime occurred, and the fine shall be doubled in case of recurrence.

Article 249:

The employer or his representative on behalf of the establishment who violates any of the provisions of Articles (76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 91, 92, 93, 94, 95) shall be punished. , 96, 139, 140, 142, 144) of this law and the ministerial decisions implementing it, with a fine of not less than one hundred pounds and not exceeding two hundred pounds.

The fine shall be multiplied by the number of workers in respect of whom the crime occurred, and the fine shall be doubled in case of recurrence.

Article 250:

The employer or his representative on behalf of the facility who violates any of the provisions of Articles (110, 111, 113, 116, 118, 119, 123, 124, 126, 127, 130) of this law and the ministerial decisions implementing it shall be punished with a fine of no less than two hundred pounds. It does not exceed five hundred pounds.

The fine shall be multiplied by the number of workers in respect of whom the crime occurred, and the fine shall be doubled in case of recurrence.

Article 251:

Whoever violates any of the provisions of Articles (135, 136, 137, 138) of this law shall be punished with a fine of not less than five hundred pounds and not exceeding two thousand pounds.

Upon conviction, it is obligatory to close the facility.

Article 252:

Whoever violates any of the provisions of Articles (149, 150, 157) of this law shall be punished with a fine of not less than two hundred pounds and not exceeding five hundred pounds.

Article 253:

Anyone who violates the provision of Article (169) of this law shall be punished with a fine of not less than one thousand pounds and not more than five thousand pounds.

Article 254:

The employer or his representative on behalf of the establishment who violates the provisions of Article (196) of this law shall be punished with a fine of not less than one thousand pounds and not more than two thousand pounds.

The fine shall be multiplied by the number of workers in respect of whom the crime occurred, and the fine shall be doubled in case of recurrence.

Article 255:

The employer or his representative on behalf of the establishment who violates any of the provisions of Articles (197, 198, 200) of this law shall be punished with a fine of not less than five hundred pounds and not exceeding one thousand pounds.

Article 256:

Anyone who violates any of the provisions of Book Five regarding occupational safety and health, securing the work environment, and the decisions issued in implementation thereof, shall be

punished by imprisonment for a period of no less than three months and a fine of no less than one thousand pounds and not more than ten thousand pounds, or one of these two penalties.

The penalties of imprisonment and a fine stipulated in the previous paragraph shall be mandatory if the crime results in death or serious injury.

The fine shall be doubled in case of repetition.

The business owner or his representative on behalf of the facility shall be jointly liable with the convict to pay the financial penalties if the crime occurred as a result of his breach of any of the duties imposed on him by this law.

Article 257:

The employer or his representative on behalf of the facility who violates any of the provisions of Articles (234) and (235) of this law shall be punished with a fine of not less than five hundred pounds and not exceeding one thousand pounds.

The fine shall be doubled in case of repetition.

3.1.3.4 Violations of relevant articles from law No. 50/2014, its amendments in 141/2021

Articles 306 bis (A) and 306 bis (B)

Article 306 bis (A):

Whoever exposes others in a public, private or public place by committing sexual or pornographic insinuations or insinuations, whether by gesture, verbal or deed, by any means, including Wired, wireless, or electronic means of communication, or any other technical means.

The penalty shall be imprisonment for a period of no less than three years and not exceeding five years, and a fine of no less than two hundred thousand pounds and not more than three hundred thousand pounds, or either of these two penalties if the act is repeated by the offender through stalking and tracking the victim.

In the event of recurrence, the minimum and maximum penalties of imprisonment and a fine shall be doubled.

Article 306 bis (B):

It is considered sexual harassment if the crime stipulated in Article 306 bis (a) of this law is committed with the intention of the offender obtaining from the victim a benefit of a sexual nature, and the offender shall be punished with imprisonment for a period of no less than five years. Those who are stipulated in the second paragraph of Article 267 of this law, or who had an occupational, family, or educational authority over the victim, or who exerted any pressure on him that circumstances allow him to exercise against him, or the crime was committed by two or more

persons, or at least one of them was carrying a weapon, the penalty shall be Imprisonment for a period of not less than seven years.

3.1.3.5 Violation of relevant articles from law 3/2010:

Whoever violates provisions of ARTICLE 5 bis, 24 and 36 of this law shall be punished by imprisonment for a period not more than one year and by a mulct not less than 5,000 (five thousand) Egyptian Pounds and not more than 20,000 (twenty thousand) Egyptian Pounds or one of either above-mentioned penalty. In all cases the antiquity, object of the crime, shall be confiscated together with sets, instruments, machinery, and cars used in said crime for the benefit of the Council.

3.1.3.6 Violation of relevant articles from law 48/1982:

Without prejudice to the provisions prescribed in the Penal Code, the violation of the provisions of Articles 2, 3, last paragraph, 4, 5, 7 of this law and the decisions implementing them shall be punished by imprisonment for a period not exceeding one year and a fine of not less than five hundred pounds and not exceeding two thousand pounds, or either of these two penalties. In the event of the violation being repeated, the penalty shall be doubled, and the violator must remove or correct the violating works on the time specified by the Ministry of Irrigation, this is without prejudice to the right of the Ministry to cancel the license.

3.2 International Standards and Guidelines

The proposed risk category is substantial. The aim of following international guidelines and standards is to ensure that all issues are considered and managed in line with international good practice. This section describes the most relevant international guidelines and standards aimed at ensuring that all environmental and social issues are considered and managed in line with good international practices. Where standards and guidelines do not exist in Egyptian law or are more stringent than similar industrial guidelines, compliance will be with the more stringent guidelines.

3.2.1 World Bank Requirements

The project components shall comply with the WB Environmental and Social Framework, Environmental and Social Standards (ESSs) and guidelines. The standards help to ensure the environmental and social soundness and sustainability of investment projects. They also support integration of environmental and social aspects of projects into the decision-making process. In addition, the ESF promotes sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and the environment.

3.2.1.1 World Bank Environmental and Social Standards (ESSs)

The World Bank (WB) has identified 10 environmental and social standards that should be considered in its financed projects. Eight out of these ESSs are considered relevant to the project. These standards are:

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

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

This ESS highlights the importance of managing environmental and social performance, including the ESIA studies.

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 social component due to planned locations of activities near agricultural lands.

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

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 labor, (ii) temporary labor influx, (iii) risk of gender-based violence, and (iv) land acquisition.

3.2.1.1.2 ESS 2: Labor and Working Conditions

This ESS discusses the worker-management relationship. It aims to promote the fair treatment and equal opportunities of workers without any discrimination in order to comply with the national employment and labor laws to protect workers (including vulnerable categories such as children, workers engaged via third party and workers in the supply chain) and to avoid the use of forced labor in order to promote safe working conditions.

Project activities will involve employment of labor. The nature of activities will involve general construction and associated health and safety risks and hazards. The project will involve specialized activities involving generation and handling of hazardous wastes and associated safety

hazards and risks. The scale of the project is expected to require employment of various types of workers including direct, contracted, and primary suppliers.

ESS2 is relevant to this 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 labor working conditions which are all addressed under the developed LMP.

3.2.1.1.3 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.

The project will use only licensed quarries to source sand and gravel that are approved by the ministry of Environment.

Project activities will involve resource consumption including water, electricity etc.

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

3.2.1.1.4 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 must 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.

ESS4 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 especially in agricultural areas, (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

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

This ESS discusses the resettlement techniques (physical or economic) that cannot be avoided and need to be done as a result of any land acquisition or restrictions on land use that occur during the project life cycle. The standard aims to avoid, or minimize if avoidance is not possible, the adverse social and economic impact of land acquisition but providing compensation for loss of assets at

replacement cost and ensure the resettlement activities are implemented with appropriate information, consultation and informed participation of the affected personnel.

ESS5 is relevant to the project. Segment 1 is expected to pass through agricultural development projects and cultivated lands. Hence, the relevant resettlement plan should be prepared.

ESS5 is also relevant to segment 2 in the context of re-possession of the use of land for signaling related works. Systems have been established to help ENR follow procedures to determine the land related issues prior to construction, the impacts associated with land acquisition for construction work and to identify mitigation measures and corrective measures associated with it. Those include master lists with include a description and data for all construction sites, including Main technical Buildings (MTBs), Secondary technical Buildings (STBs) and rooms for level crossings. In cases, where land taking might be needed, land screening forms are applied. Those forms include guidance on when to prepare resettlement plans, depending on responses to six questions.

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

This ESS aims to protect and conserve the biodiversity and adopting the practices that integrate conservation needs and development priorities in order to promote the sustainable management of living natural resources.

Working in close proximity to water bodies such as the sewage pond and the biodiversity existing around it might result in the release of contaminants to the water body and directly affect the welfare of the nearby flora and fauna. Also, the project will be crossing over various agricultural lands and greenhouse farms, as well as Reyah El Nassiri irrigation channel. Therefore, ESS6 is precautionary relevant.

3.2.1.1.7 ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

ESS 7 aims to ensure that the development process maintains full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of indigenous people issue. It aims to establish an on-going relationship based on Informed Consultation and Participation (ICP) with the local communities that may be affected by a project.

Project activities are planned at currently uninhibited land between 6th of October City, Sheikh Zayed City and El Behera governorate. This area is either cultivated or planned for cultivation. The project will also through some cultivated land near Bani Salamah, where there are no indigenous people.

ESS7 is not currently relevant to this project.

3.2.1.1.8 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.

Project activities will involve excavation works for cable trenching along the railway track on shallow depths as well as construction of utilities connections, level crossings, concrete sleepers, electronic signals and interlocking systems, road networks, railway networks, embankment and viaducts, terminals and dry ports, and container handling. Therefore, there are no risks of finding tangible physical cultural heritage. However, the possibility of the "chance finds" will be taken into account.

ESS8 is relevant to the project due to the minor possibility of the "chance finds".

3.2.1.1.9 ESS 9: Financial Intermediaries (FI)

ESS 9 aims to set out guidelines for the FI for the assessment and management of environmental and social risks and impacts resulted from the financed subprojects. It also seeks to promote good environmental and social management practices as well as sound human resources management in the financed subprojects.

Project activities do not include financial intermediaries.

ESS9 is not currently relevant to the project.

3.2.1.1.10 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.

Stakeholder engagement activities will be conducted throughout the lifetime of the project cycle. A Stakeholder Engagement Plan (SEP) was prepared as part of the project preparation and should be carefully applied throughout project implementation.

Consultations have been conducted the with multiple stakeholders. The results of the consultation can be found in the Public Consultation and Engagement chapter of this ESIA.

ESS10 is relevant to the project due to the involvement of various stakeholders and complex implications of the project.

3.2.2 World Bank Environmental, Health and Safety (EHS) Guidelines[15]

The general World Bank Environmental, Health, and Safety Guidelines will be followed to ensure that all the project components and subcomponents comply with the Environmental Health and Safety standards and requirements of the WB during the different phases of the project. In the scope of the project, the entirety of the WB EHS general guidelines are applicable. These guidelines are based on good international industrial practices and the achievable levels of

[15] WBG EHS guidelines. (www.ifc.org/EHSguidelines)

performance in new facilities at reasonable costs through existing technology. It is important to note that if national regulations differ from the levels and measures contained in the environmental health and safety guidance, the project developer is expected to achieve the most stringent.

3.2.3 World Bank Environmental, Health and Safety Guidelines for Railways

The EHS Guidelines for Railways are applicable to activities typically conducted by rail infrastructure operators dedicated to passenger and freight transport. This guideline is organized into two main areas, namely rail operations, covering construction and maintenance of rail infrastructure as well as operation of rolling stock, such as locomotives and rail cars: and, locomotive maintenance activities, including engine services, and other mechanical repair and maintenance of locomotives and railcars.

Table 3-2: Industry-Specific Impacts, Management and Monitoring

Aspect	Activity	Possible Impact	Performance indicators/Monitoring
Environment	Rail Operations	• Habitat alteration and fragmentation • Emissions to air • Fuel management • Wastewater • Waste • Noise	Environmental monitoring programs should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the particular project. Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken.
	Maintenance of Rolling Stock	• Hazardous materials • Wastewater • Waste management	
Occupational Health and Safety	Rail Operations	• Train / worker accidents • Noise and vibration	The working environment should be occupational hazards relevant to the specific project. Monitoring should be designed and

		• Diesel exhaust • Fatigue • Electrical hazards • Electric and magnetic fields	implemented by accredited professionals as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents
	Maintenance of Rolling Stock	Physical, chemical, and biological hazards as well as confined space entry hazards. Physical hazards may be associated with work in proximity to moving equipment. Chemical hazards may include potential exposures to a variety of hazardous materials. 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.	
Community Health and Safety	General Rail Operational Safety	The threat of serious injury or the potential loss of life due to train collisions with other trains or with road vehicles, as well as the possibility of derailment due to these or other operational causes such as excessive speed through a curve, the mechanical failure of tracks such as broken rails, or the mechanical failure of the wheels. Indicators include number of accidents reported.	

	Transport of Dangerous Goods	A potential risk of release to the environment in the event of accidents	
	Level Crossings Safety	Represent high-risk accident locations for railways. On railways with sparse traffic, a flagman may be used to stop all traffic at the crossing and clear the tracks before the approach of a train.	
	Pedestrian Safety	Risks from moving trains, electrical lines and equipment, and hazardous substances.	

3.2.4 World Bank Environmental, Health and Safety Guidelines for Construction Materials Extraction (2007)

The EHS Guidelines for construction material extraction is relevant to construction materials extraction activities such as aggregates, limestone, sand, gravel, and clay, as well as other materials. It addresses stand-alone projects and extraction activities supporting construction, civil works, and cement projects. The construction materials extraction guidelines concepts are also applicable to small extraction operations if need for the project.

3.2.5 World Bank Good Practice Note

3.2.5.1 Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in Investment Project Financing involving Major Civil Works

This Good Practice Note applies to any World Bank Global Practice that involves major civil works. It covers key issues that involve project preparation and implementation as follows:

1. Identification and assessment of risks of SEA/SH during project preparation. The fact that SEA/SH risk assessment is a continuous process and should take place throughout the project life cycle since SEA/SH is a potential occurrence at any moment.
2. Addressing the identified risks through implementation of appropriate SEA/SH risk mitigation and monitoring measures.
3. Responding to any reported GBV allegations, regardless its relevance to the project. following a survivor-centered approach and through having a robust referral system, regardless its relevance to the project. This is achieved through effective monitoring and evaluation mechanisms, which meet the World Bank's requirements on SEA/SH.

3.3 Gap Analysis for Key Egyptian and WB Environmental and Social Standards

This section outlines the key requirements of both the Egyptian legislations and the WB ESSs and the gaps between the requirements of the two entities.

3.3.1 Gap Analysis for ESSs and National Laws

Table 3-3 shows the gaps between the WB ESSs and national laws.

Table 3-3: Gap analysis between ESSs and national laws

ESS	National Laws	Gap
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	• Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law) and its amended Articles of Association amended by Resolution 1095 of 2011, Decree No. 710 of 2012, Decision of the Prime Minister No. 964 of 2015 and Decree No. 618 and 1963 of 2017 • Public cleanliness law 38/1967 amended by law 31/1976 and its executive regulations • Law no. 159 for the year 1953 regulates the cleanliness of fields, roads and streets as well as organization of collection and transport of waste. • 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	• Discrepancies in air quality, water quality and noise limits between the national laws and WB standards • Not addressing all social risks and impacts, including: (i) temporary labor influx, and (ii) risk of gender-based violence. • The lack of a specific role for the official in charge of social aspects

ESS 2: Labor and Working Conditions	• Articles 43 - 45 of Law No. 4/1994 and articles 44 - 47 of its modified Executive Regulations by Decrees No. 1095/2011 and 710/2012 • Labor Law and the Social Insurance and Pensions Law- Decree no. 168/2007 and its amendment no.162/2019, which originally referred to article No.26 of Labor Law 12 of the year 2003 • Laws relating to prohibition of GBV (SEA-SH): Presidential Decree No. 50 of 2014, its amendments in 2017; and recent amendment to law 141/2021 carried out in August 2021 amending some articles of the 58/1937 Penal Law, to increase the penalty for sexual harassment, including sexploitation	No gaps identified
ESS 3: Resource Efficiency and Pollution Prevention and Management	• Law No. 4 of 1994 Amended by Law No. 9 of 2009 (Environment Law) and its amended Articles of Association amended by Resolution 1095 of 2011, Decree No. 710 of 2012, Decision of the Prime Minister No. 964 of 2015 and Decree No. 618 and 1963 of 2017 • Public cleanliness law 38/1967 amended by law 31/1976 and its executive regulations • Law no. 159 for the year 1953 regulates the cleanliness of fields, roads and streets as well as organization of collection and transport of waste. • Law 10/2005 establishing a solid waste collection fee system on the electricity bill • Laws 106/1976 and 101/1996 allow local governments to include the management of construction and demolition waste in the permits required for construction activities	No gaps

	• 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 • Law 202/2020 for waste management.	
ESS4: Community Health and Safety	Law no. 94/2003, Protection of communities Human Rights Laws	Not addressing all social risks and impacts, including: (i) Infrastructure and equipment design and safety, and (ii) safety of services
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	• Egyptian Constitution has preserved the right of private property, Egyptian Constitution (1971, amended in year 1980) and Egyptian Constitution (2014, articles 33 and 35) • Egyptian Civil code 131/1948, Articles 802-805 for private ownership right • Law No. 10 of year 1990 and its amendments by law No. 24 for the year of 2018, and law No. 1 for the year 2015 for property expropriation for public benefit	The Egyptian legislation does not address encroachers and informal settlers. 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 per say, particularly if the impacts are related to agricultural lands that might experience changes in crops and tenancy. However, there are specific timelines for the census survey, receiving complaints that could cover the same objective of the cut-off date • 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 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 value (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 10: Stakeholder Engagement and Information Disclosure	• EEAA EIA guidelines related to the Public Consultation prior to the project construction and implementation	• Although the Environmental Law requires conducting consultations to present the draft EIA results, there are no regulations on committing the project owner to conducting stakeholder engagement activities as an ongoing process nor on disclosing information regarding the environmental and social risks and impacts of the project to project-affected parties as well as to community members, throughout the project life cycle • There are no regulations on committing the project owner in establishing a grievance mechanism

3.3.2 Gap Analysis for Key Egyptian and WB Environmental Quality Limits

This section outlines the key environmental requirements of both the Egyptian Legislations and the World Bank policies and the gaps between both.

3.3.2.1 Air Quality

Table 3-4 shows Ambient Air Quality limits in the Egyptian legislations and WB/IFC standards.

Table 3-4: Ambient Air Quality limits in the Egyptian legislations and WB/IFC standards

	Requirements of Egyptian Legislation				**Requirements of WB/IFC**			
	Outdoor Air Pollutants (in urban and industrial areas) as per Article 34 of law 4/1994 amended by law 9/2009 and Annex 5 of the Executive Regulations amended by Decree 710/2012.				**Ambient Air Quality** as per WB-IFC General EHS Guidelines (Table 1.1.1 [16] [17])			
Exposure Period	1 hr	8 hr	24 hr	1 year	1 hr	8 hr	24 hr	1 year
Carbon monoxide CO (µg/m³)	30 (urban and indus.)	10 (urban and indus.)	N/A	N/A	N/A	N/A	N/A	N/A
Sulphur dioxide SO_2 (µg/m³)	300 (urban) 350 (indus.)	N/A	125 (urban) 150 (indus.)	50 (urban) 60 (indus.)	N/A	N/A	125 (IT-1) 50 (IT-2) 20 (guideline)	N/A
Nitrogen Oxides NOx (µg/m³)	300 (urban) 300 (indus.)	N/A	150 (urban) 150 (indus.)	60 (urban) 80 (indus.)	200 (guideline)	N/A	N/A	40 (guideline)
Particulates PM_{10} (µg/m³)	N/A	N/A	150 (urban) 150 (indus.)	70 (urban) 70 (indus.)	N/A	N/A	150 (IT-1) 100 (IT-2) 75 (IT-3) 50 (guideline)	70 (IT-1) 50 (IT-2) 30 (IT-3) 20 (guideline)

[16] World Health Organization (WHO). Air Quality Guidelines Global Update, 2005.
[17] IT stands for Interim Target, which are the increment values that should be targeted by an organization during the implementation of a project leading to the recommended guideline values.

	Requirements of Egyptian Legislation				Requirements of WB/IFC			
Particulates $PM_{2.5}$ ($\mu g/m^3$)	N/A	N/A	80 (urban) 80 (indus.)	50 (urban) 50 (indus.)	N/A	N/A	75 (IT-1) 50 (IT-2) 37.5 (IT-3) 25 (guideline)	35 (IT-1) 25 (IT-2) 15 (IT-3) 10 (guideline)
Total suspended particles TSP ($\mu g/m^3$)	N/A	N/A	230 (urban) 230 (indus.)	125 (urban) 125 (indus.)	N/A	N/A	N/A	N/A
Ozone O_3 ($\mu g/m^3$)	180 (urban) 180 (indus.)	120 (urban) 120 (indus.)	N/A	N/A	N/A	160 (IT-1) 100 (guideline)	N/A	N/A

In case of any discrepancy between the requirements of Egyptian legislations and the requirements of the WBG, the requirements of the WBG will be applied. However, the Egyptian limits will be applied for the following cases:

- Carbon monoxide limits
- Sulfur dioxide limits for 1 hour, and 1 year
- Nitrogen oxide limits for 24 hours
- Total suspended particulates limits
- Ozone limits for 1 hour

3.3.2.2 Water Quality

Table 3-5 shows Egyptian legislations and WBG standards concerning Water Quality.

Table 3-5 Egyptian legislations and WB/IFC standards concerning Water Quality

Requirements of Egyptian Legislations		**Requirements of WBG**	
Reference	Requirements	Reference	Requirements
Executive Regulations issued by decree 92/2013 of Law 48/1982 (Article 49)	States the standards and specifications of fresh waterways quality to which industrial water can be discharged	ESS1	Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the

Requirements of Egyptian Legislations		Requirements of WBG	
			necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment.
Ministerial Decree No. 44/2000 of law 93/1962	Controlling the discharge of wastewater into the sewage system and public network, and includes the Limits for discharging treated wastewater effluent The decree also states the entity should acquire the wastewater discharge licenses from the concerned authorities during the construction and operation phase	ESS1	Discharges of industrial wastewater, sanitary wastewater into public or private wastewater treatment systems should meet the pretreatment and monitoring requirements of the sewer treatment system into which it discharges.

Table 3-6 Limits for discharge of liquid effluent into sewer system

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

In case of any discrepancy between the requirements of Egyptian legislations and the requirements of the WB/IFC, the requirements of the WB/IFC will be applied, as it is more conservative.

3.3.2.3 Noise

Table 3-7 provides a summary of the Egyptian legislations and WB/IFC standards concerning ambient noise. Moreover,

Table 3-8 provides a comparison between the limits for ambient noise as per Egyptian and WB/IFC requirements, while Table 3-9 provides the same comparison regarding work space. For ambient noise levels, it can be noticed that Egyptian legislations are more precise about the noise levels, as the ambient noise levels are divided according to various area types. Correspondingly, the WB standards only mention the limits for residential and industrial areas. However, for both area types mentioned in the WB standards, the national and WB limits are the same.

Table 3-7 Egyptian legislations and WB/IFC standards concerning Ambient Noise

Requirements of Egyptian Legislations		**Requirements of WBG**	
Reference	Requirements	Reference	Requirements
Law 4/1994 amended by law 9/2009 and its ERs amended by decree 1095/2011 and 710/2012	Maximum allowable limit for ambient noise intensity	ESS1	Limit of noise beyond the property boundary of the facilities.
Law 4/1994 amended by law 9/2009 and its ERs amended by decree 1095/2011 and 710/2012	Maximum noise limits in work environment	WBG General Guidelines: Occupational Health and Safety Table 2.3.1	Limit of noise exposure inside the work environment

The WBG guidelines allow a maximum of 3 dB increase of the background noise level with limits shown in Table 3-8.

Table 3-8 Limits for ambient noise as per Egyptian and WB/IFC requirements

Egyptian Law Permissible noise level			**WBG Permissible noise levels**		
Area type	**Maximum permissible equivalent noise level [dB(A_{eq})]**		**Receptor**	**One-hour L_{Aeq} (dB_A)**	
	Day	Night		Daytime	Night
	7 AM – 10 PM	10 PM – 7 AM		7:00 – 22:00	22:00 – 7:00
Sensitive areas to noise exposure	50	40	Residential	55	45

Egyptian Law Permissible noise level			WBG Permissible noise levels		
Residential suburbs with low traffic flow	55	45	Industrial	70	70
Commercial and administrative areas in city center	60	50			
Residential areas with some workshops, administrative activities, or recreational and entertainment activities overlooking public roads less than 12 meters	65	55			
Areas overlooking public roads more than or equal 12 meters, or industrial areas with light industries	70	60			
Industrial Zone with heavy industries	70	70			

Table 3-9 Limits noise exposure in Work environments as per Egyptian and WB/IFC requirements

Egyptian Law Permissible noise level			WBG Permissible noise level		
Type of place and activity	**Maximum permissible equivalent noise level [dB(A)]**	**Exposure duration**	**Location/ activity**	**Equivalent Level, L_{Aeq}, 8 hrs.**	**Maximum LAmax, fast**
a) Workplaces (workshops and industries) with up to 8-hour shifts	90	8	**Heavy Industry (no demand for oral communication)**	85 dB(A)	110 dB(A)

Egyptian Law Permissible noise level			WBG Permissible noise level		
(licensed before 2014)					
b) Workplaces (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)

In conclusion, the WBG has more stringent regulations regarding the noise levels, while the Egyptian has more classifications. For conservative approach, the WBG regulations will be followed. Ambient noise measurements were taken for different points along the path, can be found in 4.4 and a noise model was developed for the project in Annex 7.

3.4 Institutional Framework

3.4.1 Institutional and Organizational Arrangement of ENR

The Project Management Unit (PMU) created for the implementation of the Railway Improvement and Safety for Egypt (RISE) Project will implement the CATLDP project. ENR through the current PMU for the RISE project will manage the project and will be accountable for the overall compliance with the ESF requirements including for the activities/components financed by the local fund and for activities conducted by other entities. There will be collaboration with other entities, including the Egyptian Survey Authority (ESA) which is the national entity in charge of applying the public interest and eminent domain law in the country. In the meantime, land acquisition procedures will be implemented in coordination with ENR as per the resettlement framework (RF). Moreover, the General Authority for Roads, Bridges (GARB) will be the one in charge to manage the civil works for the creation of the parallel track and the creation of the new alignment, after that ENR will be in charge to manage the signaling related works. The coordination between GARB, ESA and ENR is crucial to ensure that the different activities are conducted as per the ESF requirements. To minimize the project risks, including E&S risks, sub-component 1.2 a will finance setting up an owner's Works Supervisor and Integrator to manage and integrate the design and construction of works financed by the MoT and works financed with loan proceeds in Component 2.

ENR will allocate adequate logistical and financial resources for the EAD staff dedicated for the project to support management of ESHS risks and impacts of the Project including computers, officers, logistical support, etc.

The implementation arrangements are provided in the below Figure 3-1 including the contractual arrangements and reporting lines. The ENR PMU will have the overall responsibility of ensuring the overall project compliance with the National requirements and the ESF. The key roles and responsibilities of the different entity and the proposed E&S staffing requirements are preliminary (not an exhaustive list of responsibilities) provided in the below table. It should be noted that the site-specific E&S instruments should provide more accurate assessment and staffing requirements.

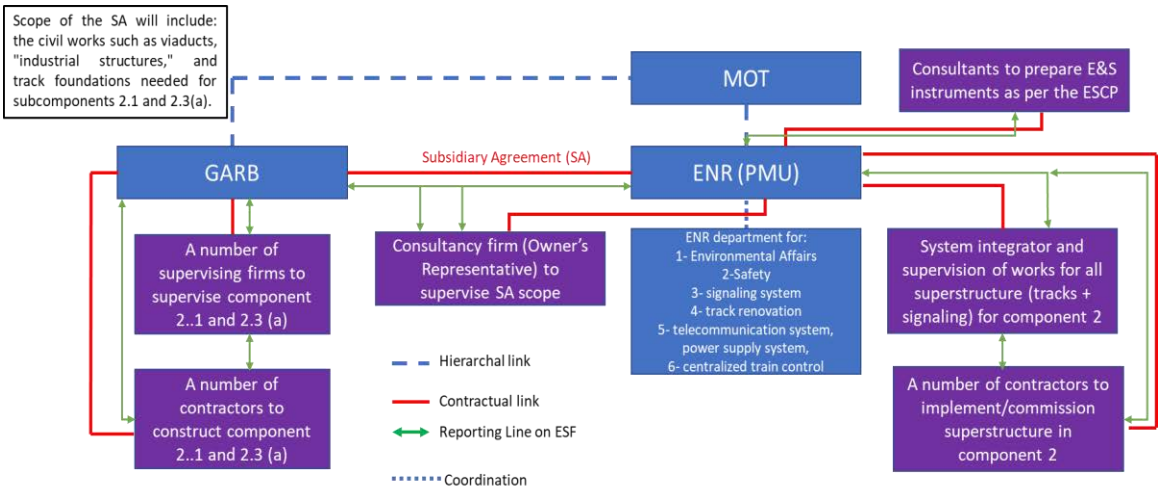


Figure 3-1 the implementation arrangements scheme

Table 3-10 Institutional framework

1. Entity	2. Main roles and responsibilities	3. E&S staffing
4. ENR PMU and ENR Environmental Affairs Department (EAD)	1- Ensure compliance of all the project components with the E&S National and ESF requirements. 2- Provide visible top management involvement in the E&S for all the project works 3- Coordinate between all the relevant departments within ENR 4- Provide clearance to all the E&S documents to be prepared including contractors' construction management plans	5. the PMU within the ENR that is tasked with ESHS management, with support from ENR Environmental affairs department (EAD). The EAD department will have the overall responsibility on the project's E&S requirements and will dedicate to the project: 6. (1) E&S manager for the project,

1. Entity	2. Main roles and responsibilities	3. E&S staffing
	5- Provide clearance for all bidding/contracts of civil works under the component 2 6- Provide clearance for all bidding/contracts of supervision works 7- Prepare the TORs for the technical studies in Component 1 and insure it includes adequate E&S arrangements 8- Prepare TORs for the project's future E&S instruments 9- Implement the procedures listed in section 7.1 10- Ensure collaboration with other entities, including the ESA and GARB. 11- Perform regular monitoring and spot check visits to ensure compliance of the projects. 12- Ensure timely implementation of all the project instruments including ESCP, LMP, ESMF, SEP, ESIA, RF and any other instruments to be prepared. 13- Prepare frequent E&S progress report for all the project 14- Prepare and implement E&S operation management plan for the project during operation	7. (2) environmental specialists, 8. (2) Occupational and health and Safety specialists (OHS), 9. (2) Social specialists.
10. Owner Representative for SA scope. 11. 12. Scope of the SA will include: the civil works such as viaducts,	1- Provide GARB with ENR standards, requirements, obligations, specs including the E&S requirements of the project's E&S instruments including future ones. 2- Ensure compliance of all infrastructure works for subcomponent 2.1 and 2.3 (a)	15. The owner Representative firm for the SA scope will include adequate number of experienced: 16. - Environmental specialist(s)

1. Entity	2. Main roles and responsibilities	3. E&S staffing
"industrial structures," and track foundations needed for subcomponents 2.1 and 2.3(a). 13. 14.	with the E&S National and ESF requirements. 3- Coordinate between ENR PMU/EAD, ESA and GARB for all E&S related aspects to subcomponent 2.1 and 2.3 4- Support in conducting consultation activities and share information with community members, as per the SEP and in collaboration with ENR. 5- Ensure that in case of land taking from land users, encroachers, tenants, or owners no civil works are happening on the ground without preparation and implementation of appropriate resettlement plans by ENR as per the RF 6- Ensure adequate integration of the site-specific E&S instruments including enforcement measures in case of poor performing contractor in the bidding documents /contracts of supervision firms and civil works contractors 7- Perform frequent monitoring and spot check visits to ensure compliance of the projects with the E&S requirements. 8- Ensure timely implementation of the site-specific E&S instruments. 9- Prepare frequent E&S progress report for subcomponent 2.1 and 2.3 (a) 10- Provide technical assistance and on the job training to ENR EAD	17. - social specialist(s), 18. - Occupational and health and Safety specialist(s) (OHS), 19. - Community Liaison Officer(s) (CLOs) 20.

1. Entity	2. Main roles and responsibilities	3. E&S staffing
	as needed to ensure project compliance. 11- assist ENR in investigating any E&S incident and prepare Root cause analysis. 12- Prepare E&S progress report to ENR PMU/EAD	
21. GARB	1- Prepare TORs, bidding/contracts for subcomponent 2.1 and 2.3 (a) and ensure integration of the E&S requirements in accordance with the project E&S instruments 2- Provide visible top management involvement in the E&S for all the project works 3- review and approve supervising firm progress reports 4- Ensure compliance of all the project components with the E&S National and ESF requirements. 5- Implement timely all the project instruments including ESCP, LMP, ESMF, SEP, ESIA, RF and any other instruments to be prepared	22. GARB will dedicate adequate number of focal points for E&S issues
23. Supervising firms including (firms to supervise component 2.1, 2.3 (a) Works Supervisor and integrator supervising firm/s for all superstructure.	1- Prepare all bidding/contracts of civil works under the component 2.1 and 2.3 (a) and ensure adequate integration of the site specific E&S instruments including enforcement measures in case of poor performing contractor 2- review and approve the Contractors' Environmental, Social and Health and Safety Management Plans in accordance with the CATLDP project E&S instruments. 3- Monitoring the implementation of the approved construction Environmental, Social and Health	24. The supervising firms will allocate sufficient resources in accordance with the progress on the ground. At least every supervising firm will include minimum number of environmental, social and OHS specialists to cover their scope in a risk based approach.

1. Entity	2. Main roles and responsibilities	3. E&S staffing
	and Safety Management Plans during the entire duration of the execution of the Contract: 4- in the event of accidents or incidents resulting in serious injury or fatalities, investigate root causes of accidents and oversee implementation of Corrective action plans. 5- ensure that in case of land taking from land users, encroachers, tenants, or owners no civil works are happening on the ground without preparation and implementation of appropriate resettlement plans by ENR as per the RF 6- undertake liaison, from time to time and as necessary, with project stakeholders to identify and discuss any actual or potential ES issues 7- Works Supervisor and integrator to develop and implement an E&S capacity building plan for ENR EAD.	
25. Contractors for all infrastructure and superstructure.	1- prepare and implement the Contractors' Environmental, Social and Health and Safety Management Plans in accordance with the CATLDP project E&S instruments. 2- ensure compliance with the E&S requirements at all the times 3- provide training to workers and ensure adequate communication with the local communities in accordance with the SEP and site-specific E&S instruments 4- monitoring and reporting the project's E&S performance. 26.	27. The supervising firms will allocate sufficient resources in accordance with the progress on the ground. At least every supervising firm will include minimum number of environmental, social and OHS specialists to cover their scope in a risk based approach.

To minimize the project risks, including E&S risks, component 1 will finance hiring a firm to act as the owner's Works Supervisor and Integrator to manage and integrate the design and construction of industrial works financed by the MoT with local counterpart funds and works financed with loan proceeds in Component 2. Under this approach, this firm scope will include ensuring that all the E&S requirements in the project's instruments are well implemented on the ground and integrated in the contractual arrangements with the different contractors. The firm will have its own E&S team to integrate the ESF requirements in the bidding documents and supervise their implementation, while building capacity of ENR and GARB teams to be assigned under the PMU. The conducted assessments clearly revealed that the extended geographical scope of the project and the significance of the impacts are calling for constant presence on the ground for the E&S team of the firm. The firm team will include also an adequate number of community liaison officers (CLO). The firm team should be working closely with the E&S team under the PMU and EAD. In the meantime, logistical and resources challenges that are encountered by EAD need to be addressed by the project to allow for an improved and more motivating working environment for the E&S teams. Also, ENR will retrofit the signed agreement with GARB to include clear articles to follow relevant E&S requirements.

3.4.2 Other Support Entities

3.4.2.1 Ministry of Agriculture

The Agriculture Directorate: In case, that the projects land needed located outside the ENR property, or an estimation of compensation for crops and trees, as well as in the case of farmers' grievance to clarify the bounders of their properties from the ENR property. The Agriculture Associations, is responsible for the following

- Provide a proof of property documentation for lands and crops
- Nominates a member to accompany Compensation Committee during the inventory,
- Estimates the value of crops and trees according to their actual conditions
- Participate with the Compensation Committee during the payment of compensation
- Attend individual consultations related to the resettlement
- Publish PAPs lists in the agriculture association

3.4.2.2 Ministry of Environment

In accordance with Article 19 of Law 4 of 1994, the entity responsible for a particular project must undertake an environmental impact assessment study for any new project and for extensions and renovations of existing projects to assess the impacts of the project on the natural and social environment prior to project implementation. The results of this assessment are submitted for review by the EEAA before other government agencies issue licenses Project execution. The law considers the ESIA as a main condition for licensing and thus the project that does not prepare an ESIA or does not abide by the ESIA conditions could be subjected to its

license revoke (Articles 10, 12 and 19 of the executive regulations of Law 4/1994, modified by the decree 1741/2005.

3.4.2.3 Governorates and Local Governmental Units

are responsible for:

- Participate with the Compensation Committee during the payment of compensation
- Providing the construction permits for new technical buildings
- Coordination between the project and the Traffic and Roads Department to facilitate construction and tunnels along the road and slides

3.4.2.4 General Authority for Roads, Bridges and Land Transport (GARB)

Responsible for permissions related to any road work for the Project (e.g., road cutting). Also, for the construction activities, ENR have signed an agreement with the General Authority for Roads and Bridges (GARB) which has ample experience procuring and implementing major transport infrastructure projects in Egypt. As part of this agreement, ENR will provide technical specifications for the civil works such as viaducts, "industrial structures," and track foundations needed for subcomponents 2.1, 2.3(a), and 2.3(a). The GARB will follow local procurement procedures for contracting these works with local contractors. ENR Subsidiary agreement with GARB will ensure that works executed by GARB will take pace in accordance with the E&S instruments prepared for the project accordance with the ESF, as sated in the project environmental and social commitment plan (ESCP). The PMU will coordinate with the GARB: (i) to select the contractors whose bids match the ENR needs most advantageously; and (ii) to manage the implementation of the contracted scope.

3.4.2.5 Egyptian Survey Authority (ESA)

According to law 10/1990, the Egyptian Survey Authority (ESA) is mandated to do the task of land or property acquisition or resettlement at the central level together with other ministries or local governmental bodies. This executing agency would be responsible for paying the compensation to affected groups through ESA or under its supervision, offering alternative resettlement options, and implementing the resettlement project.

3.4.2.6 Ministry of Water Resources and 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 duplication.

3.4.2.7 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 station.

3.4.2.8 Ministry of Tourism and Antiquities

To check with them all identified antiques area neighboring the line.

3.4.2.9 Ministry of Finance

They are responsible for cooperating with the WB in financing the project.

3.4.2.10 Ministry of Transport

ENR is affiliated to the Ministry of Transport.

3.4.2.11 Egyptian National Railways (ENR)

They are responsible for implementing agency overseeing activities of the Environmental and Social Management Plan.

3.4.2.12 New 6th of October City and New Sphinx City Authorities

The main role of the authorities is supporting the project by providing the various permits required, and infrastructure maps, if needed.

4 ENVIRONMENTAL AND SOCIAL BASELINE

This chapter will identify sensitive receptors to the project and for which assessment of impact will be carried out and mitigation measures defined.

The baseline chapter describes the existing state of environment, economic and social conditions of the project area at the national, regional, and-or local levels, as applicable. Descriptions at the local level are focused on the specific conditions in the area of influence of the railway alignments for segment 1 and 2. Sensitive receptors and associated level of sensitivity, where possible, to project activities will be identified in the context of current situation of element.

Segments 1 and 2 are treated independently for all environmental and social elements with the exception of climate and weather-related data, which is common for both.

Environmental and social baseline elements considered consist of:

1. Site location
2. Climate (common description applicable to segment 1 and 2)
3. Land environment (includes natural land environment, built infrastructure and utilities)
4. Noise and vibration levels
5. Ambient air quality
6. Geology
7. Earthquakes and seismic activity
8. Ground water
9. Water bodies and surfaces (includes natural and artificial surface water bodies)
10. Hydrology
11. Cultural heritage
12. Natural habitat and biodiversity
13. Socio-economic baseline

This chapter will assess the quality and representativeness of available environmental and socio-economic baseline data and make recommendations for further data collection such as site assessments to further identify environmental and social sensitive receptors and associated risks that may arise during project implementation.

The description and assessments are based on field surveys including site visits and field measurements, and review of secondary data including reports developed for this project.

4.1 Project Site Locations

The proposed project consists of two segments.

Segment 1: the construction of 68.5 km greenfield single-track railway Bani Salamah – 6th of October freight railway as well as signaling.

Segment 2: signaling modernization and selected track improvements on the existing Marazeek-Wahat line from its beginning at Marazeek till near DP6. Figure 4-1 shows the two segments of the project.

Figure 4-1: Location of Project on Google Earth

4.2 Climate

Climate of Egypt is mostly hyper-arid, except for coastal areas, which enjoy a slightly milder, arid climate due to the maritime effect of the Mediterranean Sea. Climate of Giza is clear and sunny most of the year. The clearest month of the year is June with only 1 okta, while the cloudiest month is December with about 3 oktas. Dust storms like Elkhamaseen occasionally occur in the spring. Mist and haze commonly occur in the summer and are associated with elevated air pollution levels. Fog is less common in the study area and takes place during the summer and early fall.[18][19]

4.2.1 Temperature

In Giza, climate is essentially continental as the maximum and minimum temperatures vary throughout the year. The warmest month of the year is July when the average mean temperature rises over 38˚C, while January is the coldest month, with an average mean temperature of 8˚C. Meteoblue's temperature chart in Giza of the last 30 years is shown in Figure 4-2.

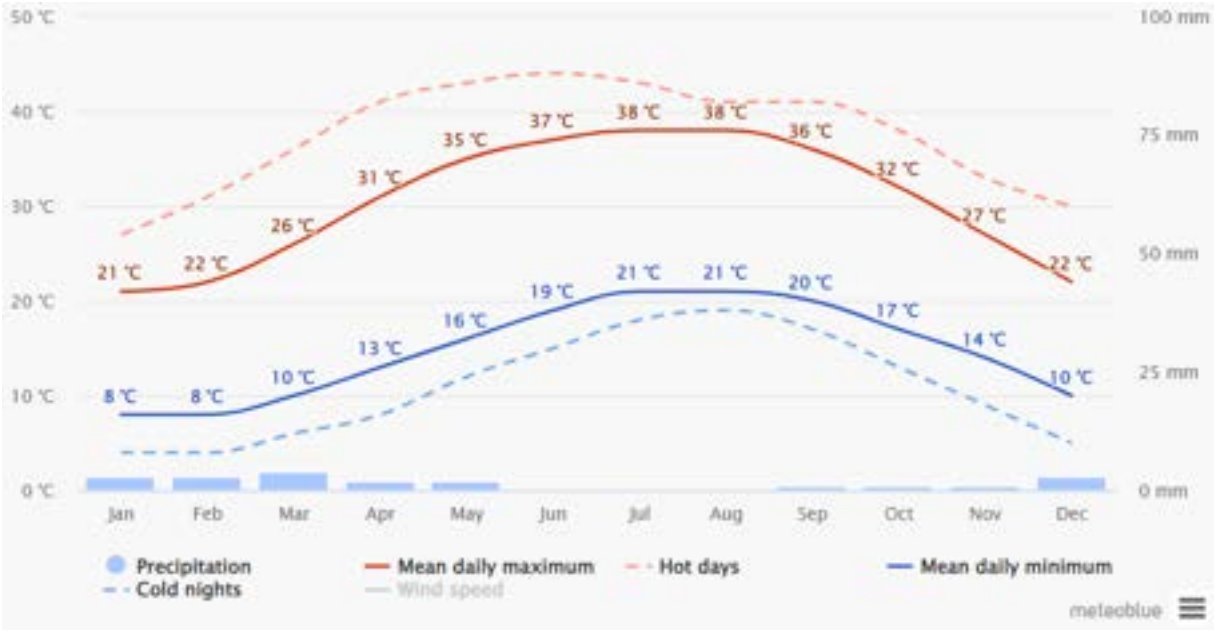


Figure 4-2 Temperature chart of the last 30 years in Giza (Source: Meteoblue)

4.2.2 Humidity

Relative humidity in Giza starts to increase later in the fall and continues to increase during the winter to a maximum of around 65%, then it declines to a minimum of 50% during the spring. The most recent average relative humidity in Giza throughout the year 2019 from the nearest weather station in Cairo is shown in Figure 4-3.

[18] An okta is a unit of measurement used to describe the amount of cloud cover at any given location such as a weather station.
[19] Feasibility Study and Demand Assessment for the Construction of a Freight Railway Line Connecting Manashy/Itay Elbaroud Line with the Logistic Port of KM 66, Giza lahat Line (Prepared in 2021 by Menarail Transport Consultants)

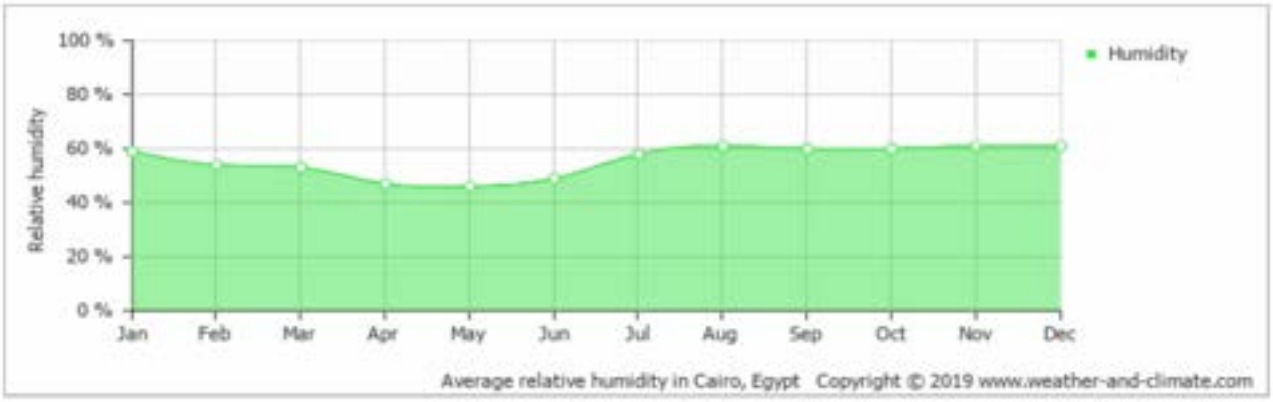


Figure 4-3: Giza relative humidity (Source: Meteoblue)

4.2.3 Rainfall

Precipitation rate in Egypt is generally low throughout the country and is mostly in the form of winter rain. Average rainfall is highest in the Mediterranean coastal belt, ranging from a maximum of 304 mm/year in Rafah, to a minimum of 73 mm in Port Said. South of the narrow coastal belt, rainfall drops to less than 10 mm annually throughout most of the country. One of the major features of rainfall of these regions is its great temporal and spatial variability. Percentage variability is greatest in the hyper-arid provinces.

Precipitation in the project area is very low, with precipitation not exceeding 5 mm in during the rainy season in winter as shown in Figure 4-4.

Figure 4-4: Rain Precipitation in Giza (Source: Meteoblue)

4.2.4 Wind

Wind circulation over Egypt is controlled by three permanent high-pressure belts: the Azores, the Indian subtropical and the South Atlantic subtropical. Besides these, a permanent low-pressure belt, the Doldrums, crosses the African continent in the vicinity of the equator.

Seasonal high and low -pressure systems also alternate over the continental mass, the Red Sea, the Mediterranean and the Arabian Peninsula. Occasionally, very hot dust-laden wind blows in the spring (Elkhamaseen). This wind may have numerous environmental consequences including possible effects on climate, soil formation, ground-water quality and crop growth. Visibility during these storms is reduced substantially (below 1000 m).

The prevailing wind in the project area usually blows from the north, northwest and northeast as shown in Figure 4-5. The numbers in the figure indicate the number of hours per year the wind blows from the indicated direction.

Figure 4-5: Giza wind rose (Source: Meteoblue)

4.3 Land Environment (Segment 1)

Segment 1 crosses through and around agricultural lands, mixed cultivated and desert areas, desert land, built infrastructure, and on the borders of a future city. The different types of land use are

summarized in Figure 4-6 and each land use including proximity to segment for non-intersecting portions is described in more details in subsequent sections.

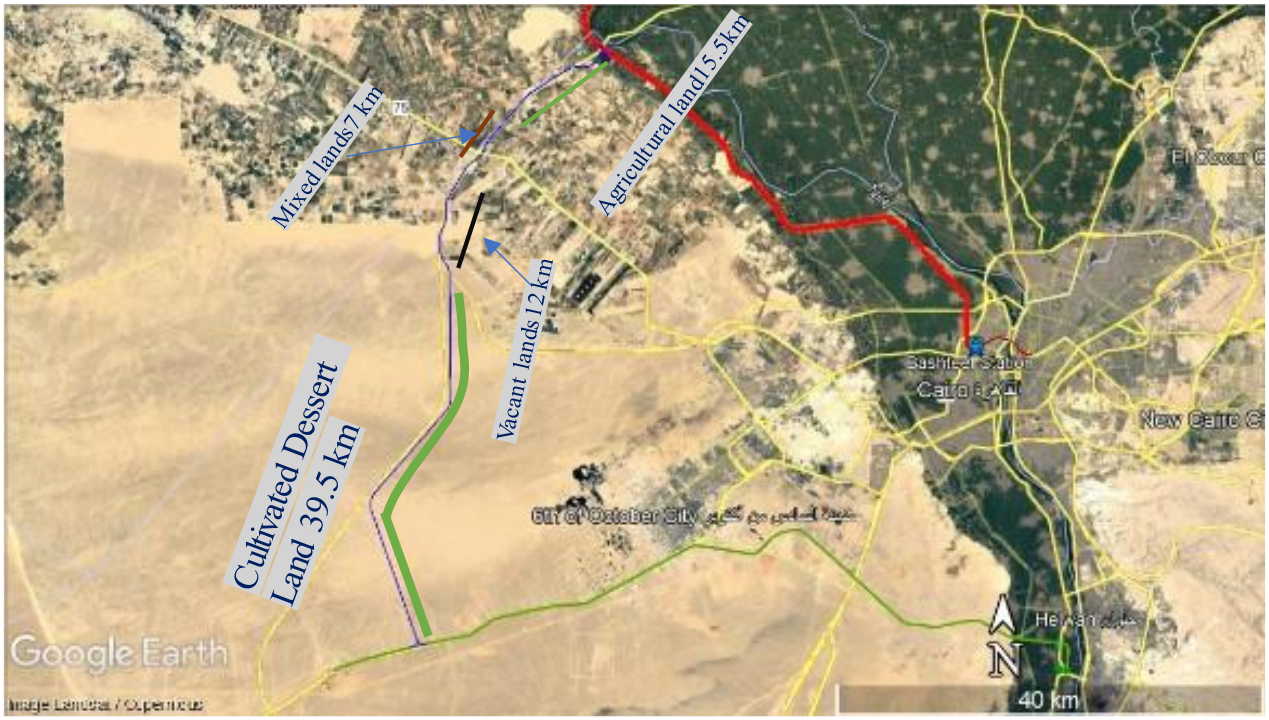


Figure 4-6: Land use across proposed route for segment 1

4.3.1 Agricultural Lands and Cultivated Desert Areas

Subcomponent 2.1 consists of constructing 68.5 km of greenfield single track/line and signaling (Bani Salamah – 6th of October freight railway) starting from Bani Salamah village and crossing through agricultural areas starting at the Bani Salamah station and covering approximately 15.5 km as shown in Figure 4-6. The proposed segment route passes near a mosque and a cemetery. It also crosses through plots of cultivated areas and through some standing structures consisting mainly of residential buildings, warehouses, agriculture greenhouses and a chicken farm (

Figure 4-7). Following 15 km of agricultural lands (corresponding to the branching site to Bani Salamah existing train track), a mixed terrain is encountered consisting of isolated dwellings in desert areas with associated plots of cultivated areas. The purpose of some structure could not be identified (primary residence or storage area) but are associated with the cultivation activities and therefore are expected to be accessible to private citizens. From 39.5 KM to 0 KM the plot of land is Currently Vacant State land planned to be reclaimed in the future. Gannet Masr Project and Mostaqbal Masr Project.as shown Figure 4-8. The agriculture in these areas (especially the cultivated deserts) have structures for irrigation purposes, such as central pivots irrigation systems and greenhouses. More information about the crops is discussed later in 4.13.

Receptor sensitivity identification: Crossing agricultural lands will compromise soil, affect health and safety of nearby community, involve land acquisition for crossing in privately owned

lands with possible implications on livelihood. The noise and vibration levels could cause a disturbance for the rituals in the mosque or the cemetery. Drainage in the agriculture area will be impacted. In addition, the impact of the train will be cumulative to the already existing impacts of the regional ring road. This includes impacts of dust that can potentially damage land usage, dividing lands in half or leaving an orphan land. Security and privacy concerns related to diving lands in half and passing close by residential buildings, possible impacts on businesses.

Sensitive receptors: agricultural lands, owners of lands, community health and safety.

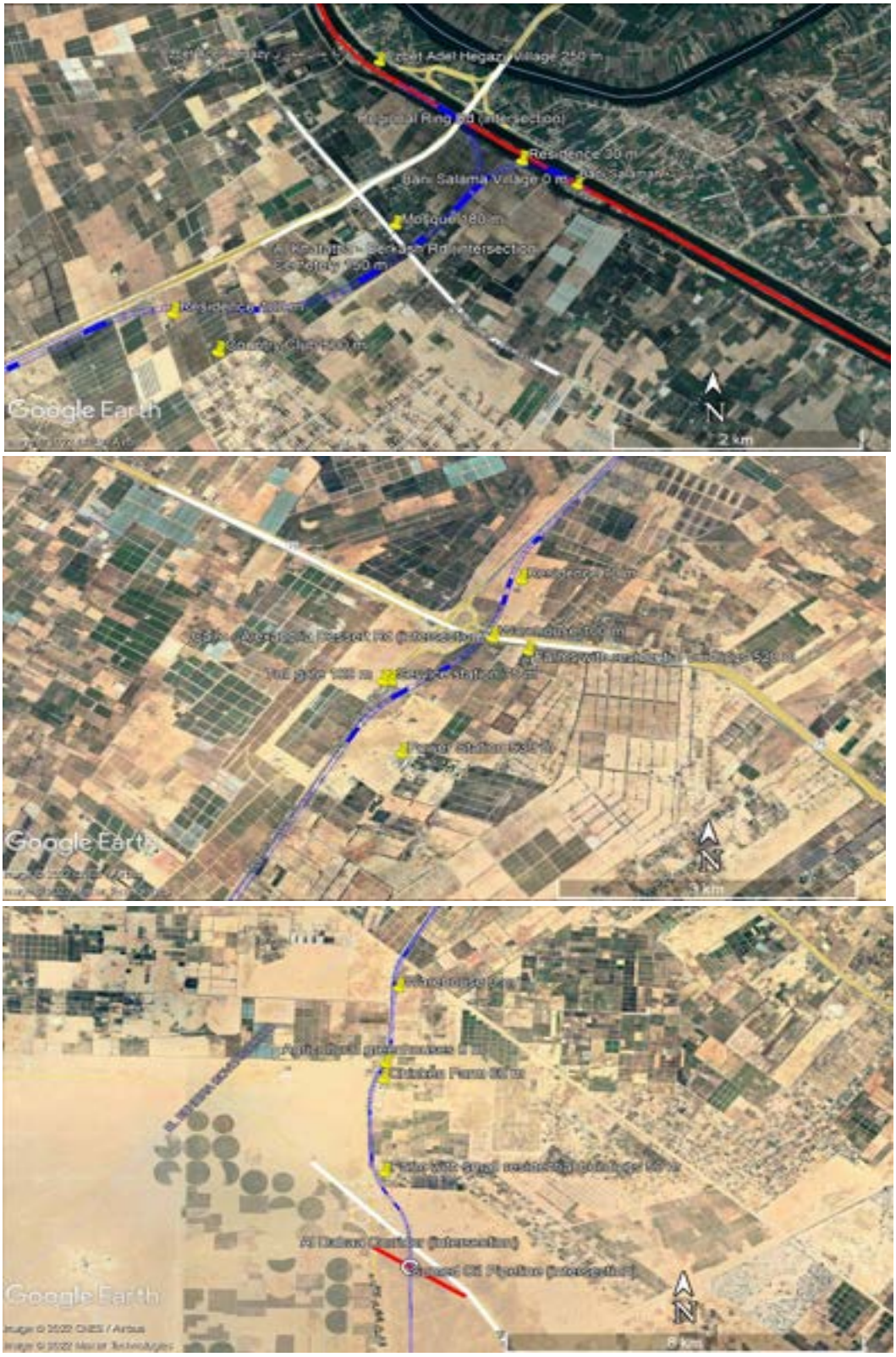


Figure 4-7: Maps of the sensitive receptors in the agricultural land and part of the cultivated desert land

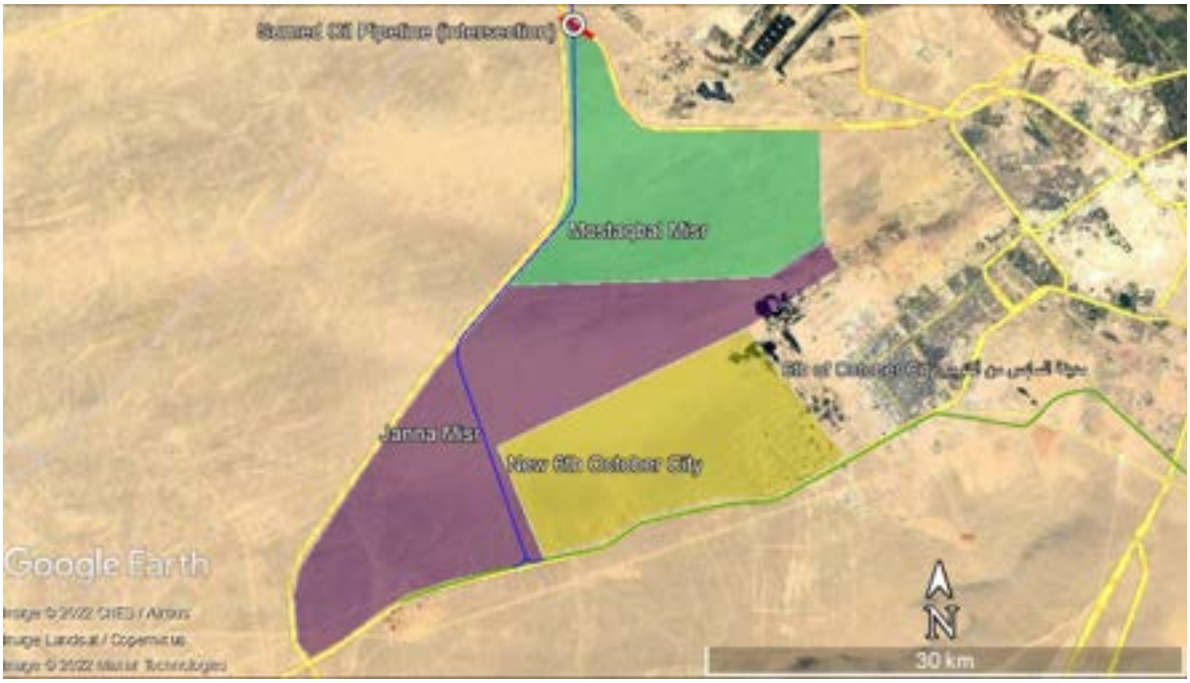


Figure 4-8: Mustaqbal Misr and Gannet Masr projects allocated Lands (cultivated and planned for cultivation)

Structures built for greenhouse farms and agricultural lands nearby Segment 1 were observed as presented in Figure 4-9 and Figure 4-10.

Figure 4-9: Greenhouse farms in proximity to Segment 1

Figure 4-10: Chicken farm in proximity to Segment 1

4.3.2 Built Infrastructure and Utilities

4.3.2.1 Existing infrastructure

4.3.2.1.1 Container Storage- Dry Port Area

Currently, there is an open storage area allocated to loading unloading of containers located 10 meters away from segment 2 and 6 km away from segment 1 of the line as shown in Figure 4-11.

Figure 4-11: Storage-loading-unloading area nearby segment 1 and segment 2 of the line

Receptor sensitivity identification: The project will affect the storage area during construction works. The storage area is near the existing Wahat Line where track upgrades and signaling modernization are planned. The impact is associated with presence of workers and equipment needed for works, which will prompt relocation of the storage area to allow free movement of labor and equipment and avoid potential compromise of the stored shipment containers and other potential occupational hazards; hazards related to compromise of containers carrying hazardous materials (i.e., petroleum); increased OHS hazards if works on segments 1 and 2 were concurrent.

Sensitive receptors identified: workers, integrity of surrounding utilities, surrounding land (soil) environment

4.3.2.1.2 Existing country Gated Farmhouse Compound (Stella Di Mare Farms)

Located 300 m away from the 64.5 to 66 KM (from Wahat) mark on segment one, is a gated farmhouse compound the place is marketed as residential compound according to the sensitivity categorization based on proximity to the railway[20].

Receptor sensitivity identification): impacts related to construction and operation activities including health safety risks and hazards related to accessibility to site, noise and vibration levels, increased air pollutant emissions, exposure to pollution from waste generated etc.

[20] Noise Annoyance through Railway Traffic: a case study, Journal of Environmental Health Science and Engineering, Z. Paulo, 2014, accessed at: https://www.researchgate.net/publication/259629742_Noise_annoyance_through_railway_traffic_-_A_case_study; (0-0.2 km) high sensitivity, (0.2-0.3 km) medium sensitivity, (>0.3 km) low sensitivity

Sensitive receptors: compound maintenance workers, community health and safety, ambient air quality, ambient noise and vibration levels.

4.3.2.1.3 Electricity Substation

Located near the 50+500 KM in segment 1, 500 meters away from the suggested route shown in Figure 4-12.

Figure 4-12: Power station near 50.5 KM in segment 1

Receptor sensitivity identification: The project will affect the substation during construction works. The impact is associated with presence of workers and equipment needed for works, which will prompt caution and coordination to allow free movement of labor and equipment and avoid potential compromise of the power station, electrical lines, and other potential occupational hazards; hazards related to compromise of high voltage lines (i.e., electrical shock).

Sensitive receptors identified: workers, integrity of surrounding utilities, surrounding land (soil) environment

4.3.2.1.4 Existing Roads and Relevant Highways

REGIONAL ROADS

The project will intersect several roads and highway presented in Figure 4-13 and Table 4-1.

Figure 4-13: relevant highways, and local roads to Segment 1

Table 4-1: Summary of highways intersecting with Segment 1

List of roads	Type	Description	No. of lanes in each direction	Speed
Regional roads: Ring Roads and Highways				
El Wahat Road	Highway	The linking axis between Greater Cairo and Western Oasis, very important for transportation of agriculture produce	4	80 km/h
El Dabaa Corridor	Highway	Connect Cairo to El Dabaa city in the northern coast.	4	120 km/h
Cairo - Alexandria Desert Road	Highway	Connects Cairo to Alexandria and serves the internal trade movement between them	4	120 km/h
		Connects the cities east and west of Cairo from Belbeis-Ismailia Agricultural Road in the east, to the El-		

		Dabaa axis in the west.		

Photos of some of those roads are presented in Figure 4-14.

Figure 4-14: roads relevant to Segment 1: (a) El Wahat Road, (b) Regional ring road (c) Al Dabaa corridor, (d) Cairo-Alexandria desert road

LOCAL ROADS

List of roads	Type	Description	No. of lanes in each direction	Speed
Al-Khatatba – Berkash road	2 Local road	Provides access to neighborhood services and facilities	2	40 km/h
Unnamed roads	2 Local roads	Roads that farmers use to reach their lands,	1	40 km/h

Photo of the local road is presented in Figure 4-15.

Figure 4-15: Local roads intersecting with Segment 1: Al-Khatatba – Berkash road

Receptor sensitivity identification: Proximity and intersection of regional roads with project activities will have potential occupational health and safety hazards, safety hazards and traffic-congestion impact on users of infrastructure. Impacts on local community relevant to works intersecting local small roads will relate to congestion, safety hazards near construction site, increased noise and vibration levels and air pollutants emissions.

Sensitive receptors: workers, community health and safety, ambient air quality, ambient noise and vibration levels.

4.3.2.1.5 Sumed Oil Underground Pipeline

The project will intersect with an underground utility: Sumed oil pipeline, which runs across from Ain Sokhna in the Gulf of Suez to Alexandria as shown in Figure 4-16. Details are presented in the project description.

Receptor sensitivity identification: Impacts relate to potential compromise of integrity of the underground pipeline, which will result in severe health and safety hazards to workers, the community, and contamination of surrounding land and air environment, fire and explosion hazards with potential exacerbation of impacts due to concurrent works on the high speed train.

Sensitive receptors: workers, community health and safety, land and air surrounding.

Figure 4-16: Sumed Oil Pipeline intersection

4.4 Noise and Vibration

The Maximum permissible limits of sound intensity are given in the Executive Regulations of Law number 4 of 1994, and the WB EHS both were discussed in Chapter 3 of this report.

Five locations were chosen along segment 1 based on proximity of segment 1 to existing sensitive receptors such as at farms with residential buildings and near road intersections and (points 2 and 3), near the location of the gated farmhouse compound (point 4) and the village and the community near the water channel (point 5) Locations for noise measurements are shown in Figure 4-17 and Table 4-2.

A noise model has been developed to assess impact of operation on noise and vibration levels (Annex 7).

Figure 4-17: Locations for noise measurements underway

Table 4-2 Ambient Air & Noise Locations Coordinats

Point	Measurements	N coordinates	E coordinates
1.	Noise	30° 0'31.41"N	30°41'21.84"E
2.	Noise	30° 8'41.41"N	30°40'33.02"E
3.	Noise	30°13'47.06"N	30°43'5.16"E
4.	Ambient Air and Noise	30°18'1.93"N	30°48'37.09"E
5.	Ambient Air and Noise	30°18'55.98"N	30°50'25.99"E

Results of ambient noise measurements

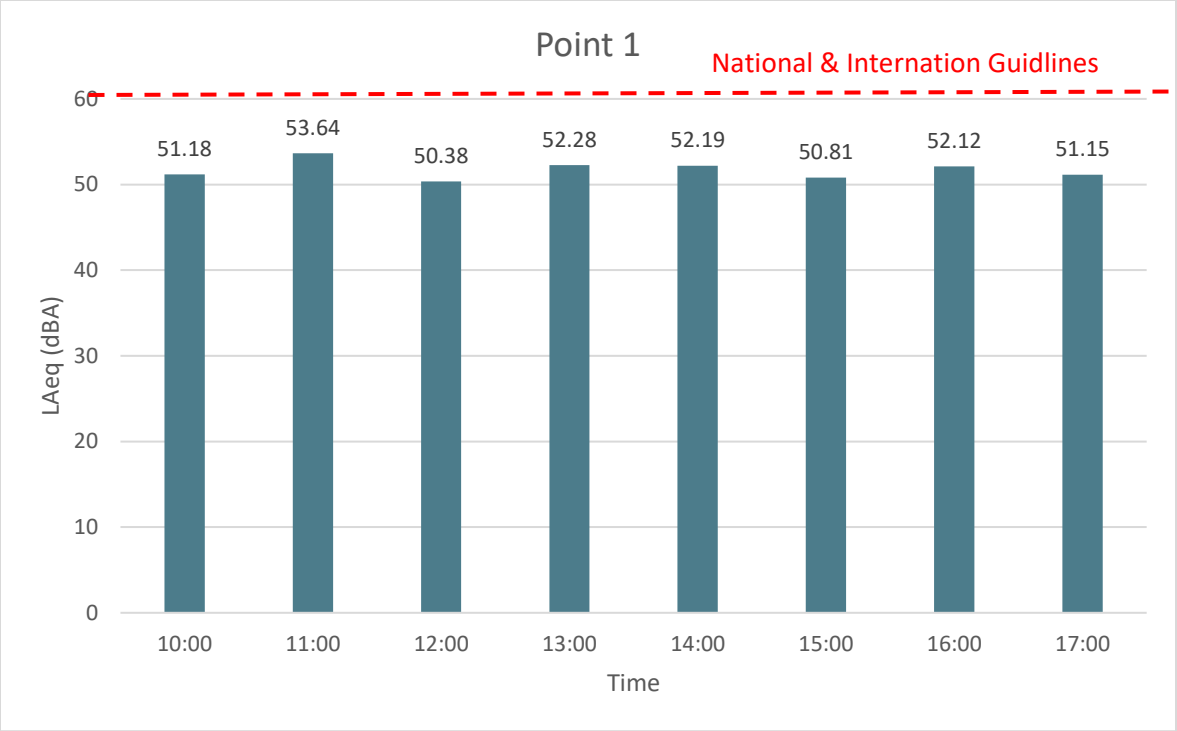


Figure 4-18: Ambient Noise Levels Readings at location 1 for 8 hours average

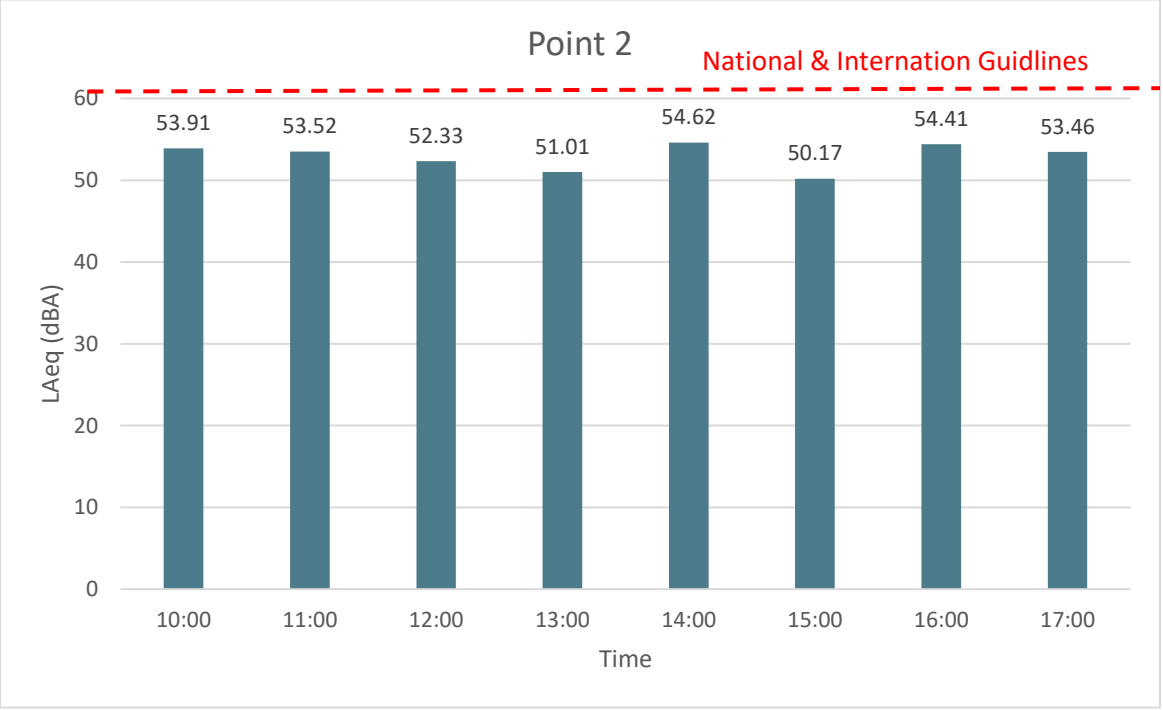


Figure 4-19: Ambient Noise Levels Readings at location 2 for 8 hours average

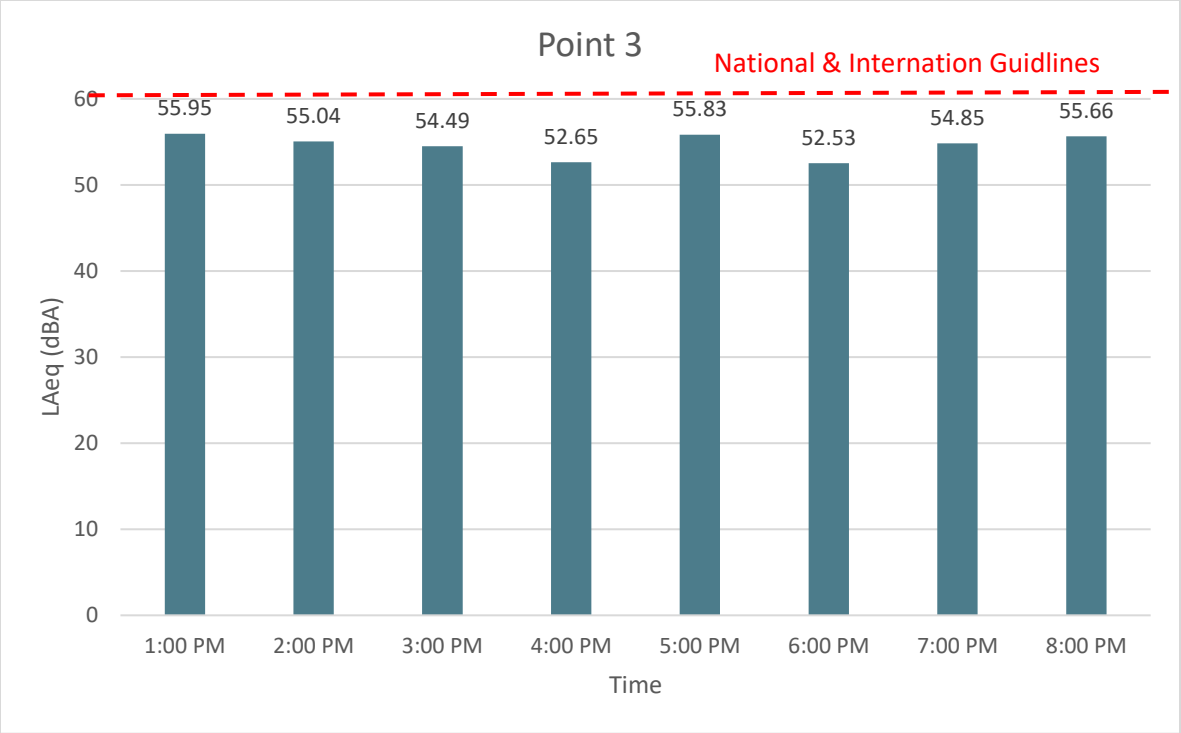


Figure 4-20: Ambient Noise Levels Readings at location 3 for 8 hours average

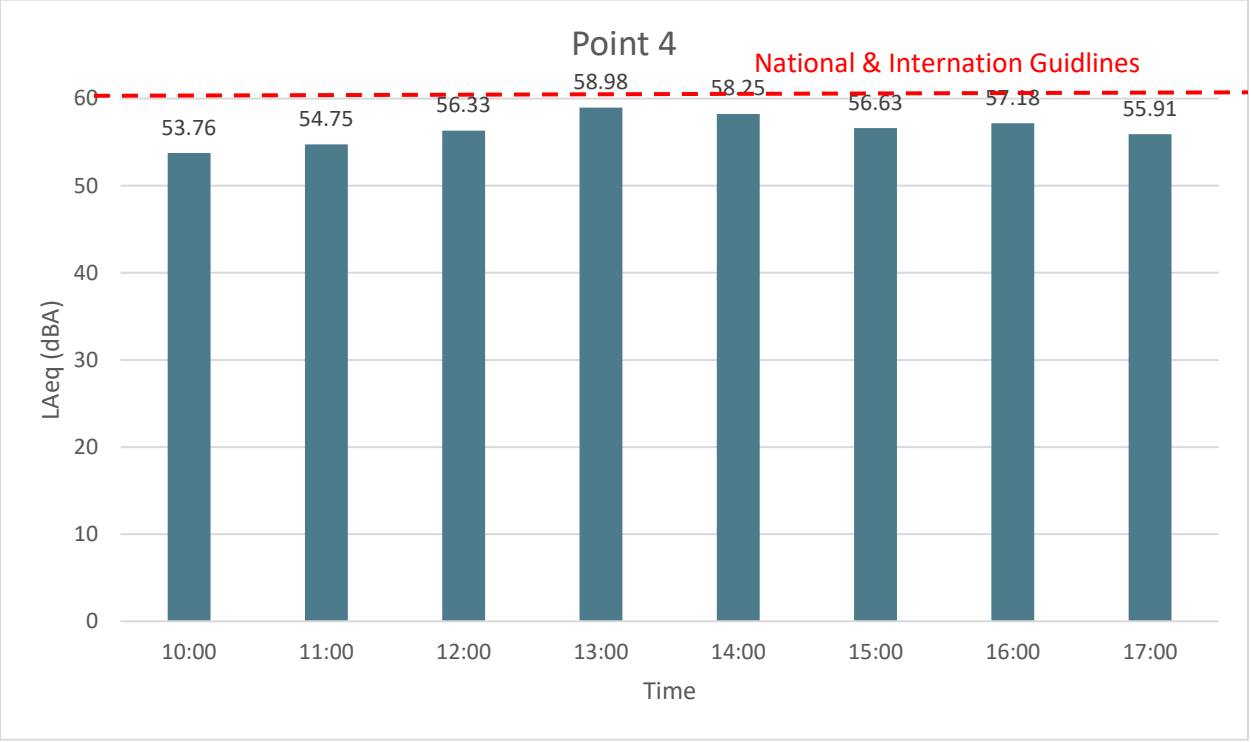


Figure 4-21: Ambient Noise Levels Readings at location 4 for 8 hours average

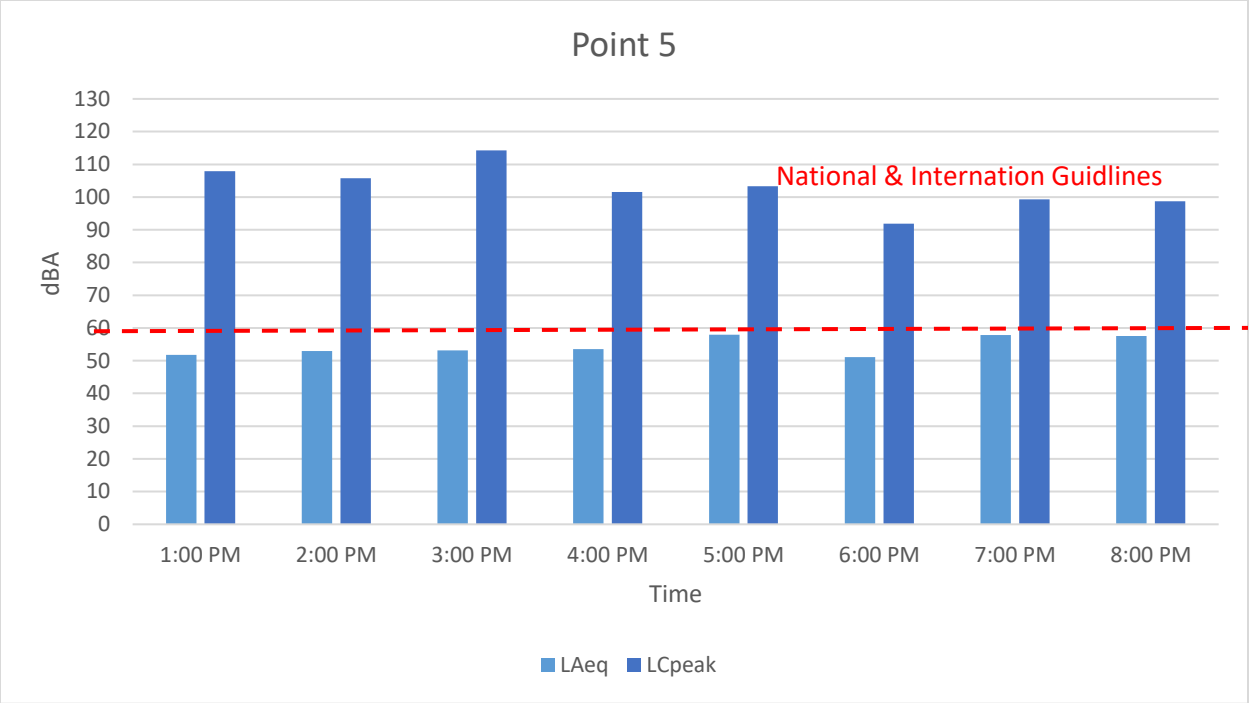


Figure 4-22: Average Equivalent and Maximum Ambient Noise Levels Readings at location 5 for 8 hours

The above table shows the 1-hour average and the 1-hour maximum during the 8-hours monitoring period at location 5 near the existing train station.

As shown from above tables, ambient noise levels for all areas are below permissible limits during the day. Therefore, any construction or operation activities should be limited to daytime to avoid exceedance of limits.

Typical noise and vibration levels from different construction equipment are presented in Table 4-3 presents typical noise levels emitted by common construction equipment at 15 m. These values are obtained from the Roadway Construction Noise Model (RCNM) by the U.S. Federal Highway Administration (FHWA, 2017). It is important to note that there are no national databases in Egypt for construction equipment noise levels.

Table 4-3: Maximum Noise Levels Produced by Construction Equipment (FHWA, 2017)

Equipment	Maximum Noise Level at 15 m (dB)
All Other Equipment > 5 HP	85
Auger Drill Rig	85
Backhoe	80
Bar Bender	80
Blasting	94
Boring Jack Power Unit	80

Chain Saw	85
Compressor (air)	80
Concrete Mixer Truck	85
Concrete Saw	90
Dozer	85
Drill Rig Truck	84
Drum Mixer	80
Excavator	85
Flat Bed Truck	84
Generator	82
Horizontal Boring Hydraulic Jack	80
Jackhammer	85
Man Lift	85
Mounted Impact Hammer (hoe ram)	90
Pavement Scarifier	85
Paver	85
Pickup Truck	55
Pneumatic Tools	85
Roller	85
Scraper	85
Sheers (on backhoe)	85
Tractor	84
Vacuum Excavator (Vac-Truck)	85
Vibrating Hopper	85
Vibratory Concrete Mixer	80
Welder/Torch	73

Furthermore, during the operation phase, it is expected that noise and vibration levels will exceed permissible levels by WBG regulations, especially for sensitive receptors bordering the proposed route. During operation, noise and vibration from the locomotive are expected to affect residences

living within the 200 m radius (according to sensitivity scale). Concerned receptors include isolated residences in agricultural areas, where distances as short as 5 m from the proposed segment were identified. Cumulative impacts of noise in areas bordering the highway can also be anticipated.

Receptor sensitivity identification: Communities in proximity to proposed segment 1, workers using and exposed to construction machinery and operating the locomotive; cumulative impacts associated with noise generated from traffic and other concurrent construction activities, and operation of other non-road transport vehicles intersecting or in proximity to the segment, namely, monorail and the high speed train (once completed).

Sensitive receptors: communities in the agricultural areas, gated farmhouse compound residents; workers.

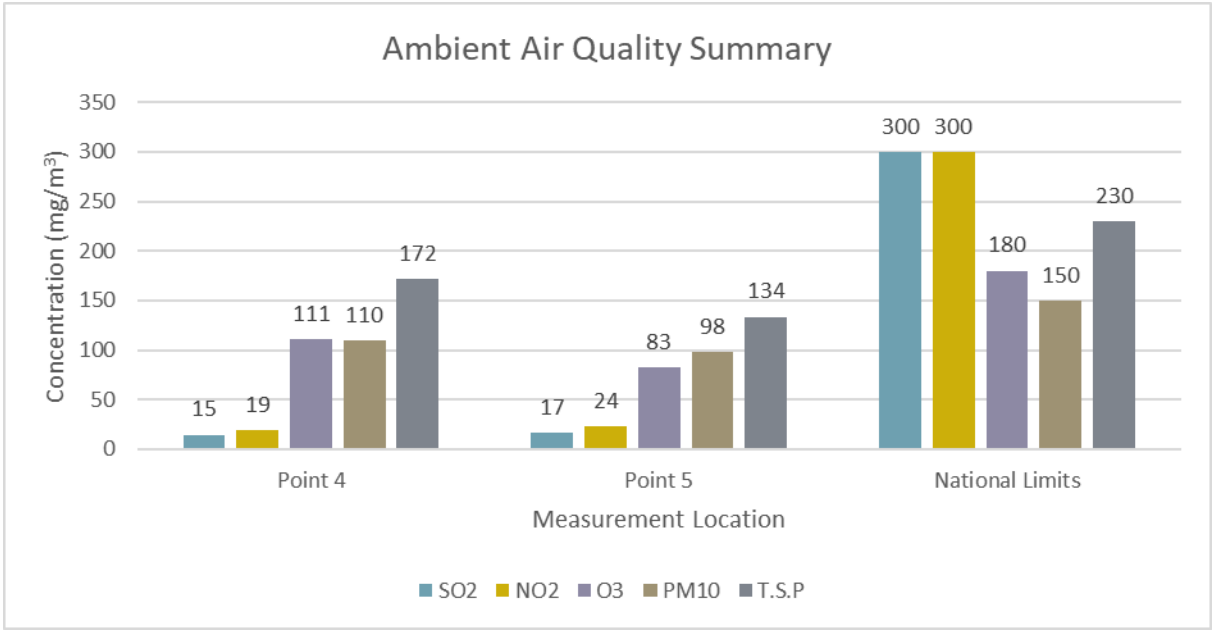
4.5 Air Quality

Air quality at the current site of the project is exhibiting acceptable levels of classic air pollutants in fact the levels are way below the national guidelines. Generation and dispersion of dust from increased vehicle traffic, especially during the daily activities, may reduce visibility, relative to baseline levels, and, together with combustion engine emissions, may affect ambient air quality. Concentration of dust particles, both total suspended particulate and respirable particulate matter and other pollutants from emissions from equipment and machinery used in transportation, the nearby plant operations and emissions from vehicles used to transport passengers also contribute to air pollution. These impacts may affect the human environment and, typically, arise during the ordinary daily activities and, to a much lesser extent, during the operation phase, requiring monitoring and assessment of the natural and man-made air pollutants.

Two locations have been chosen along Segment 1 for air quality measurements. The first location's choice is based on proximity of Segment 1 to Bani Salamah (Point 5) as it includes residences, and places of worship and borders water bodies and major highways with existing sources of air pollution (from vehicles) and expected to be subject to cumulative impacts from emissions during construction. The second location (Point 5) was selected to be close to one of the sensitive receptors, the gated farmhouse compound, which is still close to a road intersection and a mosque. Locations for air quality measurements are shown in Figure 4-23.

Figure 4-23: Locations for air quality measurements underway

Results for ambient air quality



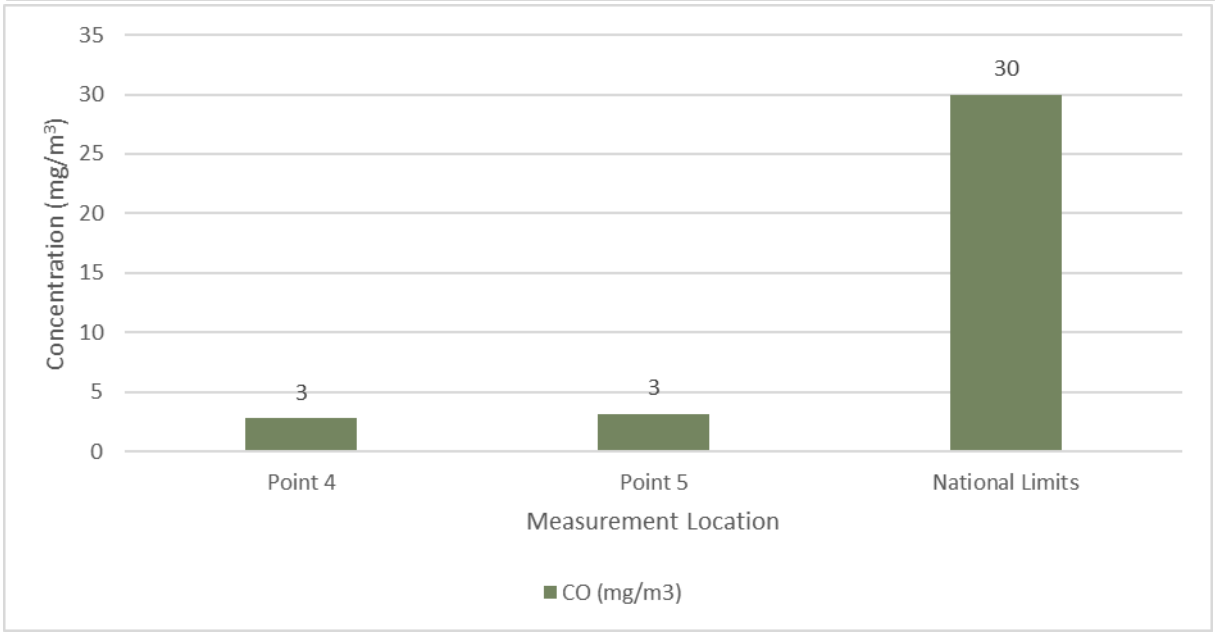


Figure 4-24: Average results of ambient air at both locations (µg/m^3)

As shown from above Figure, ambient air levels of the measured contaminants are below permissible levels. Construction activities may increase those levels close to or beyond permissible levels. The full air quality report is attached in Annex 2. All the recorded results showed compliance with the national and international guidelines for ambient air quality moreover, most of the data recorded were way below the guidelines, which indicates that the ambient air quality in this area are matching with guidelines of emissions released from proposed sources.

During construction the use of construction equipment and trucks will result in emissions of pollutants. The combustion of diesel (used to operate heavy machinery) will contribute to NOx, PM, CO, and unburnt hydrocarbons. Reported emissions for excavators operated with diesel consist of non-methane hydrocarbons, which were dominated by alkanes, formaldehyde (among other aldehydes) and benzene (among the BTEX group- benzene, toluene, ethylbenzene, and xylene)[21]. The exhaust also revealed particle phase pollutants consisting of polycyclic aromatic hydrocarbons including phenanthrene, fluoranthene, and naphthalene. Emissions concentrations were highly dependent on operating conditions and type of control system of the equipment (diesel oxidation catalysts -DOC and selective catalytic reduction). The objective of the present analysis is to identify key pollutants to be anticipated and is meant to serve for indicative purposes.

During operation typical emissions of locomotives combusting diesel consist of particulate matter, $PM_{2.5}$ in particular, NOx, CO, and hydrocarbons. Main receptors will be those closest to the segment. Reported emissions[22] associated with locomotives are presented in Table 4-4: Average air pollutant emissions.

Table 4-4: Average air pollutant emissions from diesel operated locomotives

Pollutant	**Operating conditions**	
	Idle (315 rpm; fuel consumption = 0.4 L per min.	Notch 8 (900 rpm); fuel consumption = 10 L per min.
PM (< 2.5 µm)	43.4 ± 6.84 mg/m3	239.0 ± 26.88 mg/m3
NOx	147 ± 19.46 ppm	1137 ± 64.97 ppm
CO	94 ± 44.23 ppm	389 ± 86.60 ppm
Hydrocarbons	4.3 ± 0.02 ppm	7.6 ± 0.13 ppm

In addition to being a health threat, NOx and volatile organic compounds (hydrocarbons) are precursors to photochemical O_3 both a pollutant and a greenhouse gas. Unburnt hydrocarbons also undergo subsequent reactions resulting in the formation of secondary particles with further implications on air quality and climate change.

[21] Jung, S., Kim, S., Lim, Y., Lee, J., Chung, T., Hong, H., Mun, S., Lee, S., Jang, W. and Lim, J. (2020). Emission Characteristics of Hazardous Air Pollutants from Construction Equipment. *Aerosol Air Qual. Res.* 20: 2012–2024. https://doi.org/10.4209/aaqr.2020.04.0131

22 Kim, Min-Kyeong et al. "A Study on Characteristic Emission Factors of Exhaust Gas from Diesel Locomotives." International journal of environmental research and public health vol. 17,11 3788. 27 May. 2020, doi:10.3390/ijerph17113788.

Health hazards associated with O_3, NOx, CO, and PM, volatile organic compounds, polycyclic aromatic hydrocarbons and formaldehyde are well documented[23]. Benzene and PAHs are known carcinogens and formaldehyde is associated with attention disorder, memory loss among others. Other hazards include cardiovascular disease, lung cancer and asthma.

Receptor sensitivity identification: Communities in proximity to proposed segment 1, workers using and exposed to construction machinery and operating the locomotive; cumulative impacts associated with emissions from traffic and other concurrent construction activities, and operation of other non-road transport vehicles intersecting or in proximity to the segment, namely, monorail and the high speed train (once completed).

Sensitive receptors: communities in the agricultural areas, residential conglomerates (Bani Salamah village); workers.

Once the route is optimized an air dispersion model should be developed for areas close to the final route.

4.6 Geology

The study area is covered by a relatively thick succession of Pliocene (155 m thick) and Quaternary sediments (48 m thick) exposed at many natural outcrops and quarries. The Pliocene rocks are widely distributed in the study area. They are present as a long narrow belt parallel to the Nile River on its western bank, and they unconformably overlie the Upper Eocene, Oligocene, and Miocene deposits.[24]

4.7 Earthquakes and Seismic Activity

6th of October city lies in low seismic activity zone with magnitude less than 5 as shown in Figure 4-25.

[23] Jung, S., Kim, S., Lim, Y., Lee, J., Chung, T., Hong, H., Mun, S., Lee, S., Jang, W. and Lim, J. (2020). Emission Characteristics of Hazardous Air Pollutants from Construction Equipment. *Aerosol Air Qual. Res.* 20: 2012–2024. https://doi.org/10.4209/aaqr.2020.04.0131 and references therein

[24] Feasibility Study and Demand Assessment for the Construction of a Freight Railway Line Connecting Manashy/Itay Elbaroud Line with the Logistic Port of KM 66, Giza lahat Line (Prepared in 2021 by Menarail Transport Consultants)

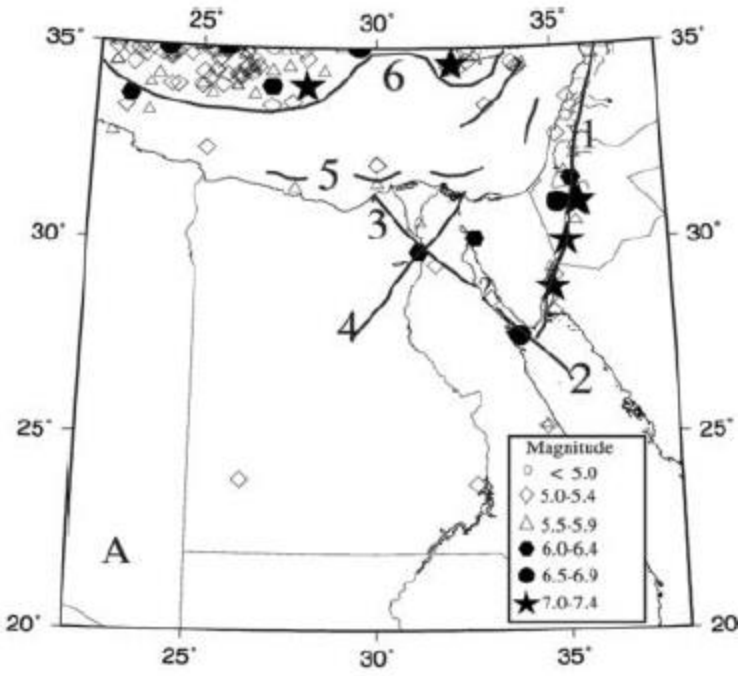


Figure 4-25: Seismic magnitude in Egypt

No anticipated risks of seismic activity on either segment 1 or 2.

4.8 Ground Water

The main aquifer in the eastern part of the study area is the Nile (Quaternary) Aquifer. The Quaternary aquifer is divided into two hydrogeological units, the Holocene aquitard in the upper unit and the Pleistocene aquifer in the lower unit.

The system of the Pleistocene aquifer consists of sand and gravel with clay lenses, which are covered by a clay cap of the semi-perennial Holocene aquitard and an impermeable Pliocene aquiclude. The Depth of the Quaternary aquifer in Giza ranges between 100-150 m and declines gradually towards the Nile Valley's borders at the east and west

The western part of the study area (shown in Figure 4-26) is likely underlain by the Moghra aquifer which consists of Lower Miocene fluviatile and fluviomarine coarse sand and gravel of the Moghra Formation. This system is west of the Cairo-Alexandria Desert Road and covers a vast area of the Western Desert between the Nile Delta and the Qattara Depression.[25]

[25] Feasibility Study and Demand Assessment for the Construction of a Freight Railway Line Connecting Manashy/Itay Elbaroud Line with the Logistic Port of KM 66, Giza lahat Line (Prepared in 2021 by Menarail Transport Consultants)

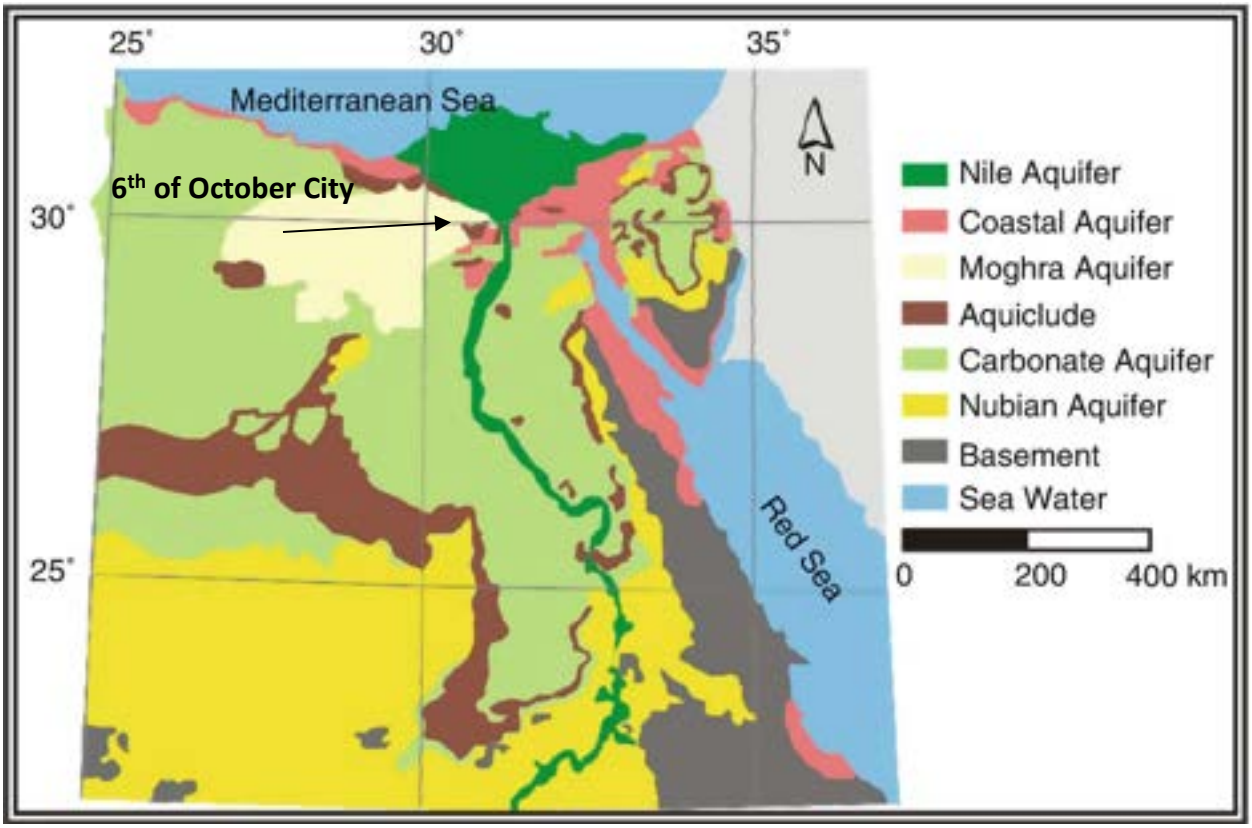


Figure 4-26: Groundwater aquifers in Egypt

Potential risks associated to excavation works and installation of viaducts in the km 66-69 of segment 1.

4.9 Water Bodies

4.9.1 Water Channels

Segment 1 will cross over Reyah El Nassiri channel via 2 viaducts to connect at two points to the existing track as shown in Figure 4-27 and Figure 4-28.

Figure 4-27: Segment 1 over crossing Reyah El Nassiri irrigation canal at two junction points (circled)

Figure 4-28: Reyah El Nassiri Channel crossing to link Itay Al Baroud-Bashteel line to the Bani Salamah-6th of October line

Reyah El Nassiri is an old, lined irrigation channel, averaging about 45 m in width and has average depth 2-5 m. Based on visual observations made during the site visit, the water in this channel is mainly used for irrigation purposes as shown in Figure 4-29.

Figure 4-29: The Irrigation Canal at the Beginning of Segment 1

Other irrigation channels are too far away to be impacted by any of the project activities and as such have been scoped out of the assessment.

4.10 Hydrology

The hydrological study carried out by the Research and Studies Center of Civil Engineering (RSCCE)[26] identified six catchment valleys and numerous spillways that intersect with the proposed alignment. Out of the five alternatives which the study had been commissioned to study, the proposed alignment was found to intersect with the least number of spillways and catchments, according to RSCCE. RSCCE also identified the necessary protective measures to protect the route from floods such as pipes and artificial ponds. According to RSCCE, the culvert model shown in Table 4-5 has been proposed for the alignment.[27]

Regarding the climate change impact, the hydrological study has overestimated the maximum flowrate of the storms by 15% to account for the continued rainfall for extended periods of time or more intense storms which both are two of the expected impacts of the climate change. This a more conservative approach regarding this point as suggested by a recent study at Tanta University.[28] The study expected no to very little change in rainfall patterns in the area of interest for this project.

[26] Research and Studies Center of Civil Engineering (RSCCE) – Faculty of Engineering, Cairo University (November 2018) Hydrological Assessment for the West Cairo Railway Bypass Project

[27] Feasibility Study and Demand Assessment for the Construction of a Freight Railway Line Connecting Manashy/Itay Elbaroud Line with the Logistic Port of KM 66, Giza lahat Line (Prepared in 2021 by Menarail Transport Consultants)

[28] Climate change effects on annual rainfall characteristics in Egypt - Twenty-First International Water Technology Conference, IWTC21, Port Said, 28-30 June 2018 – (Full text)

Table 4-5: Proposed flood protection works for the alignment

Catchment	Km	Model	No. of Pipes	Pipe Diameter (m)	Bank Level (m)	Ground Level (m)	Culvert Bed Level (m)	Culvert Length (m)
1	0+060	M1	1	1.5	202.9	200.5	199.2	30
2	1+870	M1	1	1.5	202	196	195.5	50
3	4+250	M1	1	1.5	180.3	177.1	176.6	30
4	6+400	M2	2	1.5	160.98	159.78	157.28	30
5	14+100	M1	1	1.5	122.96	120.06	119.26	30
6	27+750	Water Pond (75 m× 75 m× 3 m)						
7	36+500	M1	1	1.5	120.41	116.81	116.31	33
8	38+160	M2	2	1.5	113.41	103.4	102.9	74

The watershed basins (red outlines) and the flood paths (blue) can be seen in Figure 4-30.

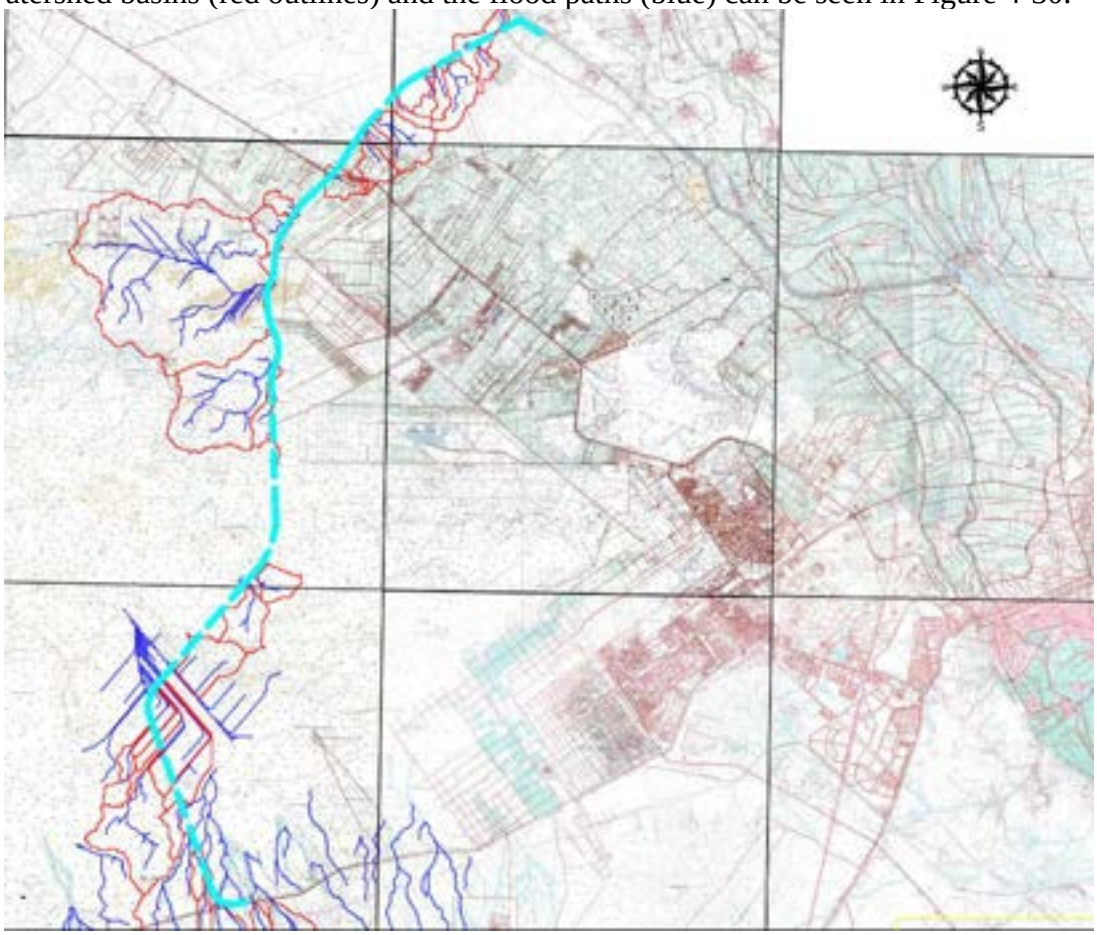


Figure 4-30: Watershed basins (red outlines) and streams (blue)

The protection of the route from floods will be through culverts described in Table 4-5 and from impacts of direct rainfall will be through the geotextile methods described in the design section of the project description.

4.11 Cultural Heritage

The route in segment 1 passes very close to a cemetery (150 m) and a mosque (180 m) between 66 KM and 67 KM as shown in Figure 4-31

Figure 4-31: Cemetery (top) and mosque (not shown) near segment 1

According to the sensitivity categorization based on proximity to the railway[29], the preliminary sensitivity has been assessed and resulted in high sensitivity.

Receptor sensitivity identification): impacts related to construction and operation activities including health safety risks and hazards related to accessibility to site, noise and vibration levels, increased air pollutant emissions, exposure to pollution from waste generated etc. The project will affect the peace and quiet needed for the mourners and the worshippers at the

[29] Noise Annoyance through Railway Traffic: a case study, Journal of Environmental Health Science and Engineering, Z. Paulo, 2014, accessed at: https://www.researchgate.net/publication/259629742_Noise_annoyance_through_railway_traffic_-_A_case_study; (0-0.2 km) high sensitivity, (0.2-0.3 km) medium sensitivity, (>0.3 km) low sensitivity

cemetery and the mosque. The project will also impact the integrity of some of the cemetery's building in case the buildings were not in a good condition before the start of the project.

Sensitive receptors identified: workers, integrity of surrounding utilities, surrounding land (soil) environment

4.12 Natural Habitat and Biodiversity

This section includes a description of the ecology study. The ecological survey has been done to establish the baseline ecological conditions of the study area, to assess the potential ecological impacts of the proposed project upon ecology, to develop adequate and feasible mitigation measures to keep residual ecological impacts with acceptable limits, and also to develop ecological monitoring parameters. This section of report presents ecological baseline of the area.
Both a desktop study and on-ground survey were conducted, for botanical and fauna habitat values.

- **Desktop study**: A review of previously collated information relevant to the area was conducted
- **Botanical Survey and Fauna Habitat Assessment**: Information on the local vegetation was recorded as the area was observed over.

The information collected included the extent of native vegetation, brief descriptions of the community structure as well as detailed lists of plant species found within the communities. A fauna habitat assessment was conducted in conjunction with the vegetation surveys, by visual inspection of the range of habitat types present.

The ecological survey has been done the ecological study has been done along 20 km around project area to establish the baseline ecological conditions of the study area, to assess the potential ecological impacts of the proposed project upon ecology, to develop adequate and feasible mitigation measures to keep residual ecological impacts with acceptable limits, and also to develop ecological monitoring parameters.

4.12.1 Natural Habitat

4.12.1.1 Terrestrial Biological Environment (Flora and Fauna)

Terrestrial Flora and Vegetation

Taxonomic nomenclature is according to Täckholm (1974), updated by Boulos (1995, 1999, 2000, 2002, 2005). Close observation and desk study according to Zaharan, & Willis, (1992) Zahran and Willis, (2009), Zahran, (2009) and Abd El-Ghani (2011) reveals that species as shown in Table 4-6 and Figure 4-32.

Table 4-6: List of flora distributed in project area

Plant species

Aerva javanica	*Heliotropium digynum*
Agathophora alopecroides	*Lycium shawii*
Anabasis setifera	*Matthiola livida*
Artemisia monosperma	*Mesembranthemum forsskalei*
Astragalus spinosa	*Neurada procumbens*
Calotropis procera	*Noaea mucronata*
Centaurea aegyptiaca	*Ochradenus baccatus*
Convolvulus lanatus	*Pancratium sickenbergeri*
Cornulaca monacantha	*Panicum turgidum*
Cynodon dactylon	*Phragmites australis*
Deverra tortuosa	*Pituranthas turtuosus*
Deverra triradiate	*Pluchea dioscoridis*
Echinops spinosus	*Reseda sp.*
Ephedra alata	*Retama raetam*
Erodium pulverulentum	*Stipagrostis ciliata*
Fagonia arabica	*Thymelaea hirsuta*
Fagonia glutinosa	*Thymus capitatus*
Farsetia aegyptia	*Zilla spinosa*
Haloxylon salicornicum	*Zygophyllum coccineum*
Halocnem um strobilaceum	*Zygophyllum simplex*

Figure 4-32: vegetation cover in project area

Field surveys show that no significant habitats or species were found in the surveyed area. No rare or threatened species were found or are recorded in this area. Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. No protected flora, expected to be impacted by the construction and operation phases of the project. However, the majority of these are common species and not of significant ecological value.

4.12.1.2 Fauna

Reptiles

About 34 species of reptiles are known from this area (Habitat Diversity, EEAA-NBU, 1993). However, not all of them are known to occur in the project area as shown in Table 4-7.

Table 4-7: List of reptiles distributed in project area

Species	Conservation Status
Lizards	
Ptyodactylus guttatus	Stable
Mesalina guttulata guttulata	Stable
Mabuya quinquetaeniata	Stable

Leptotyphlos cairi	Not listed
Eryx Jaculus Jaculus	Not listed
Psammophis schokari schokari	Not listed
Trapelus flavimaculatus	Stable
Trapelus pallida	Not listed
Certopodion scaber	Not listed
Hemidactylus turcicus	Increasing
Ptyodactylus hasselquistii	Stable
Stenodactylus sthenodactylus	Stable
Tarentola annularis	Stable
Tropiocolotes steudneri	Stable
Acanthodactylus boskianus	Stable
Acanthodactylus scutellatus	Stable
Chalcides ocellatus	Stable
Mesalina rubropunctata	Stable
Sphenops sepsoides	Stable
Scincus scincus	Stable
Chamaeleo chamaeleon	Stable
Snakes	
Coluber rogersi	Not listed
Psammophis schokari	Least Concern
Malpolon moilensis	Stable
Spalerosophis diadema	Stable
Telescopus dhara	Least Concern
Cerastes cerastes	Stable
Cerastes vipera	Stable
Echis carinatus	Stable

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*

Amphibians

Amphibian species in the region are few. They include the Square-marked Toad, *Bufo regularis*, and Green Toad *Bufo viridis*. These are a typical freshwater species but can withstand being outside of water for several days. The frogs include the Marsh Frog *Rana ridibunda* and Mascarene Frog *Ptychadena mascareniensis* are particularly well adapted to life in water bodies with dense waterside vegetation as shown in Table 4-8.

Table 4-8: List of Amphibians distributed in project area

Species	Conservation Status
Bufo regularis	Stable
Bufo viridis	Least Concern
Ptychadena mascareniensis	Least Concern
Rana ridibunda	Least Concern

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*

Birds

Common breeding birds of the Nile Valley and Delta include 66 species. At least 14 of these are known to breed outside that habitat (Habitat Diversity, EEAA-NBU, 1993). The Nile Valley and Delta with their abundance of water and food available for birds provide an important, relative, easy and safe route for trans-Saharan, palearctic migration. Huge numbers of individuals of many species utilize this route during both spring and autumn migrations. The region also provides wintering habitats for large populations of many palearctic migratory species. However, that the noticed bird's species in the project area are the domestic birds (hens, ducks, turkeys, chicks … etc.) reared usually by the inhabitants as shown in Table 4-9.

Table 4-9: List of birds distributed in project area

Species	Conservation Status
Hirundo rustica	Least Concern
Bubulcus ibis	Least Concern
Pycnonotus barbatus	Least Concern
Phylloscopus collybita	Least Concern
Gallinula chloropus	Stable
Upupa epops	Least Concern
Prinia gracilis	Stable
Ardea cinereal	Least Concern
Merops orientalis	Least Concern
Phalacrocorax carbo	Least Concern
Egretta garzetta	Least Concern
Ixobrychus minutes	Not listed
Falco tinnunculus	Least Concern
Passer domesticus	Least Concern
Corvus cornix	Not listed
Streptopelia senegalensis	Stable
Ceryle rudis	Least Concern
Calidris minuta	Least Concern
Vanellus spinosus	Least Concern
Ardeola ralloides	Least Concern
Halcyon smyreninsis	Not listed
Motacilla alba	Stable
Motacilla Flava	Least Concern

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*

Mammals

Forty mammalian species are known to occur in the project area (Habitat Diversity, EEAA-NBU, 1993). Rodents are the most common in the project area inhabiting the cultivated lands. Among the most characteristic mammalian species are *Hmiechinus auritus*, *Crocidura flavescens*, *Herpestes ichneumon* and *Felis sylvestris*. Wild carnivores have suffered a great deal of decline in the recent years as a result of secondary poisoning with pesticides widely used to control *Arvicanthis niloticus* and another rodent pest. The mammals known to exist in this part of the

desert are *Gerbillus gerbillus, Mus musculus, Jaculus jaculus,* Ruppel's Fox (*Vulpes rueppelli*). Camels, sheep, donkeys and goats are frequent mammals observed in the region.

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. No protected flora, expected to be impacted by the operation phase of the project. However, the majority of these are common species and not of significant ecological value. Except the following:

- *Arvicanthis niloticus* listed as Least Concern
- *Gerbillus gerbillus* listed as Least Concern (Stable)
- *Mus musculus* a widespread and abundant species that thrives in anthropogenic habitats, hence listed as Least Concern.
- *Jaculus jaculus* listed as Least Concern.
- *Vulpes rueppelli* listed as Least Concern (Stable)

Insects

The vegetation in the project area forms the basis for local insect life. Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. No protected insects' species, expected to be impacted by the construction and operation phases of the project. However, the majority of these are common species and not of significant ecological value as following*:*

- Desert Pebble Mantis (*Eremiaphila zetterstedti*) is not listed
- Butterflies (e.g., *Vanessa cardui*) is listed as Least Concern
- Camel Spiders (*Galeodes arabs*) is not listed
- Dragonflies (e.g., *Sympetrum fonscolombii*) is listed as Least Concern -Stable
- Hoverflies (*Simosyrphus sp*.) is not listed
- Desert Locust (*Schistocerca gregaria*) is not listed
- Vagrant Emperor dragonfly (*Anax ephippiger*) is listed as Least Concern

4.12.1.3 Aquatic Habitat

The aquatic habitats in the project area exist in two different locations, namely, El-Rayah El-Behery and El-Rayah Al-Nassery.

El-Rayah Al- Behery and El-Rayah Al-Nassery

El-Rayah Al-Nasary starts from Rosetta branch at El-Kanater El- Khayria city and extends parallel to El-Rayah Behery in the West of Delta, where is heading northwest in the direction of Noubaria canal which across from El-Rayah Behery. El-Rayah Al-Nasery meets with Noubaria canal at Kanater Pauline (at Koum Hamada) and then heading to the northwest even Mediterranean Sea breaking Mariout Lake. It extends to the right of Rayah many of villages while on the left side there are many of agricultural land reclamation, it also a distinct course of navigation, especially across Noubaria Canal. The length of this Rayah is about 200 Km starting from El-Kanater El-khairia city with average width 40-50 m and its average depth 2-5 m.

El-Rayah Al-Behery starts from the Rosetta branch at El- Kanater El- Khayria city and extends into the West of Delta, heading the north-west parallel to Rosetta branch and west of Giza Governorate. It passes in Nekla, Abu Ghalib and Khatatba cities and then through Beheira Governorate and, it passes into Kafr Daoud, Kom Hamada, Itai El Baroud, Damanhur, Kafr El Dawar cities then Alexandria Governorate. El-Rayah Al-Behery confluences with El Mahmudiyah canal after Damanhur city (El Mahmudiyah canal is a branch from Rosetta branch at El Mahmudiyah city). This segment is heading to the northwest until it reaches to Alexandria city, this a part of Rayah is taking name (El Mahmudiyah canal) after concordance even Alexandria that a part is an important nautical stream. The length of this Rayah is about 220 Km or more starting from El-Kanater El- Khayria city to Alexandria with average width 40-50 m and its average depth 2-3m.

Hydrophytes

Zahran (2009) stated that the aquatic vegetation of the Nile in Egypt is classified under 36 communities dominated by 6 submerged, 9 floating and 17 emergent species as shown in Table 4-10 and Figure 4-33.

Table 4-10: Hydrophytes plant species known to inhabit the El-Rayah El-Behery and El-Rayah El-Nassery

Emergent species	Conservation Status
Cyperus alopercuroides	Not listed
Cyperus articulatus	Stable
Cyperus difformis	Stable
Cyperus papyrus	Stable
Cyperus schimperianus	Least Concern
Echinochloa stagnina	Least Concern
Juncus subulatus	Stable
Leersia hexandra	Stable
Leptochloa fusca	Stable
Paspalum distichum	Least Concern
Persicaria salicifolia	Least Concern
Persicaria senegalensis	Least Concern
Phragmites australis	Stable
Pycreus mundtii	Stable
Scirpus litoralis	Stable
Scirpus maritimus	Stable
Typha domingensis	Stable
Submerged species	**Conservation Status**
Ceratophyllum demersum	Stable
Elodea canadensis	Least Concern
Myriophyllum specatum	Not listed
Potamogeton crispus	Stable
Potamogeton pectinatus	Stable
Ruppia Maritima	Stable
Floating species	**Conservation Status**

Azolla filiculoides	Not listed
Eichhornia crassipes	Not listed
Lemna gibba	Stable
Ludwigia stolonifera	Stable
Nymphaea caerulea	Least Concern
Nymphaea lous	Not listed
Pistia stratiotes	Stable
Potamogeton nodosus	Least Concern
Vossia cuspidate	Stable

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*

Field surveys show that no significant habitats or species were found in the surveyed area. There are no protected areas in the vicinity of the project area. No rare or threatened species were found or are recorded in this area. Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. No protected hydrophytes, expected to be impacted by the construction and operation phases of the Railway project.

Figure 4-33: El-Rayah El-Behery along railway in Bani-Salama village

Phytoplankton

The phytoplankton community consisted of 152 species; highest biomasses were recorded as freshwater species *Scenedesmus quadricauda, Selenastrum gracile, Actinastrum hantzchii, Schroederia* sp., *Ankstrodesmus setigera* and *Pediastrum simplex* (Gharib, 2006).
Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. However, the majority of these are common species and not of significant ecological value. Except the following: *Schroederia* sp. listed as Least Concern

Zooplankton

Rotifers were dominating the zooplankton and *Keratella cochlearis, Polyarthra vulgaris, Brachoinus calyciflours, Collotheca pelagica* and *Philodina roselea.*

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. However, the majority of these are common species and not of significant ecological value.

Fish and Fisheries

The ecological changes left their fingerprints on the biodiversity of the biota inhabiting El-Rayah Al- Behery and El-Rayah Al-Nassery. The most common species existing now in the river are: *Oreochromis niliticus, Oreachromis aureus, Sarotherodon galilaeus,* and *Tilapia zillii, Clarias gariepinus, Lates niloticus* and *Bagrus bajad* (Habitat Diversity, EEAA-NBU, 1993).

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*. However, the majority of these are common species and not of significant ecological value. Except the following:

- *Sarotherodon galilaeus* listed as Least Concern
- *Clarias gariepinus* listed as Least Concern
- *Lates niloticus* listed as Least Concern
- *Bagrus bajad* listed as Least Concern
- *Bagrus docmak* listed as Least Concern
- *Hemichromis bimaculatus* listed as Least Concern

Benthos

Benthic organisms are vital environmental indicators and through references indicate larger communities than those seen during the field trip (Table 5), Benthos included are shown in Table 4-11.

Table 4-11: Species composition of macrobenthos in El-Rayah Al- Behery and El-Rayah Al-Nassery

Macrobenthos	Species	Conservation status
Mollusca	*Melanoides tuberculata*	Least Concern (Increasing)
	Corbicula fluminals	Not listed
	Lanistes carinatus	Least Concern
	Cleopatra bulimoides	Least Concern
	Bellamya unicolor	Least Concern (Stable)
	Corbicula consorbina	Not listed
	Lymnaea truncatula	Least Concern
	Caelatura prasidens	Not listed
Annelida	*Limnodrilus hoffmeisteri*	Not listed
	Limnodrilus udekemianus	Not listed

	Branchiura sowerbyi	Not listed
Arthropoda (Insecta)	*Chironomus Larvae*	Not listed
	Micronecta plicuta	Not listed
	Damselflies	Least Concern
	Caddis flies	Not listed
Crustacea	*Cardina nilotica*	Not listed
	Potamonautes niloticus	Least Concern (Stable)

Conservation Status update to IUCN. 2021. *The IUCN Red List of Threatened Species. Version 2021-3*

4.12.1.4 Gannet Masr and Mustaqbal Misr Projects

The "New Delta" project region is located on Egypt's northwest coast as a shared region among four governorates: Behiera, Matrouh, Giza, and Alexandria. The total area of this project, when completed, is planned to be about two million feddans (equivalent to 840,000 ha), making it the largest in the history of Egyptian agricultural projects. The project benefits from three groundwater reservoirs, which are an extension of the Wadi El-Natrun region. Underground wells will be dogged, considering the distance between wells to preserve the underground and to achieve sustainable development standards. It is proposed to add a surface water source by extending Egypt's Future Canal with a length of 41 km to supply the project with a capacity of 10 million m^3 / day to cultivate about an additional 700,000 feddans. Recycling agricultural drainage water, to be used for irrigation is one of the biggest challenges in the New Delta project (Figure 4-34).

The New Delta Project is one of the mega projects in the agricultural field, where it will be established on nearly one million feddans in the western northern coast. The project of "Egypt Future" comes within the framework of the New Delta Project, which adds a new cultivated area reaching nearly 15% in Egypt that will be utilized to achieve the food security. The project is extended to north Oases, south Wadi El-Natroun, east and west Monkhafad El-Qattara. The project includes nearly 688 feddans in south El-Dabaa axis and west old Delta in addition to the project of "Egypt Future" on nearly 500 thousand feddans. It also includes 250 thousand feddans affiliating to the National Service Projects. The New Delta Project includes Mustaqbal Misr, Gannet Masr and south Dabaa axis projects.

The "Mustaqbal Misr" (Egypt's Future) project is located within the area of the giant project of "New Delta", along the new Rod El Farag\ El Dabaa axis, near the airports of Sphinx, which helps to facilitate the delivery of production requirements and products and makes the project an attractive agricultural destination for investors. The project extends over an area of 500 thousand feddans along Al-Dabaa Axis in the northwest direction of Egypt. The cultivation of an area of 200.000 feddans has been completed through using the available groundwater, and the cultivated are expected to reach 350.000 feddans by the beginning of 2022 with the use of 1.600 developed pivot irrigation devices. The area will be cultivated twice annually (in the summer and winter seasons).

South Dabaa Axis Project spans over 500,000 feddans in south Dabaa Axis to the west of Egypt Future Project. It is located along the road to the new Rawd al-Faraj -al-Dabaa axis, the road that

was established under the national road project, with a length of 120 km and a depth of 60: 70 km. The project was divided into equal parts, each part is 1000 acres.

As stated by the Egyptian Ministry of Agriculture, these lands cultivated with strategic crops, fruits and vegetables. field crops are included: wheat (*Triticum aestivum*), maize (*Zea mays*), barley (*Hordeum vulgare*), sugar beet (*Beta vulgaris*), peanuts (*Arachis hypogaea*), sunflower (*Helianthus annuus*) and soybean (*Glycine max*). Vegetables are included: strawberry (*Fragaria ananassa*), potatoes (*Solanum tuberosum*), white beans (*Phaseolus vulgaris*), onions (*Allium cepa*), tomatoes (*Solanum lycopersicum*), peas (*Pisum sativum*), carrots (*Daucus carota*) and cucumber (*Cucumis sativus*). Fruits are included: orange (*Citrus sinensis*), tangerine (*Citrus reticulata*), lemon (*Citrus limon*), guava (*Psidium guajava*), grape (*Vitis vinifera*) and mango (*Mangifera indica*) as shown in Figure 4-35.

Figure 4-34: Common reed (Phragmites australis) and Typha (Typha domingensis) plants grown around treated wastewater basin in Gannet Masr project

Figure 4-35: Cultivated desert lands around project area (Gannet Masr), in top figure maize (Zea mays), left figure tomatoes (Solanum lycopersicum) and the right one sugar beet (Beta vulgaris).

Figure 4-36: Cultivated desert lands around project area, olive tree (Olea europaea)

4.12.1.5 Agricultural Areas

Bani-Salama village (Giza governorate) is known for its agricultural production of crops, fruits and vegetables (Figure 4-37). Cultivated lands, represented by the arable lands occupied by field crops and *Citrus spp.,* bananas (*Musa sp.*), olive (*Olea europaea*), date palm (*Phoenix dactylifera*) and apricots (*Prunus armeniaca*). Agriculture in the Giza governorate follows the general Egyptian pattern *i.e.,* summer and winter crops (the seasonal sequence). The main included crops were the Egyptian clover (*Trifolium alexandrinum* L.), Faba bean (*Vicia faba*) and wheat (*Triticum aestivum*) as winter crops, maize (*Zea mays* L.) and cotton (*Gossypium barbadense* L.) as summer crops. Vegetables crops i.e., tomato (*Solanum lycopersicum*), aubergine (*Solanum melongena*), pepper (*Capsicum annuum*), cucumber (*Cucumis sativus*), lettuce (*Lactuca sativa*), thymus (*Thymus vulgaris*) and mentha (*Mentha spp.*), onions (*Allium cepa*), peas (*Pisum sativum*), carrots (*Daucus carota*), squash (*Cucurbita sp.*), cabbage (*Brassica oleracea var. capitata*), eggplant (*Solanum melongena*), spinach (*Spinacia oleracea*) and molokhia (Corchorus olitorius).

Weeds of very common occurrence in the cultivated lands of winter crops in all regions of Egypt are *Anagallis arvensis, Brassica nigra, Chenopodium album, C. murale, Convolvulus arvensis, Cynodon dactylon, Melilotus indica, Polypogon monspeliensis, Sonchus oleraceus* and *Trifolium resupinatum*. The very common weeds in summer crops include *Amaranthus angustifolius, A. ascendens, Convolvulus arvensis, Corchorus olitorius, Cynodon dactylon, Portulaca oleracea, Solanum nigrum* and *Sonchus oleraceus.*

Figure 4-37: Cultivated lands around Bani-Salama village

4.13 Land Environment (Segment 2)

Segment 2 consists of an existing railway line where works will consist of signaling modernization and track upgrades. The length of the segment, where works will be carried out is 66 km long.

4.13.1 Agricultural Lands

The segment borders agricultural lands along 8 km (Figure 4-38 and Figure 4-39). Approximate distances between the existing track and agricultural lands start as low as 5 m away.

The soil right below the track may be contaminated with oil and grease due to train operation.

Identification of sensitive receptors: With respect to the land acquisition, project activities consist of upgrades of the existing infrastructure, there are no impacts related to land acquisition, but may involve re-possession of the use of land on the rail RoW. Impacts related to potential pollution of nearby surrounding due to mismanagement of waste and further soil contamination from oil and grease on the tracks potentially leaching into the underlying soil. Details on expected waste generated from track upgrade and signaling and modernization activities are addressed in the Project Description chapter.

Sensitive receptors: land and water environment, community health and safety.

Figure 4-38: Map illustrating Segment 2 starting at Marazeeq in the agricultural area and ending at km 66 on Wahat-Marazeeq line

Figure 4-39: Segment 2 track bordering agricultural areas

4.13.2 Desert Lands

Starting km 8 on the segment until 85 km, the land area corresponds to desert lands. This segment at km 85 will be linked to segment 1. The area is the extension of the desert area described for segment 1 (where the junction is planned)

4.13.3 Built Infrastructure

4.13.3.1 Existing Track and Surrounding

Segment 2 is an existing track for freight transport starting at the Marazeeq station and extending until km 66 of Marazeeq-Wahat existing line. There are no stations along the segment until km 66. The track is an open track for most of the segment. Reaching the Marzaeeq station requires going through Bashteel station on the Bashteel-Itay El Baroud rail corridor and merging onto the Marazeeq-Wahat track or going through Giza-Beni Suef rail corridor. In both cases, the tracks are used for freight and passenger trains. Those tracks will likely be used to transport old tracks and new tracks and associated materials (e.g., basalt).

Although the other train lines before Marazeeq station have up to three tracks serving for passenger trains and the freight transport as illustrated in (Figure 4-40). The Marazeeq-Wahat line has only one track dedicated for the freight transport; works will be carried out on the single track.

Figure 4-40: Branching out onto Marazeeq-Wahat track, i.e., segment 2

Most of the segment consists of open tracks. Wooden ties-sleepers were observed for some portions of the segment while other parts were seemingly buried under the soil (Figure 4-41) and sand (Figure 4-42) or absent.

Figure 4-41: Segment 2 wooden ties and buried track

Figure 4-42: Buried sleepers and tracks under sand

Identification of sensitive receptors: Impacts related to the generation of waste constituted of old tracks, ties and sleepers. Old sleepers were commonly coated by hazardous benzo-pyrene and could be a potential source of hazardous waste once removed. The level of contamination was tested for a previous project involving track renewals (ENRRP) and no traces of carcinogens were detected. That said, testing of wooden sleepers for possible contamination should be performed under this project to inform on adequate disposal. Commonly observed as well is ballast contaminated with grease. Both contaminated wooden ties and ballast are classified as hazardous waste requiring proper disposal in a licensed facility.

Sensitive receptors: land and water environment, community health and safety, workers.

4.13.3.2 Illegal Crossings

There are illegal crossings along segment 2 and, therefore, potential health and safety risks on the surrounding community (Figure 4-43).

Figure 4-43: Illegal crossings and overpasses crossing small irrigation channels and local roads

4.13.3.3 Overpasses

The segment crosses over two small irrigation channels (Figure 4-43).

Identification of sensitive receptors: Impacts relate to potential compromise of the integrity of the overpass. Works on such infrastructure are carried out using specialty equipment to reduce vibrations and to prevent deep excavation. There is also a potential for pollution of the underlying channel. Health and safety hazards associated with works near water.

Sensitive receptor: integrity of existing infrastructure, worker, water environment.

4.13.3.4 Residential and Commercial areas

There are communities in the vicinity of the existing segment and within the ROW of the track. In many areas, there are structures serving living or commercial purposes bordering the existing open track. Absence of fencing and barriers is common. The local community can easily access the tracks.

There are isolated residences located along the agricultural portion of the route at distances ranging from as low as 5 m away to the track. There are 2 village agglomerates along the route located at 100 m and 150 m from the track (Figure 4-44). The segment consists mostly of open tracks without barriers between the residences and the segment (Figure 4-45)

Figure 4-44: Nearest residences and residential areas along segment 2

Figure 4-45: Informal residences in close proximity to open tracks on segment 2 in the agricultural area

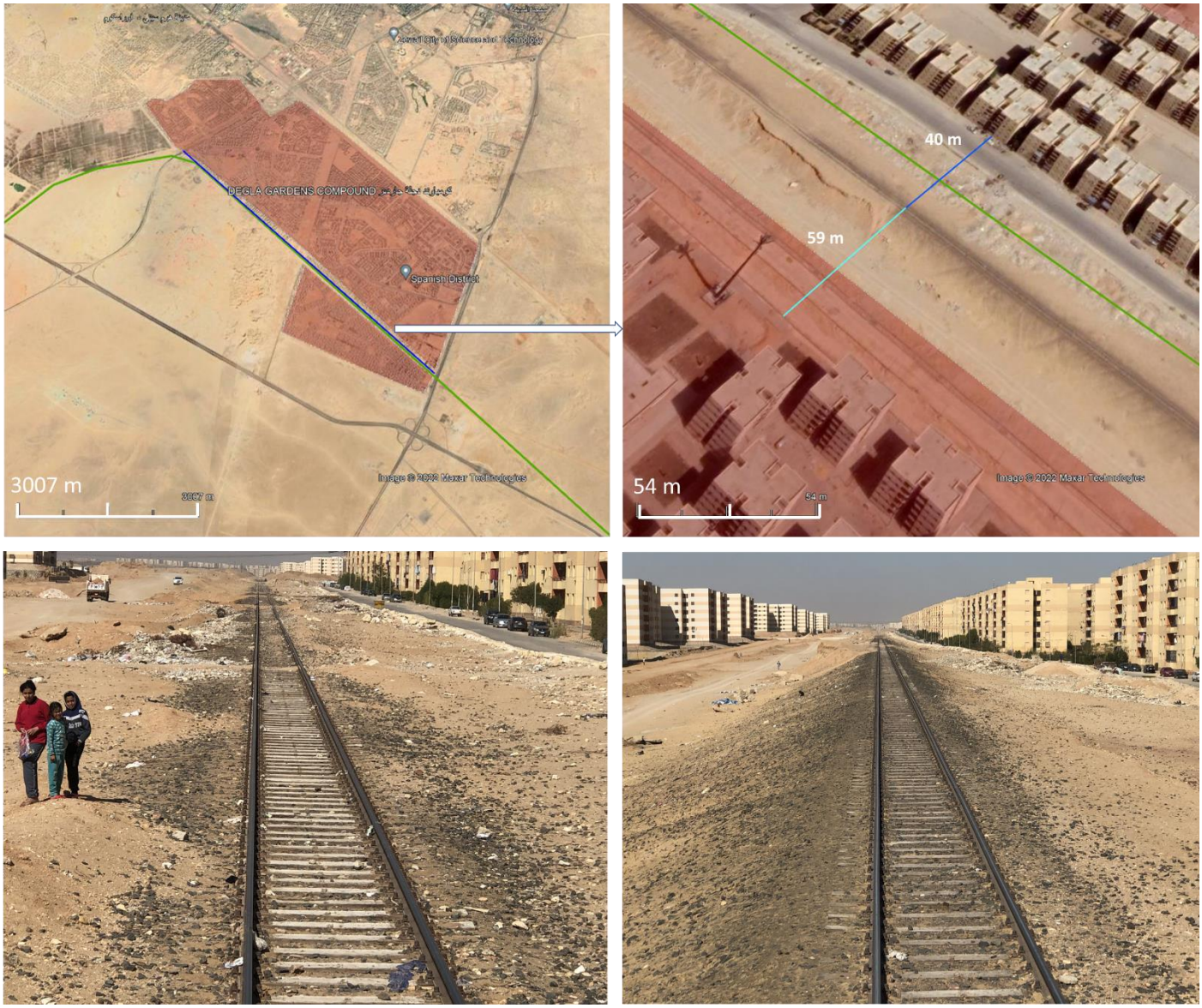


Figure 4-46: Segment 2 crossing through first large conglomerate of residential buildings in the desert area over 7 km and corresponding to Government Youth residential program

The segment crosses between another conglomerate of residential areas over 7 km. Distances from the segment to the line are in the range of 60-75 m away (Figure 4-47)

Figure 4-47: Segment 2 crossing through second large conglomerate of residential buildings in the desert area over 7 km

In addition to residences, places of worship, i.e., a mosque, and a school were identified at 84 m and 78 m from the segment, respectively as shown in Figure 4-48. It should be noted that there are residences on both sides of the track, therefore, crossings by the community to reach those utilities are expected.

Figure 4-48: Segment 2 bordering a mosque and a school 84 m and 78 m away, respectively

Identification of sensitive receptors: Impacts relate primarily to risks and hazards on community health and safety related to works due to close proximity of community to open tracks; transport of materials (old and new tracks etc.) via tracks in the vicinity of passenger

tracks, impacts include increased noise and vibration levels during construction, ease of accessibility of local community to the tracks with safety implications, and influx of laborers with risks of GBV owing to the agricultural activities being performed by females as well as the presence of markets and residential buildings, potential pollution if waste is improperly handled and disposed in the surrounding. And risks on the project such as sabotage of materials.

Sensitive receptors: community, in particular females (during construction), ambient noise and vibration levels (during construction), ambient air quality (during construction)

4.13.3.5 Highways and Bridges

The segment crosses two major highways: the Middle Ring Road and the Fayoum Desert Road (Figure 4-49) and passes under South Dahshour bridge (Figure 4-50) and Table 4-12.

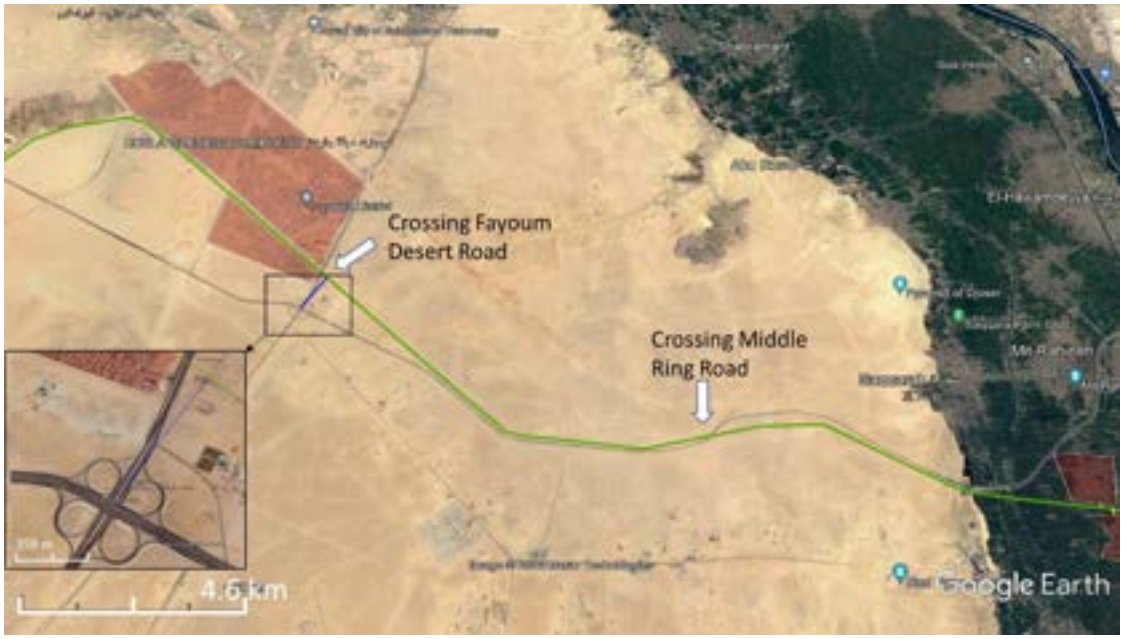


Figure 4-49: Crossings between segment 2 and Middle Ring Road and Fayoum Desert Road

Figure 4-50: Segment 2 crossing under South Dahshour bridge

Table 4-12: Summary highways intersecting with Segment 2

List of roads	Type	Description	No. of lanes in each direction	Speed
Regional roads: Highways				
Middle Road Axis	Ring road	Connects the cities east and west of Cairo from Belbeis-Ismailia Agricultural Road in the east, to the El-Dabaa axis in the west	8	120 km/h
Fayoum Desert Road	Highway	Connects Greater Cairo and Fayoum City	4	120 km/h
South Dahshour road	Highway	Connects Greater Cairo and Dahshour City	4	120 km/h

Photos of some of those regional roads are presented in Figure 4-51.

Figure 4-51: Regional roads intersecting with Segment 2: (a) Middle road axis, (b) South Dahshour road, (c) Fayoum Desert Road

The segment also crosses a newly built bridge under which trucks were observed. The surrounding is accessible to construction trucks.

Segment passes under a second bridge, where other parked vehicles were observed.

Figure 4-52: Segment 2 crossing local road off Wahat highway and going under bridge

Identification of sensitive receptors: Impacts relate to community health and safety risks due to works on highways, traffic impacts due to closures, and occupational health and safety due to presence of vehicles.

Sensitive receptors: workers, users of infrastructure, infrastructure integrity

4.13.3.6 Industrial Zone

The industrial zone is located at 180 m away from segment 2. Segment 2 borders zone 5 of the industrial zone as shown in Figure 4-53.

Figure 4-53: 6th of October industrial zone in proximity to Segment 2

Identification of sensitive receptors: During construction, increased air pollutant emissions will contribute to cumulative impacts of emissions from the industrial zone. During operation, emissions will likely be reduced as a result of improved tracks and improved efficiency of the rolling train.

Sensitive receptors: community near industrial zone (during construction), ambient air quality and noise and vibration levels.

4.13.3.7 Existing infrastructure

4.13.3.7.1 Container Storage- Dry Port Area

Currently, there is an open storage area allocated to loading unloading of containers located 10 meters away from segment 2.

Sensitive receptor: integrity of infrastructure, workers.

4.13.3.8 Infrastructure under Development

There are several ongoing construction activities in the vicinity along segment 2 in the desert areas after km 8 (starting at Marzaeeq) and before the crossing with Fayoum Desert Road corresponding to Ain Sokhna- Alamein Train.

Identification of sensitive receptors: Impacts relate to occupational health and safety of workers working in the vicinity of other large scale infrastructural works and associated exposure and access to heavy machinery etc.

Sensitive receptor: traffic users, community, workers.

4.13.4 Waste Management

Occurrences of uncontrolled waste disposal have been observed and constitute a common feature along the segment as shown in (Figure 4-54). occurrences of Waste were observed in the ROW of the segment across the entire segment starting at Marazeeq and until km 66 of Wahat line. This waste will be cleared off the ROW as part of the trenching process described in the trenching section in the project description.

Figure 4-54: Uncontrolled disposal of waste along segment 2

4.14 Air Quality (Segment 2)

Air quality measurements were not conducted on the existing site as the train already exists. The improved tracks are expected to improve rolling efficiency with possible reductions in air pollutant emissions.

Identification of sensitive receptors: The main sources of gaseous emissions are in the construction phase and are expected to be the exhaust gas from heavy machinery and the vehicles for the transportation of materials and workers to the site**.**

Sensitive receptors: community, workers, ambient air quality. . Se

4.15 Noise and Vibration (Segment 2)

According to sensitivity scale defined according to distance to railway, isolated residence along the segment encountered in agricultural areas are considered highly sensitive.

Noise levels near agricultural areas at the beginning of segment and in the absence of a passing train are expected to be comparable to noise levels recorded near agricultural plots in segment 1 corresponding to low range of 50 dB at night and around 59 dB during the day.

Segment 2 is an existing operating track, i.e., project activities are expected to introduce a new source of noise and vibration during the construction phase only, which will be temporary and short term. Table 4-13 presents typical noise levels emitted by common construction equipment at 15 m. These values are obtained from the Roadway Construction Noise Model (RCNM) by the U.S. Federal Highway Administration (FHWA, 2017). It is important to note that there are no national databases in Egypt for construction equipment noise levels.

Table 4-13: Maximum Noise Levels Produced by Construction Equipment (FHWA, 2017)

Equipment	Maximum Noise Level at 15 m (dB)
All Other Equipment > 5 HP	85
Auger Drill Rig	85
Backhoe	80
Bar Bender	80
Blasting	94
Boring Jack Power Unit	80
Chain Saw	85
Compressor (air)	80
Concrete Mixer Truck	85
Concrete Saw	90
Dozer	85
Drill Rig Truck	84
Drum Mixer	80
Excavator	85
Flat Bed Truck	84
Generator	82
Horizontal Boring Hydraulic Jack	80
Jackhammer	85
Man Lift	85

Mounted Impact Hammer (hoe ram)	90
Pavement Scarifier	85
Paver	85
Pickup Truck	55
Pneumatic Tools	85
Roller	85
Scraper	85
Sheers (on backhoe)	85
Tractor	84
Vacuum Excavator (Vac-Truck)	85
Vibrating Hopper	85
Vibratory Concrete Mixer	80
Welder/Torch	73

The use of construction equipment is expected to increase noise and vibration levels beyond permissible limits.

During operation, the upgraded tracks are expected to allow smoother travel of the train with potentially reduced noise and vibration levels.

Identification of sensitive receptors: The freight train already exists and is an existing source of noise; the track renewal should reduce the noise and vibration levels due to improved infrastructure. Therefore, the impact is expected to be positive during operation. During construction, typical noise and vibration are expected to affect nearby sensitive receptors especially those in agricultural areas, where distance between the track and their dwellings can be as short as 5 m. While ambient levels were not measured for those area, they are expected to be comparable to measured areas assuming no train is passing. Comparable values may range between 55dB to 60 in the daytime. Considering that permissible levels will be lower (i.e., 60 dB) in agricultural areas, it is expected that construction activities will surpass permissible levels during the daytime for those areas**.**

Sensitive receptors: communities living in proximity to existing track.

4.16 Water Bodies (Segment 2)

There are small irrigation channels along the segment (described in the context of overpasses Figure 4-55) There is also a swampy pond resulting from the discharge of wastewater. The pond

resulted from an excess of wastewater not being used for irrigation of the surrounding area and is considered a modified habitat such as those encountered in segment 1.

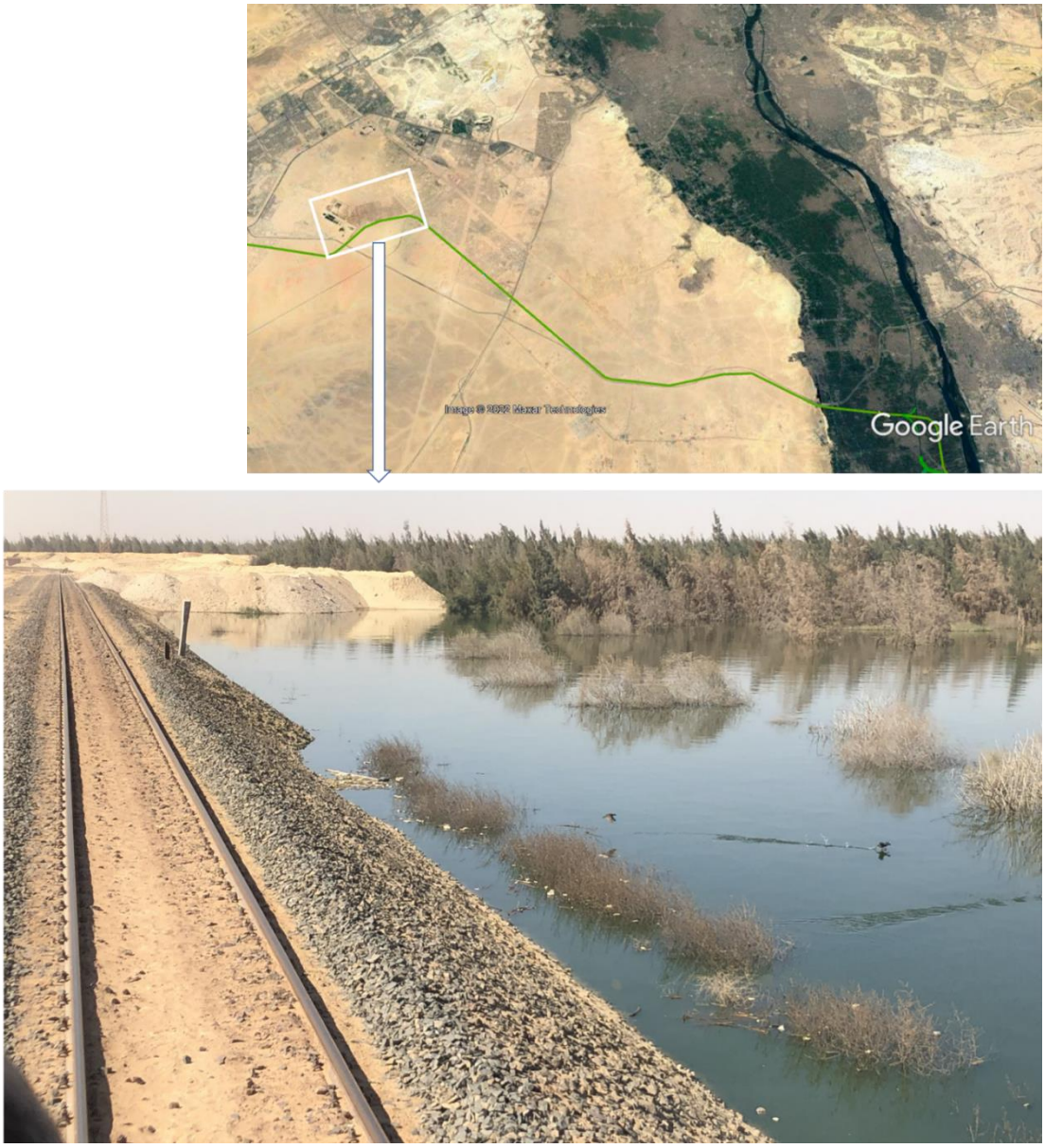


Figure 4-55: Swampy areas along segment 2

Identification of sensitive receptors: The presence of water close to the segment constitutes severe occupational health and safety hazards especially during electrical works, installation of cables as well as due to potential drowning and exposure to contaminated water etc.

Sensitive receptors: workers.

4.17 Cultural Heritage (Segment 2)

This segment passes through a land with considerable number of historical monuments near Saqqara area, the closest monument being the Southern South Saqqara Pyramid located 300 m away from the track lines, as shown in Figure 4-56, which makes this pyramid a highly sensitive location. However, as the line is already established and the modernization works will not require excessive digging, the possibility of endangering the historical monuments is very unlikely. Same goes for the effects of noise sensitivity of the area, as noise levels will only increase during the construction phase.

Figure 4-56: Historical monuments surrounding the tracks

4.18 Biodiversity (Segment 2)

The segment is classified into 2 types of habitats (natural and modified). The areas bordering agricultural lands and small irrigation channels are comparable to those encountered in the Bani Salamah area. In the latter, no different species of significant value were observed. The second area consisting of desert lands is an extension of the area described for 4.12. no different species of ecological value have been identified. Details are addressed in section 4.12. An artificial water pond adjacent to a vegetation has also been observed. The origin and description of the pond were discussed in 4.16. The shallow ponds have common reed (*Phragmites australis*) plants (Figure 4-57).

Figure 4-57: Grown plants in the pond

4.19 Socio-Economic Baseline

4.19.1 Socio-Economic Profile

This section includes a description of the baseline socio-cultural characteristics of the social environment at the proposed project areas. It will highlight the following: basic information about the project areas, administrative areas, demographic characteristics, human development profile, access to basic services, health profile, economic characteristics, transportation, services, and NGOs.

4.19.2 Demographic characteristics

4.19.2.1 Bani Salama -6th of October Dry Port (Subcomponent 2.1)

The new alignment (disclosed in August 2022) is approximately 68.5 km long excluding the curves at each end of the alignment. The alignment starts in the south at El Wahat Road at the 6 October Dry Port and ends in the north in Beni Salama station. The alignment extents almost parallel to the eastern side of Regional Ring Road and is planned to be constructed in the RoW of the RRR. It

passes through various localities: Bani Salama Local Unit (Monshaeet El Qanater, Giza Governorate), New Sphinx City (Giza Governorate), 2 government agricultural reclamation projects (Mostaqbal Masr and Gannet Masr owned by the Egyptian Armed Forces). It also passes on the borders of the New October City (Giza Governorate).

Monshaeet El Qanatar Markaz

Monshaeet El Qanater Markaz and City is affiliated to Giza Governorate and is the first markaz from the north border. It was separated from Awsseim Markaz in 1998 with a total area of 200 km^2. It is bordered from the North by Menofeya Governorate, from the South by Awsseim Markaz, from the East by the Nile River and Rosetta Branch, and from the West by Cairo-Alexandria Desert Road and Kerdassa Markaz and City.

The Markaz includes one city (Monshaeet El Qanater), 9 local units (Kafr Hegazi, Nekla, Baharmas, El Werdan, Berqash, El Galatma, Abou Ghaleb, El Mansoureya, and Beni Salama), and 23 villages. The main economic activity in the Markaz is agricultural.

According to CAPMAS population and housing conditions census 2017, total population of Monshaat El Qanater Markaz is estimated at 515512 (51.7% males and 48.3% females, where 96.5% live rural areas and 3.5% live in urban areas). Total number of households is 120465 with an average family size of 4.3 members. Illiteracy rate reaches 34.6% in 2017, while unemployment is 10.3% where about 6.5% of total labor force 15+ in 2020 are engaged in agricultural and fishing activities. A total of 95.6% of households have access to potable water, 36.8% have access to public/private sewage network, and about 41.7% have access to septic tanks.

Beni Salama Local Unit

Bani Salama is a local unit affiliated to Monshaeet El Qanater District in Giza Governorate. It includes 19 satellite villages Ezbas). According to the information office of the local unit, total area of Beni Salama is estimated at 43,214.86 feddans; and total population is estimated at 33,800 capita and 4,600 households. There are two health care units, one veterinary care unit, 6 schools, one post office, one ambulance, one agricultural cooperative, one social affairs office, one subsidized food office, and one electricity maintenance office.

According to the head of Bani Salama agricultural cooperative, total agricultural lands is estimated at 5,820 feddans attained by 2,200 persons. Almost three quarters of lands are cultivated fruits (mangoes, bananas, grapes, citrus, apricots, plumps, peaches, pears, and apples). The remaining quarter is planted crops (wheat, corn, white beans) and vegetables (potatoes, cucumber, capsicum, tomatoes). Most farmers cultivate clover and livestock feeding gras for domestic consumption. Almost all lands are irrigated through groundwater using water pumps, except those in the east which are located close to El Nassery Irrigation Canal.

Table 4-14: Average land plot size as per Head of Agricultural Cooperative of Bani Salama

Plot size	Approximate number

Less than one feddan	850
1-5 feddans	250
More than 5 feddans and less than 10	350
More than 10 feddans	750
Total number of land plots	2,200

New Sphinx City

The city was established according to the Presidential Decree 61/2019 under the Authority of NUCA. New Sphinx is located 10 km away from Sphinx Airport, 20 km from Sheikh Zayed City, 30 km from 6th of October City, 47 km from Giza City, and 65 km from Cairo City. The total area is estimated at 59.5 feddans to be further extended to 77 thousand feddans in the future. Current population is estimated at 41,477 capita with a planned capacity to absorb a total of 1,300,000 capita in the coming years.

New October City

The city was established according to the Presidential Decree 77/2017 under the Authority of NUCA. The New October is located on km 47-72 on Giza-Wahat Road. It can be accessed by Dabaa Corridor from the north, Fayoum Road from the south, Regional Ring Road from the west, and Wahat and Middle Ring Road from the east. Total land area is estimated at 78.5 thousand feddans and a targeted population of 4.75 million capita in 2025.

Mostaqbal Masr

The project is owned by the Egyptian Air Forces as part of the New Delta Land Reclamation Project. Total land area is estimated at 500 thousand feddans. It is located on the Dabaa Corridor on the eastern side of Regional Ring Road, close to ports, airports, industrial areas, and major hubs.

Gannet Masr

The project is owned by the Egyptian Air Defense as part of the New Delta Land Reclamation Project. Total area is estimated at 64 thousand feddans. The project is located on the eastern side of the Regional Ring Road and extends from the north of Mostakbal Masr Project until El Wahat Road in the south.

The 6th of October Dry Port

The Dry Port is the first inland dry port in Egypt on a total area of 100 feddans. The main plan is to link the port to Giza-Etay El Baroud railway and further to Alexandria Port

4.19.2.2 Marazeek-Wahat (Subcomponent 2.2)

The main interesting localities with Subcomponent 2.2 are El Badrashen Markaz and 6th of October City; both are affiliated to Giza Governorate.

Giza Governorate is located on the west side of the Nile River. It is bordered by Qalyoubeya, Menofiya and Behaira Governorates in the north, Fayoum and Giza in the south, in addition to 2 localities El Saff and Atfeeh which are located on the eastern side of the Nile River. Giza total area is 13.184 km2, forming 1.3% of the country's total area. The inhabited area of Giza Governorate represents about 8.8% of its total area of 1,156 km. The inhabited area of Giza Governorate is distributed in various proportions to occupy agricultural lands within the reins 8,66% of the total inhabited area of the governorate. The area of agricultural lands outside the reins with approximately 174 km at 15% of total inhabited area followed by the benefits and cemeteries with an area of 120 km2 with a percentage of 10.3%. While housing is occupied by 1.7% of the total inhabited area. The largest area for agricultural use is located in the Awssim Markez, with a surface area of 25,184 km of the total inhabited area of the governorate known as the flood plain of the governorate.

Locality one: El Badrashen

El Badrashen is located in Giza Governorate, about 30 km southwest of Cairo on the west bank of the Nile River. El Badrashen hosts the oldest Egyptian monuments. In the village of Abu sir, the oldest-known pyramids can be found; these pyramids are of the sun temples. The village of Saqqara hosts the first stone building in history, the pyramid of King Djoser and amphitheatre. The pyramids of Dahshur, such as the pyramid of Snefru, are the first complete pyramids known to history. The pyramid of Amenemhat II, pyramid of Amenemhat III, and many temples, such as the Temple of King Ramesses II, in which his statue was discovered, were transferred to Bab Al-Hadid Square. Ramesses is in the heart of Cairo and was then moved to the shooting range at the entrance to the pyramids. The village of Aziziyah is the prison where Joseph was incarcerated. El Badrashen has the oldest bridge in Egypt, El Maraziq bridge. El Badrashen City is surrounded by villages and agricultural lands which produce one third of Egypt's dates. In addition, El Badrashin is the second largest producer of furniture in Egypt after Damietta. Other industries include oil, soap-making, rug-making, textiles, yacht-building and furniture-making.

According to CAPMAS population and housing conditions census 2017, total population of El Badrashen Markaz is estimated at 537132 (51.9% males and 48.1% females, where 84.0% live in rural areas and 16.0% live in urban areas). Total number of households is 130003 with an average family size of 4.13 members. Illiteracy rate reaches 37.7% in 2017, while unemployment is 10.3% where about 6.5% of total labor force 15+ in 2020 are engaged in agricultural and fishing activities. A total of 81.4% of households have access to potable water, 18.0% have access to public/private sewage network, and about 81.8% have access to septic tanks.

Locality two: 6th of October City

6th of October is a city in Giza Governorate, a satellite town and part of the urban area of Cairo, Egypt located about 32 km outside the city and 17 km away from the great Giza pyramids. The settlement was established in 1979 upon the presidential decree by the Egyptian President Anwar El Sadat 504/1979. The city has a total area of 482 km2 and, eventually, is expected to reach a population of 6 million inhabitants in the future. In April 2008, it was announced as the capital of the 6th of October Governorate; however, in April 2011, it was reincorporated into Giza Governorate, to which it had originally belonged. It was also planned to have a wide greenbelt around the city to act as a green lung for its inhabitants.

The City has one of the largest industrial zones in Egypt on which the entire city is established. The industrial zone provides jobs for employees within the city as well as from other parts of Giza. It is accompanied by a banking sector area that groups branch of all banks in Egypt in an area that is close to the industrial area to serve the needs of the industry and residents. In addition to various residential compounds, it hosts a big number of private universities, institutes, schools, hospitals, hotels, commercial malls, and a wide variety of entertainment and leisure facilities and clubs.

The Smart village was launched upon the presidential decree by the Egyptian President Hosni Mobarak 355/2000, in order for Egypt to build its IT economy and IT industry. The Smart Village host a number of government and ministry buildings, as well as private companies. The Ministry of Communications and Information Technology is located in the Smart Village. In 2012, the Egyptian Stock Exchange moved its administrative functions to Smart Village and has one of the largest buildings in the district, with a skyway connecting the two. After that, many important companies joined the Smart Village, e.g., Research in Motion, Raya, and Xceed Telecom Egypt. In 2018, the Bibliotheca Alexandrina opened an Egyptology research center in Smart Villages and named it the Hawass Saqqara Training Center.

According to CAPMAS population and housing conditions census 2017, total population of 6th of October City is estimated at 348870 (52.8% males and 47.2% females, where 100% live in urban areas). Total number of households is 91466 with an average family size of 3.81 members. Illiteracy rate reaches 2.8% in 2017, while unemployment is 10.3% where about 6.5% of total labor force 15+ in 2020 are engaged in agricultural and fishing activities. A total of 99.0% of households have access to potable water, 99.8% have access to public/private sewage network, and about 0.1% have access to septic tanks.

Table 4-15: Population and infrastructure services, CAPMAS 2017

Governorate		
Markaz/City	**El Badrashen**	**6th of October**
Population		
Total population count	537132	348870

Total number of households	130003	91466
Average household size	4.13	3.81
Males %	51.9	52.8
Females %	48.1	47.2
Urban population %	16.0	100
Rural population %	84.0	
Illiteracy rate %	37.7	2.8
Unemployment rate (% of total labor force) 2020	10.3	
Population 15+ engaged in agricultural & fishing activities (% of total labor force) 2020	6.5	
Infrastructure services		
Households with access to potable water %	81.4	99.0
Households with access to public/private sewage network %	18.0	99.8
Households with access to septic tanks %	81.8	0.1

5 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION

This section presents assessment of the risks and impacts of subcomponents 2.1 “Track Extension for Bani Salamah to 6th of October Freight Railway and subcomponent 2.2 Track Upgrades, and Railway Signaling Modernization for Marazeek-Wahat railway”.

Impact assessment seeks to establish the environmental and socio-economic effects of the project and assess these effects against the current baseline. In this section impacts are going to be discussed as follows:

1. Identified impacts and risks due to segment 1 project activities
2. Identified impacts and risks due to segment 2 project activities
3. Associated facilities specific impacts

Using a systematic and evidence-based approaches, this section evaluates the impacts and risks of the project pre-construction, construction, and operation activities on environmental and social receptors. follows:

Negative impacts on

1. Ambient Air quality
2. Noise and vibration levels
3. Soil and geology
4. Hydrology and surface water
5. Utilities including use of resources,
6. Integrity of existing and under development infrastructure consisting of roads, highways, other means of transport
7. Ecology and biodiversity (flora and fauna)
8. Occupational health and safety including spread of COVID-19
9. Culture heritage
10. Resource efficiency and pollution prevention
11. Traffic

Risks of:

12. Risk of child labor
13. Risk of GBV
14. Land acquisition
15. Risk associated with temporary labor influx
16. Risks of land and asset value depreciation

The methodology used in assessing the impacts draws upon a number of guidance documents, including:

- Egypt's principles and procedures for environmental impact assessment, 2009
- World Bank Group Environmental, Health and Safety General Guidelines ("WBG EHS General Guidelines"), and WBG EHS guidelines for Railways, 2007

The legislative context of the assessments undertaken are provided in chapter 3.

Several environmental and social impacts (positive and negative) associated with the proposed project were identified through field visits, desktop analysis and the use of experts' judgment. The project's impact assessment is developed using the following steps:

- Characterizing the baseline conditions
- Describing the project's components and activities throughout the construction and operation phases
- Evaluating the project's alternatives to assess if an impact can be reduced
- Conceptual identification of the impacts resulting from the proposed project during the construction and operation phases
    - Describing the studied aspect, its potential impact, its source, and conceptual assessment (negative or positive, short, medium or long-term, low impact or high)
- Rating the impacts using evaluation matrix that follows rating method for severity and frequency of impacts as illustrated in the following section.
- Identifying mitigation and enhancement measures to address the impact

Evaluation Matrix

A simple rating method will be applied to identify the significance of the impacts. Each impact will be given a rank for severity (S) and frequency of occurrence (F). Ranks for severity and frequency are given on a scale from 1 to 5, as shown in Table 5-1 and Table 5-2.

Table 5-1 Scale used in Severity Ranking of Impacts

1	2	3	4	5
Insignificant	Minor	Moderate	Major	Catastrophic

Table 5-2 Scale used in Frequency Ranking of Impacts

1	2	3	4	5
Rare	Unlikely	Possible	Likely	Almost certain

To determine the severity rank, four parameters are considered, as follows:

1. Scale: How widespread will the impact be? Considerations can include e.g. area affected by land pollution impact, number of people affected by health impact, etc.

2. Difficulty in changing the impact: How difficult will it be to reverse or mitigate the impact? Considerations can include e.g. availability of technology to change impact, level of complexity of available technology, capacity to apply available technology, existence of constraints to change impact, etc.

3. Cost of changing the impact: How much will it cost to change the impact? cost in relation to the means of change considered in the above parameter

4. Effect on public image: To what degree does the impact affect the public image of the enterprise (positively for positive impacts and negatively for negative impacts)?

Similarly, for the frequency rank, two parameters are considered:

1. Probability: What is the probability of occurrence of the impact?

2. Duration: How long will the impact last?

Table 5-3: Significance ranking matrix

Risk Score	**Risk Level Category**	**Frequency of Scenario**				
1 to 4	Low					
5 to 10	Moderate					
11 to 18	Substantial	**Rare (1)**	**Unlikely (2)**	**Possible (3)**	**Likely (4)**	**Almost Certain (5)**
19 to 25	Critical					
Severity	**Catastrophic (5)**	Moderate	Moderate	Substantial	Critical	Critical
	Major (4)	Low	Moderate	Substantial	Substantial	Critical
	Moderate (3)	Low	Moderate	Moderate	Substantial	Substantial
	Minor (2)	Low	Low	Moderate	Moderate	Moderate
	Insignificant (1)	Low	Low	Low	Low	Moderate

This analysis is conducted for both the construction and operation phases of the project.

5.1 Overview of the Environmental and Social Aspects

Implementation of subcomponents 2.1 and 2.2 will involve general activities at the line from Bani Salamah to 6th of October as well as associated facilities specific impacts on the surrounding sensitive areas. The following list shows the main activities to be conducted under the ongoing and proposed project:

Description of 2.1 activities:

- Embankment and Earthworks
- Equipment, construction raw materials, cables, new tracks, and sleepers' mobilization
- Trenching and new cables installation activities
- Horizontal Directional Drilling (HDD)
- Construction of viaducts and other infrastructural works such as road flyovers,

Description of 2.2 project activities:

- Track upgrading / renewal activities- removal of old tracks
- HDD
- Construction activities required for signaling towers

5.2 Impacts Resulting from Project Activities Segment 1: Greenfield Bani Salamah - 6 October

The Project will result in positive and negative impacts. The following subsections present a detailed assessment of the general impacts resulting from the proposed Project during pre-construction, construction, and operation phases.

5.2.1 Positive impacts – Segment 1

During construction

- Provision of job opportunities for local residents (especially in the construction sector). Contracted workers for segment 1 according to LMP will reach 400 workers.

During operation

- Enhancement of ENR capacity
- Provision of safe land transport means
- Shortening of travel journeys
- Improvement of freight land transport (direct economic benefit for trade and industry sectors)
- Access to 6th of October Dry Port
- Provision of job opportunities
- Reduction of CO_2 emissions as a result of model shift from trucks to rail. Reducing GHG emissions has global impact as well as improving air quality locally. Emission reductions achieved as a result of modal shift from trucks to rail are estimated to be 12,380[30] tCO_2/year.

5.2.2 Negative impacts – Segment 1

5.2.2.1 Pre-Construction Phase

[30] More details on method of estimation is included in the alternatives chapter

Table 5-4 Environmental and social impacts resulting from the Project during pre-construction of Segment 1 are shown in the table 5-4.

Table 5-4 Environmental and social impacts resulting from the Project during pre-construction phase for Segment 1

Pre-Construction Phase of Segment 1: Bani Salamah - Wahat					
1	Aspect	**Land Acquisition (Code :LA1)** **Relevant ESSs: ESS 5**			
	Description	Land to be affected are located parallel to the RRR, in Bani-Salamah village, and potentially in areas of New Sphinx City. Acquisition of privately owned lands (agricultural lands or lands used for other purposes) and structures on the land. While land will be acquired from landowners, tenants and encroachers may also be encountered during the census survey. There is also a risk on livelihoods, due to land acquisition. Legal tittles could not be confirmed because potentially affected PAPs are not yet identified and consulted.			
	Impacts / Risks	As mentioned earlier, about 22.3 km of agricultural land is subject to potential partial expropriation. Approximate total land area subject to potential expropriation is roughly calculated at 216 feddan (equivalent 905,000 m^2). These can be classified into two main group as follows: 1. In about 17 km (km 47-64), a strip of an average of 40 meters from the western, and sometimes the eastern border of land plots will need to be expropriated for the proposed alignment. PAPs of these lands are yet to be identified. However, it is anticipated that owners of these lands will not be severely affected since the expropriation is on the edge of the land. Vulnerability elements will need to be examined more carefully once the PAPs are identified, such as potential experience of an accumulated impact if parcels of their lands were previously expropriated for the construction of the Regional Ring Road alignment.. 2. In the remaining 4 km (km 64-68) and the curves at the end of it (about 1.3 km), the alignment will pass through the land. A strip of an average of 40 meters inside the plot will need to be expropriated for the proposed alignment. It was understood during the meetings with the design consultant that segmentation and fragmentation of such plots will be avoided to the extent possible during the actual final refinement of the alignment. PAPs of these lands are yet to be identified.			
	Source	Pre-construction activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance

Pre-Construction Phase of Segment 1: Bani Salamah - Wahat					
		4	4	16	Substantial
	Impact Assessment	Negative, Substantial; Long term			

5.2.2.2 Construction Phase

The environmental and social impacts resulting from the Project during the construction phase of Segment 1 are shown in Table 5-5

Table 5-5: Environmental and social impacts resulting from the Project during construction phase of Segment 1

Construction Phase of Segment 1: Bani Salamah - Wahat					
1	Aspect	**Air Quality (code: AQ1)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	**Gaseous emissions:** emissions from machinery used for construction (e.g., excavator and wheel loader); emissions of NOx, CO, PM. Hydrocarbons, SO_2 from diesel combustion in construction equipment, exhausts of vehicles used to transport workers, cables, new tracks and other basic equipment. Track will be transported on the gradually completed freight track **Dust emissions:** Dust emissions are expected to occur during the construction phase due to the on-site excavation and trenching activities in addition to the movement of the construction vehicles and unloading of ballast which generate fugitive dust and generation of PM from diesel combustion Emissions may also increase during road closure due to congestion and contribute to new sources in areas where potential re-routing may be needed.			
	Impacts / Risks	As indicated in the baseline chapter, existing concentrations of NO_2 ,SO_2 and CO have been found to be low within the study area. Gaseous emissions will also be temporarily during construction phase. However, trucks and machinery should work efficiently to minimize emissions whether local pollutants or GHG emissions that contribute to global warming. As indicated in the baseline chapter, PM10 and TSP is also below the national law limit. Therefore, the sensitivity of the airshed as a receptor is considered to be low. Wind is another factor that can impact dispersion of dust and other pollutants. Impacts of increased dust will affect workers and communities especially in areas in proximity to the segment, i.e., communities near the Reyah el Nassiri canal.			
	Source	Excavation for trenching work, embankment activities, vehicles and machinery operation, traffic congestion			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term			

Construction Phase of Segment 1: Bani Salamah - Wahat					
2	Aspect	**Noise and Vibration (code: NV1)** **Relevant ESSs: ESS1, ESS 2, ESS 4**			
	Description	Activities such as equipment mobilization, site preparation, excavation and trenching works, and new tracks installation construction and installation are expected to increase noise and vibration levels. Construction activities and duration vary along the alignment and will move along by average two to three times a month. For example, at intersection with roads, construction would last longer than in open areas. Accordingly, the impact is local, temporary and for short time. The main receptors for noise and vibration will be workers, nearby communities in the agricultural areas, near scattered farm houses along the route, gated farmhouse compound and Bani Salamah village.			
	Impacts / Risks	Increased noise and vibrations caused by operation of machinery and transport of materials especially at locations 3, 4 and 5 where the ambient noise measurements were close to the permissible levels as was indicated in the baseline chapter. Impacts of increased noise and vibrations are expected to affect workers, e.g., the hearing system, general health conditions and muscular disorders of workers; surrounding community.			
	Source	Construction activities, trenching activities, unloading and handling of raw materials.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term			
3	Aspect	**Soil and geology (code: SG1)** **Relevant ESSs: ESS 3**			
	Description	The soil in the project area consists of (1) fertile agriculture soil along the route at km 68.5 until km 64.5 km and at the connecting point in Bani-Salamah (2) Cultivated land from km 64.5 to km 39.5 and desert land that will be cultivated from km 39.5 to km 0.			

Construction Phase of Segment 1: Bani Salamah - Wahat					
		Change integrity of soil: General works on soil include trenching, cutting, filling activities, embankment and track, installation Movement of heavy trucks would loosen soil by pressure from the wheels and facilitating erosion by wind. Contamination of soil: Maintenance activities of heavy machinery, vehicles and equipment will involve repairs, washing, oil change, use of lubricant. Potential spillage of oil and lubricants, wash water can contaminate soil.			
	Impacts / Risks	• Soil erosion due to exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. Soil erosion may lead to increased dust emissions • Dust emissions from stored soil stored in a stockpile, which can be swept away by rain • Generation of mud (solid waste) • Soil contamination from spillage and improper handling of solid waste, lubricants and fueling activities			
	Source	Trenching, excavation, heavy vehicle movement			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate; Short-term			
4	Aspect	**Hydrology and surface water (code: HSW1)** **Relevant ESSs: ESS 3, ESS 4**			
	Description	Segment 1 will cross over Reyah El Nassiri channel at km 68, which is mainly used for irrigation of nearby farms and agricultural lands. Consequently, communication and power cables of the proposed signaling network have to cross these bodies of water running under water. Horizontal Directional Drilling (HDD) will be used for under water trenching which may result in surface water pollution. Construction of viaducts over Reyah El Nassiri. The construction phase is not expected to have any impacts on catchments and spillways.			
	Impacts / Risks	• Surface water pollution of water channel at km 68 (linking to existing Bani Salamah station) as a result of construction material/waste falling in the water			

Construction Phase of Segment 1: Bani Salamah - Wahat					
		• Groundwater contamination of Reyah el Nassiria • Impacts of viaduct on water body of Reyah el Nassiria			
	Source	Trenching and HDD and viaduct construction			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate; Short-term			
5	Aspect	**Use of Resources and pollution generation (code: RP1)** **Relevant ESSs: ESS 2, ESS3, ESS4**			

	Description	• **Energy:** Increased energy consumption for transportation of materials and use of construction equipment to prepare the site (e.g., trucks and loaders)
		• **Water:** Increase consumption of water
		• **Raw materials**: Increased use of ballast sourced from Oases quarry and raw materials
		• **Waste**:
		  o Hazardous wastes including used oils and insulation materials, empty containers (paint, solvents)
		  o Non - hazardous solid waste: construction and demolition waste (concrete, bricks, sand and gravel), packaging materials, refuse, such as metal scrap, wood and empty containers
		  o Municipal waste from workers activities at sites, sewage from workers
		• **Pollution generation** due to generation and potential mismanagement of waste including waste water, solid hazardous and non-hazardous waste, municipal waste, construction and demolition waste, exhaust emissions.			

	Impacts / Risks	• Air pollution due to exhaust emissions from construction equipment and vehicles • Emissions of GHGs due to fuel combustion used for operation machinery and vehicles • Increased use of resources: raw material sourced from quarries and sand. • Mismanagement of generated waste including construction and demolition and potential uncontrolled disposal causing pollution in surrounding areas and associated impacts such as visual disturbance, odor, open burning and damage the fertility of the land.			
	Source	Increase in energy consumption for operation of construction equipment Water Consumption for construction work and by workers at the site			

Construction Phase of Segment 1: Bani Salamah - Wahat					
		Raw material consumption: Ballast from quarries and sand Waste water generation Solid hazardous and non-hazardous waste generation in including construction and demolition waste			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term			
6	Aspect	**Occupational Health and Safety (code: OHS1)** **Relevant ESSs: ESS 2**			
	Description	Construction of the new segment 1 includes embankment, trenching, use of heavy machinery, laying out cables and installing tracks, working around water, working around contaminated sites, working at heights, working at the vicinity of other trains (at the joining links at Bani Salamah station and on Wahat-Marazeeq), working near highway, crossing Sumed Oil pipeline and large infrastructural works under development, large concentration of workers and potential spread of infectious diseases (e.g., COVID-19), risks of child labor, risks of GBV			
	Impacts / Risks	Main construction site hazards identified by the Occupational Safety and Health Administration (OSHA), Injuries from minor to fatal, including train/worker accidents, rotating and moving equipment, electrical hazards, fire and explosions, eye hazards, noise and vibration, and fatigue, striking by moving objects, accidents by nearby moving vehicles when working near highways 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			

<table>
<tr><th colspan="6">Construction Phase of Segment 1: Bani Salamah - Wahat</th></tr>
<tr><td></td><td></td><td colspan="4">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 at work
7. Electricity line workers, electricity technicians and electricity engineers are constantly exposed to electricity and face daily risks especially when working near water

Inadequate working conditions: workers may encounter inappropriate working conditions or risk of complaints that are not appropriately addressed

Risks related to child labor
Risks related to GBV
Safety hazards associated with works near highways such as crossing of Daba’a Road
Safety hazards associated with works in areas where other large infrastructural works are taking place, e.g., high speed rail
Safety hazards associated with works crossing other existing infrastructure such as Sumed oil underground pipeline
Risks of drowning while working around the water channels
Health and safety hazards associated with COVID-19 spread and potentially a large number of workers getting infected.</td></tr>
<tr><td></td><td>Source</td><td colspan="4">Construction activities</td></tr>
<tr><td></td><td rowspan="2">Significance</td><td>Severity (S)</td><td>Frequency (F)</td><td>Magnitude (SxF)</td><td>Significance</td></tr>
<tr><td></td><td>4</td><td>4</td><td>16</td><td>Substantial</td></tr>
<tr><td></td><td>Impact assessment</td><td colspan="4">Negative, Substantial; Long -term</td></tr>
<tr><td>7</td><td>Aspect</td><td colspan="4">Ecology and Biodiversity (flora and fauna) (code: EB1)
Relevant ESSs: ESS 6</td></tr>
<tr><td></td><td>Description</td><td colspan="4">As the project is mainly located in a desert area and in the existing railway corridor (link that will be built to connect segment1 at the Bani Salamah station and at the Wahat-Marazeek existing line), important species are not expected to be encountered within the project route. In addition, even biodiversity species recorded within</td></tr>
</table>

Construction Phase of Segment 1: Bani Salamah - Wahat					
		the wider project area are common and unthreatened. Also, no flora exists in the project area, with the exception of native flora growing on the tracks which was observed during the site visit. Impact on biodiversity is considered short term, local, and direct.			
	Impacts / Risks	• Loss of vegetation in agriculture lands • Displacement of Flora on site • Habitat disturbance • Reduced connectivity of fauna populations, and/or isolation of local habitats due to clearing and location of infrastructure • Contamination of the aquatic environment as a result of construction activities • Increased suspended sediment and pollutant loads, permanent loss and disturbance to aquatic flora and fauna. • Loss or degradation of aquatic environment due to drainage shadow effects			
	Source	• All heavy construction activities, vehicle movements, and transport of friable construction materials • Surface runoff from site during construction activity			
	Assessment	Negative, low; Short-term			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate; Short -term			
8	Aspect	**Community Health, Safety, and Security (code: CHS1)** **Relevant ESSs: ESS 4**			
	Description	**Presence of local communities in and around construction site** at the Bani Salamah station near water canal, agricultural lands, farm houses in Sphinx City, New October City workers, workers at new agriculture projects in Gannet Masr and Mostabal Masr, **Crossing or close proximity of works to existing and under development infrastructure** • Crossings of project works with existing infrastructure including major highways, local roads in and around water canal and agricultural areas			

Construction Phase of Segment 1: Bani Salamah - Wahat					
		• Crossings of project works with infrastructure under development including the high-speed rail between Alamein and Ain Sokhna, and the Sumed oil pipeline stretching from the Gulf of Suez to the Mediterranean Sea. Horizontal Directional Drilling (HDD) will be used for trenching works near communities in the surrounding of Bani Salamah station near the water canal **Influx of labor in and around communities in agricultural lands and near water canal; although, unlikely due to the temporary nature of the construction activities and moving along the alignment continuously.**			
	Impacts / Risks	**Lack of privacy and security risks to communities near Reyah ElNassiri water canal area in the surrounding of Bani Salamah station** and in agricultural areas: accessibility to the land/resources/structures, and security concerns **Risks of COVID-19 pandemic due to workers relevant to works near water channel and agricultural lands where there are communities** **Congestion and safety related risks** due to works intersecting existing infrastructures consisting of Daba'a road, Cairo-Alex Desert Road, local roads near water canal • Accidents, loss of lives and properties due to construction activities • Safety risks to the public at or near the construction site • Inappropriate response to incident by security personnel • Safety risks associated with HDD: electric shocks, arc blasts and fire hazards due to underground conduit overlaps, power cables splices, or accidental oil spillage. • Congestion and safety issues associated with works crossing existing infrastructure • Health and safety risks due to increased traffic jams and exposure of road users to exhaust and noise			
	Source	Close proximity of works to local communities and users of existing infrastructure			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance

Construction Phase of Segment 1: Bani Salamah - Wahat					
		4	4	16	Substantial
	Assessment	Negative, Substantial; Long-term			
9	Aspect	**Traffic (code: T1)** **Relevant ESSs: ESS 4**			
	Description	For Areas where line will be intersecting with existing infrastructure, the roads may be blocked, and traffic can be affected. Near water channel, local roads are very small, new line will disrupt 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 as a result of construction activities.			
	Impacts / Risks	Blocked roads due toas a result of the construction works, inadequate storage of excavated soil, trenching activities, etc.			
	Source	Construction and trenching activities			
	Assessment	Negative, High; Short-term			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact Assessment	Negative, Substantial; Short-term			
10	Aspect	**Existing Utilities/Infrastructure (code : EUI 1)** **Relevant ESSs: ESS 4**			
	Description	Crossing with existing infrastructure in the railway alignment such as water and sewage lines or communication cables and high voltage lines of electricity. The construction phase may lead to breaking of any of the existing underground infrastructure lines which will lead to negative effects on the water supply, communication service or electricity to the surrounding areas. If the sewage line is broken, many adverse environmental impacts may occur in the event that the sewage may flood the main land road/agricultural land, and may infiltrate the groundwater, and the residents of the affected area will face a shortage of water supply.			

Construction Phase of Segment 1: Bani Salamah - Wahat					
		Segment will intersect with Sumed oil pipeline and the construction activities may lead to breaking of the existing pipelines.			
	Impacts / Risks	Breaking of underground utilities, which can lead to negative impacts on surrounding communities as a result of service delay.			
	Source	Construction activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term			
11	Aspect	**Risk of child labor and minimum age (code: CL1)** **Relevant ESSs: ESS 2**			
	Description	Child labor is a common practice in Egypt at large, the project in particular, considering constructions, primary supply; service provisions around stations. According to Egyptian Labor Law No.12/2003, child labor should be prohibited especially in dangerous works. Children below 18 are favorable labor as they receive low salaries and they are less demanding. LMP elaborates labor issues pertaining to primary supply workers including child labor and indirect workers to ensure compliance with ESS2.			
	Impacts / Risks	There is a risk that this common practice is used in the project. This risk should be carefully handled and restrict obligations and monitoring should be applied in the contractor obligations.			
	Source	Violating the labor law, employing children, and exposing them to work risks			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	2	8	Moderate
	Impact Assessment	Negative, Moderate; Short-term			
12	Aspect	**Risk associated with temporary labor influx (code: TLI1)** **Relevant ESSs: ESS 2, ESS 4**			

Construction Phase of Segment 1: Bani Salamah - Wahat					
	Description	Generally speaking, having workers in small cities or villages might result in unfavorable impacts on the available resources (e.g., pressure on accommodation, food, risk of communicable diseases especially in light of the COVID-19, health care and medication and potable source of water).			
	Impacts / Risks	It may result in inconvenience to the local communities, particularly in the areas where communities are conservative or not accustomed to having outsiders such as agricultural areas at the km 43-49 GBV risk and specifically SEA/SH is also applicable Lack of privacy, accessibility to the land/resources/structures, security concerns,			
	Source	Temporary labor influx risks as a result of construction activities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	2	8	Moderate
	Impact Assessment	Negative, Moderate; Short-term			
13	Aspect	**Risk of gender-based violence (GBV) SEA-SH (code: GBV1)** **Relevant ESSs: ESS2, ESS 4**			
	Description	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 project can lead to an increased risk of Gender Based Violence, as women are particularly vulnerable within the context of construction projects. While the impact of the project on GBV cannot be specifically determined. The construction field is typically male-dominated			
	Impacts / Risks	The various forms of GBV that are likely to occur include: • Sexual harassment of women and girls by workers in agricultural areas and areas close to residential buildings. • Security concerns due to passing of the railway line close by land residents and by-passers			

Construction Phase of Segment 1: Bani Salamah - Wahat					
		• Discrimination against women in terms of employment and security issues			
	Source	GBV risks as a result of temporary labor influx and construction activities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	2	8	Moderate
	Impact Assessment	Negative, Moderate, Short Term			
14	Aspect	**Culture heritage (code: CH1)** **Relevant ESSs: ESS 8**			
	Description	No deep excavations will be carried out, so finding artifacts is unlikely. No deep digging/trenching during installation of signaling towers and track installation and upgrade will take place, thus there is no probability to find antiquities.			
	Impacts / Risks	Probability to find antiquities.			
	Source	Digging/trenching during installation of signaling towers and track extension and upgrade will take place, thus there is no probability to find antiquities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	2	4	Low
	Impact Assessment	Negative, Low; Short Term			
15	Aspect	**Land Acquisition (code : LA1)** **Relevant ESS : ESS 5**			
	Description	Relocation of some structures Loss of crops by the movement of construction vehicles and equipment Temporary land acquisition for contractors to store their materials			

Construction Phase of Segment 1: Bani Salamah - Wahat					
	Impacts / Risks	- Partial loss of asset that may need to be relocated (e.g., small rooms, greenhouse, steel-structures warehouse or huts) - Plots might be subject to damage of crops and plantations. This could result in temporarily loss of income, if plants (crops and plantation) will be affected/damaged during construction phase. - Conflicts between surrounding communities and contractor around storage of materials or waste.			
	Source	Construction activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial, Short-term			

5.2.2.3 Operation Phase

The environmental and social impacts resulting from the Project during the operation phase of Segment 1 are shown in Table 5-6.

Table 5-6: Environmental and social impacts resulting from the Project during operation phase of Segment 1

Operation Phase of Segment 1: Bani Salamah – What					
1	Aspect	**Air Quality (AQ2)** **Relevant ESSs: ESS2, ESS3, ESS4**			
	Description	There are potential gaseous emissions from locomotives and dust emissions from locomotive movement disturbing the ground. The locomotives will be properly covered and tightly sealed to avoid scattering of goods along the way. In addition, the design of the railway has taken into account future electrification, which would reduce project gaseous emissions instead of relying on diesel. With proper maintenance of locomotives gaseous emissions can be reduced. Since the trains will only pass by a local community with a duration expected to last not more than two minutes in transit, the air quality impact is minor. Existing air pollutants recorded during the baseline assessment are relatively low indicating that the air shed is not degraded. The frequency and duration of the events is likely to be continuous and long term. However, the potential for an exceedance of the law limit taking into account background concentrations is considered low.			
	Impacts	Emissions of PM, NOx, CO and unburnt hydrocarbons as indicated in Table 7-2			
	Source	Project operation			
	Significance	Severity (S)	Frequency (F)	Magnitude (S*F)	Significance
		2	2	4	Low
	Impact Assessment	Negative, Low, Long term			
2	Aspect	**Occupational Health and Safety (code: OHS2)** **Relevant ESSs: ESS 2**			
	Description	Health and safety issues specific to railway operations include the following: • **Train / Worker Accidents** Railway workers in the vicinity of rail lines are exposed to moving trains. • **Noise and Vibration** Crew members may be exposed to noise from locomotives, rolling stock, and machinery, as well as to significant repetitive mechanical shocks and / or vibrations.			

Operation Phase of Segment 1: Bani Salamah – What		
		• **<u>Diesel Exhaust</u>** Railway workers, including locomotive crews and workers in stations, rail yards, and locomotive and car shops, may be exposed to exhaust from diesel locomotives and other diesel engines. Crew members riding immediately behind the lead engines of trains (e.g., trailing locomotives) and workers in indoor turnaround areas where locomotives are usually left operating, sometimes for prolonged periods, may be exposed to particularly high levels of diesel exhaust consisting of high levels of PM2.5 and NOx. • **<u>Fatigue</u>** Locomotive engineers and other railway workers are often required to work irregular work hours which may result in fatigue. Fatigue may be affected by the length and time of the shift (e.g., long night shifts, shift start times); the nature of the changes between shifts (shift rotation); the balance in concentration and stimulation in the work activities being undertaken; insufficient rest breaks; and the time of day. Fatigue, particularly of drivers, signalers, maintenance workers, and others whose work is critical to safe operation, can pose a serious safety risk for railway workers and the general public. • **<u>Electrical Hazards</u>** Electrified railways use either overhead wires or a conductor rail (e.g., third rail) to transmit electrical power to the train locomotive or multiple units. Overhead power lines may also be present near non-electrified rail lines. • **<u>Electric and Magnetic Fields</u>** Railway workers on electric railway systems may have a higher exposure to electric and magnetic fields (EMF) than the general public due to working in proximity to electric power lines. • **<u>Diesel Storing tanks for power generators</u>** Power generators to be used in case of powers cut-offs and emergencies are operating with diesel oil that is stored in large steel tanks above or underground. During summer time, temperatures are high causing the generation of diesel fumes which may lead to fire hazards. **Fire and explosion hazards related to transport of flammable materials (petroleum) and accidental spillage**
	Impacts / Risks	• Train / worker accidents • Noise and vibration • Diesel exhaust • Fatigue • Electrical hazards • Electric and magnetic fields

Operation Phase of Segment 1: Bani Salamah – What					
		• Fire and explosion hazard			
	Source	Project operation			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	4	16	Substantial
	Impact Assessment	Negative, Substantial; long-term			
3	Aspect	**Noise and Vibration (code: NV2)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	Annex 7 shows noise model conducted to assess noise and vibration impacts from the operation of the proposed greenfield. The main outcome is presented as follows:			

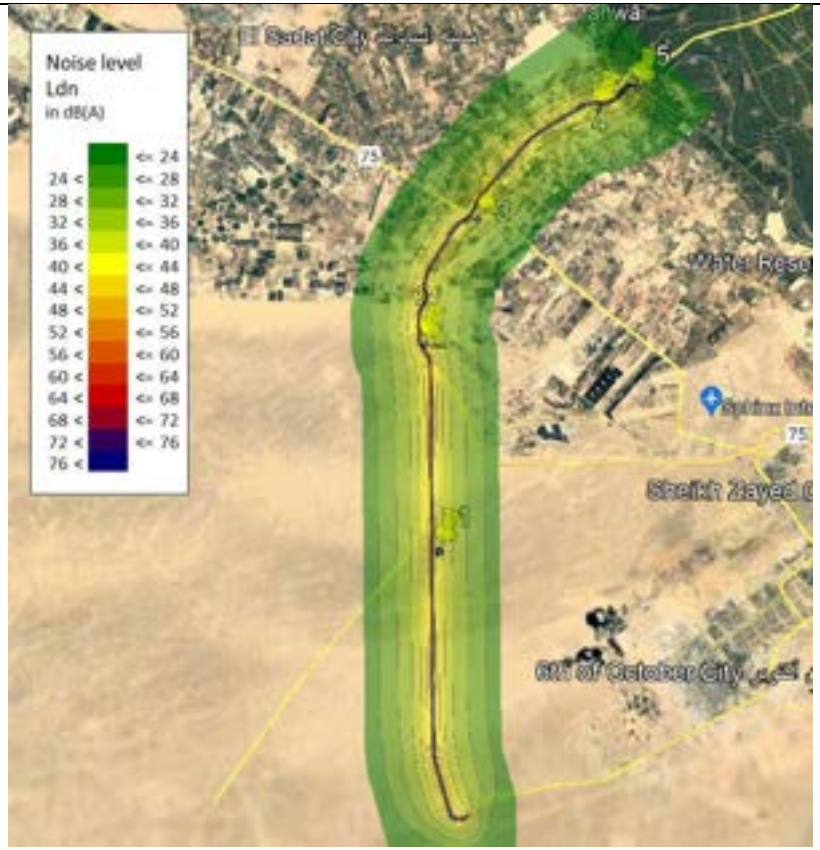


Figure 5-1: Grid noise map for the railway and surroundings

Table 5-7: Comparison between the predicted, measured, and permissible sound pressure levels at the sensitive locations

Operation Phase of Segment 1: Bani Salamah – What

Point	Predicted Leq. dB(A)	Measured background noise dB(A)	Permissible level dB(A)
1	40	54	60
2	45	55	60
3	38	56	60
4	41	59	60
5	36	58	60

According to the resulted noise map and the predicted levels stated in Table 4, for Bani-Salamah – Wahat, the predicted noise levels are lower than the permissible levels for the residential areas during the daytime slot according to the Egyptian environmental law. Furthermore, the current measured background noise levels are higher than the predicted noise levels of the railway at the same locations with a significant difference, which means that the railway impact can be neglected compared to the current background noise caused by other noise sources.
According to the following equation for the sound levels summation of different sources, when the difference between two sources is more than 10 dB, the smaller level is negligible.

$$SPLTOTAL = 10log10\left[10^{SPL1/10} + 10^{SPL2/10}\right](dB)$$

SPL1 and SPL2 are the sound pressure levels of the first and second sources.

However, since the railway is passing through sensitive residential areas, a recommended mitigation measure is proposed to reduce the instant noise level of the train while it is instantly passing near to these locations. The noise model shows that the maximum SPL of the railway at the nearest residential area is around 62-72 dBA which can be a source of annoyance when it is passing near to any sensitive receptor. Therefore, a noise barrier is recommended to be installed near to the railway track to reduce the instant noise level of the passing train for more convenience at the sensitive locations.

Noise is expected from maintenance and engineering work as well as from various parts of the train, such as engines, traction motors, brakes, and the wheels turning on the rails. Some of these train-related sources of noise and vibration are:

- Gaps in the rail to allow for rail expansion.
- Roughness and irregularities on the wheel and rail surfaces

Operation Phase of Segment 1: Bani Salamah – What					
		• Rail squeal caused by a train's wheels slipping under specific conditions, usually in sharp curves • Air displacement of a train in a tunnel • horns, whistles, and bells for both communication and warning • The engines in diesel locomotives • Electric traction motors often produce electromagnetically induced noise. • Noise from wheel axle bearings Crew members may be exposed to noise from freight operations and potential accidents or maintenance related hazards			
	Impacts / Risks	• Communities in cultivated desert lands, agricultural areas, Bani Salamah village and scattered farmhouses in the vicinity of the line will be subject to potentially high noise and vibration levels. • Effects on the hearing system, general health conditions and muscular disorders of workers and nearby receptors. • Vibrations can cause structural damage to nearby buildings. • Cumulative impacts due to other noise and vibration sources such as traffic on nearby highways			
	Source	Freight line operation			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	4	16	Substantial
	Impact Assessment	Negative, Substantial; Long-term			
4	Aspect	**Community Health and Safety (code: CHS2)** **Relevant ESSs: ESS 4**			
	Description	Segment 1 will cross through agricultural areas (km 68.5-39.5) where there are isolated residences introducing the risk for accidents since the segment is new. This may lead to potential disruption of access between land parcels around the line. Nearby communities will also be subject to new sources of noise and vibration and increased air pollutant emissions The transport of hazardous and flammable material also introduces health and safety hazards and risks in case of accidents and spilling of petroleum Maintenance activities will generate waste including hazardous and non-hazardous waste			

Operation Phase of Segment 1: Bani Salamah – What					
	Impacts / Risks	• Safety risks and accidents associated with possible accident while transporting dangerous materials • Release of toxic material that can pollute air, soil or water and accordingly impact the surrounding community • Collision of railway with passengers or cars leading to major accidents (safety access risk) as well as with farmers accessing their land, if divide in half. • Increased levels of noise and vibrations • Increased levels of PM2.5 and NOx • Improper disposal of waste can contaminate surrounding • Risks of privacy and security concerns especially where rail passing close to residential buildings or cutting land in half			
	Source	Freight operation and maintenance			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact Assessment	Negative, Substantial; Long-term			
6	**Aspect**	**Ecology and Biodiversity (code: EB2)** **Relevant ESS: ESS6**			
	Description	Based on the identified flora and fauna of the project area, it is not anticipated that there will be any further impacts to fauna and flora as a result of the operation of the Bani Salamah - Wahat Railway. There will be no further habitat loss/vegetation clearance required during the operation. Overall, the operational effects of Bani Salamah - Wahat Railway are considered likely to be Minor permanent adverse (assuming that where habitat clearance is required that compensatory planting and / or habitat creation is agreed and implemented). The provision of compensatory habitat planting or biodiversity improvement measures should be implemented. Habitat connectivity – Ensure that the rail track and roadside habitat is maintained and no severance of habitat occurs without prescriptive mitigation (which would be detailed as the scheme design progresses and appropriate survey information becomes available) Working near water and generation of artificial substrates: the main impact anticipated will be disturbance to aquatic habitats. Ensure that all ecological surveys include checking of the watercourse for the presence of otters and other protected species during project design and construction to ensure that there is minimal disturbance.			
	Impacts / Risks	Reduced flora species and ecosystem diversity. Cumulative loss of vegetation and flora species.			

Operation Phase of Segment 1: Bani Salamah – What					
		Reduced fauna species and ecosystem diversity. Cumulative loss of fauna species. Cumulative loss of marine Benthic. Disruption of fisheries			
	Source	Operation activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate, Long-term			
7	**Aspect**	**Culture Heritage (code: CH2)** **Relevant ESS: ESS 6**			
	Description	Presence of cemetery and mosque near the alignment at km 66, located 180 m away			
	Impacts / Risks	Impacts on structure from vibration of passing rail.			
	Source	Movement of railway			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact Assessment	Negative, Substantial, Long-term			
8	**Aspect**	**Land and Assets Value Depreciation (code: LA2)** **Relevant ESS: ESS 5**			
	Description	Segment 1 will cross through agricultural areas (km 68.5-39.5 at the intersection with Daba'a road) where there are isolated privately owned residences			
	Impacts / Risks	There is a risk of land and asset value depreciation as a result of isolating land from the road and for dividing lands in the 4km curve near Bani Salamah station.			

Operation Phase of Segment 1: Bani Salamah – What					
	Source	Project operation			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate, Long-term			

5.2.2.4 Impacts Rating Summary

Table 5-8 shows a rating summary of the environmental and social impacts and risks resulting from activities at Segment 1 during pre-construction, construction, and operation phases.

Table 5-8 Environmental and social impact and risks rating summary for Segment 1

Phase	Receptor/ EHS Aspect		Impact Rating			
			Low	Moderate	Substantial	High
Pre-construction	Land acquisition	Acquisition of agricultural lands in Bani-Salamah			✔	
Construction	Air Quality			✔		
	Noise and Vibration			✔		
	Soil and geology			✔		
	Hydrology and surface water			✔		
	Resource efficiency and pollution prevention			✔		
	Occupational Health and safety				✔	
	Ecology and Biodiversity (flora and fauna)			✔		
	Community health and safety				✔	
	Traffic				✔	
	Existing Utilities/Infrastructure			✔		
	Risk of child labor			✔		
	Temporary labor influx			✔		
	Risk of gender-based violence (GBV)			✔		
	Culture heritage		✔			
	Land acquisition	Loss of crops – movement of structures - Temporary land			✔	

Phase	Receptor/ EHS Aspect		Impact Rating			
			Low	Moderate	Substantial	High
		acquisition by the contactor				
Operation	Air quality		✔			
	Occupational Health and Safety				✔	
	Noise and Vibration				✔	
	Community Health and Safety				✔	
	Ecology and biodiversity				✔	
	Culture heritage				✔	
	Land acquisition	Devaluation of assets		✔		

As seen in the previous table, applying the impact ranking method discussed in the beginning of this section yields 15 significant negative impacts and risks during the pre-construction and construction phases of Segment 1 which are:

Negative impacts on:

1. Air quality
2. Noise vibration
3. Soil and geology
4. Hydrology and surface water
5. Resource efficiency and pollution prevention
6. Occupational Health and safety
7. COVID-19 pandemic
8. Ecology and Biodiversity (flora and fauna)
9. Community health and safety
10. Traffic
11. Existing Utilities/Infrastructure

Risk of:

12. Land acquisition
13. Risk of child labor
14. Risk associated with temporary labor influx
15. Risk of gender-based violence (GBV)

While during operation phase of Segment 1, the impact ranking method yields 6 significant negative impacts and risks, which are:

1. Occupational Health and Safety
2. Noise and Vibration
3. Community health and safety
    a. Accidents from crossing the railway
    b. Cargo load
4. Ecology and Biodiversity (flora and fauna)
5. Culture heritage
6. Risk of land acquisition

Mitigation measures for these moderate to high impacts are discussed in the following section.

5.3 Impacts Resulting from Project Activities Segment 2: Signaling Modernization and Track Upgrades of Marazeeq – Wahat existing railway

The following subsections present a detailed assessment of the general impacts resulting from the proposed Project during construction, and operation phases of Segment 2.

5.3.1 Positive impacts - Segment 2

During construction

Create direct and indirect job opportunities

- The project activities will require engineers, skilled and unskilled labor. They are expected to be residents of the districts surrounding the project sites. Contracted workers for segment 2 according to LMP will reach 200 workers.

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 project area through the following supply chain:
    - Implementation of works and provision of supplies related to construction, and closure of the site;
    - 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
    - Workers and engineers may need accommodation facilities.

During operation

Increased efficiency of the railway transportation system

- Increased safety and reliability of the national railway service and,
- Reducing trip time as a result of increased train travel speed and reducing operational delay.
- Decrease (or nearly elimination) of train-related accidents, which either involve derailments of the trains, and train to vehicle accidents at road crossings;
- The daily freight transport time will be reduced as a result of the modernized railway system; reduced emissions associated with improved operating conditions

5.3.2 Negative impacts – Segment 2

5.3.2.1 Pre-Construction Phase

Table 5-4 Environmental and social impacts resulting from the Project during pre-construction of Segment 1 are shown in the table 5-4.

Table 5-9 Environmental and social impacts resulting from the Project during pre-construction phase for Segment 1

Pre-Construction Phase of Segment 1: Bani Salamah - Wahat					
1	Aspect	**Land acquisition (code: LA3)** **Relevant ESSs: ESS 5**			
	Description	The re-possession of the land use corresponding to track ROW in agricultural areas bordering the track			
	Impacts / Risks	Relocation of settlers, loss of livelihood			
	Source	Project construction			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	4	16	High
	Impact assessment	Negative, High, Long term			

5.3.2.2 Construction Phase

Construction Phase of Segment 2 are shown in Table 5-10.

Table 5-10: Environmental and social impacts resulting from the Project during construction phase of Segment 2

Construction Phase of Segment 2: Marazeek-Wahat					
1	Aspect	**Air Quality (code: AQ 3)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	**Gaseous emissions:** Emissions from machinery used for construction (e.g., excavator and wheel loader); Emissions (e.g., CO, NOx and SO_2) from the exhausts of vehicles used to transport workers, cables, new tracks and other basic equipment. **Dust emissions:** Dust emissions are expected to occur during the construction phase due to the on-site excavation and trenching activities in addition to the movement of the construction vehicles and unloading of ballast which generate fugitive dust.			
	Impacts / Risks	Impacts on ambient air quality are expected, in addition to adverse health impact on the respiratory system of the workers. However, the vehicles and machinery present point sources. Accordingly, under normal conditions any effects witnessed on a local-scale will be of a temporary nature and restricted to the immediate point of exhaust emission			
	Source	Excavation for trenching work, backfilling activities, vehicles and machinery operation and ballast unloading.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term			
2	Aspect	**Noise and Vibration (code : NV3)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	Crew members may be exposed to noise from locomotives, rolling stock, and machinery, as well as to significant repetitive mechanical shocks and / or vibrations.			

Construction Phase of Segment 2: Marazeek-Wahat					
		Activities such as equipment mobilization, site preparation, excavation & trenching works, old tracks dismantling and new tracks installation construction and installation could potentially lead to an increase of noise and vibration levels. The main receptors for noise and vibration will be workers and nearby residential areas, but it is expected to be limited impacts as it's only for short time upgrading works on an existing operating railway line.			
	Impacts / Risks	Construction activities, trenching activities, unloading and handling of raw materials.			
	Source	Construction activities, trenching activities, unloading and handling of raw materials.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact Assessment	Negative, Moderate; Short-term			
3	Aspect	**Soil and Geology (code: SG3)** **Relevant ESSs: ESS 3, ESS 4**			
	Description	The proposed works will involve excavations for trenching activities. Also impacts on soil from track upgrading are expected but will not be major as it only for upgrading the existing tracks. Movement of heavy trucks would loosen the soil by pressure from the wheels and expose them for easy erosion by wind. The heavy machinery, vehicles and equipment will require repairs and maintenance including washing. This may lead to spillage of oil during changing and repairs, generation of waste like engine filters, grease, and scrap materials may lead to soil contamination at the project site.			
	Impacts / Risks	• Soil erosion due to exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. Soil erosion may lead to increased dust emissions • Excavated soil storage area may block the parallel roads or landscape view at the site. • Dust emissions from stored soil stored in a stockpile, which can be swept away by rain			
	Source	Trenching, excavation, heavy vehicle movement			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	2	6	Moderate

Construction Phase of Segment 2: Marazeek-Wahat					
	Impact assessment	Negative, Moderate; Short-term			
4	Aspect	**Hydrology and surface water (code: HSW 3)** **Relevant ESSs: ESS 3, ESS 4**			
	Description	The railway track cross over water bodies, Consequently, communication and power cables of the proposed signaling network have to cross these bodies of water running under water. Horizontal Directional Drilling (HDD) will be used for this required for under water trenching which may result in surface water pollution.			
	Impacts / Risks	• Pollution of surface water • Falling over • Falling objects and loads • Stepping on unstable objects • Vehicles falling into trenches • Flying fragments or particles • Fire or explosion hazards. • Accidents due to living beings. • Impacts on railway lines • Noise and vibration • Generation of mud (solid waste).			
	Source	Horizontal Directional Drilling (DD) activities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate; Short-term			
5	Aspect	**Resource Efficiency and Pollution Prevention (code: RP3)** **Relevant ESSs: ESS 3**			
	Description	There will be an increase in energy consumption during the construction phase as a result of the transportation of materials and construction equipment to the project site as well as the equipment used to prepare the site (e.g. trucks			

<table>
<tr><th colspan="6">Construction Phase of Segment 2: Marazeek-Wahat</th></tr>
<tr><td></td><td></td><td colspan="4">& loaders), and there will be an increase in overall resource consumption of water, equipment, ballast and raw materials during construction phase.</td></tr>
<tr><td></td><td>Impacts / Risks</td><td colspan="4">Air pollution and the negative health effects of exhaust emissions from construction equipment and vehicles. However, emissions are not likely to be significant.

The amounts of fuel combustion, consumption of raw material for construction such as concrete and water consumption are not specified. However, the project is not expected to significantly use water and construction raw material. Efficient use of energy in terms of controlling running vehicles and equipment should be in place.</td></tr>
<tr><td></td><td>Source</td><td colspan="4">Energy consumption: There will be an increase in energy consumption as a result of increased construction equipment.

Water Consumption: The water will be used for construction work, as well as the workers consumption of water at the site

Ballast: Ballast from quarries is to be supplied and used at areas of track upgrades.</td></tr>
<tr><td></td><td rowspan="2">Significance</td><td>Severity (S)</td><td>Frequency (F)</td><td>Magnitude (SxF)</td><td>Significance</td></tr>
<tr><td></td><td>3</td><td>3</td><td>9</td><td>Moderate</td></tr>
<tr><td></td><td>Impact Assessment</td><td colspan="4">Negative, Moderate; Short-term</td></tr>
<tr><td></td><td>Description</td><td colspan="4">Other than the excavated soil due to trenching works, construction activities may potentially generate solid waste that consists of municipal waste, construction waste and some hazardous waste from project activities. Waste is expected to include the following categories:

<u>Hazardous Wastes</u>

• Used oils & insulation materials, if any
• Empty containers, such as paints.
• Replaced sleepers and ballast contaminated with grease.
• Some of the sleepers (crossties) are very old and were potentially treated with hazardous materials such as benzo-pyrene. However, it should be noted that during track renewal activities, samples from wooden ties should be analyzed to determine if it is contaminated by hazardous materials or not.</td></tr>
</table>

<table>
<tr><th colspan="6">Construction Phase of Segment 2: Marazeek-Wahat</th></tr>
<tr><td></td><td></td><td colspan="4">• Waste electrical and electronic equipment (WEEE)
• Ballast contaminated with oil and grease
<u>Non - hazardous solid waste</u>
• Construction and Demolition waste (concrete, bricks, sand and gravel)
• Dismantled old tracks and related components (track operation keys).
• Packaging materials
• Damaged cables, old replaced cables, waste pipes, …
• Inert construction / demolition materials;
• Refuse, such as metal scrap, wood and empty containers
• Sewage from workers
<u>Municipal waste</u>
From workers activities at sites</td></tr>
<tr><td></td><td>Impacts / Risks</td><td colspan="4">Negative effects on the environment in case of improper disposal of solid waste on the surrounding community and its associated impacts of visual disturbance, odor and even open burning.
The hazardous waste streams should be properly handled and safely stored and disposed of.
Otherwise, it will increase traffic when moving waste to designated landfills / disposal sites or taking up and requiring more areas in landfill to host the waste generated in case no proper waste management practice is in place (reduce, reuse and recycle).
Sewage could be pumped out and discharged in the adjacent wastewater treatment plant otherwise it can cause contamination to soil and water sources.</td></tr>
<tr><td></td><td>Source</td><td colspan="4">Construction waste from the project site and track upgrading works.</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Significance</td><td>Severity (S)</td><td>Frequency (F)</td><td>Magnitude (SxF)</td><td>Significance</td></tr>
<tr><td>3</td><td>3</td><td>9</td><td>Moderate</td></tr>
<tr><td></td><td>Impact Assessment</td><td colspan="4">Negative, Moderate; Short-term</td></tr>
<tr><td>7</td><td>Aspect</td><td colspan="4">Occupational Health and Safety (code: OHS3)</td></tr>
</table>

Construction Phase of Segment 2: Marazeek-Wahat		
		Relevant ESSs: ESS 2
	Description	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. In addition to the risk of potential spread of infectious diseases due to the large number of workers (e.g., COVID-19). There is also a swampy pond resulting from excess untreated wastewater at approximately km 30 and spanning over approx. 300 m at a distance of about 1.5 – 2 meters from the railway tracks and that exposes the workers to both health and safety hazards due to working near water.
	Impacts / Risks	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 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 8. injuries from minor to fatal, including train/worker accidents, rotating and moving equipment, electrical hazards, fire and explosions, eye hazards, noise and vibration, and fatigue including Struck by moving objects, 9. Excavation and Trenching – OSHA has recognized excavation and trenching as the most hazardous construction site operation. 10. 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. 11. Stable and mobile stairs - Fixed and mobile stairs are important causes of injuries and disasters among construction workers. 12. 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. 13. 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. 14. 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. Health and safety hazards due to working near water may include the following: • The risk of falling into water and drowning

<table>
<tr><th colspan="6">Construction Phase of Segment 2: Marazeek-Wahat</th></tr>
<tr><td></td><td></td><td colspan="4">• Contact with contaminated water, may expose the workers to contaminated waterborne diseases
• Manual handling and lifting hazards
• Electrical hazards
• Trips, slips and falls
• Exposure to chemicals
• Impact with submerged objects
• Floating or submerged debris
• Hypothermia

In addition to the health and safety risks, workers may encounter inappropriate working conditions or risk of complaints that are not appropriately addressed. And health and safety hazards associated with COVID-19 spread and potentially a large number of workers getting infected.</td></tr>
<tr><td></td><td>Source</td><td colspan="4">Construction activities</td></tr>
<tr><td></td><td rowspan="2">Significance</td><td>Severity (S)</td><td>Frequency (F)</td><td>Magnitude (SxF)</td><td>Significance</td></tr>
<tr><td></td><td>4</td><td>4</td><td>16</td><td>Substantial</td></tr>
<tr><td></td><td>Impact assessment</td><td colspan="4">Negative, Substantial; Long -term</td></tr>
<tr><td>8</td><td>Aspect</td><td colspan="4">Community Health, Safety, and Security (code: CHS3)
Relevant ESSs: ESS 4</td></tr>
<tr><td></td><td>Description</td><td colspan="4">- Level Crossings Safety:
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.

- Pedestrian Safety:
Trespassers on rail lines and facilities may incur risks from moving trains, electrical lines and equipment, and hazardous substances, among other issues. Also due to the closure of level crossings during construction activities, it is expected that illegal track crossing will be increased raising the risk of accidents.</td></tr>
</table>

Construction Phase of Segment 2: Marazeek-Wahat					
		- **Unexpected train delays due to reduction of train speed at the project's construction sites will result in longer train trip time** - **Construction activities at sites accessible to public (e.g., local markets)**: 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			
	Impacts / Risks	- Accidents, loss of lives and properties. - Longer train trip time and train delays - Safety risks to the public at or near the construction sites.			
	Source	Unsafe level crossings and pedestrian trespassing on the tracks.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	4	16	Substantial
	Impact assessment	Negative, Substantial; Long -term			
9	Aspect	**Natural disaster risk (code: NDR3)** **Relevant ESSs: ESS 2, ESS 4**			
	Description	Earthquakes & Flooding; however, Egypt is characterized by low seismic activity and no flooding in the project route			
	Impacts / Risks	Negatively impact the time schedule of the construction activities and may cause injuries or fatalities to the workers. Emergency response plan prepared by the contractor will mitigate the risk of natural disaster.			
	Source	Natural causes			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	1	4	low
	Impact assessment	Negative, Low; Long -term			
10	Aspect	**Traffic (code : T3)** **Relevant ESSs: ESS 1, ESS 2, ESS 4**			

	Description	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.			
	Impacts / Risks	Blocked roads as a result of the construction works, inadequate storage of excavated soil, trenching activities, etc.,			
	Source	Construction and trenching activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial; Short-term			
11	Aspect	**Use of Herbicides (code: UH3)** **Relevant ESSs: ESS 1, ESS 2, ESS 4**			
	Description	It is necessary to prevent vegetation within railroad rights-of-way to avoid interference with train operations and track maintenance. Growth of trees and plants can cover signals, fall onto the tracks and overhead power lines, and prevent workers from getting to places of safety when trains are passing. The control on vegetation will involve the use of mechanical methods (e.g., mowing) and manual methods (e.g. hand pruning), and the use of herbicides will be avoided.			
	Impacts / Risks	Minimum risk as use of herbicides will be avoided.			
	Source	Control the vegetation along the track right of way			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	2	4	low
	Impact assessment	Negative, low, short term			
12	Aspect	**Ecology and Biodiversity (flora and fauna) (code: EB3)** **Relevant ESSs: ESS 6**			
	Description	The railway track corridors have been in place for more than a century and is already part of the man-made landscape. Although some wild animals and plants seem to utilize man-made microhabitats around the track			

		corridor, none seems to be obligate user that requires these microhabitats for its survival. Available data show that none of the species that are likely to occur around the railway corridor is threatened. Mismanagement of waste might lead to water resources contamination especially during HDD and working in the vicinity of the water resources.			
	Impacts / Risks	Minimal impacts are expected on diversity environmental and biological.			
	Source	Construction activities including trenching & track upgrades.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		2	2	4	low
	Impact assessment	Negative, Low; short term			
13	Aspect	**Risk of child labor (code: CL3)** **Relevant ESSs: ESS 2**			
	Description	Child labor is a common practice in Egypt at large, the project in particular, considering constructions, primary supply; service provisions around stations. According to Egyptian Labor Law No.12/2003, child labor should be prohibited especially in dangerous works. Children below 18 are favorable labor as they receive low salaries and they are less demanding. LMP elaborates labor issues pertaining to primary supply workers including child labor and indirect workers to ensure compliance with ESS2.			
	Impacts / Risks	There is a risk that this common practice is used in the project. This risk should be carefully handled and restrict obligations and monitoring should be applied in the contractor obligations.			
	Source	Violating the labor law, employing children, and exposing them to work risks			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate; Short-term			
14	Aspect	**Risk associated with Temporary labor influx (code: TLI3)** **Relevant ESSs: ESS 2, ESS 4**			

	Description	Generally speaking, having workers in small cities or villages might result in unfavorable impacts on the available resources (e.g. pressure on accommodation, food, risk of communicable diseases especially in light of the COVID-19, health care and medication and potable source of water). The contractor will depend on the local labor as much as possible; they are expected to be residents of the project area; which may reduce the risk of labor influx.			
	Impacts / Risks	It may result in inconvenience to the local communities, particularly in the areas where communities are conservative or not accustomed to having outsiders.			
	Source	Temporary labor influx risks as a result of construction activities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	3	9	Moderate
	Impact assessment	Negative, Moderate; Short-term			
15	Aspect	**Risk of gender-based violence (GBV) (code: GBV3) including SEA and SH** **Relevant ESSs: ESS 2, ESS 4**			
	Description	The scale of labor influx and the absorptive capacity of the local community indicates the significance of the anticipated risk of GBV including SEA and SH. 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 project can lead to an increased risk of Gender Based Violence, as women are particularly vulnerable within the context of construction projects. While the impact of the project on GBV cannot be specifically determined.			
	Impacts / Risks	The various forms of GBV that are likely to occur include: - Sexual harassment of women and girls by workers, - Security concerns and the probability of limitation of women and young girls' mobility in the project sites, - Discrimination against women in terms of employment.			
	Source	GBV risks as a result of temporary labor influx and construction activities.			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance

		3	3	9	Moderate
	Impact assessment	Negative, Moderate; Short-term			
16	**Aspect**	**Culture heritage (code: CH3)** **Relevant ESSs: ESS 8**			
	Description	The majority of the construction activities and trenching activities will be carried out parallel to the existing 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 signaling equipment and track upgrade will take place on the same existing tracks location, thus there is no probability to find antiquities. However, in the event that any archaeological remains are discovered during digging, the contractor must follow the Chance Find Procedures.			
	Impacts / Risks	Probability to find antiquities.			
	Source	Digging/trenching during installation of signaling towers and track upgrade			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		3	2	6	Moderate
	Impact assessment	Negative, Moderate; short term			
17	Aspect	**Land Acquisition (code : LA3)** **Relevant ESS : ESS 5**			
	Description	Temporary land acquisition for contractors to store their materials			
	Impacts / Risks	Conflicts between surrounding communities and contractor around storage of materials or waste.			
	Source	Construction activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	3	12	Substantial
	Impact assessment	Negative, Substantial, Short-term			

5.3.2.3 Operation Phase

Table 5-11: Environmental and social impacts resulting from the Project during operation phase of Segment 2

Operation Phase of Segment 2: Marazeek -Wahat		
1	Aspect	**Occupational Health & Safety (code: OHS4)** **Relevant ESSs: ESS 2**
	Description	Health and safety issues specific to railway operations include the following: • **Train / Worker Accidents:** Railway workers in the vicinity of rail lines are exposed to moving trains. • **Noise and Vibration** Crew members may be exposed to noise from locomotives, rolling stock, and machinery, as well as to significant repetitive mechanical shocks and / or vibrations. • **Diesel Exhaust** Railway workers, including locomotive crews and workers in stations, rail yards, and locomotive and car shops, may be exposed to exhaust from diesel locomotives and other diesel engines. Crew members riding immediately behind the lead engines of trains (e.g., trailing locomotives) and workers in indoor turnaround areas where locomotives are usually left operating, sometimes for prolonged periods, may be exposed to particularly high levels of diesel exhaust. • **Fatigue** Locomotive engineers and other railway workers are often required to work irregular work hours which may result in fatigue. Fatigue may be affected by the length and time of the shift (e.g., long night shifts, shift start times); the nature of the changes between shifts (shift rotation); the balance in concentration and stimulation in the work activities being undertaken; insufficient rest breaks; and the time of day. Fatigue, particularly of drivers, signalers, maintenance workers, and others whose work is critical to safe operation, can pose a serious safety risk for railway workers and the general public. • **Electrical Hazards** Electrified railways use either overhead wires or a conductor rail (e.g. third rail) to transmit electrical power to the train locomotive or multiple units. Overhead power lines may also be present near non-electrified rail lines. • **Electric and Magnetic Fields**

		Railway workers on electric railway systems may have a higher exposure to electric and magnetic fields (EMF) than the general public due to working in proximity to electric power lines.			
	Impacts / Risks	○ Risks of fire and explosion associated with transport of flammable materials ○ Train / worker accidents ○ Noise and vibration ○ Diesel exhaust ○ Fatigue ○ Electrical hazards ○ Electric and magnetic fields			
	Source	Project operation			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	4	16	High
	Impact assessment	Negative, High; long-term			

5.3.2.4 Impacts rating Summary

Table 5-12 shows the environmental and social impacts and risks rating summary for Segment 2.

Table 5-12: Environmental and social impact and risks rating summary for Segment 2

Phase	Impact and risk category		Impact Rating			
			Low	Moderate	Substantial	High
Pre-construction	Land acquisition	Repossession of the use of land			✔	
Construction	Air Quality			✔		
	Noise and Vibration			✔		
	Soil and geology			✔		
	Resource efficiency and pollution prevention			✔		
	Ecology and biodiversity (flora and fauna)		✔			
	Occupational Health & safety				✔	
	Community health and safety				✔	
	Traffic				✔	
	Natural disaster risk		✔			
	Use of Herbicides		✔			
	Risk of child labor			✔		
	Risk associated with temporary labor influx			✔		
	Risk of gender-based violence (GBV)			✔		
	Culture heritage			✔		
	Hydrology and surface water			✔		
Operation	Occupational Health & Safety				✔	

From the above table, applying the impact ranking method discussed in the beginning of this section yields 13 significant negative impacts during the preconstruction and construction phases of Segment 2 which are:

1. Air Quality: dust & gaseous emissions due to the on-site activities (site preparation, excavation, etc.)
2. Noise and vibration arising from civil works and installations
3. Resource efficiency and pollution prevention
4. Occupational Health & Safety.
5. Community health, safety and security
6. Natural disaster risk
7. Traffic
8. Culture heritage
9. Hydrology and surface water

Risk of:

1. Land acquisition
2. Risk of child labor
3. Risk associated with temporary labor influx
4. Risk of gender-based violence (GBV)

While during operation phase of Segment 2, the impact ranking method yields 1 negative impact, which is:

1. Occupational Health & Safety

Mitigation measures for these significant impacts are discussed in the following section.

5.3.3 Associated Facilities Specific Impacts

Associated facilities related to this Project are road upgrades of the intersection roads, and freight stations (goods stations). The following subsections present a detailed assessment of the impacts resulting from the associated facilities during construction and operation phases.

5.3.3.1 Construction Phase

The environmental and social impacts resulting from associated facilities during the construction phase are shown in Table 5-13.

Table 5-13: Environmental and social impacts resulting from associated facilities during construction phase

Construction Phase of Associated Facilities					
7	Aspect	**Occupational Health and safety (code: OHS5)** **Relevant ESSs: ESS 2**			
	Description	There are different activities that expose workers to health and safety risks and accidents.			
	Impacts / Risks	Worker accidents are generated if caution is not taken and include injuries from minor to fatal, including moving equipment, fall, electrical hazards, fire, noise and vibration In addition to the health and safety risks, workers may encounter inappropriate working conditions or risk of complaints that are not appropriately addressed…etc.			
	Source	Construction activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	4	16	High
	Impact Assessment	Negative, High; Long -term			
8	Aspect	**COVID-19 pandemic** **Relevant ESSs: ESS 2, ESS 4**			
	Description	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 in the project is extremely serious, as are the implications of such a spread. The project must also exercise appropriate precautions against introducing the infection to local communities.			
	Impacts / Risks	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 Project's progress is slowed down			
	Source	Construction activities			

Construction Phase of Associated Facilities					
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	4	16	High
	Impact Assessment	Negative, High; Long -term			
9	Aspect	**Traffic (code: T5)** **Relevant ESSs: ESS 4**			
	Description	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.			
	Impacts / Risks	Blocked roads as a result of the construction works, inadequate storage of excavated soil, trenching activities, etc.			
	Source	Construction and trenching activities			
	Significance	Severity (S)	Frequency (F)	Magnitude (SxF)	Significance
		4	2	8	Moderate
	Impact Assessment	Negative, Moderate; Short-term			

5.3.3.2 Operation Phase

No significant environmental and social impacts resulting from associated facilities during the operation phase are expected.

5.4 Mitigation Measures for the Potential Environmental and Social Impacts of Segment 1

As discussed above, there are 15 significant negative impacts resulting during the pre-construction, construction and operation phases of Segment 1. In this section, possible means of mitigating or enhancing these effects are discussed. These proposed methods constitute the basis of the proposed environmental management plan, which will be presented in Chapter 8 (Environmental and Social Management Plan). Cost and responsible party for implementation of mitigation measures are presented in the ESMP.

In identifying mitigation measures, the mitigation hierarchy has been applied:

- Avoid: adopting a design that avoids impacts;
- Reduce: assessing alternatives and, where feasible, adopting those with less or lower impacts;
- Mitigate: applying mitigation measures to manage remaining impacts; or
- Offset: addressing residual impacts that remain after implementation of the above steps.

5.4.1 Pre-Construction and Construction Phases

5.4.1.1 Land Acquisition (code: LA1)

During Preconstruction

The mitigation measures related to land acquisition will follow the provisions of ESS5, which are provided in detail in the Project's Resettlement Framework. Resettlement Plans will be prepared and implemented, as per the Resettlement Framework, prior to any construction related works.

During Construction:

Loss of crops and plantations

According to the Egyptian Law 10/1990 and its amendments, owners will be compensated for crops and plantations on affected plots of lands. Compensation of plants is based on official valuation list issued by each pertinent Governorate. For the project, a resettlement plan (RP) will be prepared, and landowners, tenants and encroachers will be compensated as per the entitlement matrix stipulated in the RF. Construction works will not start until the RP is prepared and implemented and compensation is disbursed to affected parties

Small affected structures

According to Law 10/1990 and its amendments and Ministerial Decree 20/2019, owners of lands are eligible for monetary compensation for any structures, e.g., rooms or wells on lands subject to expropriation according to ESA valuation. There are a few small rooms or huts on lands subject to potential expropriation. These shall be avoided or relocated within the same land, if necessary.

The majority of structures such as greenhouse agriculture can be reassembled in another place in the same land plot. For the project, a resettlement plan (RP) will be prepared, and landowners,

tenants and encroachers will be compensated as per the entitlement matrix stipulated in the RF. Construction works will not start until the RP is prepared and implemented and compensation is disbursed to affected parties.

Impacts related to temporary land use

Impact related to temporary land use; in case that the contractor needs land to store equipment and building materials, it will be in the 40 m RoW of the railway. In case, the contractor doesn't have enough space at the construction site, the following is proposed:

- Contractor is renting land plots from tenants to store their materials in some cases. It should be done according to the market price in the area. The owner has the right to refuse, then the contractor will look for another alternative.
- The contractor is responsible for implementing provisions in the SEP and RF of the project.
- Contractors are to conduct systematic and consistent consultations with community members. Those consultation activities should take place prior to construction works, and as needed during construction works, with enough notification period to ensure that community members will be able to attend.

Residual impacts: Mitigation measures will reduce impacts of LA1 to **moderate** to **low.**

5.4.1.2 Air Quality (code:AQ1)

During construction phase, dust emissions are expected from on-site activities (preparation, excavation, etc.) as well as the equipment movement on unpaved roads.

The contractor shall assign HSE manager is a must at all construction sites who will ensure the implementation of good site practices and prepare and implement an **Air Quality Management Plan- tentative table of content of the plan is provided in Annex 4.** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

:

- Appropriate sitting and covering of stockpiles of friable materials with a suitable cover in addition to regularly spraying water so as to minimize dust blow
- Minimizing drop heights for material handling activities such as unloading of friable materials
- Keeping the roads damped via watering spraying to minimize dust from spraying as a result of vehicles moving
- Ensuring that vehicles travel on paved routes wherever possible
- Sheeting of lorries transporting friable construction materials
- Enforcing speed limits on unpaved roads to be <30 km/hr

- Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fume

5.4.1.3 Noise and Vibration (code: NV1)

Construction activities will cause higher levels of ambient noise from vehicles and machines used for drilling and construction purposes. Also, track upgrading activities including dismantling of old tracks and installation of new ones will generate noise. However, this impact is temporary and fades away at the end of the construction phase. The contractor shall prepare and implement **a Noise and Vibration Management Plan**. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- Reduces workers' exposure times to noise and vibration, so that they do not exceed the safety limits stipulated in the Egyptian environmental law in addition to occupational safety and health standards
- Provide workers in areas of activities with high noise levels with earplugs
- The contractor must train all workers before starting construction work on the danger of noise and vibration; and how to avoid them
- Avoid construction work in the evening
- Restricting the movement of lorry cars to prevent noise and vibration in the early morning and late evening periods
- Control exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure
- All machines and vehicles must be stopped when not in use
- Communicate the construction schedule with neighboring communities and sensitive receptors

Residual impacts: Mitigation measures will reduce impacts of AQ1 to **low.**

5.4.1.4 Soil and Geology (code: SG1)

Soil will be impacted from construction activities of cutting and filling and movement of heavy vehicles. Impacts can be soil erosion by the effect of wind and rain, compaction, contamination from equipment maintenance activities. The following mitigation measures will be applied to reduce the impact on soil during the construction phase:

- Schedule construction activities to avoid rainfall and high wind periods to the extent practical.
- Sequence construction activities so that the soil is not exposed for long periods of time.
- Stockpile removed topsoil for revegetation.
- Maintain soil cohesiveness (by wetting disturbed areas and by avoiding unnecessary traffic on construction sites).
- Cover on-site stockpiles of spoils and fill.

- Construction vehicles will be restricted to designated areas to avoid soil compaction within the project site
- Provide temporary cover such as mulch or plastic when extended exposure is unavoidable.
- Use offsite equipment fueling and oil stations as much as possible, or dedicated fueling areas onsite.
- Include spill kit on site to control, contain and clean up any potential spill.

Residual impacts: Mitigation measures will reduce impacts of SG1 to **low.**

5.4.1.5 Hydrology and surface water (HSW1)

Mitigation measures for hydrology and surface water are addressed in in RP1 and EUI1.

Residual impacts: Mitigation measures will reduce impacts of HSW1 to **low.**

5.4.1.6 Resource Efficiency and Pollution Prevention (code: RP1)

5.4.1.6.1 Resource efficiency

Measures to ensure efficient use of raw materials:

- Proper handling of raw materials to minimize waste
- Proper testing and checking of the raw material to make sure they are in good condition and would work properly
- Reuse and recycle materials when feasible
- Monitor consumption to make sure the raw materials are used efficiently
- Ensuring borrow materials are sourced from licensed quarries

Measures to ensure efficient energy use:

- Optimize fuel consumption in construction equipment (opt for newer more efficient equipment when possible)
- Conduct regular maintenance of equipment based on manufacturer recommendation
- Minimize idling time

Measures to ensure efficient water use:

- Detail measures to ensure efficient water usage in project construction activities such as undertaking regular leak checks, repair or replacement of faulty plumbing encountered and monitoring of construction water usage.

5.4.1.6.2 Pollution Prevention

Figure 5-2 presents different waste generated throughout the project phases from exploitation to operation.

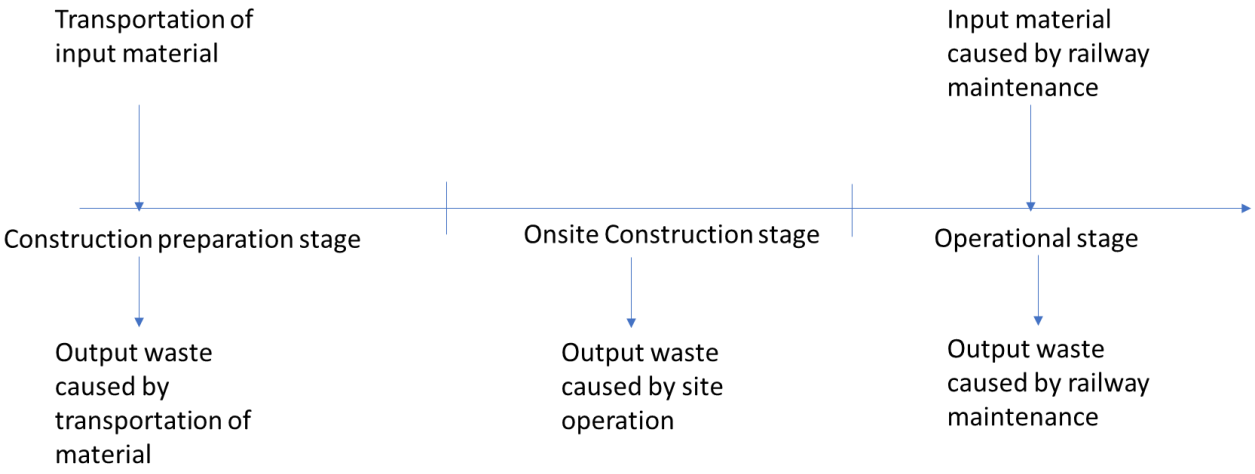


Figure 5-2: Types of Waste generated throughout the project

Mitigation measures for waste generated during construction preparation stage and onsite construction stage are presented below. For wasted generated during operation stage, it is covered in section 5.3.2.3.

Waste is generated as result of loss of material such as ballast and sand during transportation and usage. This indicates that improving the transportation and use of the materials can significantly reduce the production of waste. Waste from transportation process can be reduced by reducing the transport distance and choosing appropriate transport vehicles with proper storage capacity.

The generation of waste is associated with construction activities; therefore, cannot be avoided. The contractor shall prepare and implement a **Waste Management Plan (WMP), and Hazardous Waste and Material Management Plan (HAZMAT)**. The plans will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- The contractor will obtain official permits from the local authorities for the disposal of wastes (construction wastes landfills, hazardous wastes landfills, etc.) prior to the commencement of construction activities
- Wastes will be segregated and temporarily stored safely in the allocated areas for waste storage on the premises of the construction site in a way that doesn't cause further traffic disruption
- Wastes will be covered to avoid the pollution of the ambient air by dust dispersion
- Adequate trucks will be used for wastes transportation and the trucks will not be overloaded with waste volumes
- Consignments for waste disposal will be recorded in terms of weight, destination and responsible person
- Waste collection should occur daily and it should be transported to the approved and safe disposal locations via adequately equipped trucks. The supervisor has to make sure that this process occurs without any hazards or problems

- This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites/quarries

Non-hazardous (domestic) waste disposal

The proposed **Solid Waste Management Plan** for the safe disposal of domestic waste including but not limited to:

- The non-hazardous wastes (paper, garbage, wood and plastics) will be segregated and transported to the local disposal sites by the mean of the approved contractor
- The non-hazardous wastes will be transported off-site for recycling or final disposal by a licensed contractor and supervisor will be responsible for the disposal procedure and the conditions of the trucks
- This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites/quarries

Old Dismantled Tracks disposal

- The dismantled tracks are either:
  - Maintained and reused by ENR at sub-railroad lines, or
  - Sold by auctions/bidding as scrap

Hazardous waste generation

Hazardous waste from construction activities is limited to lubricating oil, empty paint cans. The proposed **Hazardous Waste Management Plan** for the safe disposal of such waste including but not limited to:

- According to Article 33 of Law 4/1994, the contractor is required to keep up records and manifests in a register for the methods of waste disposal and the agencies contracted to receive such wastes
- Training to employees should incorporate information from Material Safety Data Sheets (MSDSs) for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language
- Description of response activities in the event of a spill, release, or other chemical emergency should be incorporated
- Representatively test the wooden ties and Ballast to confirm their disposal/reuse techniques

While hazardous waste generated from tracks upgrading / renewal are old, contaminated sleepers/ crossties which were coated by a hazardous benzo-pyrene and ballast contaminated with grease, both will be disposed to a hazardous waste landfill by specialized and approved contractor.

Construction and demolition waste handling

Avoid storing material and construction waste on agriculture land. Contractors to take appropriate measures to prevent materials leakage to ensure that fertility of land will remain as is after completion of construction work. Construction and demolition waste are deposited in landfills. The contractor will classify the waste according to its type and either transport it to landfill or have contract with governorate or certified contractor to transport to its safe disposal in landfills. Each time the waste is disposed in the landfill the contractor receives a receipt from the landfill of the amount and date. In Giza Governorate, there is only one managed operating landfill in Shabramant (Figure 5-3). If there is hazardous waste among the construction and demolition waste such as oil or paint, it will be handled with caution, in special labeled containers till its final disposal in Nasserya certified landfill.

Egypt has construction and demolition strategy, where C&D crushers will be distributed around managed landfill around Egypt. The Ministry of Local Development is coordinating with the governorates, and NUCA, in studying and identifying sites designated for the establishment of fixed and mobile demolition and construction waste recycling stations. The contractor shall contact governorate to be up to date to the location of nearby C&D disposal sites.

Figure 5-3: Location of managed and official landfill in Shabramant that serves Giza governorate and 6th of October city

Residual impacts: Mitigation measures will reduce impacts of RP1 to **low.**

5.4.1.7 Occupational Health and Safety (code: OHS1)

The contractor shall prepare and implement an **Occupational Health and safety Management Plan.** The OHS management plan should be informed by the root cause analysis for the fatalities reported for previous projects; the contractor shall consider the lessons learned from previous projects in the OHS Management plan. The plan will be reviewed and approved by the supervising consultant and PMU. The contractor will implement the LMP developed for this project. The plan will include the adequate mitigation measures including but not limited to:

- Ensure that all workers under both the contactors and the sub-contractors are covered by social insurance and other appropriate types of insurance against work related accidents and fatalities and have legal documents in place for all types of workers including seasonal and daily workers
- Restricted entrance to all construction sites, where attendance sheets and copies of national IDs of all workers at site are required
- Providing training for workers in personal track safety procedures and working around contaminated sites
- Coordination procedures with ENR to block/arrange train traffic on lines where works are occurring ("green zone working"), giving the contractor safe time to conduct the required works.
- As per the labor management procedures, workers grievance mechanism should be established and well-functioning and workers should be made aware of their rights regarding working hours, days off, salaries, etc.

The occupational health and safety mitigation plan shall include but will not be limited to the following measure:

- Provide adequate signage to prevent accidental falling into open areas
- Will be informed by the WB Good Practice Note – Addressing SEA/SH in IPF Involving Major Civil Works
- Fencing of the work areas Health and safety environment (HSE)
- There is posted material indicating the nearest police station and hospital (with accident and emergency facilities)
- The contractor must take reasonable steps to prevent unauthorized people accessing the site procedures to address the following risks (injuries from minor to fatal, including train/worker accidents, rotating and moving equipment, electrical hazards, fire and explosions, eye hazards, noise and vibration, and fatigue including Struck by moving objects)
- Provide a first aid kits in different places of the work site with the appropriate number of materials given the number of workers on site. The locations of the first aid kits will be provided to all workers
- Providing extinguishers on work site
- Stop people smoking and prohibit using cell phones on work sites and do not allow other work activities involving potential ignition sources to take place nearby
- Providing site boundaries by installing suitable physical boundaries (barriers, tape or fence), fences are the primary barriers to prevent unauthorized access to the construction

sites, should be in place before starting any excavation works and removed after finishing the construction activities.

- Marking excavation holes with physical boundaries (barriers, tape or fence)
- The contractor shall put up barriers or covers in the area of openings and excavations.
- Store building materials (such as pipes, manhole rings, and cement bags) so that they cannot topple or roll over
- Keep walkways and stairways free of tripping hazards such as trailing cables, building materials, and debris
- Everyone who works on any site must have access to adequate toilet and washing facilities, a place for preparing and consuming refreshments, and an area for storing and drying clothing and personal protective equipment (PPE)
- Contractor to ensure PPE (personal protective equipment) is used by all workers on site
- Contractor shall hire a certified Health and safety supervisor
- Materials and equipment are tidily stacked, protected and covered where necessary. Additionally, there is adequate space for new materials to be stored in secured covered areas to avoid damage, theft, and to protect these items from weather conditions.
- Scaffolding for work in elevated areas such as ceiling painting should comply with the OSHA "General Requirements for Scaffolds"
- Emergency response to respond to different risks including natural disasters

To avoid workplace health and safety issues including accidents and injuries, the Contractor OHS Plan will be prepared according to the World Bank General Environmental, Health and Safety Guidelines and the World Bank Environmental, Health and Safety Guideline for Railways, as well as other Good International Industry Practice (GIIP); and the project specific LMP. The OHS plan will incorporate lessons learned from ENR fatalities including Stop Usage of any Motorbike on the project subcontracted and own activities; risk/job hazard assessment of all activities under the project; as well as strictly enforce and monitor the OHS plan for all the project activities whether it is done by the contractor or its subcontractors. The main implementing contractor shall pass the OHS procedures to all sub-contractors and provide occupational health and safety training to all employees engaged in work.

Residual impacts: Mitigation measures will reduce impacts of OHS1 to **moderate to low.**

5.4.1.8 Covid-19 Pandemic (code: OHS1)

With ongoing emergence of new variants, the risks and impacts due to COVID-19 continue to be relevant. During construction, large gathering of workers may cause spreading of COVID-19; impacts on health and safety of workers is negative, high with potentially long-term side-effects. While individual infection cannot be avoided, spreading events at the construction site can be avoided by proper implementation of a COVID-19 and communicable diseases Management Plan. The contractor shall prepare and implement as **a COVID-19 and communicable diseases Management Plan** as part of the **Occupational Health and safety Management Plan** or as a stand-alone. The plan will include the adequate mitigation measures 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
    - Facemasks 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
        - coordination with local health facilities and authorities
- 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)
- ensure all workers are trained on and aware of COVID-19 prevention and precautionary measures, and are following the measures on a daily basis (direct and temporary workers)

5.4.1.9 Ecology and Biodiversity (flora and fauna) (code: EB1)

The potential impacts of construction phase on any existing flora and fauna and aquatic environment will be minimized as a result of the following mitigation measures:

- Personnel and vehicles will be restricted to within the boundaries of the construction site, lay down areas and access roads, and will not be permitted to enter surrounding land
- Run-off from construction activities and any movement of contaminants disturbed along the land flats, will be attenuated and disposed of in a controlled manner to ensure that surrounding species/habitats are not significantly affected
- Avoid disturbance of habitat/s
- Minimize disturbance through clearly demarcating areas and using access roads where possible
- Minimize interference -creating activities after sundown, including heavy vehicle movements and unnecessary bright lights outside of the immediate area of the facility
- Keep areas of natural vegetation cleared to as minimum as possible
- Control the vehicles to ensure they operate only within the area to be disturbed by access roads and other works
- Develop and implement management procedures for dust, weeds, ground disturbance and clearing activities
- Evaluate contractor environmental management procedures
- Design drainage features to maintain hydrological flows across landscape
- Minimize clearing of high value habitats where possible
- Spill prevention for environmentally hazardous materials – e.g., management of storage, handling and spill recovery
- The emergency spillage contingency plans and water pollution control measures/procedures will help to minimize the occurrence of major ecological effects

- Comply with hazmat for the storage and handling of environmentally hazardous materials.
- No effluents will be discharged into the land during normal construction activities
- A site drainage plan will be developed to ensure that if any erosion occurs during storm events, minimal amounts of sediment will result by reducing the flow velocity and sediment load before discharge
- Good site management practices will be enforced to ensure that the construction site is kept clean and tidy
- Process effluents will be collected in engineered, contained site drainage systems where they can be controlled, monitored and treated as appropriate prior to discharge
- No disposal of solid wastes or waste water into the discharge structure
- Regular maintenance of site drainage system to ensure efficient operation
- Evaluate contractor procedures and environmental management on environmental aspects
- All discharges will comply with local Egyptian guidelines

Residual impacts: Mitigation measures will reduce impacts of EB1 to **low.**

5.4.1.10 Community Health and Safety (code: CHS1)

The contractor shall prepare and implement a **Community Health and Safety** Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- Information to be shared regularly and systematically as per stakeholder engagement plan (SEP) with communities.
- 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
- 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 PMU (or Owner Engineer) prior to commencement of construction
- Development and implementation of a Traffic Management Plan (including routes and alternative routes, truck movements, transport of workers, and short-term closure of roads (if necessary)
- The construction site to be fenced and guarded by security personnel in order to prevent any unauthorized access to the site. The security personnel will be the responsibility of the contractor
- 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 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 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

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
- During the final design and the census survey, the consultant will try to pass on the borders of lands and will avoid to the extent possible to pass inside lands, as requested during the public consultation conducted in August 2022 (details in chapter 9). This will be conducted in consultation with landowners.
- Constructing pedestrian service tunnels and crossing points at locations suggested by stakeholder consultations with the nearby communities to make sure they don't have to walk long distances to cross the rail. In addition, the dimensions of the service tunnels shall be wide enough to accommodate the pedestrian and their animals and crops, if needed (around 3 m wide).
-

For Engaging Security personnel or companies:

- The contractor shall prepare and implement a Security Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures .

Residual impacts: Mitigation measures will reduce impacts of CHS1 to **moderate to low.**

5.4.1.11 Traffic (code: T1)

The contractor shall prepare and implement a **Temporary Traffic Management Plan (TTMP).** The plan will be reviewed and approved by the supervising consultant and PMU.

Typically, there is a hierarchy of TTMPs – a Route Wide Traffic Management Plan, Local Area Plans and Site-Specific Plans. TTMPs will aim to minimize delays and reduce detours, ensure safe access, and protect railway and road assets, and passengers, pedestrians and other rail and road users. The TTMPs should also address access to and from the construction zones by minimizing road crossings by heavy plant, managing truck queuing, managing truck haul routes between construction sites, landfill sites, dump sites and quarries, and ensuring that construction timing and sequences do not adversely affect the road network and its environs.

TTMP Overview: Each level of TTMP should include adequate mitigation measures including but not limited to:

- Use of standardized base plans
- Presentation of data on estimated truck numbers – per hour and/or per day
- Showing on plans where truck holding areas are
- Showing that Non-motorized Transport (NMT) – pedestrians, cyclists, carts, animal-drawn vehicles - are better catered for and protected
- Focusing on safety at level crossings and formal/informal track crossings – this is where confusion could arise if there are detours or temporary traffic signals deployed; there is a risk of trains colliding with vehicles and pedestrians
- It is assumed that truck loads are of normal size. If there is a need for any special provision for abnormal truck loads – extra wide, long or high – then this should be catered for and included in the TTMP

TTMP details: The details of the mitigation measures in each TTMP should include:

1. Checking that any additional traffic generated by the construction would have insignificant impacts on the level of service on the road
2. Ensuring that information signs are installed at construction zones before the commencement of any construction activities to inform and ensure the safety of all road users
3. Ensuring safe locations chosen by the contractors and site supervisors for the temporary storage of construction materials, equipment, tools, waste and machinery so as not to cause traffic disruption due to route blockages
4. Minimizing pedestrian interaction with construction vehicles; pedestrian crossings and safety fencing/barrier should be provided if necessary
5. Avoiding construction work at the traffic peak times whenever possible
6. Prohibiting uncontrolled off-road driving
7. Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions The use of Traffic Agents such as the Traffic Police should be examined. Such personnel can provide in-situ supervision of the TTMPs at construction sites and stations and be on-hand 24/7 to direct traffic, direct residents and answer their questions

8. Ensuring the regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure
9. Using locally sourced materials, whenever possible, to minimize transport distances
10. Improving driving skills and requiring licensing of drivers. The contractors should make sure that the employed drivers of construction machinery (such as trucks and loaders) have received sensitization/training on safety utilization of their machines in order to minimize accident risks
11. The issue of hiring trucks and recruitment of truck drivers should be examined. As can sometime be the case worldwide, trucks are typically individually owned or form part of a small fleet under a small contractor. If this is the case, ENR and its contractors will need to be able to manage this myriad of trucks and truck drivers in an efficient way. Truck management can be improved with the use of GPS, RFID or mobile phone applications. ENR could also consider the development of a Drivers' Information Pack on road safety to be handed out to all drivers
12. Adopting limits for trip duration and arranging driver rosters to avoid overtiredness
13. Avoiding dangerous routes and times of day to reduce the risk of accidents
14. Using speed control devices (governors) on trucks, and remote monitoring of driver actions, if possible
15. Obtaining approval from the traffic department prior to construction should be obtained by the contractor prior to the construction preparation
16. Submitting a monthly report to the relevant authority by the construction supervisor on unusual traffic delays or accidents caused during construction, or any complaints received

Time Management Plans within the TTMPs: The contractor shall develop time management plans to manage and schedule traffic movements for: (1) the delivery of construction materials and equipment; and (2) the transport of construction debris to landfill and dump sites. The contractor shall notify the relevant traffic authority such as the Traffic Department to gain approval for the time management plan prior to construction activities.

Institutional arrangements: The institutional arrangements for the development and implementation of the TTMPs should be presented. Usually this is a top-down approach but with room for flexibility at a local level to meet contingencies. The **main contractor** prepares the TTMPs for: (1) the whole route or route section of the railway track; (2) each signaling tower; (3) trenching accesses; (4) level crossings and other pedestrian/vehicle crossing sites; and (5) designated truck routes to/from dump sites and quarries.

Learning Legacy: There is scope to showcase this project and provide a learning archive by uploading a Learning Legacy online as other major rail projects (such as Crossrail/Elizabeth Line and HS2 in the UK) have done.

Residual impacts: Mitigation measures will reduce impacts of T1 to **moderate to low.**

5.4.1.12 Damages to Existing Utilities/Infrastructure (code: EUI1)

General rules on prevention and collective protection

- Before operating the HDD, make sure that all cover and protective housings are installed.
- The worker who handles the HDD must know their management perfectly, being informed of the risks involved in their use. The handling by underage workers, inexperienced or not trained for it is prohibited
- The operator must become familiar with the operation of the machine in particular before using it for the first time
- The HDD should only be used for the purpose for which it was intended and always by authorized personnel trained for its use
- Pay special attention to all the information and warning boards provided on the machine.
- The maintenance, repair or any modification of the machine can only be carried out by specialized personnel belonging to the rental company
- Before using the machine, the possible existence of stains that indicate fluid losses will be checked

Safety rules during handling

- The machine will be perfectly installed according to the manufacturer and following the regulations regarding homologations and securities already exposed
- The controls of the machine and electronic equipment will only be handled by specialized personnel following the manufacturer's instructions
- The safety and risk instructions that are attached to the machine will be maintained in a 100% legible condition
- The electrical installation will be carried out according to the specific regulations.
- The machinery will be checked on a daily basis before the start of work
- To avoid risks of landslides, during the work there will be no personnel present in the vertical of the drilling and neither at the exit of the hole

In addition, bentonite which is a form of clay that is naturally existent, is used as the drilling fluid so it does not adversely affect the environment.

Also, the resulting mud will be collected at the time of generation and disposed of site by licensed contractors.

ENR will hire contractors responsible for construction. The contractors will be responsible for getting all necessary permits from the relevant authorities as well as coordinate with them before beginning the work to make sure there are no impacts on underground utilities.

Infrastructure utilities services

Normally height of embankment or depth of cutting depends upon topography and desired rail level. Accordingly, construction work can impact existing infrastructure or antiquities in the construction location.

Each governorate, especially the big ones like Cairo and Giza have Information Center that can provide infrastructure maps present in the governorate. Before construction works begin, the

contractor will acquire infrastructure maps (as built drawings) to know the type of pipelines, cables, or antiquities present in the location of construction. In case there is gas pipeline or telephone cables or any other infrastructure and/or antiquities, the contractor shall go to the relevant directorate affiliated to the governorate to conduct coordination meeting and inform the directorate about the location of construction and acquire permit of work. The meeting is documented with meeting minutes on the conditions of the relevant directorate to conduct construction work near its utility/infrastructure/antiquities to ensure its safety. On the day of construction, a representative from the directorate will be present to make sure that the contractor is applying safety conditions. In case infrastructure maps are not yet present, sometimes shallow manual excavation not exceeding 75 cm is conducted as exploratory method for the existing infrastructure in coordination with the governorate.

Residual impacts: Mitigation measures will reduce impacts of EUI1 to **low.**

5.4.1.13 Risk of Child Labor and Minimum Age (code: CL1)

- 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 laborers 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 labor is occurred in the project

Residual impacts: Mitigation measures will reduce impacts of CL1 to **low.**

5.4.1.14 Risk associated with Temporary Labor Influx (code: TLI1)

In order to minimize impacts pertaining to labor influx, the LMP prepared for the project must be implemented; the following should be thoroughly implemented:

- The contractor will depend on the local labor as much as possible; they are expected to be residents of the project area; which may reduce the risk of labor influx.
- Signature of all workers, contractors and sub-contractors of the code of conduct in the LMP in annex 1 that stipulates the different commitment of labor towards community groups and the different behavior that should be avoided
- Code of conduct in annex 2 of the LMP to be disclosed in all project sites, and as needed to be updated
- All workers should be trained on the Code of Conduct during induction
- Code of conduct induction to be done every 2 weeks for the recurrent workers and the newcomers before starting work.

- Apply penalties to workers violating the code of conduct
- Training on Covid-19 prevention

Residual impacts: Mitigation measures will reduce impacts of TLI1 to **low.**

5.4.1.15 Gender Based Violence (GBV) (code: GBV1), including sexual exploitation and abuse (SEA) and sexual harassment (SH)

- All types of inappropriate behavior of workers should be identified, and the importance of adhering to the code of conduct is emphasized
- Signature of all workers, contractors and sub-contractors of the code of conduct in the LMP in annex 1 that stipulates the different commitment of labor towards community groups and the different behavior that should be avoided
- Code of conduct in annex 2 of the LMP to be disclosed in all project sites, and as needed to be updated
- All workers should be trained on the Code of Conduct during induction
- Code of conduct induction to be done every 2 weeks for the recurrent workers and the newcomers 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

Residual impacts: Mitigation measures will reduce impacts of GBV1 to **low.**

5.4.2 Operation Phase

5.4.2.1 Occupational Health and Safety (code: OHS2)

Train / Worker Accidents

Recommended management strategies include:

- Training workers in personal track safety procedures including use of personal protective equipment (PPE)
- Elimination of mobile phones or portable music devices when working in the danger zone (within 3 metres) of the railway
- 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
- Slow speed for trains on adjacent line when working in double line section
- Temporary fences/barriers to prevent workers straying onto active line

- Design and construction of rail lines with adequate clearance for workers especially on viaduct structures and bridges as well as in cuttings and embankments where there should be minimum 3 metres clearance from nearest rail for workers to stand
- Segregation of stabling, marshalling, and maintenance areas from the running lines

Noise and Vibration

Recommended management strategies include:

- Use of air conditioning systems to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise
- Reduction of internal venting of air brakes to a level that minimizes noise without compromising the crew's ability to judge brake operation
- Installation of active noise cancellation systems
- Use of personal protective equipment (PPE) if engineering controls are not feasible or adequate to reduce noise levels
- Use of dampers at the seat post to reduce the vibration experienced by the operator
- Installation of active vibration control systems for locomotive suspension, cabs, or seat posts, as needed to comply with applicable international and national standards and guidelines

Diesel Exhaust

Measures recommended to prevent, minimize, and control workers' exposure to diesel exhaust:

- Limiting time locomotives are allowed to run indoors and use of pusher cars to move locomotives in and out of maintenance shops
- Ventilation of locomotive shops or other enclosed areas where diesel exhaust may accumulate
- Filtration of air in the train crew cabin
- Use of PPE where engineering controls are not sufficient to reduce contaminant exposure to acceptable levels

Fatigue

Railway operators should schedule rest periods at regular intervals and during night hours, to the extent feasible, to maximize the effectiveness of rest breaks, and in accordance with international standards and good practices for work time

Electrical Hazards

Measures recommended to prevent, minimize electrical hazard, include:

- Workers exposed to electrical hazards from electrified railways should be trained in personal track safety
- Only workers who are specifically trained and competent in working with overhead
- lines and conductor rails should be allowed to approach these systems

Electric and Magnetic Fields

Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components:

- Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, and limiting access to properly trained workers
- Implementation of an action plan to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE)

Diesel Storing tanks for power generators

- Avail water cooling sprayers on the outer surface of the diesel tank, to prevent the generation of diesel fumes
- An efficient firefighting system is a must

Residual impacts: Mitigation measures will reduce impacts of OHS2 to **moderate to low.**

5.4.2.2 Noise and Vibrations (code: NV2)

The maximum sound power level according to the noise model (annex 7) is estimated to be 95 dB for the train. Accordingly, noise barrier is recommended at point 4 and 5 (km 64.5 to km 68.5), where there are sensitive receptors and link points with Bashteel-Itay ElBaroud train and where ambient noise level in the baseline is near the law limit.

Noise barriers are one of the most used mitigation measures. Noise barriers are applied in many cases, both with new rail infrastructure significantly changed infrastructure and as noise abatement in existing situations. As the dominant noise source (the wheel-rail contact surface) is close to the track, noise barriers are highly effective as long as the receiver position is in the shadow zone (i.e. there is no direct sight from the receiver to the source).

Most noise barriers near railway lines are between 1 and 4 meters high, but very high barriers (up to 10 meters) are erected in exceptional situations. The key parameter for the barrier effectiveness is the geometry, i.e. the location of the upper edge of the barrier concerning the source location.

An important effect is the reflection of sound between the barrier and the train car body, which may affect the achievable reduction. This so-called canyon effect can be avoided with a lining with a high absorption coefficient of the barrier side facing the tracks. Alternatively, the barrier may be put in an inclined position, to direct the reflections towards the sky (barriers inclined backward) or towards the ballast (barrier inclined to the track). An inclined position is chosen with transparent barriers, which can't achieve sound absorption on the trackside. Welldesigned and located noise barriers can be effective with attenuation of 10 dB(A) or more at the façade

of the receiver (when the barrier comfortably blocks the line of sight between the noise source and receiver).

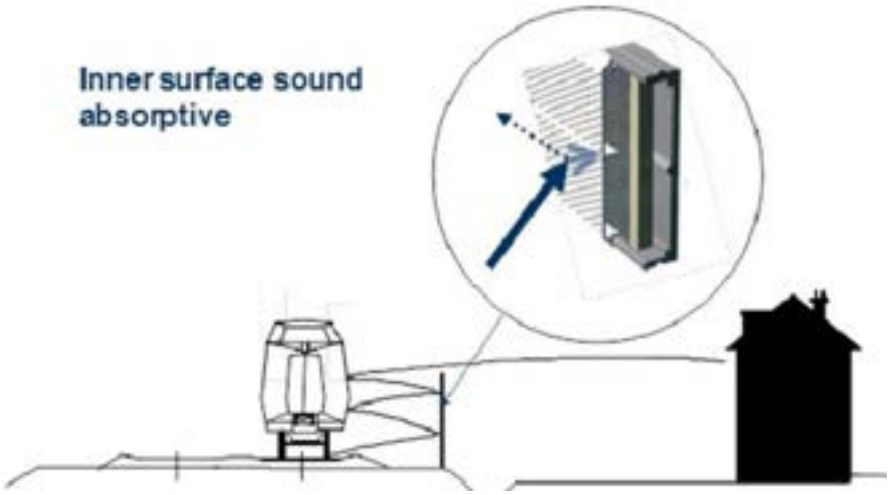


Figure 5-4: Illustration of the "canyon" effect and how it can be prevented by an absorptive surface

In addition to the above, as part of the design, the alignment was optimized in some areas to ensure the possible maximum distance form Noise sensitive receptors. ENR may consider establishing a quite zone in sensitive areas where engineers do not use the horn, except in emergencies.

In addition to the proposed noise barriers proposed above, mitigation measures implemented at source are recommended as follows:

- Establishing action plan in coordination with EEAA to conduct spot noise measurements in different locations
- Using modern non-metallic disc brakes, which can reduce rolling noise by 8-10 decibels (dB) compared to cast-iron block tread brakes utilized on older vehicles (non-metallic disc brakes also reduce wearing of wheels and rails)
- Reducing the roughness of running surfaces through regular maintenance of wheels and tracks
- Preventing the noise from source by applying improved sound-proofing, and other noise reducing features (e.g., engine enclosures and exhaust muffling for diesel engines
- Building noise barriers in different locations along the railway corridor
- Developing a technical study for detailed design of noise barrier construction which include:
    - Required amount of noise reduction as per the noise model prepared for the project
    - Barrier construction material
    - Barrier location
    - Barrier shape and dimensions
    - Ease of maintenance

Also, some of the aspects that are important to consider during the design stage of the noise barrier especially in areas near existing sensitive receptors are:

- Will the barrier block a view that is important to the residents?
- Will the barrier itself look unattractive?
- Will the barrier obstruct a breeze that helps cool residences' yards?
- Will the barrier adversely effect plants or gardens? Will it cause unacceptable shading?
- Will the barrier require passages for pedestrian and/or vehicle access?

Residual impacts: Mitigation measures will reduce impacts of NV2 to **moderate to** low**.**

5.4.2.3 Community Health and Safety (code: CHS2)

Air quality

Increased air pollutant emissions can be controlled by:

- Perform air dispersion model to identify sensitive areas in close proximity to segment and adopt necessary measures such as reducing speed of train to reduce emissions. Current receptors consist of scattered farm houses in cultivated land and agriculture land and Bani Salamah village
- Select freight engines with adequate emission control systems, diesel oxidation catalysts and selective catalytic reduction
- Operate freight train at optimal conditions. As emissions increase according to operating conditions; carry out optimization study to determine optimal conditions minimizing emissions, while not compromising on freight service delivery
- Perform technical assessment considering time of freight delivery and climate and weather conditions and air quality index, which have implications on the formation of photochemical O_3
- Perform technical studies to consider electrification options to reduce emissions associated with diesel

Accidents From Crossing the Railway Corridor

Trespassers on rail lines and facilities may incur risks from moving trains, electrical lines and equipment, and hazardous substances, among other issues. Measures to minimize, prevent, or control trespassing include:

- Posting of clear and prominent warning signage at potential points of entry to track areas
- Installation of fencing or other barriers at station ends and other locations to prevent access to tracks by unauthorized persons. There is a plan in ENR to install fences around all railways affiliated to ENR with priority given to highly densely populated area
- Raise safety awareness among surrounding communities and include clear signage and leaflets including safety instruction regarding the dangers of trespassing (especially among young people)

- Determine authorized route that is safe and convenient to the surrounding communities to use to pass the corridor and make sure it is clearly indicated and convenient
- Monitor authorized routes to make sure traffic is smooth, provide warnings to violators and prevent accidents

Cargo Load Material

The type of material that the freight train will carry is important to be handled properly. ENR has procedure to follow during transportation of hazardous material with specified roles and responsibilities to personnel. The procedure is based on ENR's Operation Safety Regulation (2014). The procedure includes the following mitigation measures:

- Selecting suitable routing and timing of hazardous materials transport to minimize unnecessary storage
- Ensuring that all safety equipment is available onboard the train for the safety of employees
- Making sure that the hazardous material is authorized to be transported by conducting proper screening and acceptance
- Presence of material safety datasheet provided by the sender and documented in the shipping policy
- Equip locomotives to be appropriate for the cargo being carried (e.g., thermal protection and puncture resistance) and implementing a preventive maintenance program
- Making sure that the locomotives are well maintained and free from any defects or leakages
- Limiting train speed in developed areas
- Making sure that all employees received training to deal with hazardous materials and document every training received

Waste generated during operation

Maintenance activities of the rail are conducted at the workshops affiliated to ENR as explained in section 2.1.6. Based on consultation with ENR maintenance department, engine oil amounts to 1200 kg per year. Replaced oil generated during maintenance of engine is sold and collected by Petrotrade (affiliated to Ministry of Petroleum) to be properly handled and disposed of.

Residual impacts: Mitigation measures will reduce impacts of CHS2 to **moderate to** low**.**

5.4.2.4 Ecology and Biodiversity (flora and fauna) (code: EB2)

To minimize the potential impacts during operation phase, the following mitigation measures will be implemented:

- Evaluate the results of the baseline flora, fauna and aquatic environment surveys and where practicable utilize the results to avoid disturbing species or vegetation communities of significance by optimizing the design and layout of project infrastructure

- Areas of vegetation outside of the Bani Salamah - Wahat Railway zone will be fenced off
- Establishment of plant gardens within the project site. Where possible retain some of the natural vegetation
- Rehabilitate all temporary disturbed areas
- Suitable green belt will be developed as per landscaping plan in and around the site using local flora, which will enhance the ecology
- Provide suitable management guidelines and procedures for clearing and ground disturbance activities. This may consider pre-start procedures for clearance of fauna to remove fauna from proposed clearing areas
- Prepare and implement EMP inclusive of: water quality monitoring, aquatic habitat health monitoring and management actions for trigger values
- Strategies will be developed for the management of potential non-indigenous marine species, while ensuring consistency with accepted guidelines and codes of practice
- The agricultural activities will be monitored for the status of the crop production

Residual impacts: Mitigation measures will reduce impacts of EB2 to **low.**

5.4.2.5 Culture heritage (code: CH2)

It's unlikely to find artifacts in the project area especially that the excavation is not deep. However, it is important that the contractor implements chance finds procedure. This is due to the proximity of the site to Southern South Saqqara Pyramid located 300 m away from the alignment. Steps to be included in the chance finds procedure include:

- Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained.
- Notify the relevant authorities of the find.
- Document and record any chance find which may occur.

Residual impacts: Mitigation measures will reduce impacts of CH2 to **low.**

5.4.2.6 Land and asset value depreciation (code: LA2)

The mitigation measures related to land acquisition will follow the provisions of ESS5, which are provided in detail in the Project's Resettlement Framework. Resettlement Plans will be prepared and implemented, as per the Resettlement Framework, prior to any construction related works. Moreover, during the final design and the census survey, the consultant will try to pass on the borders of lands and will avoid to the extent possible to pass inside lands, as requested during the public consultation conducted in August 2022 (details in chapter 9). This will be conducted in consultation with landowners.

The valuation of losses in assets depends on the type of the lost asset. For physical assets, market value should be assessed to estimate the replacement cost plus the 20% mandated top up. This should consider any associated costs to bring the asset to its pre-displacement value. The WB also gives big attention to intangible assets although estimating their value is a relatively a subjective process. Alternative opportunities should be provided to PAPs as a way for compensating their loss for intangible assets. Alternative opportunities may include job opportunities with ENR if possible. Alternative opportunities will be decided case by case depending on the socio-economic profile and impacts

For intangible losses that cannot easily be valued in monetary terms (i.e. access to employment opportunities, public services, natural resources, social capital), the project should attempt to establish access to equivalent resources and earning opportunities that are acceptable to the PAPs. This will be done through a case by case study and consultations carried out with PAPs (see section 3.4 institutional and organizational arrangement for land acquisition).

Residual impacts: Mitigation measures will reduce impacts of LA2 to **low.**

5.5 Mitigation Measures for the Potential Environmental and Social Impacts of Segment 2

As discussed above, there are 12 significant negative impacts resulting during the construction and operation phases of Segment 2. In this section, possible means of mitigating or enhancing these effects are discussed. These proposed methods constitute the basis of the proposed environmental management plan, which will be presented in Chapter 7 (Environmental and Social Management Plan).

5.5.1 Pre-construction and Construction Phases

5.5.1.1 Land acquisition (code: LA3)

During Preconstruction:

The mitigation measures related to the repossession of the use of land will follow the provision of the ESS5, which are provided in detail in the Project's Resettlement Framework. Resettlement Plans or appropriate documentation will be prepared and implemented, as per the Resettlement Framework, prior to any construction related works.

During Construction:
Impact related to temporary land use; in case that the contractor needs land to store equipment and building materials, it will be in the 40 m RoW of the railway. In case, the contractor doesn't have enough space at the construction site, the following is proposed:

- Contractor is renting land plots from tenants to store their materials in some cases. It should be done according to the market price in the area. The owner has the right to refuse, then the contractor will look for another alternative.

- The contractor is responsible for implementing provisions in the SEP and RF of the project.
- Contractors are to conduct systematic and consistent consultations with community members. Those consultation activities should take place prior to construction works, and as needed during construction works, with enough notification period to ensure that community members will be able to attend.

Residual impacts: Mitigation measures will reduce impacts of LA3 to **moderate** to **low.**

5.5.1.2 Dust and gaseous emissions during the Construction Phase (code: AQ3)

During construction phase, dust emissions are expected from on-site activities (preparation, excavation, etc.) as well as the equipment movement on unpaved roads.
The contractor shall assign HSE manager at all construction sites who will ensure the implementation of good site practices, and prepare and implement an **Air Quality Management Plan- tentative table of content of the plan is provided in Annex (V)-** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- Appropriate sitting and covering of stockpiles of friable materials with a suitable cover in addition to regularly spraying water so as to minimize dust blow
- Minimizing drop heights for material handling activities such as unloading of friable materials
- Keeping the roads damped via water spraying to minimize dust as a result of vehicles moving. The water spraying should be at the beginning of each working shift and repeated every 2 hours during summer time.
- Ensuring that vehicles travel on paved routes wherever possible
- Sheeting of lorries transporting friable construction materials
- Enforcing speed limits on unpaved roads to be <30 km/hr
- Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fume.

Residual impacts: Mitigation measures will reduce impacts of AQ3 to **low.**

5.5.1.3 Noise and Vibration (code: NV3)

Construction activities will cause higher levels of ambient noise from vehicles and machines used for drilling and construction purposes. Also, track upgrading activities including dismantling of old tracks and installation of new ones will generate noise. However, this impact is temporary and fades away at the end of the construction phase. The contractor shall prepare and implement **a Noise and Vibration Management Plan**. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- Reduces workers' exposure times to noise and vibration, so that they do not exceed the safety limits stipulated in the Egyptian environmental law in addition to occupational safety and health standards

- Provide workers in areas of activities with high noise levels with earplugs
- The contractor must train all workers before starting construction work on the danger of noise and vibration; and how to avoid them
- Avoid construction work in the evening time
- Restricting the movement of lorry cars to prevent noise and vibration in the early morning and late evening periods
- Control exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure.
- All machines and vehicles must be stopped when not in use
- Communicate the construction schedule with neighboring communities and sensitive receptors

Residual impacts: Mitigation measures will reduce impacts of NV3 to **low.**

5.5.1.4 Soil and Geology (code: SG3)

Soil will be impacted from construction activities of cutting and filling and movement of heavy vehicles. Impacts can be soil erosion by the effect of wind and rain, compaction, contamination from equipment maintenance activities. The following mitigation measures will be applied to reduce the impact on soil during the construction phase:

- Schedule construction activities to avoid rainfall and high wind periods to the extent practical.
- Sequence construction activities so that the soil is not exposed for long periods of time.
- Stockpile removed topsoil for revegetation.
- Maintain soil cohesiveness (by wetting disturbed areas and by avoiding unnecessary traffic on construction sites).
- Cover on-site stockpiles of spoils and fill.
- Construction vehicles will be restricted to designated areas to avoid soil compaction within the project site
- Provide temporary cover such as mulch or plastic when extended exposure is unavoidable.
- Use offsite equipment fueling and oil stations as much as possible, or dedicated fueling areas onsite.
- Include spill kit on site to control, contain and clean up any potential spill.

Residual impacts: Mitigation measures will reduce impacts of SG3 to **low.**

5.5.1.5 Resource Efficiency and Pollution Prevention (code: RP3)

The contractor shall prepare and implement a **Waste Management Plan (WMP), and Hazardous Waste and Material Management Plan (HAZMAT)**. The plans will be

reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- The contractor will obtain official permits from the local authorities for the disposal of wastes (construction wastes landfills, hazardous wastes landfills, etc.) prior to the commencement of construction activities
- Wastes will be segregated and temporarily stored safely in the allocated areas for waste storage on the premises of the construction site.
- Wastes will be covered to avoid the pollution of the ambient air by dust dispersion
- Adequate trucks will be used for wastes transportation and the trucks will not be overloaded with waste volumes
- Consignments for waste disposal will be recorded in terms of weight, destination and responsible person
- Waste collection should occur daily and it should be transported to the approved and safe disposal locations via adequately equipped trucks. The supervisor has to make sure that this process occurs without any hazards or problems.
- This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites/quarries.

Non-hazardous (domestic) waste disposal

The proposed **Solid Waste Management Plan** for the safe disposal of domestic waste including but not limited to:

- The non-hazardous wastes (paper, garbage, wood and plastics) will be segregated and transported to the local disposal sites by the mean of the approved and authorized contractor
- The non-hazardous wastes will be transported off-site for recycling or final disposal by a licensed contractor and supervisor will be responsible for the disposal procedure and the conditions of the trucks
  This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites.

Old Dismantled Tracks disposal

- For the final disposal of the dismantled tracks are either:
  - Maintained and reused by ENR at sub-rail road lines, or
  - Sold by auctions/bidding as scrap.

Hazardous waste generation

Hazardous waste from construction activities is limited to lubricating oil, empty paint cans. The proposed **Hazardous Waste Management Plan** for the safe disposal of such waste including but not limited to:

- According to Article 33 of Law 4/1994, the contractor is required to keep up records and manifests in a register for the methods of waste disposal and the agencies contracted to receive such wastes
- Training to employees should incorporate information from Material Safety Data Sheets (MSDSs) for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language
- Description of response activities in the event of a spill, release, or other chemical emergency should be incorporated
- Representatively sample test the wooden ties and Ballast to confirm their disposal/reuse techniques.

While hazardous waste generated from tracks upgrading / renewal are old contaminated sleepers/ crossties which were coated by a hazardous benzo-pyrene and ballast contaminated with grease, both will be disposed to a hazardous waste landfill by specialized and approved contractor. However, it should be noted that during ENRRP track renewal activities, samples from wooden ties were sent to laboratories in Italy and found to be free of carcinogenic contaminants. Accordingly, representative samples of the wooden ties to be generated should be tested in reputable laboratories to ensure their disposal/reuse techniques.

Residual impacts: Mitigation measures will reduce impacts of RP3 to **low.**

5.5.1.6 Occupational Health & safety (code: OHS3)

The contractor s prepare and implement an **Occupational Health & safety Management Plan.** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- Implement the occupational health & safety plan during all construction phases.
- Ensure that all workers under both the contactors and the sub-contractors are covered by social insurance and other appropriate types of insurance against work related accidents and fatalities and have legal documents in place for all types of workers including seasonal and daily workers
- Restricted entrance to all construction sites, where attendance sheets and copies of national IDs of all workers at site are required
- As per the labor management procedures, workers grievance mechanism should be established and well-functioning and workers should be made aware of their rights regarding working hours, days off, salaries, etc.

Train/ worker accidents that are generated from railway workers being in the vicinity of rail lines and exposed to moving trains can be mitigated as follows:

- Providing training for workers in personal track safety procedures and working around contaminated sites

- Coordination procedures with ENR to block/arrange train traffic on lines where works are occurring ("green zone working"), giving the contractor safe time to conduct the required works.

The occupational health & safety mitigation plan shall include but will not be limited to the following measure:

- Provide adequate signage to prevent accidental falling into open areas
- Fencing of the work areas
- There is posted material indicating the nearest police station and hospital (with accident and emergency facilities).
- The contractor must take reasonable steps to prevent unauthorized people accessing the site.
- Avoid the burning of materials on site.
- Provide a first aid kits in different places of the work site with the appropriate number of materials given the number of workers on site. The locations of the first aid kits will be provided to all workers.
- Providing extinguishers on work site.
- Stop people smoking and prohibit using cell phones on work sites and do not allow other work activities involving potential ignition sources to take place nearby.
- Providing site boundaries by installing suitable physical boundaries (barriers, tape or fence). fences are the primary barriers to prevent unauthorized access to the construction sites, should be in place before starting any excavation works and removed after finishing the construction activities.
- Marking excavation holes with physical boundaries (barriers, tape or fence)
- The contractor shall put up barriers or covers in the area of openings and excavations.
- Store building materials (such as pipes, manhole rings, and cement bags) so that they cannot topple or roll over.
- Keep walkways and stairways free of tripping hazards such as trailing cables, building materials, and debris.
- Everyone who works on any site must have access to adequate toilet and washing facilities, a place for preparing and consuming refreshments, and an area for storing and drying clothing and personal protective equipment (PPE).
- Contractor to ensure PPE (personal protective equipment) is used by all workers on site.
- Contractor shall hire a certified Health & safety supervisor
- Materials and equipment are tidily stacked, protected and covered where necessary. Additionally, there is adequate space for new materials to be stored in secured covered areas to avoid damage, theft, and to protect these items from weather conditions.
- Scaffolding for work in elevated areas such as ceiling painting should comply with the OSHA "General Requirements for Scaffolds".

Regarding the work near water risks, the proposed mitigation actions are:

- Working with a partner or team when working around or on water. Preferably at least two people need to be in sight of each other at all times.
- Communication devices are necessary, and they must be waterproof, suitable to the area of operation and tested before work commences. There must be an emergency plan, including provision for rescue and contact, if necessary, with the emergency services
- Proper provision must be made for first aid. Specialist training and equipment may be required.
- Suitable personal buoyancy equipment, such as lifejackets, should be provided by employers and worn by everyone at risk.
- PPE should be provided as necessary to provide protection against other hazards, such as chemical exposure. Operators also need to cover broken skin and wash hands thoroughly after coming into contact with water. Also, high-visibility clothing and Boots or water shoes should be provided.
- All electrical installations and equipment should be constructed, installed, operated, protected and maintained to prevent the risk of danger from electric shock or burns. Special attention should be paid to "earthing" if the supply is from portable generators.
- Training and supervision are an essential part of adequate control measures. All persons must understand clearly any procedures in place and what action they must take to protect themselves, including in an emergency.

5.5.1.7 Covid-19 Pandemic

The contractor shall prepare and implement as **a COVID-19 and communicable diseases Management Plan** as part of the **Occupational Health & safety Management Plan** or as a stand-alone. The plan will include the adequate mitigation measures 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.
  - coordination with local health facilities and authorities
- 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).
- ensure all workers are trained on and aware of COVID-19 prevention and precautionary measures, and are following the measures on a daily basis (direct and temporary workers)

Residual impacts: Mitigation measures will reduce impacts of OHS3 to **moderate** to **low.**

5.5.1.8 Community Health and Safety(code: CHS3)

The contractor shall prepare and implement a **Community Health and Safety** Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

- Information to be shared regularly and systematically as per stakeholder engagement plan (SEP)
- Awareness raising campaigns should be tailored in cooperation with the community-based organization. Securely surround the trench with a solid fence when working adjacent to residential clusters or any area where children are suspected to be present.
- 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 PMU (or Owner Engineer) prior to commencement of construction.
- Development and implementation of a Traffic Management Plan (including routes and alternative routes, truck movements, transport of workers, and short-term closure of roads (if necessary)
- The construction site to be fenced and guarded by security personnel in order to prevent any unauthorized access to the site
- In case of transporting heavy equipment, the nearby population should be notified in advance
- Develop and Implement a well communicated and accessible grievance mechanism for community members to address any complaints

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 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.

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.

For Engaging Security personnel or companies, the contractor shall prepare and implement a Security Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures .

5.5.1.9 Traffic (code: T3)

The contractor shall prepare and implement a **Temporary Traffic Management Plan (TTMP)** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to:

Typically, there is a hierarchy of TTMPs – a Route Wide Traffic Management Plan, Local Area Plans and Site-Specific Plans. TTM plans will aim to minimize delays and reduce detours, ensure safe access, and protect railway and road assets. The TTMPs would also address access to and from the construction zones by minimizing road crossings by heavy plant, managing truck queuing, managing truck haul routes between construction sites, dump sites and quarries, and ensuring that construction timing and sequences do not adversely affect the road network and its environs.

The TTMPs should:

- use standardized base plans;
- present data on estimated truck numbers – per hour and/or per day;
- show on plan where truck holding areas are;
- show that Non-Motorized Transport (NMT) – pedestrians, cyclists, carts, animal-drawn vehicles - are better catered for and protected;
- focus on safety at level crossings and formal/informal track crossings – this is where confusion could arise if there are detours or temporary traffic signals deployed; there is a risk of trains colliding with vehicles and pedestrians.
- It is assumed that truck loads are of normal size. If there is a need for any special provision for abnormal truck loads – extra wide, long or high – then this should be catered for and included in the TTMP.

The institutional arrangements for the development and implementation of the TTMPs should be presented. Usually this is a top-down approach but with room for flexibility at a local level to meet contingencies. The **main contractor** prepares the TTMPs for: (1) the whole route or route section of the railway track; (2) each station; (3) each signaling tower; (4) trenching accesses; (5) level crossings and other pedestrian/vehicle crossing sites; and (6) designated truck routes to/from dump sites and quarries;

The issue of hiring of trucks and recruitment of truck drivers should be examined. As can sometime be the case worldwide, trucks are typically individually owned or form part of a small fleet under a small contractor. If this is the case, ENR and its contractors will need to be able to manage this myriad of trucks and truck drivers in an efficient way. Truck management can be improved with the use of GPS, RFID or mobile phone applications. ENR could also consider the development of a Drivers' Information Pack on road safety to be handed out to all drivers.

The use of Traffic Agents such as the Traffic Police should be examined. Such personnel can provide in-situ supervision of the TTMPs at construction sites and stations and be on-hand 24/7 to direct traffic, direct residents and answer their questions.

There is scope to showcase this project and provide a learning archive by uploading a Learning Legacy online as other major rail projects (such as Crossrail and HS2 in the UK) have done.

The contractor requires to have a time management plan to manage and schedule the traffic movement for the construction materials, equipment in addition to transporting the debris to the landfill. In addition, the notification to the traffic department should be obtained and the time management plan should be approved prior to the construction activities.
It is estimated that the overall additional traffic would have insignificant impacts on the level of service on the road.
The following point present mitigation measures for the traffic impact:

1. Informational signs should be posted at the construction zones before the commencement of any construction activities to inform drivers and ensure the safety of the roads
2. The contractors and the site supervisor should choose a location for temporary storage of construction materials, equipment, tools, wastes and machinery before construction so as not to cause further traffic disruptions due to routes blockages
3. Minimizing pedestrian interaction with construction vehicles. Pedestrian crossings can be provided if necessary
4. Construction work should be avoided at the traffic peak times whenever possible.
5. Uncontrolled off-road driving will be prohibited
6. Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions
7. Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
8. Using locally sourced materials, whenever possible, to minimize transport distances. Locating associated facilities
9. Improving driving skills and requiring licensing of drivers
10. Adopting limits for trip duration and arranging driver rosters to avoid overtiredness
11. Avoiding dangerous routes and times of day to reduce the risk of accidents
12. Use of speed control devices (governors) on trucks, and remote monitoring of driver actions, if possible
13. Approval from the traffic department prior to construction should be obtained by the contractor prior to the construction preparation
14. The contractors should make sure that the employed drivers of construction machinery (such as trucks and loaders) have received sensitization/training on safety utilization of their machines in order to minimize accidents risks
15. Unusual traffic delays or accident caused during construction or any complaints received should be reported in the monthly report prepared by the construction supervisor

Residual impacts: Mitigation measures will reduce impacts of CH33 and T3 to **moderate** to **low.**

5.5.1.10 Child labor (code: CL3)

- 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 laborers 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 labor is occurred in the project

Residual impacts: Mitigation measures will reduce impacts of CL3 to **low.**

5.5.1.11 Risk associated with temporary Labor Influx (code: TL3)

In order to minimize impacts pertaining to labor influx, the LMP prepared for the project must be implemented; the following should be thoroughly implemented:

- Signature of all workers, contractors and sub-contractors of the code of conduct in the LMP in annex 1 that stipulates the different commitment of labor towards community groups and the different behavior that should be avoided
- Code of conduct in annex 2 of the LMP to be disclosed in all project sites, and as needed to be updated
- All workers should be trained on the Code of Conduct during induction
- Code of conduct induction to be done every 2 weeks for the recurrent workers and the newcomers before starting work.
- Apply penalties to workers violating the code of conduct
- Training on Covid-19 prevention

Residual impacts: Mitigation measures will reduce impacts of TLI3 to **low.**

5.5.1.12 Gender Based Violence (GBV) (code: GBV1), including sexual exploitation and abuse (SEA) and sexual harassment (SH)

- All types of inappropriate behavior of workers should be identified, and the importance of adhering to the code of conduct is emphasized
- Signature of all workers, contractors and sub-contractors of the code of conduct in the LMP in annex 1 that stipulates the different commitment of labor towards community groups and the different behavior that should be avoided
- Code of conduct in annex 2 of the LMP to be disclosed in all project sites, and as needed to be updated
- All workers should be trained on the Code of Conduct during induction

- Code of conduct induction to be done every 2 weeks for the recurrent workers and the newcomers 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

Residual impacts: Mitigation measures will reduce impacts of GHV3 to **low.**

5.5.1.13 Culture Heritage (code: CHS3)

It's unlikely to find artifacts in the project area especially that the excavation is not deep. However, it is important that the contractor implements chance finds procedure. This is due to the proximity of the site to Southern South Saqqara Pyramid located 300 m away from the alignment. Steps to be included in the chance finds procedure include:

- Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained.
- Notify the relevant authorities of the find.
- Document and record any chance find which may occur.

Residual impacts: Mitigation measures will reduce impacts of CH3 to **low.**

5.5.1.14 Hydrology and Surface Water (code: HSW3)

General rules on prevention and collective protection

- Before operating the HDD, make sure that all covers and protective housings are installed.
- The worker who handles the HDD must know their management perfectly, being informed of the risks involved in their use. The handling by underage workers, inexperienced or not trained for it is prohibited.
- The operator must become familiar with the operation of the machine in particular before using it for the first time.
- The HDD should only be used for the purpose for which it was intended and always by authorized personnel trained for its use.
- Pay special attention to all the information and warning boards provided on the machine.
- The maintenance, repair or any modification of the machine can only be carried out by specialized personnel belonging to the rental company.
- Before using the machine, the possible existence of stains that indicate fluid losses will be checked.

Safety rules during handling

- The machine will be perfectly installed according to the manufacturer and following the regulations regarding homologations and securities already exposed.
- The controls of the machine and electronic equipment will only be handled by specialized personnel following the manufacturer's instructions.
- The safety and risk instructions that are attached to the machine will be maintained in a 100% legible condition.
- The electrical installation will be carried out according to the specific regulations.
- The machinery will be checked on a daily basis before the start of work.
- To avoid risks of landslides, during the work there will be no personnel present in the vertical of the drilling and neither at the exit of the hole.

In addition, bentonite which is a form of clay that is naturally existent, is used as the drilling fluid so it does not adversely affect the environment.
Also, the resulting mud will be collected at the time of generation and disposed of site by licensed contractors.

Residual impacts: Mitigation measures will reduce impacts of HSW3 to **low.**

5.5.2 Operation Phase

5.5.2.1 Occupational Health & safety (code: OHS4)

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.

Noise and Vibration

Recommended management strategies include:

- Use of air conditioning systems to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise;
- Reduction of internal venting of air brakes to a level that minimizes noise without compromising the crew's ability to judge brake operation;
- Installation of active noise cancellation systems;
- Use of personal protective equipment (PPE) if engineering controls are not feasible or adequate to reduce noise levels;
- Use of dampers at the seat post to reduce the vibration experienced by the operator;
- Installation of active vibration control systems for locomotive suspension, cabs, or seat posts, as needed to comply with applicable international and national standards and guidelines.

Diesel Exhaust

Measures recommended to prevent, minimize, and control workers' exposure to diesel exhaust:

- Limiting time locomotives are allowed to run indoors and use of pusher cars to move locomotives in and out of maintenance shops;
- Ventilation of locomotive shops or other enclosed areas where diesel exhaust may accumulate;
- Filtration of air in the train crew cabin;
- Use of PPE where engineering controls are not sufficient to reduce contaminant exposure to acceptable levels

Fatigue

- Railway operators should schedule rest periods at regular intervals and during night hours, to the extent feasible, to maximize the effectiveness of rest breaks, and in accordance with international standards and good practices for work time

Electrical Hazards

Measures recommended to prevent, minimize electrical hazard, include:

- workers exposed to electrical hazards from electrified railways should be trained in personal track safety.
- Only workers who are specifically trained and competent in working with overhead
- lines and conductor rails should be allowed to approach these systems.

Electric and Magnetic Fields

Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components:

- Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, and limiting access to properly trained workers;
- Implementation of an action plan to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE).

Residual impacts: Mitigation measures will reduce impacts of OHS4 to **moderate** to **low.**

5.6 Mitigation Measures for the Potential Environmental and Social Impacts of Associated Facilities

The same mitigation measures proposed for OHS3 apply.

6 CUMULATIVE IMPACT ASSESSMENT (CIA)

This ESIA addresses cumulative impacts defined by ESS1 as “Cumulative impact Assessment is an instrument to consider cumulative impacts of the project in combination with impacts from other relevant past, present and reasonably foreseeable developments as well as unplanned but predictable activities enabled by the project that may occur later or at a different location”

CIA focuses on the valued environmental and social components (VECs) of the broader area, assessing how the VECs will be impacted under scenarios with current, planned and future development projects. A wide range of VECs are assessed such as airshed, soil, and community structure. The main purpose is to avoid or minimize these impacts to the greatest extent possible.

The process for assessing cumulative impacts consisted of identifying external projects including planned, under development or existing activities, in the project area. On the basis of either spatial and/or temporal overlaps between project activities and aforementioned external activities, external activities were screened. Environmental and social sensitive components were determined using the baseline description of the project and for which project impacts were identified. The potential for cumulative impact was assessed for identified environmental and social receptors and corresponding mitigation measures based on the mitigation hierarchy determined. In cases where temporal information was unavailable, a conservative approach was applied and the project screened in and cumulative impacts assessed.

Figure 6-1 sets out the methodology used to assess cumulative impacts based on a six-step rapid cumulative impact assessment (RCIA) process.

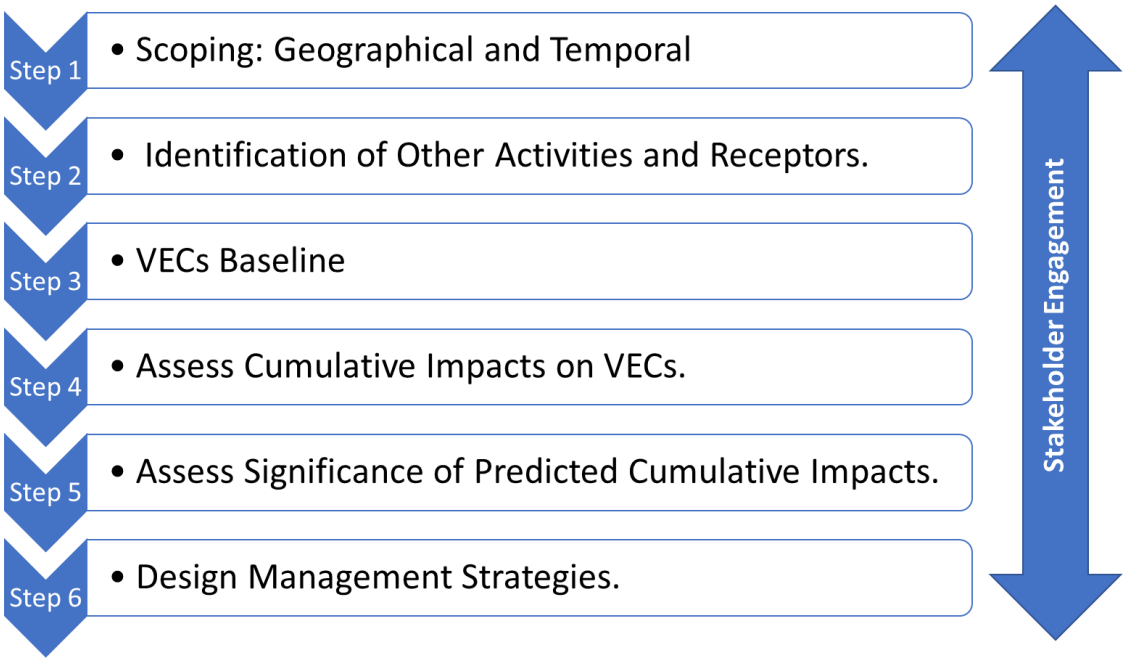


Figure 6-1: Methodology used to assess cumulative impacts

6.1 Segment 1

6.1.1 Step 1: Scoping

6.1.1.1 Geographical Scope

Geographic boundaries or spatial boundaries extend to the point at which the impacts on VEC are no longer significant or of interest to the affected communities. The geographic boundary of the RCIA is the area directly affected by the project, as was described in the project description chapter.

6.1.1.2 Temporal Scope

Temporal scope includes construction, demobilization and operation phases of the project. It's worth to mention that the level of uncertainty increases as temporal scope increases into the future.

6.1.2 Step 2: Identification of Other Activities and Receptors

6.1.2.1 VECs

VECs were identified on the basis of the impacts identified as having medium or higher significance in the project impact assessment.

Valued environmental and social component consist of airshed-ambient air quality, ambient noise and vibration levels, land and water bodies: surrounding, community health and safety, occupational health and safety (workers) and socio-economic development.

6.1.2.2 Other Projects and Developments

In this step, the objective is to identify the environmental and social factors that can impact VECs. Those factors can be planned or existing activities or a natural phenomenon.

A summary of the developments identified as part of the RCIA are provided in Table 6-1. The developments were identified by stakeholder consultation and through site visit.

The developments identified along with spatial and temporal scope of the project will determine the cumulative impacts. Projects that have been operational and assessed in the environmental and social impact assessment chapter have been screened out. Figure 6-2 shows where the developments intersect with the spatial boundary of the project.

Table 6-1: Identified developments in the spatial boundary of the project

Project Name	Status + timeline Planned Under construction Operational	Description Spatial boundaries	Description temporal boundaries	Screened in/out
High speed rail	Under construction	Intersecting at km 47	Yes 30 months to complete[31]. (2.5 years) On September 3, 2020, Egyptian-Chinese Consortium Samcrete Engineers & Contractors won the bid for executing the Ain Sokhna to Alamein high-speed electric rail.[32]The project should start this year.	Screened in (If temporally overlapping) CI during construction and operation (on CHS)
Sumed oil line	Operational	Intersects at km 47	Yes	Screened out- addressed in impact assessment- no other projects intersecting
Transmission lines	Operational	Intersects	Yes	Screened out- addressed in impact assessment- no other projects intersecting

[31] https://nilefm.com/digest/article/6519/egypt-begins-work-on-high-speed-electric-train-set-to-connect-ain-sokhna-to-alamein-in-a-3-hour-trip
[32] https://egyptianstreets.com/2020/09/09/9-billion-high-speed-train-connecting-egypts-ain-sokhna-to-alamein-in-progress/

Project Name	Status + timeline Planned Under construction Operational	Description Spatial boundaries	Description temporal boundaries	Screened in/out
Wahat road	Operational	Intersects	Yes	Screened in-impact on air quality due to traffic on Wahat road
Al Dabaa Corridor	Operational	Borders	Yes	Screened in-impact on CHS during construction on workers due to existing traffic and operation on nearby scattered farmhouses
Cairo Alex Desert Road	Operational	Intersects	Yes	Screened in-impact on CHS during construction operation on nearby community due to existing traffic noise etc.
RRR	Operational	Parallel	Yes	Screened in-impact on CHS during construction and operation on nearby community

Project Name	Status + timeline Planned Under construction Operational	Description Spatial boundaries	Description temporal boundaries	Screened in/out
Bashteel-Itay El Baroud railway	Operational	Link point at km 68.5	Yes	Screened out- addressed in impact assessment
Wahat-Marazeeq railway	Operational	Link point at the first km	Yes	Screened out- addressed in impact assessment
Cemetery and mosque	Operational	Intersection at km 66	Yes	Screened out- addressed in impact assessment

Figure 6-2: Locations of screened in developments with respect to the project

Table 6-2: Scoping of Other Projects for Consideration in Cumulative Impact Assessment

Project aspect CI on	VEC Sensitive receptors	Potential Cumulative Impact	Project phase		Development					Scoped In/Out
			C	O	Segment 2	High speed train	Cairo-Alex	Al Dabaa Corridor	RRR	
Air pollutant emissions	OHS workers	Increased levels of pollutants degraded ambient air quality	y	x	y	y	y	y	y	In
	CHS-Residential receptors in close proximity to Project route Segment 1	Air emissions-degraded ambient air quality	y	y	x	x	y	y	x	In
Generation of noise and vibration	OHS workers	Increased noise and vibration	y	x	y	y	y	y	y	In

Project aspect CI on	VEC Sensitive receptors	Potential Cumulative Impact	Project phase		Development					Scoped In/Out
			C	O	Segment 2	High speed train	Cairo-Alex	Al Dabaa Corridor	RRR	
	CHS Residential receptors in close proximity to Project route Segment 1	Increased noise and vibration	y	y	x	x	y	y	x	In
Waste generation	Land and water resources	Pollution of surrounding in case of improper disposal	y	y	Y (during maintenance activities if same WS)	Y	x	x	x	In
Contamination of surrounding	Soil	Pollution of soil due to leakage from construction equipment	y	x	y	y	x	x	x	In

Project aspect CI on	VEC Sensitive receptors	Potential Cumulative Impact	Project phase		Development					Scoped In/Out
			C	O	Segment 2	High speed train	Cairo-Alex	Al Dabaa Corridor	RRR	
Large gatherings of workers-	workers	Spread of covid-19	y	x	y	y	x	x	x	In
Socio-economic development	Community	Direct and indirect job opportunities	y	x	y	y	x	x	x	In

6.1.3 Step 3: VECs Baseline

For sensitive receptors screened into the CI, the baseline conditions are summarized in Table 6-3. More detailed information can be found in the baseline chapter.

Table 6-3: VECs baseline

Aspect/ ESIA	VEC/sensitive receptor	Baseline conditions
Air quality	Workers	Km 47: high speed rail - air pollutants below permissible levels Dust levels during dust storms contribute to higher levels of dust Air emissions-degraded ambient air quality
	Residential receptors in close proximity to Project route	- air pollutants below permissible levels Air emissions-degraded ambient air quality
Noise and vibration	workers	Below permissible levels, but close to permissible levels at km 68.5 Noise and vibration impact from construction works
	Residential receptors in close proximity to Project route	Ambient noise levels for all areas are below permissible limits.
Soil contamination	Soil environment	The top soil consists of cultivated land area (at km 47-intersection with high-speed rail)
Waste generation	Land and water resources	Land areas around high-speed rail (at km 47) consist of cultivated desert areas, segment 2 Pollution of surrounding in case of improper disposal
OHS	workers	Spread of covid-19

6.1.4 Step 4, 5 and 6: Assess Cumulative Impacts on VECs, Determine Impact Significance and Mitigation Measures

This section discusses the cumulative impacts that results from interaction between the project and other projects and developments.

6.1.4.1 Air Quality

Ambient air levels of the tested contaminants are below permissible limits of the law.

During construction, potentially concurrent works on high-speed rail (2.5 years starting 2020) involving use of heavy machinery and traffic from nearby highways and considering potential dust storms or the effect of wind in the desert-sandy environment characterizing the project site are expected to release air pollutants and PM in particular. Levels of PM are not expected to exceed permissible levels. However, there may be implications affect workers health and safety. The cumulative impacts of dusts and traffic in addition to the project activities are expected to impact health and safety of nearby community. The impact is expected to be of high significance and short term.

During operation, cumulative impact on ambient air quality is due to emissions generated by traffic on nearby highways, near residential areas. Impacts affect health and safety of nearby residences in Bani Salmah village and gated farmhouse compound. The operation of the freight train cannot be avoided. The impact is expected to be of high significance and short term.

Mitigation measures

Owing to the nature of the project site, dust generation due to blowing wind cannot be controlled, however, working schedule can be selected to avoid windy days and dust storm events. Emissions due to traffic, and machinery operating on diesel cannot be avoided. However, impacts can be mitigated by implementing measures consisting of adequate spraying techniques, limiting use of machinery and equipment, limiting speed of heavy vehicles, provision of PPE. **Residual impacts are expected to be of medium significance and short term.**

During operation, implementing proper emission controls systems in the design to control dust, NOx emissions (e.g., diesel particulate filters and selective catalytic reduction systems) can reduce the cumulative impact of traffic and freight train (the Project), optimizing operating conditions of the freight train. **Residual impacts are expected to be of low-medium significance and long term.**

6.1.4.2 Noise and Vibration

During construction, potentially concurrent works on high speed rail (2.5 years starting 2020) involving use of heavy machinery and in addition to noise from traffic on nearby highways can

contribute to impacts of noise from the project. Increased noise and vibration levels can be expected with health and safety impacts on workers at project sites, where the monorail and high speed rail will intersect. The impact is expected to be of high significance and short term.

Cumulative impacts due to traffic and project activities can also be expected near Bani Salamah village, where recorded noise levels were below, but close to permissible levels and expected to be exceeded during construction. The impact is expected to be of medium significance and short term.

During operation, cumulative impacts of noise in areas bordering the Cairo-Alex highways can be anticipated; affected areas consist of residential areas along the km 64.5- km 68.5 stretch. The impact is expected to be of medium significance and long term.

Mitigation measures

During construction, neither the use of machinery nor traffic can be avoided, but can be controlled to minimize impacts. Measures include coordinating with other large works to minimize use of heavy equipment simultaneously (monorail, high speed train) (though this may be difficult to control), use of proper PPE (all sites), optimize use of noise and vibration generating equipment (turning off when not needed etc.), adapting noise control systems. **Residual impacts are expected to be of medium significance and short term.**

During operation, cumulative impacts due to traffic and operating freight train cannot be avoided, but can be minimized by implementing and optimizing use of strong noise barrier technology along areas most susceptible to increased noise and vibration, i.e., km 64.5-km68.5 stretch, optimizing operating conditions of the freight train Residual impacts are expected to be of low significance and long term (noise model to confirm based on noise barrier design proposals). **Residual impacts are expected to be of medium significance and long term.**

6.1.4.3 Waste Generation

During construction, waste including construction and demolition, hazardous materials (used oils) will be generated by the project. Other sources of waste generation are associated with surrounding possibly concurrent projects, namely, and high speed rail (at km 47), which intersect with planned route of segment 1. There is a potential for contamination of the surrounding in case of improper waste disposal. The impact is assessed as having medium significance and short term.

During operation, waste will be generated by the project and other works during maintenance. Maintenance workshops for the freight train are located in Boulaq near the Bani Salamah area. The spatial criteria do not overlap. Therefore, no cumulative impacts are anticipated.

Mitigation measures

Implementing proposer waste management plans for generated waste can avoid potential pollution of the surrounding associated with improper disposal of waste. **Residual impact is expected to be insignificant and long term.**

6.1.4.4 Soil Contamination

During construction, potentially concurrent works and high speed rail (2.5 years starting 2020) involving use of heavy machinery and equipment increasing the occurrences of leakage of oil and fuel to the surrounding. Impacts are expected to be of medium to high significance and short term.

Mitigation measures

Implementing proper maintenance and operating conditions and applying good housekeeping onsite can minimize impacts due to leakage and spills. **Residual impacts are assessed as low-medium and short term.**

6.1.4.5 Spread of COVID-19

During construction, larger gathering of workers in intersecting work areas can increase risks of COVID-19 spread among workers despite being in outdoor setting. **The impact is assessed as having medium to high significance and short term.**

Mitigation measures

Implementing a covid prevention plan will minimize potential risks of covid spread. **Residual impact is assessed as having low significance.**

6.1.4.6 Socioeconomic Development

Given the construction phase for the project may only partially overlap with the other projects, the construction workforce employed would be well equipped/trained to find further employment on the wider range of projects. Workers can finish one project and move to the next. Accordingly, the in-combination effect of direct and indirect employment opportunities is considered to be **Positive**.

6.2 Segment 2

For segment 2, there are no planned or future developments along the route. However, the segment borders the industrial zone across 5 km, and borders Middle Ring Road over approximately 13 km.

6.2.1 Step 1: Scoping

6.2.1.1 Geographical Scope

Geographic boundaries or spatial boundaries extend to the point at which the impacts on VEC are no longer significant or of interest to the affected communities. The geographic boundary of the RCIA is the area directly affected by the project, as was described in the project description chapter.

6.2.1.2 Temporal Scope

Temporal scope includes construction, demobilization and operation phases of the project. It's worth to mention that the level of uncertainty increases as temporal scope increases into the future.

6.2.2 Step 2: Identification of Other Activities and Receptors

6.2.2.1 VECs

Similar to segment 1, valued environmental and social component consist of airshed-ambient air quality, ambient noise and vibration levels, land and water bodies: surrounding, community health and safety, occupational health and safety (workers) and socio-economic development.

6.2.2.2 Other Projects and Developments

In this step, the objective is to identify the environmental and social factors that can impact VECs. Those factors can be planned or existing activities or a natural phenomenon.

A summary of the developments identified as part of the RCIA are provided in Table 6-4. The developments were identified by stakeholder consultation and through site visit.

The developments identified along with spatial and temporal scope of the project will determine the cumulative impacts. Projects that have been operational and assessed in the environmental and social impact assessment chapter have been screened out.

Table 6-4: Identified developments in the spatial boundary of the project

Project Name	**Status + timeline** **Planned** **Under construction** **Operational**	**Description** **Spatial boundaries**	**Description** **temporal boundaries**	**Screened in/out**
Road				**Air pollutant emissions due to existing traffic**

Project Name	Status + timeline Planned Under construction Operational	Description Spatial boundaries	Description temporal boundaries	Screened in/out
Middle ring road	Operational	Bordering along 12 km	Yes	Screened in-impact on air quality due to traffic on road (80 m away)
Fayou Desert road	Operational	Intersection only	Yes	Screened out, impact accounted for by works on middle ring road
Wahat road	Operational	Bordering along	Yes	Screened in during construction on workers due to existing traffic – no communities or other projects around
Industrial zone	Operational	Borders along 5 km	Yes	Screened in for distance less than 3 km (conservative approach)

Project aspect **CI on**	**VEC** **Sensitive receptors**	**Potential Cumulative Impact**	**Project phase**					**Scoped in out**
			C	**O**	**Middle ring road**	**Wahat road**	**Industrial zone**	
Air pollutant emissions	OHS workers	Increased levels of pollutants degraded ambient air quality	y	x	y	y	y	In
	CHS-Residential receptors in close proximity to Project route (residential area between track and industrial zone Residential: 4km bordering industrial	Air emissions-degraded ambient air quality	y	x	x	y	Y	In

	zone, at 340 m							
Generation of noise and vibration	OHS workers	Increased noise and vibration	y	x	y	y	Y	In
	CHS Residential receptors in close proximity to Project route Segment 1	Increased noise and vibration	y	x	x	y	y	In

6.2.1 Step 3: VECs Baseline

For sensitive receptors screened into the CI, the baseline conditions are summarized in the baseline chapter.

6.2.2 Step 4, 5 and 6: Assess Cumulative Impacts on VECs, Determine Impact Significance and Mitigation Measures

6.2.2.1 Air emissions

During construction, increased air emissions due to the project and operations of the industrial zone and potential dust blowing owing to the nature of project site may contribute to increased air emissions affecting the air quality of nearby residential zone and workers. **Cumulative impacts on workers are expected to be of medium significance and short term.**

During operation, as it is an existing track, the project does not add emissions, but may reduce them due to improved and upgrading tracks. **Positive cumulative impacts can be expected due to reduced overall emissions**.

Mitigation measures

Owing to the nature of the project site, dust generation due to blowing wind cannot be controlled, however, working schedule can be selected to avoid windy days and dust storm events. Emissions due to traffic, and machinery operating on diesel cannot be avoided. However, impacts can be mitigated by implementing measures consisting of adequate spraying techniques, limiting use of machinery and equipment, limiting speed of heavy vehicles, provision of PPE. **Residual impacts are expected to be of low significance and short term.**

6.2.2.2 Noise and vibration

During construction, impacts on workers due to works bordering highways 80 m away, and impacts on residential area between the track and the industrial zone (140 m away) and the residential areas 340 m away from the industrial zone and 180 m away from segment 2 track are expected. Increased noise levels during construction contributing to noise and vibration from the industrial zone can increase ambient noise levels with impacts on the residential community. **Impacts are expected to be of medium significance and short term.**

During operation, as it is an existing track, the project will not contribute to an added noise and vibration source, and may even reduce them due to improved and upgraded tracks. There are no adverse cumulative impacts on residential areas bordering the industrial zone. **Positive cumulative impacts can be expected due to reduced overall noise and vibration levels.**

Mitigation measures

During construction, use of noise barriers, the use of mase of proper PPE (all sites), optimal use of noise and vibration generating equipment (turning off when not needed etc.), adapting noise

control systems, minimizing work during high traffic times can reduce adverse impacts on workers and on the nearby community. **Residual impacts are expected to be of low significance and short term.**

7 ANALYSIS OF ALTERNATIVES

The analysis of the project alternatives forms an integral part of the ESIA as it helps determining the optimum technical and economical options with maximized positive environmental and social impacts and reduced or mitigated negative impacts. This analysis evaluates whether there are viable alternatives to the proposed development which can fulfill the same function while reducing the overall environmental impact.

The main concept that this chapter serves is applying the mitigation hierarchy of avoid, reduce, mitigate and offset. Assessing alternatives reflect the avoid term in the mitigation hierarchy. Identifying alternatives in the design or alignment that avoids negative impacts.

This section discusses the following alternatives for both segment 1 and 2.

For segment 1:

- No action alternative
- Road transportation alternative
- Technological and material alternatives
- Alternative alignment/routes

For segment 2:

- No action alternative
- Alternative trenching activities
- Alternative Technologies in Interlocking Systems

7.1 Segment 1

7.1.1 No Action

The proposed project has many economic, environmental, and social benefits summarized in the following points:

- It will absorb the country's projected increase in export and import (increase of 5.8% and 2.8% up to 2024[33], respectively). Since the Port of Alexandria and El Deikheila receive about 55% of Egypt's containerized gateway traffic, there is a need to distribute the goods to other parts of Egypt.
- The transport of goods from and to Alexandria, Bani Salamah line and DP6 will allow:
    - Saving time by reducing travel time in a short cut, enabling the customers to receive goods at DP6 in the same day

[33] World Economic Outlook (WEO April 2019)

- Support further development in new urban 6th of October City by attracting new economic interest, business, expansion and generate additional income and tax revenues
- Provide job opportunities not only in the freight railway but also indirectly in other developments that can appear as a result of the project
- Facilitate internal and external trade as a result of saving money and time for freight and logistic companies

- Reduce traffic congestion between Alexandria and 6th of October
- Reduce the traffic burden on Cairo Railway Hub that is already congested with passenger traffic

Based on the above reasons, the no action alternative is not beneficial.

7.1.2 Road Transportation Alternative

An alternative to the new railway is to upgrade the existing road network between Alexandria and 6th of October city. Rail transportation of goods has more advantages to offer than road due to the following:

- One freight train can transport more TEUs per trip than one truck
- Trains are faster than trucks (It can run at a velocity of 140 km/hr. all the way, truck can't reach this speed)
- Low personnel operating cost
- More affordable to wider population
- Lower GHG emissions
- Safer in terms of accidents and breakdowns

Rail is considered energy efficient in terms of energy consumption per km per tonnage, which is lower than road transportation. The main disadvantage or rail transportation compared to road include the following:

- Higher investment cost in terms of construction and maintenance
- Less flexibility in terms of route and time schedule
- Less flexibility in cargo load, it wouldn't be economical if it weren't loaded fully

Based on recent assessment conducted by the Consultant with MoT and consultation with ENR, railway consume around 15 ktoe/billion.ton.km. On the other hand, heavy duty trucks consume around 69 ktoe/billion.ton.km. Table 7-1 shows estimation of GHG emissions as a result of using rail as compared to trucks.

Table 7-1: GHG emission comparsion between railway and truck

	Distance (km) A	Tonnage B	Billion ton. Km/yr. C= A*B*365/10^9	GHG emissions[34] (tCO_2/yr.) D=EF*C*41.86*73
Railway	68.5	3000[35]	0.07	3,439
Truck				15,818

As it was shown from the previous table, there is significant difference between rail and truck in terms of carbon dioxide emission in favor of railway. In terms of local pollutants, emission factor of some local pollutants such as NOx and PM is higher for railway than trucks as shown in Table 7-2. However, one truck can carry two containers or two TEUs, and one train can carry 50 containers. In order to carry 300 TEUs, it would require 150 trucks but would require only 6 trains. In addition, it would require trucks to travel longer distance to reach destination and subject to traffic. Meanwhile, railway is straightforward and direct. Accordingly, the emission of local pollutants from trucks per trip would be greater than rail.

Table 7-2: Local pollutants emission factor rails compared to trucks

g/bhp-hr	CO	HC	NOx	PM
Railway[36]	1.5	0.14	1.3	0.03
HDV[37]	14.4	0.14	0.2	0.01

Finding: Rail transportation offers more advantages than disadvantages and is the most economical means of transportation.

7.1.3 Technological and Material Alternatives

7.1.3.1 Locomotive: diesel or electric power

Diesel locomotives are self-powered whilst electric powered locomotives require an overhead line to distribute power.

Electric power locomotives offer better performance in terms of higher acceleration and pollutant emissions. It is lower carbon alternative since the electricity in Egypt rely mainly on Natural gas

[34] Emission factor of diesel is taken from IPCC 2006 Guidelines 73 ton/GJ. One ktoe is equivalent to 41.86 GJ
[35] taking max capacity in the operation phase in the future as indicated in the environmental feasibility study of the project
[36] EPA, 2016, Locomotives: Exhaust Emission Standards https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OA09.pdf (accessed in August 2022)
[37] EPA, 2016, Heavy-Duty Highway Spark-Ignition Engines: Exhaust Emission Standards https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OA01.pdf (accessed in August 2022)

for almost 80% of the fuel in addition to other renewable sources that are increasing with time and according to Egypt's Integrated Energy Strategy.

ENR currently doesn't have freight fleets operating with electric locomotives. Currently, ENR's priority to provide electric locomotives will be given more to passenger rail fleet more than freight as passenger fleets are used more. The new railway will include in its design future electrification.

7.1.3.2 Material Choice: Concrete or Wooden Sleepers

To compare between concrete and wooden sleepers as alternative material of the new railway.

Concrete sleepers are heavier and are less susceptible to change by temperature unlike wood, which is less unstable with temperature change. Concrete sleepers are also safer in terms of fire hazards. However, wooden sleepers are more flexible to absorb impacts from wheels better than concrete, which is brittle and can crack and need replacement.

Concrete sleepers have longer life than wooden ones and require less maintenance and hence, less closure times. They have been chosen for this project due to their safety and longer lifespan.

7.1.4 Alternative Alignments

ENR takes into consideration several factors for the selection of railway alignment, which include:

- Trip time
- Outcome of hydrological and geological studies
- Locations of flood drainage valleys
- Volume of construction work
- Cost of construction and operation work

Cairo University conducted a study of 5 different alternative alignments as shown in Figure 7-1.

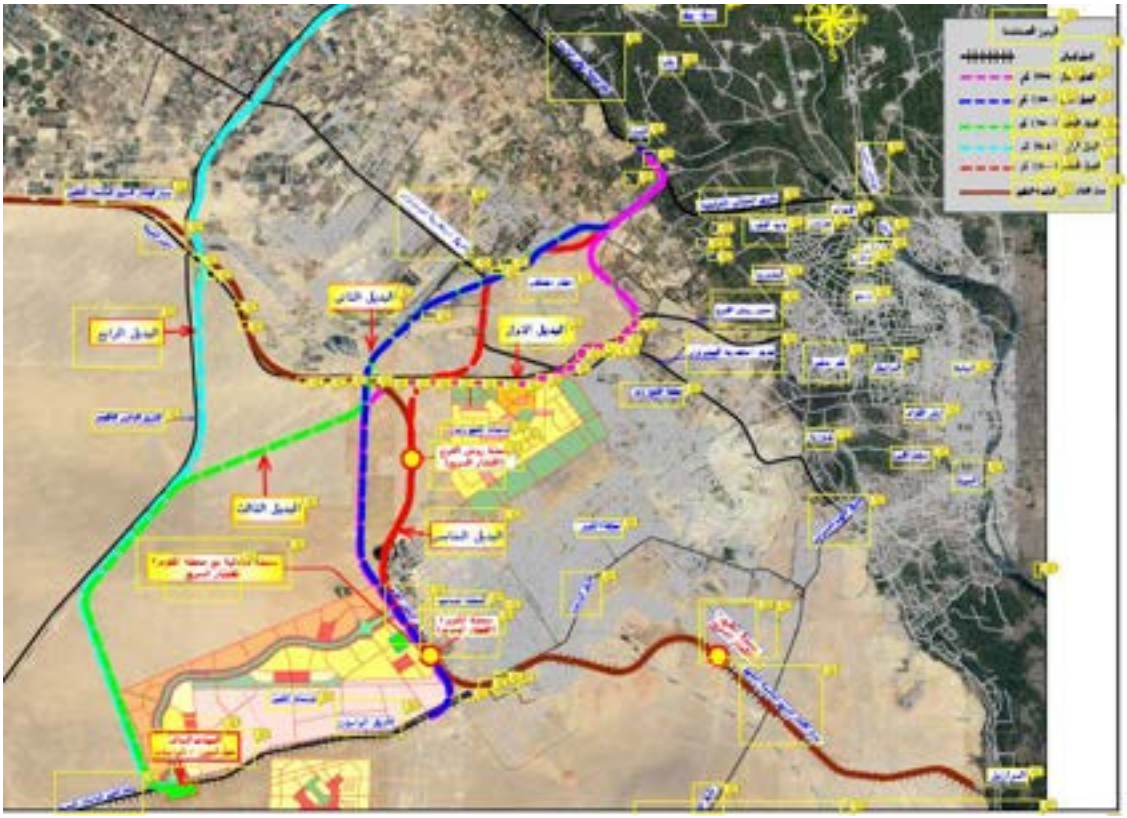


Figure 7-1: The five alignments proposed by Cairo University distinguished by color (the pink line presents the 1st alternative, the blue line presents the second, the green line presents the third, the light blue line presents the fourth and the red line presents the fifth)

The study concluded that the 5th alternative as the most suitable alignment because it has an advantage from the planning point of view as it is parallel in some parts to highways such as Daba'a corridor and these corridors connect new development areas. In addition, it was the alternative with the least construction and operation cost. From the hydrological aspect it required the least cost of culverts and flood hazards protection work. Based on the above, Cairo University study didn't assess the environmental and social aspects of the different alternatives. It only concluded the best alternative from technical, financial and hydrological point view.

Public consultation session was conducted for the 5th alternative alignment. Different stakeholders from land owners to real estate developers and NUCA were invited to consult them for the location of the alignment. The attendees and outcome of the public consultation are presented in the Public Consultation and Engagement chapter. The result of the public consultation was very effective that it drew the attention of the alignment consultant and ENR to the social impacts of the 5th alternative. After the public consultation, the 4th alternative replaced the 5th alternative alignment as shown in Figure 7-2. Currently ENR and alignment consultants are conducting coordination and public consultation with the relevant stakeholders.

Environmental and social impact assessment comparison between alternative 4 and alternative 5 are presented in Table 7-3. The assessment is based on impact severity and frequency. The severity and frequency are based on a scale from 1 to 5, 1 being very low and 5 being very high. The total score was calculated by multiplying the severity times the frequency. The alternative with the highest score has the highest impacts.

Figure 7-2: Comparison between 4th and 5th alternatives

Table 7-3: Comparative impact assessment between the 4th and 5th alternatives

E&S indicators	4th alternative			5th alternative		
Air quality	Line extends over 68.5 km, which means higher emissions			Line extends over 49 km.		
	S:3	F:4	TS:12	S:3	F:3	TS: 9

E&S indicators	4th alternative			5th alternative		
Noise and vibration	More than 50% of the alignment passes through desert area planned to be cultivated and parallel to RRR (average noise level 56 dB during the day)			Passes near more residential areas especially those parallel to Dabaa road (future extension of Sheikh Zaied residential areas), which already has high noise levels in the baseline as a result of the road (average noise level 60 dB during the day).		
	S:2	F:3	TS:6	S: 4	F: 3	TS:12
Occupational health and safety	Avoids sewage ponds.			Passes through large area of sewage ponds. Health and safety hazards associated with works carried out at and near the swampy sewage pond especially when crossing over dried sludge from the sewage ponds, polluted water with sludge at the surface, and proximity to wastewater pumping stations.		
	S:2	F:3	TS:6	S: 4	F:3	TS:12
Land acquisition	It is estimated that around 905,000 m^2 of land plots will need to be expropriated for the proposed alignment. Owners/users of these lands might be less affected since the expropriation is on the edge of the land and in the RoW of the RRR.			It is estimated that around 1.504 million m^2 of land will be acquired for the project. The problem is that land acquisition is in the middle of residential areas and cutting the agriculture areas in half.		
	S: 4	F: 2	TS: 8	S: 4	F: 3	TS: 12
Construction cost	According to Cairo University study, construction cost amounts to 3,244 mil EGP			According to Cairo University study, construction cost amounts to 2,868 mil EGP. The cost doesn't include compensations for land acquisition.		
	S: 3	F: 3	TS: 9	S:3	F: 3	TS: 9

E&S indicators	4th alternative	5th alternative
Future potential for electrification hence better performance and less GHG emissions	Possible, since it's a way from Sphinx airport.	Not possible, since it passes near Sphinx airport. Electrification can cause disturbance to the communication waves at the airport.
	Positive impact	Negative impact
Average score	**8.2**	**10.8**
Priority rating	**1**	**2**

Finding: Based on the above, the 4th alternative has lower impacts than the 5th alternative. This means it is the recommended alignment. However, stakeholder consultations are still underway and the alignment shall be updated based on the outcome of the consultation sessions.

7.1.5 Recommendations

7.1.5.1 Alternative Mitigation Measures

Recommendations to ensure the alignment is the best alternative are summarized in the following points:

1. Conduct soil analysis report prior to construction after determining the exact alignment, so that impacts on soil are minimized;
2. Conduct geotechnical investigations to make sure the ground can withstand the pressures of embankments and cuttings;
3. Source raw materials such as embankment fill from local locations to minimize transportation impacts after conducting the necessary tests;
4. Consult with relevant stakeholders especially of future developments to make sure impacts are minimized;
5. Minimize noise impacts near residential areas by employing locomotives that reduce rolling noise as well as noise barriers. Based on the outcome of the noise and vibration measurements in the baseline (section 4.4), areas at the link points in Bani-Salamah village located near the existing Bashteel – Itay El Baroud railway have high recorded levels slightly near the law limit 59 dB during the day. Accordingly, special attention should be given to this area in the design;
6. Apply mitigation hierarchy of avoid, minimize and mitigate.
7. Raise safety awareness among surrounding communities and include clear warning signage at potential points of entry to track areas.

8. Keep constant communication with surrounding communities and establish grievance mechanism

The institutional and monitoring requirements for the alternative mitigation measures are covered in chapter 8 of the ESIA (Environmental and Social Management Plan).

7.2 Segment 2

7.2.1 No Action

7.2.1.1 Modernization of Signaling System of the Marazeeq-Wahat 66 km

Without the project, the railway service over the Marazeeq-Wahat line will undergo further deterioration affecting millions of users, resulting in operational risks and increased financial burden and train unreliability. Modernization of signaling system provides better safety performance of the train and offers more safety to the surrounding community. No action alternative will deprive the community of attaining the positive impacts of the project.

7.2.1.2 Track Upgrades

This alternative suggests continuing the operation of the railway tracks with their current condition of signaling system, and deteriorated quality and inefficient operational capabilities. This will cause more financial burden on ENR resulting from the frequent breakdowns, and the low-speed motion of trains on those tracks, causing delayed schedules, and further congestion of trains. This will eventually lead to uneconomical use of the lines, decreased reliability of ENR and consumer dissatisfaction without the implementation of the proposed project, and reduced overall railway safety.

7.2.2 Alternative trenching activities

One of the main activities during Signaling Modernization 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 over ground to save the time and resources associated with the digging and backfilling activities. However, installing cables over ground would result in increased risks of asset loss and deterioration. Specifically, exposed cables would be subject to damage due to weather, and material wear and tear and potential increase in cables theft.

7.2.3 Alternative Technologies in Interlocking Systems

This ESIA studies the upgrade of the traditional signaling system of Maraeeq-Wahat line (66 km) from mechanical interlocking to electronic interlocking system. However, there are some different

applications of interlocking systems, with different operational characteristics as shown in the Table 7-4.

Table 7-4: Comparison between interlocking systems

Mechanical	Relay	Electronic
This mechanical type of interlocking allows capacity of one train per 30-50 minutes depending on track arrangement, due to the fact that train route cannot be preselected and levers have to be manually operated. Also, it contains a high probability of error and malfunction.	Consist of complex circuitry made up of relays in an arrangement of relay logic that ascertain the state or position of each signal appliance. As appliances are operated, their change of position opens some circuits that lock out other appliances that would conflict with the new position. Equipment used for railroad signaling tends to be expensive because of its specialized nature and fail-safe design.	Modern interlockings are generally solid state, where the wired networks of relays are replaced by software logic running on special-purpose control hardware. The fact that the logic is implemented by software rather than hard-wired circuitry greatly facilitates the ability to make modifications when needed by reprogramming rather than rewiring. In many implementations, this vital logic is stored as firmware or in ROM that cannot be easily altered to both resist unsafe modification and meet regulatory safety testing requirements. Electronic Interlocking are being adopted on a large scale to derive benefits of digital technologies in train operation and to enhance safety.

Therefore, it can be concluded that electronic interlocking systems provide more reliability and safety when it comes to operation as it minimizes the human factor and relies on highly functional computers and telecommunicated signals, creating overall accuracy and precision in operation.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The PMU is committed to ensure compliance with the proposed mitigation measures, and all applicable national and international environmental legislation, regulations and standards, as well as the proper management of all significant environmental impacts and the continual improvement of the environmental performance of the project. In order to achieve this, an environmental and social management plan (ESMP) must be established to complete the environmental evaluation. The ESMP summarizes the mitigation measures suggested and discusses initial and ongoing monitoring and management measures of significant impacts of the proposed project. The management of the proposed project shall be committed to implement the environmental and social management plan (ESMP) requirements included therein.

This section discusses the various elements of a separate environmental and social management plan for sub-component 2.1 and 2.2 of the project.

8.1 Environmental and Social Objectives and Targets

The management of the proposed project is committed to implementing an environmental and social management and monitoring plan. The plan will ensure that the construction phase and operation of the project involve full implementation of all proposed mitigation measures and complies with:

- World Bank Environmental and Social Standards
- Egyptian environmental standards including procedures and guidelines of the EEAA

Previous sections of this report have outlined: the baseline environmental and social conditions in the area of the proposed development, have identified the potential impacts on these baseline conditions which could result from both construction and operational activities, and have proposed measures to minimize and mitigate any negative impact identified. To complete the environmental and social evaluation, this section presents an Environmental and Social Monitoring Plan (ESMP). ESMP reflects the implementation procedures and mechanisms for the mitigation measures suggested. It discusses initial and ongoing monitoring and management of significant impacts of the proposed project. The ESMP will focus on the following:

- Construction impacts management, including control of construction traffic, dust impacts, construction waste, relations with neighboring communities, etc.
- Operational impacts management and control
- Environmental and social management organization, which includes staffing levels, staff training, and communication and reporting

The effectiveness of these environmental and social management and mitigation measures will be monitored throughout the construction and operation of the proposed project. Monitoring will be

carried out by the supervising contractor management of the lines as appropriate to the size and scale of the project.

As explained above, a number of indicators have been selected for each of these objectives. These indicators are measurable. Therefore, when monitored as part of the monitoring and environmental and social management plan, will provide a quantitative yield on the environmental and social performance of the system. The explanation of the selected indicators for each goal and their target values are explained in more detail below.

8.2 Environmental, Social, Health and Safety (ESHS) Institutional Arrangements

8.2.1 PMU

The Project Management Unit (PMU) created for the implementation of the Railway Improvement and Safety for Egypt (RISE) Project will implement the CATLDP project. The PMU will include qualified staff and resources to support management and monitoring of E&S risks. The PMU will be strengthened as it is tasked with ESHS management, with support from ENR Environmental affairs department (EAD). The EAD department will have the overall responsibility on the project's E&S requirements and will dedicate to the project One (1) E&S manager for the project, two (2) environmental specialist, two (2) Occupational and health and Safety specialists (OHS), and two (2) social specialists. The PMU will be responsible for the management and monitoring of the project overall performance including the ESHS aspects during construction and operation phases of the project. The PMU will closely be monitoring the contractors on-ground and will be supported by the supervision firms. The PMU will ensure that contractors comply with and implement the provisions set forth in the project's ESF instruments (ESCP, SEP, ESIA, ESMF, LMP), including requirements related to workers' GM. The PMU will incorporate the relevant aspects of the ESCP, including, inter alia, the relevant E&S instruments, the LMP, and code of conduct, into ESHS specifications of the procurement documents. The project's contractors and supervising firms including the Owner's supervisor and system integrator shall comply and cause subcontractors to comply with the ESHS specifications of their respective contracts. As needed, the PMU can hire E&S consultancy firm as needed during the project implementation to support the project.

8.2.2 Contractor ESHS Management

The activities will be implemented by contractors. Qualified and experienced contractors will be responsible for implementation of the detailed design and construction of the proposed project. Accordingly, these contractors will be responsible for developing site specific ESHS Management plans and code of conduct, consistent with this study, as well as ensuring environmental protection and safety procedures on site. Contractors shall have adequate and dedicated staffing for environmental, social and health and safety management. Contractors' (and sub-contractors') workers will be required to demonstrate appropriate skills, qualifications and/or experience prior

to employment. Also, contractors will be responsible for managing and auditing primary suppliers to ensure compliance with ESS2. The contractor shall provide a monthly report on implementation of ESMP to the PMU.

There should be and HSE Manager on sit responsible for ensuring that construction works comply with the requirements of the ESIA and all environmental permits. The HSE manager's key roles will be to:

- Assume the interface with authorities for environmental authorizations and permits
- Ensure that mitigation measures to reduce impacts during the construction phase are implemented
- Ensure that monitoring to be undertaken during construction is implemented
- Ensure compliance with the environmental and social management plan
- Ensure that health and safety requirements are respected

Environmental and Social Training Program

Adequate training should be provided. The management will ensure that site supervisors are trained on:

- The general operation of the project
- Specific roles and important actions
- Occupational Health and Safety
- Emergency Preparedness and Contingency Response Procedures
- Covid-19 precautions and measures
- Grievance mechanisms
- GBV related mitigation measures, including codes of conduct
- Community Health and Safety
- WB good practice notes addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH)

The contractor is responsible for committing to and implementing the environmental and social (E&S) instruments prepared for CATLDP, which include:

- SEP
- ESCP
- LMP

All the CATLDP instruments are published here.

8.3 Environmental Social and Health and Safety Management Plans

The following list of required plans and procedures shall be developed by each contractor and approved by the Supervision Consultant in coordination with the PMU. These plans collectively are referred to as Contractor -ESHS Management Plans (C-ESHSMP). The plans should be developed prior to the procurement phase meaning the ESMP shall be added to the bidding documents and including the required plans that the contract shall have prior to the contractor selection and prior to construction phase. The contractor shall submit the plans to PMU to be reviewed and approved. The selection of the contractors should also be based on the effectiveness of plans prepared.

- Waste Management Plan (WMP)
- Hazardous Material and Waste management Plan (HAZMAT)
- Air quality, Noise and vibration Management Plan
- Traffic management plan
- Occupational Health and Safety Plan
    - Emergency preparedness and response plan
    - COVID-19 and communicable diseases management plan
- Community health and safety management plan
    - Security Management Plan, in case of engaging security personnel/company
- SEA/SH Action Plan including Worker's code of conduct
- Labor Management Procedures and Workers Grievance Mechanism
- Stakeholders Engagement Plan including grievance mechanism

Currently ENR has an occupational safety and health committee under the Centralized Management that develops and updates emergency response procedures and occupational health and safety procedures, and ensures that they are mainstreamed at all levels.

ENR shall update their current environmental management system (EMS) and emergency response plan (ERP), and make sure proper trainings are given to ENR personnel, and ensure that it covers the scope of the stations, tracks, level crossings and railway cars in order to implement it during operation phase. ENR is also improving its Safety Management System (SMS), with a systemic view that goes from locomotives and cars to tracks to signaling to junctions and vulnerable communities. Component 2 of the Railway Improvement and Safety for Egypt (RISE) project is improving the SMS to create a culture at ENR of zero harm/zero tolerance.

Guidance on the content of the different plans and procedure is given in Annex 4. All plans should at minimum specify the following in addition to the management requirements: applicable local and international legal standards, roles and responsibilities of the plan/ implementation procedures, non-conformity management, review and monitoring and training requirements where applicable. Where needed, separate plans should be prepared for the construction and operation phase

(maintenance work) in order to take into account, the difference of activities and site arrangements of both phases.

The plans will be developed in accordance with the ESF requirements and considering the ESIA prepared for the project. The current implementing contractors on the four project segments including track renewals contractors will update the existing plans or prepare new plans to be consistent with the ESIA and the plans mentioned above.

8.4 Environmental and Social Monitoring Plan

The supervising contractor will be responsible for monitoring and conducting audits of environmental and social performance during all phases of the project i.e., responsible for supervising implementation of ESIA. Audit reports should be carried out by the contractor.

This Monitoring Plan defines the key information to be monitored, monitoring location, monitoring frequency, monitoring methods, and mitigation actions to be undertaken as detailed in this section.

The monitoring data will be analyzed and reviewed at regular intervals by PMU and supervising firms; compliance against relevant WB ESS and national standards will be verified to identify necessary corrective actions in a timely manner. Records of monitoring results will be kept in the Environmental register for each contractor and reviewed by PIU and supervising contractor.

The ENR/PMU and supervising firms are entitled to audit the project contractor in order to ensure conformity with environmental and social standards and requirements. The supervising contractor shall prepare environmental and social performance reports to ensure compliance with the World Bank ESS on regular basis and in accordance with the project commitment plan.

The environmental and social monitoring plan focuses on fulfilling these objectives:

- Control and reduction of the environmental and social impacts due to construction of the project
- Control and reduction of the environmental and social impacts due to operation of the project

ENR will review and update, if needed, the Monitoring Plan every 6 months to ensure that design systems, construction procedures, and monitoring systems for the development stage of the site accurately reflect projects impacts. The review process should be established to ensure continual improvement in the management and operation of the railway lines for sustained compliance with WB ESSs and national standards.

ENR will also coordinate with EEAA and Ministry of Housing and The Holding Company for Drinking Water and Wastewater prior to contracting and construction of the project.

8.4.1 Segment 1

8.4.1.1 Preconstruction and construction phase

Table 8-1 and Table 8-2 illustrate the Monitoring Plan for the project during construction and operation phases of Segment 1.

Table 8-1: Environmental and social management and monitoring plan during construction phase of Segment 1

Environmental and Social Monitoring during Construction Phase of Segment 1		
Air Quality (code: AQ1)		
Mitigation measures	The contractor shall assign HSE manager is a must at all construction sites who will ensure the implementation of good site practices and prepare and implement an **Air Quality Management Plan (AQMP)**. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Appropriate sitting and covering of stockpiles of friable materials with a suitable cover in addition to regularly spraying water so as to minimize dust blow • Minimizing drop heights for material handling activities such as unloading of friable materials • Keeping the roads damped and construction site via watering spraying to minimize dust from spraying as a result of vehicles moving when moving on hard soil in the desert area • Ensuring that vehicles travel on paved routes wherever possible • Sheeting of lorries transporting friable construction materials • Enforcing speed limits on unpaved roads to be <30 km/hr • Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fume	
Residual impact	Negative, low, short term	
Methods of monitoring	Visual inspections and monitoring of dust and exhaust gas releases	Recording and documentation of complaint
Monitoring frequency	Daily for visual observations Monthly for measurements- y	
Monitoring Indicators	• Dust levels ambient PM (TSP, PM_{10}) using Particle sampler • Dust complaints • SO_2 using SO_2 analyzer; NOx using NOx analyzer (chemiluminescence), and CO using CO analyzer (IR) • Visible observation of black smoke from vehicles	
Monitoring location	Borders of construction location, at identified sensitive receptor's locations such as Bani Salamah, scattered farm houses and gated farmhouse compound.	

Environmental and Social Monitoring during Construction Phase of Segment 1	
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Air quality measurements: 360 000 EGP/yr.
Resource efficiency and pollution prevention (code: RP1)	
Mitigation measures	Develop and implement: waste management plan, water management plan, energy management plan covering all project phases. The contractor shall prepare and implement a **Waste Management Plan (WMP), and Hazardous Waste and Material Management Plan (HAZMAT)**. The plans will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • The contractor will obtain official permits from the local authorities for the disposal of wastes (construction wastes landfills, hazardous wastes landfills, etc.) prior to the commencement of construction activities • Wastes will be segregated and temporarily stored safely in the allocated areas for waste storage on the premises of the construction site in a way that doesn't cause further traffic disruption • Wastes will be covered to avoid the pollution of the ambient air by dust dispersion • Adequate trucks will be used for wastes transportation and the trucks will not be overloaded with waste volumes • Consignments for waste disposal will be recorded in terms of weight, destination and responsible person • Waste collection should occur daily and it should be transported to the approved and safe disposal locations via adequately equipped trucks. The supervisor has to make sure that this process occurs without any hazards or problems • This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites/quarries **<u>Non-hazardous (domestic) waste disposal</u>** The proposed **Solid Waste Management Plan** for the safe disposal of domestic waste including: • The non-hazardous wastes (paper, garbage, wood and plastics) will be segregated and transported to the local disposal sites by the mean of the approved contractor

Environmental and Social Monitoring during Construction Phase of Segment 1	
	• The non-hazardous wastes will be transported off-site for recycling or final disposal by a licensed contractor and supervisor will be responsible for the disposal procedure and the conditions of the trucks • This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites/quarries **Hazardous waste generation** Hazardous waste from construction activities is limited to lubricating oil, empty paint cans. The proposed **Hazardous Waste Management Plan** for the safe disposal of such waste including but not limited to: • According to Article 33 of Law 4/1994, the contractor is required to keep up records and manifests in a register for the methods of waste disposal and the agencies contracted to receive such wastes • Training to employees should incorporate information from Material Safety Data Sheets (MSDSs) for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language • Description of response activities in the event of a spill, release, or other chemical emergency should be incorporated **Construction and demolition waste handling** Avoid storing material and construction waste on agriculture land. Contractors to take appropriate measures to prevent materials leakage to ensure that fertility of land will remain as is after completion of construction work. Construction and demolition waste are deposited in landfills. The contractor will classify the waste according to its type and either transport it to landfill or have contract with governorate or certified contractor to transport to its safe disposal in landfills. Each time the waste is disposed in the landfill the contractor receives a receipt from the landfill of the amount and date. In Giza Governorate, there is only one managed operating landfill in Shabramant. If there is hazardous waste among the construction and demolition waste such as oil or paint, it will be handled with caution, in special labeled containers till its final disposal in Nasserya certified landfill.
Residual impact	Negative, low, short term

Environmental and Social Monitoring during Construction Phase of Segment 1	
Methods of monitoring	• Documents and records review • Site visual inspection
Monitoring frequency	• Daily for visual inspections • Bi-monthly for records review
Monitoring Indicators	• Maintaining valid contracts with authorized waste collection contractors • Records of delivery at final disposal sites • Records of the types and quantities of waste generated, and amounts diverted through salvage and reuse, and/or recycle
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Noise and vibration (on workers and public) (code: NV1)	
Mitigation measures	The contractor shall prepare and implement **a Noise and Vibration Management Plan.** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Reduce workers' exposure times to noise, so that they do not exceed the safety limits stipulated in the Egyptian environmental law in addition to occupational safety and health standards • Train all workers before starting construction work on the danger of noise and how to avoid them • Workers to be trained on use of personal protection equipment (PPE) • Avoid construction work in the evening • Restricting the movement of lorry cars to prevent noise in the early morning and late evening periods • Control exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure • All machines and vehicles must be stopped when not in use • Communicate the construction schedule with neighboring communities via the on the ground Community Liaison Officers (CLO) with close coordination with the team of ENR and sensitive receptors currently consisting of communities in agricultural and cultivated desert areas and Bani Salamah village.

Environmental and Social Monitoring during Construction Phase of Segment 1	
Residual impact	Negative, low, short term
Methods of monitoring	Site Inspection and spot measurements (if necessary)
Monitoring frequency	Daily for visual site inspections Monthly for measurements
Monitoring indicators	• Noise level maintained below permissible level during daytime and night respective to the sensitivity area • Regular records and logs showing working hours are maintained
Monitoring location	• At the sources • Along perimeter of site • At the sensitive receptors such as the nearest residential aggregation.
Responsibility	Contractor HSE manager (and officers)
Estimated cost (EGP)	Point measurement: 120 000 EGP/yr.
Occupational Health and Safety (code: OHS1)	
Mitigation measures	Implement the LMP developed for the project The contractor shall prepare and implement an **Occupational Health and safety Management Plan.** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Ensure that all workers under both the contactors and the sub-contractors are covered by insurance against any potential accidents • Restricted entrance to all construction sites, where attendance sheets and copies of all workers at site are required • Providing training for workers in personal track safety procedures • Coordination procedures with ENR to block/arrange train traffic on lines where works are occurring (“green zone working”), giving the contractor safe time to conduct the required works • Train and inform workers of WB Good Practice Note – Addressing SEA/SH in IPF Involving Major Civil Works

Environmental and Social Monitoring during Construction Phase of Segment 1	
	The occupational health and safety mitigation plan shall include but will not be limited to the following measure: • Provide adequate signage to prevent accidental falling into open areas • Fencing of the work areas Health and safety environment (HSE) • There is posted material indicating the nearest police station and hospital (with accident and emergency facilities) • The contractor must take reasonable steps to prevent unauthorized people accessing the site procedures to address the following risks (injuries from minor to fatal, including train/worker accidents, rotating and moving equipment, electrical hazards, fire and explosions, eye hazards, noise and vibration, and fatigue including Struck by moving objects) • Provide a first aid kits in different places of the work site with the appropriate number of materials given the number of workers on site. The locations of the first aid kits will be provided to all workers. • Providing extinguishers on work site • Stop people smoking and do not allow other work activities involving potential ignition sources to take place nearby • Avoid distractions for workers, especially by prohibiting the use of cell phones on work sites • Providing site boundaries by installing suitable physical boundaries (barriers, tape or fence) • Marking excavation holes with physical boundaries (barriers, tape or fence) • The contractor shall put up barriers or covers in the area of openings and excavations. • Store building materials (such as pipes, manhole rings, and cement bags) so that they cannot topple or roll over • Keep walkways and stairways free of tripping hazards such as trailing cables, building materials, and debris • Everyone who works on any site must have access to adequate toilet and washing facilities, a place for preparing and consuming refreshments, and an area for storing and drying clothing and personal protective equipment (PPE) • Contractor to ensure PPE (personal protective equipment) is used by all workers on site • Contractor shall hire a certified Health and safety supervisor • Materials and equipment are tidily stacked, protected and covered where necessary. Additionally, there is adequate space for new materials to be stored in secured covered areas to avoid damage, theft, and to protect these items from weather conditions

Environmental and Social Monitoring during Construction Phase of Segment 1	
	• Scaffolding for work in elevated areas such as ceiling painting should comply with the OSHA "General Requirements for Scaffolds". • Emergency response to respond to different risks including natural disasters
Residual impact	Negative, moderate, long term
Methods of monitoring	• Inspection of complaints • Inspection of Human Resources Policy • Inspection of employment contracts • Health records about occupational injuries and infectious diseases among workers • Inspection of attendance sheets and ID copies • Inspection of insurance policies • Inspection of Training records
Monitoring frequency	Daily for complaints and site inspections Once prior to construction works for soil assessments
Performance indicators	• Occupational health and safety Incident reports • Medical reporting on received cases • No accidents • No incidents regarding public health and safety • Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs
Monitoring location	Workers at the project location
Responsibility	Proponent's HSE manager (and officers)
Estimated cost (EGP)	Project cost
Community Health and safety (code: CHS1)	
Mitigation measures	Following optimization of the route at selected sites, sensitive receptors need to be re-assessed and impacts re-assessed

Environmental and Social Monitoring during Construction Phase of Segment 1	
	Implement the LMP prepared for this project paying particular attention to the code of conduct and risks related to GBV, SEA and SH especially in agricultural areas, cultivated desert areas and Bani Salamah village Train workers on implementing the code of conduct The contractor shall prepare and implement a **Community Health and Safety** Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Share Information with community regularly as per SEP and via Community Liaison Officers (CLO) to be present on the ground and coordinate closely with the team of ENR • Conduct Awareness raising campaigns • The contractor shall 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 PMU (or Owner Engineer) prior to commencement of construction • Construction site to be fenced and guarded by security personnel to prevent any unauthorized access to the site • Notify nearby population in case of transporting heavy equipment • Grievance mechanism for community members to address any complaints • Develop Traffic Management Plan (if necessary) **For Pedestrian Safety:** • Posting of clear and prominent warning signage at potential points in areas where nearby communities have been observed including agricultural areas, cultivated desert lands, Bani Salamah and where known unauthorized pathways exist. • Providing fences or other barriers at station ends and along tracks to prevent access to tracks by unauthorized persons. The fences shall have adequate managed crossing points to encourage the use of controlled crossings. • Constructing pedestrian service tunnels and crossing points at locations suggested by stakeholder consultations with the nearby communities to make sure they don't have to walk long distances to cross the rail. In addition, the dimensions of the service tunnels shall be wide enough to accommodate the pedestrian and their animals and crops, if needed (around 3 m wide).

Environmental and Social Monitoring during Construction Phase of Segment 1	
	• Temporary Traffic Management Plan that the contractor will construct will take into account the safety of pedestrian and traffic flows in sensitive areas near Bani-Salamah and areas where communities need to cross the rail to make sure their safety is not at risk. **<u>For Engaging Security personnel or companies</u>** The contractor shall prepare and implement a Security Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures
Residual impact	Negative, medium, long term
Method of monitoring	• Community grievance log • Reviewing community consultation reports • Interview with community members • Project details as well as grievance mechanism details available on site.
Monitoring frequency	Monthly
Performance indicators	• Number of reported complaints from the community • Community members aware of the activities conducted and the messages shared/discussed (through the beneficiary feedback survey)
Monitoring location	Construction site
Responsibility	• Social Officer of the contractor in collaboration with Site HSE officers • Social Specialist of the PMU
Estimated cost (EGP)	Covered in construction cost
Covid-19 Pandemic (code: OHS1)	

Mitigation measures	The contractor shall prepare and implement **a COVID-19 and communicable diseases Management Plan** The plan will include the adequate mitigation measures 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

Environmental and Social Monitoring during Construction Phase of Segment 1	
	○ 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) • Ensure all workers are trained on and aware of COVID-19 prevention and precautionary measures, and are following the measures on a daily basis (direct and temporary workers) • Implement LMP for the project with special focus on code of conduct and COVID-19 management measures
Residual impact	Negative, medium, short term
Method of monitoring	• Site inspection • Review of documents and records • Medical and routine check-up of staff and workers
Monitoring frequency	Daily
Performance indicator	• Number of trained workers (direct and temporary) • Number on infected persons • Number of isolated persons
Monitoring location	Construction Site
Responsibility	• Contractor and proponent's • HSE manager (and officers)
Estimated cost (EGP)	To be estimated based on the number of workers and general context
Traffic (code: T1)	
Mitigation measures	The contractor shall prepare and implement a **Temporary Traffic Management Plan (TTMP)** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: Typically, there is a hierarchy of TTMPs – a Route Wide Traffic Management Plan, Local Area Plans and Site-Specific Plans. TTM plans will aim to minimize delays and reduce detours, ensure safe access to

pedestrians and all flows related to the work of the surrounding communities (animals, crops), and protect railway and road assets. The TTMPs would also address access to and from the construction zones by minimizing road crossings by heavy plant, managing truck queuing, managing truck haul routes between construction sites, dump sites and quarries, and ensuring that construction timing and sequences do not adversely affect the road network and its environs.

The TTMPs should:

- use standardized base plans
- present data on estimated truck numbers – per hour and/or per day
- show on plan where truck holding areas are
- show that Non-Motorised Transport (NMT) – pedestrians, cyclists, carts, animal-drawn vehicles - are better catered for and protected
- focus on safety at level crossings and formal/informal track crossings – this is where confusion could arise if there are detours or temporary traffic signals deployed; there is a risk of trains colliding with vehicles and pedestrians

It is assumed that truck loads are of normal size. If there is a need for any special provision for abnormal truck loads – extra wide, long or high – then this should be catered for and included in the TTMP.

The institutional arrangements for the development and implementation of the TTMPs should be presented. Usually this is a top-down approach but with room for flexibility at a local level to meet contingencies. A typical institutional arrangement could be:

a. The **main contractor** prepares the TTMPs for: (1) the whole route or route section of the railway track; (2) each signaling tower; (3) trenching accesses; (4) level crossings and other pedestrian/vehicle crossing sites; and (5) designated truck routes to/from dump sites and quarries
b. Local contractors give their feedback including a forecast of truck volumes
c. ENR and/or MOT reviews the TTMPs, fleshes out details and define the worksites
d. The **contractors** are informed and implement the TTMPs

Environmental and Social Monitoring during Construction Phase of Segment 1	
	The use of Traffic Agents such as the Traffic Police should be examined. Such personnel can provide in-situ supervision of the TTMPs at construction sites and stations and be on-hand 24/7 to direct traffic, direct residents and answer their questions. There is scope to showcase this project and provide a learning archive by uploading a Learning Legacy online as other major rail projects (such as Crossrail and HS2 in the UK) have done.
Residual impact	Negative, moderate, short term
Method of monitoring	Maintaining and controlling traffic on and to the site by inspection of Traffic Management Plan or traffic complaints from workers or community
Monitoring frequency	Weekly during construction (especially during transport of equipment and materials)
Performance indicator	• Effectiveness/extent of implementation of traffic management plan • Number of complaints received associated with traffic and time it took to resolve them • Number of unresolved complaints
Monitoring location	Surrounding roads
Responsibility	• Contractor and proponent's • HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Risk of Child Labor (code: CL1)	
Mitigation Measures	• Implement LMP prepared for this project • The contract to be prepared for contractor/ subcontractors, 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 laborers in order to facilitate the monitoring of the presence of hired staff below 18 years • The contractor/subcontractor, primary suppliers and service provisions also 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, primary suppliers and service provisions' ToR in order to warrantee no child labor is occurred in the project

Environmental and Social Monitoring during Construction Phase of Segment 1	
Residual impact	Negative, low, short term
Method of monitoring	• Verifying contracts • Inspection of complaints • Inspection of Human Resources Policy • Inspection of employment contracts • Inspection of attendance sheets and ID copies
Monitoring frequency	• During contract preparation • Daily during construction
Performance indicator	• No complaints from community • No children on site
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Risk associated with temporary Labor Influx (code: TLI1)	
Mitigation Measures	• Implement LMP for the project • Train workers on measures outlined in the LMP with a focus on GBV especially when works will occurring next to communities (agricultural areas, cultivated desert mands, Bani Salamah, Gannet Masr and any other sensitive receptors identified following the optimization of the route at selected areas) • Daily induction on code of conduct when works are nearby communities • Preparation of appropriate code of conduct that stipulates the different commitment of labor towards community groups and the different behavior that should be avoided • All workers should be trained on the Code of Conduct) • Code of conduct to be signed by sub-contractor • 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 • Training on Covid-19 prevention

Environmental and Social Monitoring during Construction Phase of Segment 1	
Residual impact	Negative, low, short term
Method of monitoring	Visual Inspection of the site, workers, equipment and vehicles
Monitoring frequency	Daily throughout construction
Performance indicator	• The Code of Conduct has been prepared and formally adopted • Number of complaints received from the community with regards to workers' behavior in general and the time it took to solve them • Training records • All mitigation measures have been implemented (in specific those related to the code of conduct including GBV and other labor influx risks) • % of workers trained on Code of Conduct • % of workers trained on GBV
Monitoring location	Construction sites
Responsibility	**Contractor:** Implementation of mitigation measures, internal monitoring and reporting to ENR **ENR:** Ensuring the correct implementation of the mitigation and monitoring measures
Estimated cost (EGP)	Covered in construction cost
Risk of Gender Based Violence (GBV) Risk (code:GBV1)	
Mitigation Measures	• Implement LMP and code of conduct for the project • A code of conduct for workers should be developed, all workers should be trained on. All types of inappropriate behavior of workers should be identified, and the importance of adhering to the code of conduct is emphasized

Environmental and Social Monitoring during Construction Phase of Segment 1	
	• 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 • Train and inform workers on Good Practice Note – Addressing SEA/SH in IPF Involving Major Civil Works • 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 newcomers 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
Residual impact	Negative, low, short term
Method of monitoring	• Inspection of training records • Code of conduct established, disclosed and workers are trained on • The monitoring of workers' compliance to the Code of Conduct when interacting with the surrounding communities to avoid behaviors such as verbal assault, sexual harassment and other forms of GBV • Inspection of complaints • Number and documentation of awareness raising activities and stakeholder engagement activities • Interview with community members • Inspection of drug tests and alcohol tests conducted • Numbers of penalties applied
Monitoring frequency	Daily for site inspection Weekly for training records
Performance indicator	• Worker code of conduct • No complaints from community • No accidents • Community members aware of the activities conducted and the messages shared/discussed
Monitoring location	Construction site

Environmental and Social Monitoring during Construction Phase of Segment 1	
Responsibility	Community Liaison Officer (CLO) and Social Officer of the Contractor and the Social Specialist of the PMU
Estimated cost (EGP)	Covered in construction cost
Land Acquisition (code: LA1)	
Mitigation Measures	A project RF was prepared. Accordingly, the mitigation measures related to land acquisition will follow the provisions of ESS5, which are provided in detail in the Project's Resettlement Framework. Resettlement Plans will be prepared and implemented, as per the Resettlement Framework, prior to any construction related works.
Residual impact	Negative, moderate, short term
Method of monitoring	Review and audit
Monitoring frequency	At the beginning of the construction phase then weekly
Performance indicator	• Documentation of the stakeholder sessions and consultations • GM 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
Monitoring location	Construction sites
Responsibility	**Contractor:** • Implementation of avoidance strategy and mitigation measures • Reporting to ENR **ENR:** • PMU with support from the WB will maintain land avoidance strategy

Environmental and Social Monitoring during Construction Phase of Segment 1	
	• Reviewing Contractor's performance and ensuring the correct implementation of the mitigation and monitoring measures • Reviewing and assurance of Contractors reports
Estimated cost (EGP)	Covered in construction cost
Existing Utilities/Infrastructure (code : EUI 1)	
Mitigation Measures	**General rules on prevention and collective protection** • Before operating the HDD, make sure that all covers and protective housings are installed • The worker who handles the HDD must know their management perfectly, being informed of the risks involved in their use. The handling by underage workers, inexperienced or not trained for it is prohibited • The operator must become familiar with the operation of the machine in particular before using it for the first time • The HDD should only be used for the purpose for which it was intended and always by authorized personnel trained for its use. • Pay special attention to all the information and warning boards provided on the machine • The maintenance, repair or any modification of the machine can only be carried out by specialized personnel belonging to the rental company • Before using the machine, the possible existence of stains that indicate fluid losses will be checked **Safety rules during handling** • The machine will be perfectly installed according to the manufacturer and following the regulations regarding homologations and securities already exposed • The controls of the machine and electronic equipment will only be handled by specialized personnel following the manufacturer's instructions • The safety and risk instructions that are attached to the machine will be maintained in a 100% legible condition • The electrical installation will be carried out according to the specific regulations • The machinery will be checked on a daily basis before the start of work • To avoid risks of landslides, during the work there will be no personnel present in the vertical of the drilling and neither at the exit of the hole

Environmental and Social Monitoring during Construction Phase of Segment 1	
	In addition, bentonite which is a form of clay that is naturally existent, is used as the drilling fluid so it does not adversely affect the environment. Also, the resulting mud will be collected at the time of generation and disposed off-site by licensed contractors. **Infrastructure utilities services** Normally height of embankment or depth of cutting depends upon topography and desired rail level. Accordingly, construction work can impact existing infrastructure or antiquities in the construction location. Each governorate, especially the big ones like Cairo and Giza have Information Center that can provide infrastructure maps present in the governorate. Before construction works begin, the contractor will acquire infrastructure maps to know the type of pipelines, cables, or antiquities present in the location of construction. In case there is gas pipeline or telephone cables or any other infrastructure and/or antiquities, the contractor shall go to the relevant directorate affiliated to the governorate to conduct coordination meeting and inform the directorate about the location of construction and acquire permit of work. The meeting is documented with meeting minutes on the conditions of the relevant directorate to conduct construction work near its utility/infrastructure/antiquities to ensure its safety. On the day of construction, a representative from the directorate will be present to make sure that the contractor is applying safety conditions. In case infrastructure maps are not yet present, sometimes shallow manual excavation not exceeding 75 cm is conducted as exploratory method for the existing infrastructure in coordination with the governorate
Residual impact	Negative, low, short term
Method of monitoring	• Visual inspection • Inspection of complaints • Health records about occupational injuries • Inspection of Training records
Monitoring frequency	During HDD activities, construction activities
Performance indicator	• No accidents or spill incidents • Occupational health and safety Incident reports

Environmental and Social Monitoring during Construction Phase of Segment 1	
	• Medical reporting on received cases • Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Soil and geology (code: SG1)	

Mitigation Measures	• The contractor will put in place measures aimed at minimizing soil erosion and soil contamination
	  ○ To avoid soil erosion, scheduling to avoid heavy rainfall periods (i.e., during the dry season, which is most of the time of the year in Egypt) to the extent practical
	• Activities that involve fueling, lubricating or adding chemicals will not take place on-site unless it is necessary. This is to avoid soil pollution and generation of additional hazardous wastes. If such actions will necessarily take place on-site, they will be conducted over impervious surfaces and a spill kit will be made available on-site
	  ○ Containers of used chemicals and oil will be collected in specific labeled drums and disposed in an approved hazardous wastes facility in coordination with the local authorities
	• Construction vehicles will be restricted to designated areas to avoid soil compaction within the project site

Residual impact	Negative, low, short term
Method of monitoring	• Visual inspection • Inspection of complaints • Health records about occupational injuries • Inspection of Training records
Monitoring frequency	During HDD activities
Performance indicator	• No accidents or spill incidents • Occupational health and safety Incident reports

Environmental and Social Monitoring during Construction Phase of Segment 1	
	• Medical reporting on received cases • Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost

8.4.1.2 Operation phase

Table 8-2: Environmental and social management and monitoring plan during operation phase of Segment 1

Environmental and Social Monitoring during Operation Phase of Segment 1	
Occupational Health and Safety (code: OHS2)	
Mitigation Measures	**Train / Worker Accidents** • Regular training workers in personal track safety procedures including use of personal protective equipment (PPE) • Training maintenance workers on locomotive repairs and track repairs • Elimination of mobile phones or portable music devices when working in the danger zone (within 3 meters) of the railway • 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 • Slow speed for trains on adjacent line when working in double line section • Temporary fences/barriers to prevent workers straying onto active line • Design and construction of rail lines with adequate clearance for workers especially on viaduct structures and bridges where there should be minimum 3 meters clearance from nearest rail for workers to stand when needed for maintenance activities • Segregation of stabling, marshalling, and maintenance areas from the running lines

	Noise and Vibration Recommended management strategies include: • Use of air conditioning systems to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise • Reduction of internal venting of air brakes to a level that minimizes noise without compromising the crew's ability to judge brake operation • Installation of active noise cancellation systems • Use of personal protective equipment (PPE) if engineering controls are not feasible or adequate to reduce noise levels • Use of dampers at the seat post to reduce the vibration experienced by the operator • Installation of active vibration control systems for locomotive suspension, cabs, or seat posts, as needed to comply with applicable international and national standards and guidelines **Diesel Exhaust** Measures recommended to prevent, minimize, and control workers' exposure to diesel exhaust: • Limiting time locomotives are allowed to run indoors and use of pusher cars to move locomotives in and out of maintenance shops • Ventilation of locomotive shops or other enclosed areas where diesel exhaust may accumulate • Filtration of air in the train crew cabin • Use of PPE where engineering controls are not sufficient to reduce contaminant exposure to acceptable levels **Fatigue** Railway operators should schedule rest periods at regular intervals and during night hours, to the extent feasible, to maximize the effectiveness of rest breaks, and in accordance with international standards and good practices for work time **Electrical Hazards**

	Measures recommended to prevent, minimize electrical hazard, include: • Workers exposed to electrical hazards from electrified railways should be trained in personal track safety • Only workers who are specifically trained and competent in working with overhead lines and conductor rails should be allowed to approach these systems **<u>Electric and Magnetic Fields</u>** Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components: • Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, and limiting access to properly trained workers • Implementation of an action plan to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE)
Residual impact	Negative, moderate, long term
Method of monitoring	Visual Inspection – Regular tracks audits – Record Keeping
Monitoring frequency	Monthly
Performance indicator	• 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 GM • OHS statistics such as fatalities, injuries, lost time incidents, first aid cases.

	• Number of complaints received, solved and unsolved complaints • Social and medical insurance applied
Monitoring location	ENR premises (tracks, MTBs, STBs, and stations)
Responsibility	**ENR:** Ensuring the correct implementation of the mitigation and monitoring measures – Keeping record of incident report and accidents – No. of training sessions held
Estimated cost (EGP)	Covered in ENR operation costs
Noise and vibration (code: NV2)	
Mitigation Measures	The maximum sound power level according to the noise model (annex 7) is estimated to be 95 dB for the train. Accordingly, noise barrier is recommended at point 4 and 5 (km 64.5 to km 68.5), where there are sensitive receptors and link points with Bashteel-Itay ElBaroud train and where ambient noise level in the baseline is near the law limit. Noise barriers shall be constructed during the construction phase. The barriers are one of the most used mitigation measures. Noise barriers are applied in many cases, both with new rail infrastructure significantly changed infrastructure and as noise abatement in existing situations. As the dominant noise source (the wheel-rail contact surface) is close to the track, noise barriers are highly effective as long as the receiver position is in the shadow zone (i.e. there is no direct sight from the receiver to the source). Most noise barriers near railway lines are between 1 and 4 meters high, but very high barriers (up to 10 meters) are erected in exceptional situations. The key parameter for the barrier effectiveness is the geometry, i.e. the location of the upper edge of the barrier concerning the source location. An important effect is the reflection of sound between the barrier and the train car body, which may affect the achievable reduction. This so-called canyon effect can be avoided with a lining with a high absorption coefficient of the barrier side facing the tracks. Alternatively, the barrier may be put in an inclined position, to direct the reflections towards the sky (barriers inclined backward) or towards the ballast (barrier inclined to the track). An inclined position is chosen with transparent barriers, which can't achieve sound absorption on the trackside. Well designed and located noise barriers can be effective with attenuation of 10 dB(A) or

	more at the façade of the receiver (when the barrier comfortably blocks the line of sight between the noise source and receiver).
Residual impacts	Negative, moderate, long term
Method of monitoring	Noise measurements
Monitoring frequency	Annually
Performance indicator	Noise level below 60 dB
Monitoring location	Along the alignment especially near sensitive receptors at Bani Salamah and the agriculture areas
Responsibility	ENR
Estimated cost (EGP)	Project cost
Community Health and safety (code: CHS2)	
Mitigation Measures	**<u>Air Quality</u>** Increased air pollutant emissions can be controlled by: • Perform air dispersion model to identify sensitive areas in close proximity to segment and adopt necessary measures such as reducing speed of train to reduce emissions. Current receptors consist of scattered farm houses in cultivated land and agriculture land and Bani Salamah village • Select freight engines with adequate emission control systems, diesel oxidation catalysts and selective catalytic reduction • Operate freight train at optimal conditions. As emissions increase according to operating conditions; carry out optimization study to determine optimal conditions minimizing emissions, while not compromising on freight service delivery • Perform technical assessment considering time of freight delivery and climate and weather conditions and air quality index, which have implications on the formation of photochemical O3 • Perform technical studies to consider electrification options to reduce emissions associated with diesel **<u>Noise and Vibrations</u>** Increased noise levels are expected to occur in the surrounding areas from the railway operation. In addition to the proposed noise barriers proposed above, mitigation measures implemented at source are recommended as follows:

	• Establish action plan in coordination with EEAA to conduct spot noise measurements in different locations • Use of modern non-metallic disc brakes, which can reduce rolling noise by 8-10 decibels (dB) compared to cast-iron block tread brakes utilized on older vehicles (non-metallic disc brakes also reduce wearing of wheels and rails) • Reduce the roughness of running surfaces through regular maintenance of wheels and tracks • Prevent the noise from source by applying improved sound-proofing, and other noise reducing features (e.g., engine enclosures and exhaust muffling for diesel engines • Building noise barriers in different locations along the railway corridor. The technical study for the detailed design of noise barrier construction should include: • Required amount of noise reduction as per the noise model prepared for the project • Barrier construction material • Barrier location • Barrier shape and dimensions • Ease of maintenance • Also, some of the aspects that are important to consider during the design stage of the noise barrier especially in areas near existing and future residential development projects are: • Will the barrier block a view that is important to the residents? • Will the barrier itself look unattractive? • Will the barrier obstruct a breeze that helps cool residences' yards? • Will the barrier adversely effect plants or gardens? Will it cause unacceptable shading? • Will the barrier require passages for pedestrian and/or vehicle access? **<u>Accidents From Crossing the Railway Corridor</u>** Trespassers on rail lines and facilities may incur risks from moving trains, electrical lines and equipment, and hazardous substances, among other issues. Measures to minimize, prevent, or control trespassing include: • Posting of clear and prominent warning signage at potential points of entry to track areas • Installation of fencing or other barriers at station ends and other locations to prevent access to tracks by unauthorized persons. There is a plan in ENR to install fences around all railways affiliated to ENR with priority given to highly densely populated area • Raise safety awareness among surrounding communities and include clear signage and leaflets including safety instruction regarding the dangers of trespassing (especially among young people)

	• Determine authorized route that is safe and convenient to the surrounding communities to use to pass the corridor and make sure it is clearly indicated and convenient • Constructing pedestrian service tunnels and crossing points at locations suggested by stakeholder consultations with the nearby communities to make sure they don't have to walk long distances to cross the rail. In addition, the dimensions of the service tunnels shall be wide enough to accommodate the pedestrian and their animals and crops, if needed (around 3 m wide). **<u>Cargo Load Material</u>** The type of material that the freight train will carry is important to be handled properly. ENR has procedure to follow during transportation of hazardous material with specified roles and responsibilities to personnel. The procedure is based on ENR's Operation Safety Regulation (2014). The procedure includes the following mitigation measures: • Selecting suitable routing and timing of hazardous materials transport to minimize unnecessary storage • Ensuring that all safety equipment is available onboard the train for the safety of employees • Making sure that the hazardous material is authorized to be transported by conducting proper screening and acceptance • Presence of material safety datasheet provided by the sender and documented in the shipping policy • Equip locomotives to be appropriate for the cargo being carried (e.g., thermal protection and puncture resistance) and implementing a preventive maintenance program • Making sure that the locomotives are well maintained and free from any defects or leakages • Limiting train speed in developed areas • Making sure that all employees received training to deal with hazardous materials and document every training received
Residual impacts	Negative, moderate, long term
Method of monitoring	• Community grievance log • Reviewing community consultation reports • Interview with community members • Project details as well as grievance mechanism details available on site
Residual impact	Negative, medium, long term
Monitoring frequency	Monthly
Performance indicator	• Number of reported complaints from the community

	• Community members aware of the activities conducted and the messages shared/discussed (through the beneficiary feedback survey)
Monitoring location	ENR premises (tracks, MTBs, STBs, and stations)
Responsibility	• Social Officer of the contractor in collaboration with Site HSE officers • Social Specialist of the PMU
Estimated cost (EGP)	Covered in operation cost
Ecology and Biodiversity (code: EB1)	
Mitigation Measures	To minimize the potential impacts during operation phase, the following mitigation measures will be implemented: • Evaluate the results of the baseline flora, fauna and aquatic environment surveys and where practicable utilize the results to avoid disturbing species or vegetation communities of significance by optimizing the design and layout of project infrastructure. • Areas of vegetation outside of the Bani Salamah-6th of October Railway zone will be fenced off • Establishment of plant gardens within the project site. Where possible retain some of the natural vegetation. • Rehabilitate all temporary disturbed areas. • Suitable green belt will be developed as per landscaping plan in and around the site using local flora, which will enhance the ecology. • Provide suitable management guidelines and procedures for clearing and ground disturbance activities. This may consider pre-start procedures for clearance of fauna to remove fauna from proposed clearing areas. • Prepare and implement EMP inclusive of: water quality monitoring, aquatic habitat health monitoring and management actions for trigger values. • Strategies will be developed for the management of potential non-indigenous marine species, while ensuring consistency with accepted guidelines and codes of practice. • The agricultural activities will be monitored for the status of the crop production.
Residual Impact	Negative, low, short term
Method of monitoring	• Retain a qualified ecologist to conduct a walkover along the entire site. • Flora, fauna and aquatic surveys at regular intervals.

Monitoring frequency	Annually, the operational management plans will include the requirement for periodic monitoring and evaluation of flora and fauna and the status of the aquatic environment so as to determine whether the development is having any significant impact on the surrounding environment
Monitoring indicator	• Any important flora, fauna and marine species (if any) in the area will be identified and marked • Evaluate the results of flora, fauna and aquatic surveys and where practicable • Surface of habitats restored: "after use" or for natural purposes.
Monitoring location	Borders of transport infrastructure corridors, stations, and single-double-track railways.
Responsibility	Environmental Units, Egyptian National Railways, Ministry of Transport
Estimated cost (EGP)	Project cost
Land Acquisition (code: LA1)	
Mitigation Measures	A project RF was prepared. Accordingly, the mitigation measures related to land acquisition will follow the provisions of ESS5, which are provided in detail in the Project's Resettlement Framework. Resettlement Plans will be prepared and implemented, as per the Resettlement Framework, prior to any construction related works.
Residual impact	Negative, moderate, long term
Method of monitoring	Review and audit
Monitoring frequency	At the beginning of the operation phase
Performance indicator	• Documentation of the stakeholder sessions and consultations • GM 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
Monitoring location	Operation sites

Responsibility	**ENR:** • PMU with support from the WB will maintain land avoidance strategy • Reviewing Contractor's performance and ensuring the correct implementation of the mitigation and monitoring measures
Estimated cost (EGP)	Project cost

8.4.2 Segment 2

8.4.2.1 Construction phase

Table 8-3 illustrate the management and monitoring plan for the project during construction of Segment 2.

Table 8-3: Environmental and social management and monitoring plan during construction phase of Segment 2

Environmental and Social Monitoring during Construction Phase of Segment 2		
Air Quality (code: AQ3)		
Mitigation measures	The contractor shall assign HSE manager is a must at all construction sites who will ensure the implementation of good site practices and prepare and implement an **Air Quality Management Plan**. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Appropriate sitting and covering of stockpiles of friable materials with a suitable cover in addition to regularly spraying water so as to minimize dust blow • Minimizing drop heights for material handling activities such as unloading of friable materials • Keeping the roads damped via watering spraying to minimize dust from spraying as a result of vehicles moving.. The water spraying should be at the beginning of each working shift and repeated every 2 hours during summer time. • Ensuring that vehicles travel on paved routes wherever possible • Sheeting of lorries transporting friable construction materials • Enforcing speed limits on unpaved roads to be <30 km/hr • Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fume	
Residual impacts	Negative, low, short term	
Methods of monitoring	Visual inspections and monitoring of dust and exhaust gas releases via a specialized external laboratory that will be provided by the contractor.	Recording and documentation of complaint
Monitoring frequency	• Once per month during heavy excavation and backfilling works • Once every 2 months during other installation activities. • All measurements must be conducted during the normal operation conditions of the working shift	
Performance Indicators	• Dust levels ambient PM (TSP, PM_{10}) • Dust complaints • SOx, NOx, and CO and black smoke from vehicles	

Environmental and Social Monitoring during Construction Phase of Segment 2	
Monitoring location	Borders of construction location
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Air quality measurements: 800,000 LE/year
Resource Efficiency and Pollution Prevention (code: RP3)	
Mitigation measures	Develop and implement: waste management plan, water management plan, energy management plan covering all project phases. The contractor shall prepare and implement a **Waste Management Plan (WMP), and Hazardous Waste and Material Management Plan (HAZMAT)**. The plans will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • The contractor will obtain official permits from the local authorities for the disposal of wastes (construction wastes landfills, hazardous wastes landfills, etc.) prior to the commencement of construction activities • Wastes will be segregated and temporarily stored safely in the allocated areas for waste storage on the premises of the construction site. • Wastes will be covered to avoid the pollution of the ambient air by dust dispersion • Adequate trucks will be used for wastes transportation and the trucks will not be overloaded with waste volumes • Consignments for waste disposal will be recorded in terms of weight, destination and responsible person • Waste collection should occur daily and it should be transported to the approved and safe disposal locations via adequately equipped trucks. The supervisor has to make sure that this process occurs without any hazards or problems • This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites/quarries **<u>Non-hazardous (domestic) waste disposal</u>** The proposed **Solid Waste Management Plan** for the safe disposal of domestic waste including but not limited to:

- The non-hazardous wastes (paper, garbage, wood and plastics) will be segregated and transported to the local disposal sites by the mean of the approved and authorized contractor
- The non-hazardous wastes will be transported off-site for recycling or final disposal by a licensed contractor and supervisor will be responsible for the disposal procedure and the conditions of the trucks
- This will be included in the Temporary Traffic Management Plan (TTMP) for vehicles travelling between construction sites and dump sites/quarries

Old Dismantled Tracks disposal

- The dismantled tracks are either:
  - Maintained and reused by ENR at sub-railroad lines, or
  - Sold by auctions/bidding as scrap

Hazardous waste generation

Hazardous waste from construction activities is limited to lubricating oil, empty paint cans. The proposed **Hazardous Waste Management Plan** for the safe disposal of such waste including but not limited to:

- According to Article 33 of Law 4/1994, the contractor is required to keep up records and manifests in a register for the methods of waste disposal and the agencies contracted to receive such wastes
- Training to employees should incorporate information from Material Safety Data Sheets (MSDSs) for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language
- Description of response activities in the event of a spill, release, or other chemical emergency should be incorporated
- Representatively test the wooden ties and Ballast to confirm their disposal/reuse techniques

While hazardous waste generated from tracks upgrading / renewal are old, contaminated sleepers/ crossties which were coated by a hazardous benzo-pyrene and ballast contaminated with grease, both will be disposed to a hazardous waste landfill by specialized and approved contractor.

Environmental and Social Monitoring during Construction Phase of Segment 2	
Residual impacts	Negative, low, short term
Methods of monitoring	• Documents and records review • Site visual inspection
Monitoring frequency	• Regularly during construction
Performance Indicators	• Maintaining valid contracts with authorized waste collection contractors • Records of delivery at final disposal sites • Records of the types and quantities of waste generated, and amounts diverted through salvage and reuse, and/or recycle
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Noise and vibration (on workers and public) (code: NV3)	
Mitigation measures	The contractor shall prepare and implement **a Noise and Vibration Management Plan.** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Reduce workers' exposure times to noise, so that they do not exceed the safety limits stipulated in the Egyptian environmental law in addition to occupational safety and health standards • The contractor must train all workers before starting construction work on the danger of noise and how to avoid them • Avoid construction work in the evening • Restricting the movement of lorry cars to prevent noise in the early morning and late evening periods • Control exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure • All machines and vehicles must be stopped when not in use • Communicate the construction schedule with neighboring communities and sensitive receptors

Environmental and Social Monitoring during Construction Phase of Segment 2	
Residual impacts	Negative, low, short term
Methods of monitoring	Site Inspection and spot measurements (if necessary)
Monitoring frequency	• Once every 2 months.
Performance indicators	• Noise level maintained below 50 dB (A) during daytime and 40 dB (A) during night at construction phase • Regular records and logs showing working hours are maintained
Monitoring location	• At the sources • Along perimeter of site • At the sensitive receptors such as the nearest residential aggregation
Responsibility	Contractor HSE manager (and officers)
Estimated cost (EGP)	Point measurement: 88,000/year
Occupational Health and Safety (code: OHS3)	
Mitigation measures	The contractor shall prepare and implement an **Occupational Health and safety Management Plan.** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Ensure that all workers under both the contactors and the sub-contractors are covered by insurance against any potential accidents • Restricted entrance to all construction sites, where attendance sheets and copies of all workers at site are required • Providing training for workers in personal track safety procedures and working around contaminated sites • Coordination procedures with ENR to block/arrange train traffic on lines where works are occurring ("green zone working"), giving the contractor safe time to conduct the required works The occupational health and safety mitigation plan shall include but will not be limited to the following measure: • Provide adequate signage to prevent accidental falling into open areas • Fencing of the work areas Health and safety environment (HSE)

Environmental and Social Monitoring during Construction Phase of Segment 2	
	• There is posted material indicating the nearest police station and hospital (with accident and emergency facilities) • The contractor must take reasonable steps to prevent unauthorized people accessing the site procedures to address the following risks (injuries from minor to fatal, including train/worker accidents, rotating and moving equipment, electrical hazards, fire and explosions, eye hazards, noise and vibration, and fatigue including Struck by moving objects) • Provide a first aid kits in different places of the work site with the appropriate number of materials given the number of workers on site. The locations of the first aid kits will be provided to all workers. • Providing extinguishers on work site • Stop people smoking and do not allow other work activities involving potential ignition sources to take place nearby • Avoid distraction by prohibiting the use of cell phones on work sites • Providing site boundaries by installing suitable physical boundaries (barriers, tape or fence) • Marking excavation holes with physical boundaries (barriers, tape or fence) • The contractor shall put up barriers or covers in the area of openings and excavations. • Store building materials (such as pipes, manhole rings, and cement bags) so that they cannot topple or roll over • Keep walkways and stairways free of tripping hazards such as trailing cables, building materials, and debris • Everyone who works on any site must have access to adequate toilet and washing facilities, a place for preparing and consuming refreshments, and an area for storing and drying clothing and personal protective equipment (PPE) especially around eroded soil and sewage ponds • Contractor to ensure PPE (personal protective equipment) is used by all workers on site • Contractor shall hire a certified Health and safety supervisor • Materials and equipment are tidily stacked, protected and covered where necessary. Additionally, there is adequate space for new materials to be stored in secured covered areas to avoid damage, theft, and to protect these items from weather conditions • Scaffolding for work in elevated areas such as ceiling painting should comply with the OSHA “General Requirements for Scaffolds”. • Emergency response to respond to different risks including natural disasters Regarding the work near water risks, the proposed mitigation actions are:

Environmental and Social Monitoring during Construction Phase of Segment 2	
	• Working with a partner or team when working around or on water. Preferably at least two people need to be in sight of each other at all times. • Communication devices are necessary, and they must be waterproof, suitable to the area of operation and tested before work commences. There must be an emergency plan, including provision for rescue and contact, if necessary, with the emergency services • Proper provision must be made for first aid. Specialist training and equipment may be required. • Suitable personal buoyancy equipment, such as lifejackets, should be provided by employers and worn by everyone at risk. • PPE should be provided as necessary to provide protection against other hazards, such as chemical exposure. Operators also need to cover broken skin and wash hands thoroughly after coming into contact with water. Also, high-visibility clothing and Boots or water shoes should be provided. • All electrical installations and equipment should be constructed, installed, operated, protected and maintained to prevent the risk of danger from electric shock or burns. Special attention should be paid to "earthing" if the supply is from portable generators. • Training and supervision are an essential part of adequate control measures. All persons must understand clearly any procedures in place and what action they must take to protect themselves, including in an emergency. The contractor must also perform extra water and soil contamination level analysis and take necessary precaution measures based on the results of the analysis.
Residual impacts	Negative, moderate, long term
Methods of monitoring	• Checking workers complaints • Inspection of Human Resources Policy • Inspection of employment contracts • Health records about occupational injuries and infectious diseases among workers • Inspection of attendance sheets and ID copies • Inspection of insurance policies • Inspection of Training records
Monitoring frequency	Daily

Environmental and Social Monitoring during Construction Phase of Segment 2	
Performance indicators	• Occupational health and safety Incident reports • Medical reporting on received cases • No accidents • No incidents regarding public health and safety • Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs
Monitoring location	Workers at the project location
Responsibility	Proponent's HSE manager (and officers)
Community Health and safety (code: CHS3)	
Mitigation measures	The contractor shall prepare and implement a **Community Health and Safety** Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: • Share Information with community regularly as per SEP • Conduct Awareness raising campaigns • The contractor shall 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 PMU (or Owner Engineer) prior to commencement of construction • Construction site to be fenced and guarded by security personnel in order to prevent any unauthorized access to the site • Notify nearby population in case of transporting heavy equipment • Grievance mechanism for community members to address any complaints • Develop Traffic Management Plan (if necessary) **<u>For Level Crossings Safety:</u>** • Installation of automatic gates at all level crossings, and regular inspection/maintenance to ensure proper operation

Environmental and Social Monitoring during Construction Phase of Segment 2	
	For Pedestrian Safety: • Posting of clear and prominent warning signage at potential points of entry to track areas (e.g. stations and level crossings) • Fences or other barriers at station ends and along tracks to prevent access to tracks by unauthorized persons • Designing stations so as to ensure the access route is safe, clearly indicated, and easy to use • Use of CCTV to monitor rail stations and other areas where trespassing occurs frequently, with a voice alarm system to deter trespassers **For Engaging Security personnel or companies** The contractor shall prepare and implement a Security Management Plan. The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures
Residual impacts	Negative, moderate, short term
Method of monitoring	• Community grievance log • Reviewing community consultation reports • Interview with community members • Project details as well as grievance mechanism details available on site.
Monitoring frequency	Monthly
Performance indicators	• Number of reported complaints from the community • Community members aware of the activities conducted and the messages shared/discussed (through the beneficiary feedback survey)
Monitoring location	Construction site
Responsibility	• Social Officer of the contractor in collaboration with Site HSE officers • Social Specialist of the PMU
Estimated cost (EGP)	Covered in construction cost
Covid-19 Pandemic (code: OHS3)	

Environmental and Social Monitoring during Construction Phase of Segment 2	
Mitigation measures	The contractor shall prepare and implement **a COVID-19 and communicable diseases Management Plan** The plan will include the adequate mitigation measures 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: o Body-temperature measurements at the entrance of the site o Face-masks are mandatory o Prohibit gathering and smoking at closed areas o Provide soap, water and disinfectants at the site o 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) • Ensure all workers are trained on and aware of COVID-19 prevention and precautionary measures, and are following the measures on a daily basis (direct and temporary workers)
Residual impacts	Negative, moderate, long term
Method of monitoring	• Site inspection • Review of documents and records • Medical and routine check-up of staff and workers
Monitoring frequency	Daily
Performance indicator	• Number of trained workers (direct and temporary) • Number on infected persons • Number of isolated persons
Monitoring location	Construction Site
Responsibility	• Contractor and proponent's • HSE manager (and officers)
Estimated cost (EGP)	To be estimated based on the number of workers and general context
Traffic (code: T3)	

Environmental and Social Monitoring during Construction Phase of Segment 2	
Mitigation measures	The contractor shall prepare and implement a **Temporary Traffic Management Plan (TTMP)** The plan will be reviewed and approved by the supervising consultant and PMU. The plan will include the adequate mitigation measures including but not limited to: Typically, there is a hierarchy of TTMPs – a Route Wide Traffic Management Plan, Local Area Plans and Site-Specific Plans. TTM plans will aim to minimize delays and reduce detours, ensure safe access for all (pedestrian, cars , and animals, etc) , and protect railway and road assets. The TTMPs would also address access to and from the construction zones by minimizing road crossings by heavy plant, managing truck queuing, managing truck haul routes between construction sites, dump sites and quarries, and ensuring that construction timing and sequences do not adversely affect the road network and its environs. The TTMPs should: • use standardized base plans • present data on estimated truck numbers – per hour and/or per day • show on plan where truck holding areas are • show that Non-Motorised Transport (NMT) – pedestrians, cyclists, carts, animal-drawn vehicles - are better catered for and protected • focus on safety at level crossings and formal/informal track crossings – this is where confusion could arise if there are detours or temporary traffic signals deployed; there is a risk of trains colliding with vehicles and pedestrians It is assumed that truck loads are of normal size. If there is a need for any special provision for abnormal truck loads – extra wide, long or high – then this should be catered for and included in the TTMP. The institutional arrangements for the development and implementation of the TTMPs should be presented. Usually this is a top-down approach but with room for flexibility at a local level to meet contingencies. A typical institutional arrangement could be: e. The **main contractor** prepares the TTMPs for: (1) the whole route or route section of the railway track; (2) each signaling tower; (3) trenching accesses; (4) level crossings and other pedestrian/vehicle crossing sites; and (5) designated truck routes to/from dump sites and quarries **f. Local contractors** give their feedback including a forecast of truck volumes **g. ENR and/or MOT** reviews the TTMPs, fleshes out details and define the worksites

Environmental and Social Monitoring during Construction Phase of Segment 2	
	h. The **contractors** are informed and implement the TTMPs The use of Traffic Agents such as the Traffic Police should be examined. Such personnel can provide in-situ supervision of the TTMPs at construction sites and stations and be on-hand 24/7 to direct traffic, direct residents and answer their questions. There is scope to showcase this project and provide a learning archive by uploading a Learning Legacy online as other major rail projects (such as Crossrail and HS2 in the UK) have done. It is estimated that the overall additional traffic would have insignificant impacts on the level of service on the road. In addition to the mitigation measures listed in Chapter 5.
Residual impacts	Negative, moderate, short term
Method of monitoring	Maintaining and controlling traffic on and to the site by inspection of Traffic Management Plan or traffic complaints from workers or community
Monitoring frequency	Regularly during construction (especially during transport of equipment and materials)
Performance indicator	• Effectiveness/extent of implementation of traffic management plan • Number of complaints received associated with traffic and time it took to resolve them • Number of unresolved complaints
Monitoring location	Surrounding roads
Responsibility	• Contractor and proponent's • HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Risk of Child Labor (code: CL3)	
Mitigation Measures	• The contract to be prepared for contractor/ subcontractors, 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 laborers in order to facilitate the monitoring of the presence of hired staff below 18 years

Environmental and Social Monitoring during Construction Phase of Segment 2	
	• The contractor/subcontractor, primary suppliers and service provisions also 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, primary suppliers and service provisions' ToR in order to warrantee no child labor is occurred in the project
Residual impacts	Negative, low, short term
Method of monitoring	• Verifying contracts • Inspection of complaints • Inspection of Human Resources Policy • Inspection of employment contracts • Inspection of attendance sheets and ID copies
Monitoring frequency	• During contract preparation • Continuously during construction
Performance indicator	• No complaints from community • No children on site
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Risk associated with Temporary Labor Influx (code: TLI3)	
Mitigation Measures	• The contractor shall prepare an appropriate code of conduct to be reviewed and approved by the social expert in the PMU , that stipulates the different commitment of labor towards community groups and the different behavior that should be avoided • All workers should be trained on the Code of Conduct) • Code of conduct to be signed by sub-contractor • 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 • Training on Covid-19 prevention

Environmental and Social Monitoring during Construction Phase of Segment 2	
Residual impacts	Negative, low, short term
Method of monitoring	Visual Inspection of the site, workers, equipment and vehicles
Monitoring frequency	Daily throughout construction
Performance indicator	• The Code of Conduct has been prepared and formally adopted • Number of complaints received from the community with regards to workers' behavior in general and the time it took to solve them • Training records • All mitigation measures have been implemented (in specific those related to the code of conduct including GBV and other labor influx risks) • % of workers trained on Code of Conduct • % of workers trained on GBV
Monitoring location	Construction sites
Responsibility	**Contractor:** Implementation of mitigation measures, internal monitoring and reporting to ENR **ENR:** Ensuring the correct implementation of the mitigation and monitoring measures
Estimated cost (EGP)	Covered in construction cost
Risk of Gender Based Violence (GBV) Risk (code: GBV3)	
Mitigation Measures	• A code of conduct for workers should be developed, all workers should be trained on. All types of inappropriate behavior of workers should be identified, and the importance of adhering to the code of conduct is emphasized • 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

Environmental and Social Monitoring during Construction Phase of Segment 2	
	• 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 newcomers 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
Residual impacts	Negative, low, short term
Method of monitoring	• Inspection of training records • Code of conduct established, disclosed and workers are trained on • The monitoring of workers' compliance to the Code of Conduct when interacting with the surrounding communities to avoid behaviors such as verbal assault, sexual harassment and other forms of GBV • Inspection of complaints • Number and documentation of awareness raising activities and stakeholder engagement activities • Interview with community members • Inspection of drug tests and alcohol tests conducted • Numbers of penalties applied
Monitoring frequency	Continuously during construction
Performance indicator	• Worker code of conduct • No complaints from community • No accidents • Community members aware of the activities conducted and the messages shared/discussed
Monitoring location	Construction site
Responsibility	Social Officer of the Contractor and the Social Specialist of the PMU
Estimated cost (EGP)	Covered in construction cost
Land Acquisition (code: LA3)	

Environmental and Social Monitoring during Construction Phase of Segment 2	
Mitigation Measures	The mitigation measures related to the repossession of the use of land will follow the provision of the ESS5, which are provided in detail in the Project's Resettlement Framework. Resettlement Plans or appropriate documentation will be prepared and implemented, as per the Resettlement Framework, prior to any construction related works.
Residual impacts	Negative, moderate, long term
Method of monitoring	Review and audit
Monitoring frequency	At the beginning of the construction phase then weekly
Performance indicator	• Documentation of the stakeholder sessions and consultations • GM 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
Monitoring location	Construction sites
Responsibility	**Contractor:** • Implementation of avoidance strategy and mitigation measures • Reporting to ENR **ENR:** • PMU with support from the WB will maintain land avoidance strategy • Reviewing Contractor's performance and ensuring the correct implementation of the mitigation and monitoring measures • Reviewing and assurance of Contractors reports
Estimated cost (EGP)	Covered in construction cost

Environmental and Social Monitoring during Construction Phase of Segment 2	
Hydrology and Surface Water (code: HSW3)	
Mitigation Measures	**General rules on prevention and collective protection** • Before operating the HDD, make sure that all covers and protective housings are installed • The worker who handles the HDD must know their management perfectly, being informed of the risks involved in their use. The handling by underage workers, inexperienced or not trained for it is prohibited • The operator must become familiar with the operation of the machine in particular before using it for the first time • The HDD should only be used for the purpose for which it was intended and always by authorized personnel trained for its use. • Pay special attention to all the information and warning boards provided on the machine • The maintenance, repair or any modification of the machine can only be carried out by specialized personnel belonging to the rental company • Before using the machine, the possible existence of stains that indicate fluid losses will be checked **Safety rules during handling** • The machine will be perfectly installed according to the manufacturer and following the regulations regarding homologations and securities already exposed • The controls of the machine and electronic equipment will only be handled by specialized personnel following the manufacturer's instructions • The safety and risk instructions that are attached to the machine will be maintained in a 100% legible condition • The electrical installation will be carried out according to the specific regulations • The machinery will be checked on a daily basis before the start of work • To avoid risks of landslides, during the work there will be no personnel present in the vertical of the drilling and neither at the exit of the hole In addition, bentonite which is a form of clay that is naturally existent, is used as the drilling fluid so it does not adversely affect the environment.

Environmental and Social Monitoring during Construction Phase of Segment 2	
	Also, the resulting mud will be collected at the time of generation and disposed off-site by licensed contractors.
Residual impacts	Negative, low, short term
Method of monitoring	• Visual inspection • Health records about occupational injuries • Inspection of Training records
Monitoring frequency	During HDD activities
Performance indicator	• No accidents or spill incidents • Occupational health and safety Incident reports • Medical reporting on received cases • Insurance coverage for everyone on site with proof of their presence on site through attendance sheets and copy of IDs
Monitoring location	Construction site
Responsibility	Contractor and proponent's HSE manager (and officers)
Estimated cost (EGP)	Covered in construction cost
Culture Heritage (code: CH3)	
Mitigation measures	It's unlikely to find artifacts in the project area especially that the excavation is not deep. However, it is important that the contractor implements chance finds procedure. This is due to the proximity of the site to Southern South Saqqara Pyramid located 300 m away from the alignment. Steps to be included in the chance finds procedure include: • Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained. • Notify the relevant authorities of the find. • Document and record any chance find which may occur.
Residual impacts	Negative, low, short term

Environmental and Social Monitoring during Construction Phase of Segment 2	
Method of monitoring	Visual inspection
Monitoring frequency	Regularly during excavation
Performance indicator	No finds
Monitoring location	Construction site
Responsibility	Contractor
Estimated cost (EGP)	Project cost

8.4.2.2 Operation phase:

Table 8-4 presents environmental and social management and monitoring plan during operation phase of Segment 2

Table 8-4: Environmental and social management and monitoring plan during operation phase of Segment 2

Environmental and Social Monitoring during Operation Phase of Segment 2	
Occupational Health and Safety (code: OHS4)	
Mitigation Measures	Train / Worker Accidents Recommended management strategies include: • Training workers in personal track safety procedures; • Blocking/arranging 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 Noise and Vibration Recommended management strategies include:

Environmental and Social Monitoring during Operation Phase of Segment 2	
	• Use of air conditioning systems to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise; • Reduction of internal venting of air brakes to a level that minimizes noise without compromising the crew's ability to judge brake operation; • Installation of active noise cancellation systems; • Use of personal protective equipment (PPE) if engineering controls are not feasible or adequate to reduce noise levels; • Use of dampers at the seat post to reduce the vibration experienced by the operator; • Installation of active vibration control systems for locomotive suspension, cabs, or seat posts, as needed to comply with applicable international and national standards and guidelines. Diesel Exhaust Measures recommended to prevent, minimize, and control workers' exposure to diesel exhaust: • Limiting time locomotives are allowed to run indoors and use of pusher cars to move locomotives in and out of maintenance shops; • Ventilation of locomotive shops or other enclosed areas where diesel exhaust may accumulate; • Filtration of air in the train crew cabin; • Use of PPE where engineering controls are not sufficient to reduce contaminant exposure to acceptable levels Fatigue • Railway operators should schedule rest periods at regular intervals and during night hours, to the extent feasible, to maximize the effectiveness of rest breaks, and in accordance with international standards and good practices for work time Electrical Hazards Measures recommended to prevent, minimize electrical hazard, include: • workers exposed to electrical hazards from electrified railways should be trained in personal track safety. • Only workers who are specifically trained and competent in working with overhead lines and conductor rails should be allowed to approach these systems. Electric and Magnetic Fields

Environmental and Social Monitoring during Operation Phase of Segment 2	
	Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components: • Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, and limiting access to properly trained workers; • Implementation of an action plan to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE). Diesel Storing tanks for power generators • Avail water cooling sprayers on the outer surface of the diesel tank, to prevent the generation of diesel fumes. • An efficient firefighting system is a must.
Residual impacts	Negative, moderate, long term
Method of monitoring	Visual Inspection – Regular tracks audits – Record Keeping
Monitoring frequency	Monthly
Performance indicator	• 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 & storage • Availability & usage of PPEs • Condition of Rest Facilities • Workers right to work • % of employees trained on OHS, emergency procedures and GM • OHS statistics such as fatalities, injuries, lost time incidents, first aid cases. • Number of complaints received, solved and unsolved complaints

Environmental and Social Monitoring during Operation Phase of Segment 2	
	• Social and medical insurance applied
Monitoring location	ENR premises (tracks, MTBs, STBs, and stations)
Responsibility	ENR: Ensuring the correct implementation of the mitigation and monitoring measures – Keeping record of incident report and accidents – No. of training sessions held
Estimated cost (EGP)	Covered in ENR operation costs

8.4.3 Associated facilities

The project associated facilities to be identified during the project implementation, as provided in the project description chapter, will be subject to the screening process in the project's ESMF to determine the needed E&S instrument to ensure compliance with the ESF. The AF need to be fully in compliance with the ESF requirements and the same environmental and social management and monitoring plan proposed for OHS3 apply in case of small road related works.

8.5 Institutional Strengthening, Capacity Building, and Training for Implementation of ESMP

The CATLDP ESCP contains details about the monitoring and reporting arrangements throughout out the project. It also contains the organization structure of the PMU as indicated in section 8.2.1, capacity building needs as well as timeframe for implementation.

Training of the PMU, GARB ESHS and contractor ESHS staff for component 2: on WB ESF and the ESIA, RF, ESMP, LMP (with emphasis on Code of Conduct), ESMF, and SEP. More specifically, the training will focus on principles of ESF to understand applicable ESSs to the project and associated environmental and social receptors affected by activities and related indicators to assess compliance with ESMP (and plans therein) of identified receptors. PMU will be trained to conduct site visits for field monitoring using checklist, trained on preparation of monthly progress reports on implementation of ESMPs and for submission to the bank (according to outline provided in annex 6), knowledge on specified management plans consisting of emissions control plans, waste management plans, water management plans etc.

Owner's Works Supervisor and Integrator to develop and implement a capacity building plan.

Training for contracted workers and relevant ENR field and station Staff on:

- Prevention and management of OHS risks and impacts: General EHS, OHS training including Best Practices: i.e., OSHA training. Training topics should address all the project's hazards.
- Prevention of community and health safety risks and impacts including, at a minimum, prevention of Covid-19 spread, Code of Conduct and prevention of GBV, prevention of Child Labor pedestrian and train safety
- LMP and GM
- Implementation of ESMP including plans therein, such as waste management plan, Stakeholder engagement, etc
- Land management processes under the RF

Table 8-5 shows training plan for implementation of ESMP including training topics and entities receiving the training.

Table 8-5: Training Plan for Implementation of ESMP

Training Topic	PMU	GARB	Contractor
ESIA/ESMP: implementation of mitigation measures, compliance with local regulations, WB Standards, Good practice notes; Grievance mechanism process, all management plans referenced in ESMP; description of roles and responsibilities	Yes	Yes	Yes

Training Topic	PMU	GARB	Contractor
Implementation of LMP (notably, OHS plan, Code of Conduct); prevention of GBV, child labor, pedestrian and train safety, prevention of COVID, Emergency response plan,	Yes	Yes	Yes
Implementation of SEP; engagement plans; grievance mechanisms; Land management processes under the RF	Yes	Yes	Yes
Monitoring and Evaluation for Field Inspection on implementation of ESMP; use of ESMP compliance checklist; report drafting			Yes
Monitoring and evaluation of progress report			Yes

8.6 ESMP Budget

Estimated costs for implementation of ESMP include monitoring activities and institutional strengthening and capacity building activities (in the form of training) and are presented in Table 8-6. ESHS specifications of contractors' contracts are to include all the management plans referred to in the ESMP (e.g., AQMP, OHS plan, TTMP, etc.,) that the contractor shall prepare.

Table 8-6 Proposed budget for ESMP

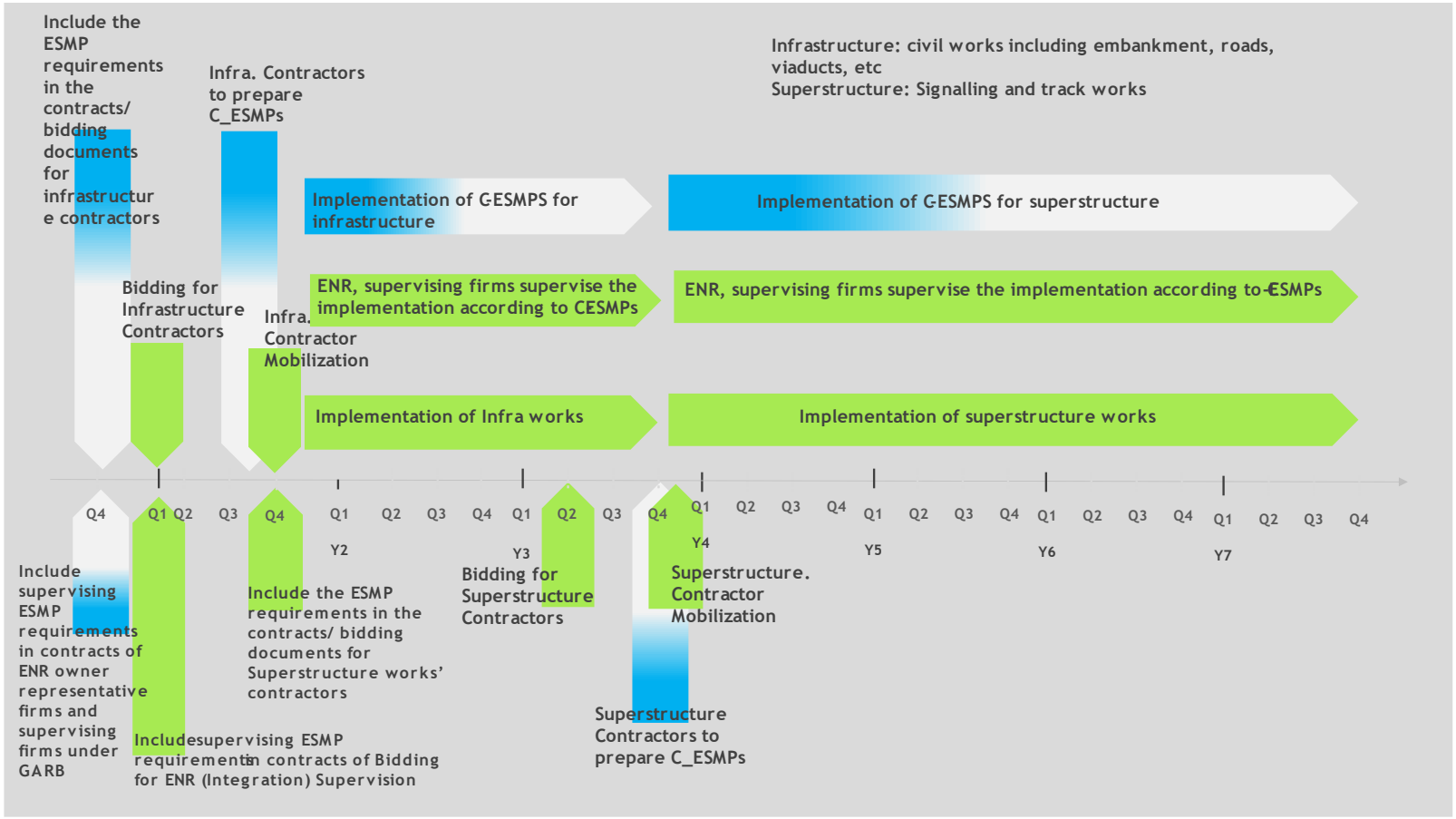
Item	Details	Cost (EGP)
Monitoring requirements		
Preparation of ESHS construction management plan for Segment 1 and 2	Estimated figure 800,000 EGP for Segment 1 and 400,000 for Segment 2	1,200,000
Air quality measurements	2 measurements monthly per year SO_2, CO, NO, NO_2, NOx, O_3, PM_{10}, TSP	One measurement point costs 15,000 EGP Total cost: 360 000 EGP/yr.
Noise and vibration measurements	2 measurements monthly per year	One measurement point costs 5,000 EGP Total costs: 120 000 EGP/yr.
Waste Management and hazardous Material handling	Including handling, storage and disposal costs in licensed locations using licensed contractors	Should be part of the contractor budgeted activities.
Supervision and monitoring of implementation of ESMP during construction	Private contractor team: External hire of 3 specialists by private contractor: OHS, environmental and social development specialists	20 000 EGP/month per specialist 720 000 EGP/yr.

Monitoring the implementation of ESMP by the EAD during and operation	two (2) environmental specialist, two (2) Occupational and health and Safety specialists (OHS), and two (2) social specialists[38]	20 000 EGP/month per specialist 1 440 000 EGP /yr.
Supervision and logistics	For air and noise measurements	624 000 EGP /yr.
Design noise barrier along areas most susceptible to increased noise and vibration, i.e., km 64.5-km68.5	Design consultant to prepare the design of the barrier to be constructed by signaling contractors	Included in Project cost (estimated cost will be based on the type/material to be selected)
Capacity building and training		
ESIA/ESMP: implementation of mitigation measures, compliance with local regulations, WB Standards, Good practice notes; Grievance mechanism process, all management plans referenced in ESMP; description of roles and responsibilities	3 days	40 000 EGP/ 3 days including logistics
Implementation of LMP (notably, OHS plan, Code of Conduct); prevention of GBV, child labor, pedestrian and train safety, prevention of COVID, Emergency response plan,	3 days	40 000 EGP/ 3 days including logistics
Implementation of SEP; engagement plans; grievance mechanisms; Land management processes under the RF	2 days	30 000 EGP/ 2 days including logistics
Monitoring and Evaluation for Field Inspection on implementation of ESMP; use of ESMP compliance checklist; report drafting	1 day at one of ENR's locations	10 000 EGP/ 1day
Monitoring and evaluation of progress report	1 day at one of ENR's locations	10 000 EGP/ 1 day
Total Cost		**3 394 000 EGP/yr. + 1,200,000 EGP for plans to be prepared in the first year**

[38] The provided numbers are only indicative, each contractor should assign the adequate number of competent specialists in accordance with the best international practices and national requirements

8.7 SMP Timeline

The timeline for implementing the ESMP is provided in the following graph. The project is expected to be operational in 8 years.



9 PUBLIC CONSULTATION AND ENGAGEMENT

The Stakeholder Engagement chapter aims at highlighting the key consultation and community engagement activities conducted and their outcomes. In addition to the procedures that must be taken into consideration when preparing the stakeholder engagement plan (SEP) as per ESS10: Stakeholder Engagement and Information Disclosure[39], specific consultations were conducted as part of preparing the respective ESIA. Stakeholders engagement activities were implemented throughout the process of preparing the ESIA. Those activities not only helped in informing the impact assessment and findings of the study but also in enhancing the project design at large and in finding more sensitive options (including for segment 1) from environmental and social stand points.

Throughout the various consultation and engagement activities, the work teams recorded the different reactions of the community and the governmental stakeholders towards the proposed project. This chapter describes the stakeholder engagement and consultation activities that have been undertaken to inform the ESIA. Future consultations are detailed in the SEP..

9.1 Consultation Objectives

The study team conducted 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.

The SEP sets the wide objectives of the stakeholders engagement as part of the project. The specific objectives of the engagements and the consultation activities conducted as part of the ESIA preparation could be summarized in the following:

- Define potential project stakeholders stakeholders including negatively affected groups and identify project impacts on them
- Disseminate proactive, transparent and comprehensive information about the project
- Enable stakeholders to identify their concerns, needs, ideas, concerns and recommendations
- Document stakeholder feedback and enhance the ESIA accordingly
- Identify the most effective outreach channels that support continuous dialogue with the community
- Discuss potential negative impacts and mitigation measures including but not limited to resettlement impacts

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

9.2 Consultation Methodology and Activities

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

- Scoping Consultation Activities consisting of meetings, interviews, and focus group discussions (FGDs) were conducted with affected communities, rail users and neighboring communities as well as a public consultation to present the findings of the environmental and social assessments and related management plans, the resettlement framework, and the stakeholder engagement plan

- Public consultation sessions, including: 1) one conducted on May 11th 2022 with concerned authorities and project stakeholders at the Egyptian National Railways Sporting Club and 2) A second public consultation session was conducted on August 25th with relevant authorities and project stakeholders at the Egyptian National Railways Sporting Club after the latest change of the alignment based on the recent consultation meetings with local authorities.

-

9.2.1 Engagement Planned During Project Preparation: Scoping Consultation Activities

Several stakeholder engagement activities have been conducted during the preparation of the ESF instruments (SEP, RF, ESIA, ESMF, Labor Management Procedures (LMP)) for CATLDP project. The following sub-section summarizes the conducted activities.

Under sub-component 2.1, a previous alignment was selected based on certain criteria where a set of consultations were conducted accordingly. Based on outcomes of these consultations, the findings recommended changing the alignment and thus, a new alignment was proposed.

The first set of consultations that were conducted for the previously selected alignment as mentioned above. Although these consultations are no longer relevant to the project, conducting them and presenting their findings is of significant importance as their outcomes led to opting for proposing a new alignment. However, all other consultation activities that were carried out for all the other sub-components (2.2, 2.3 and 2.4) remain valid and relevant to the project, which will be briefly presented along with the consultation activities conducted for the new proposed alignment under sub-component. Detailed consultation activities and outcomes is presented in the Stakeholder Engagement Plan under subcomponent 2.1 in sections 2.2.2 and 2.2.3.

In addition to multiple field visits and drive through along proposed alignment(s), summary of Key Informant Interviews KIIs and Focus Group Discussions FGDs conducted for the previously selected alignment under sub-component 2.1 is presented below.

Activity	Stakeholder	Position	Date	Location	Main outcome
KIIs with local authorities	ENR	- E&S specialists and deputies - PMU - Head of implementation Dept. - Engineers	07/04/2022	ENR premises	- Engage with ENR - Discuss final route updates - Arrange field work activities and support needed from ENR
	ESM	- Survey Consultant (GARB)	07/04/2022	ENR premises	- Understand land acquisition considerations and avoidance
	GARB	General manager of companies & technical office	10/04/2022	GARB premises	- Understand previous experience of GARB related to land acquisition procedures
	ENR (property Dept.	Head of Central Property Department	14/04/2022	ENR premises	- Enquire the estimated number of PAPs around line in subcomponent 4.2 - Collect contacts of field staff responsible for land acquisition
KIIs with local municipalities	Madinat El Sadat (Monofeya Gov)	Head of Markaz and deputies	13/04/2022	Markaz premises	- Introduce project components - Understand positive & negative impacts - Understand proposed mitigation measures - Arrange further field work in the Markaz
	Badr City (El Behaira Governorate)	Head of Markaz and deputies	13/04/2022	Markaz premises	- Introduce project components - Understand positive & negative impacts - Understand proposed mitigation measures

Activity	Stakeholder	Position	Date	Location	Main outcome
					- Arrange further field work in the Markaz
	Manshaat El Qanater (Giza Gov)	Head of Markaz and deputies	14/04/2022	Markaz premises	- Introduce project components - Understand positive & negative impacts - Understand proposed mitigation measures - Arrange further field work in the Markaz
	6 October Authority	- CEO deputy - Project management Dept. - Information System Dept.	23/04/2022	Authority premises	- Collect information on the greenfield area in 6 of October
	Sheikh Zayed Authority	CEO deputy - Head of Projects Dept.	24/04/2022	Authority premises	- Understand the layout of new development areas of the companies - Discuss perceived impacts and mitigation measures
KIIs with PAPs	Zayed Developers	Sodic & Emaar Development Directors	10/04/2022	Zoom meeting	Both companies rejected the alignment and refused any mitigation measures
	Greenbelt (owners & developers)	3 owners	28-29/04/2022	Public places	- Collect information on the greenfield area in 6 of October
FGDs with local residents	Monshaeet El Qanater Markaz & City (Giza Gov.)	7 participants (Civil Society & local residents)	14/04/2022	Markaz premises	- Understand perceived impact and proposed mitigation measures - No major issues were raised

Activity	Stakeholder	Position	Date	Location	Main outcome
	El Sadat Markaz and City (Monofeya Gov.)	10 participants (local residents & leaders)	16/04/2022	Markaz premises	- Understand perceived impact and proposed mitigation measures - No major issues were raised
	Badr Markaz & City (El Behaira Gov.)	10 participants (local residents & leaders)	18/04/2022	Markaz premises	- Understand perceived impact and proposed mitigation measures - No major issues were raised
Interviews with train users	of Bahteel-Etay line and businesses around stations	79 users representing the entire line	11-18/04/2022	On the train & around stations	- Understand current status and problems with the current single line - Understand perceived impact and proposed mitigation measures of dualization - No major issues were raised

First public consultation session May 2022:

To complement the series of the consultations mentioned above, a Public Consultation Session was held on Tuesday the 10th of May in the Egyptian Railway Club in Nasr City from 11:00 am to 14:00 pm. A total of 36 persons attended the meeting and participated in the discussion. Participants were invited through various channels including personal invitation letters, personal phone calls and on ENR official website. The Arabic executive summary of the ESIA was uploaded with the public invitation. The event was also designed to offer virtual opportunity for connection. The Public invitation included a Zoom link. Key stakeholders who attended the meeting included but were not limited to:

- Non-Governmental stakeholders (e.g., NGOs, residents of the alignment Manashi/6th October, Private real estate developers)
- Governmental stakeholders (e.g., ENR, GARB, NUCA, October City Development Agency, Egyptian Electricity Transmission Company, Ministry of Housing)

The conclusion from the consultation was very beneficial in flagging serious concerns from key governmental and non-governmental counterparts. It played an important role in complementing the findings of the earlier conducted consultations in the field. Participants of this consultations urged for revisiting the alignment for better optimization and emphasized. In particular the developers categorically refused the idea of a freight train project in the vicinity of their lands and any intersecting for the train with their land. Participants requested ENR to conduct a follow up consultation after the alignment is rerouted. Detailed minutes of meeting are presented in the SEP.

As a result of this public consultation session, it was decided to change the alignment to avoid social risks encountered, minimize land acquisition of agricultural lands in Giza and the Greenbelt, and protect national investment projects. As soon as the new alignment was designed, a second round of consultation with concerned authorities and project stakeholders was undertaken. Summary of KIIs and FGDs conducted for the new proposed alignment is presented below; detailed consultation activities and outcomes is presented in the Stakeholder Engagement Plan under subcomponent 2.1 in sections 2.2.2 and 2.2.3.

Activity	Stakeholder	Position	Date	Location	Main outcome
KIIs with local authorities	MoT	- Design Consultant - Foreign Finance Consultant	04/08/2022 18/08/2022	MoT premises	- Understand the new proposed alignment and - Assess LA avoidance
KIIs with local municipalities	Bani Salama Local Unit	- Head - Deputy heads - Agricultural Cooperative	07/08/2022	Local Unit premises	- Agricultural baseline of Bani Salama Local unit - State districts of agricultural lands in Bani Salama - Land tenure of agricultural lands Perceived positive and negative impacts - Proposed mitigation measures related to expropriation of agricultural lands
	NUCA	General Director of Projects	18/08/2022	NUCA premises	- Understand land custody authorities for the new proposed alignment
	New Sphinx Authority	- Head - Deputy heads - Urban Development Consultant	14/08/2022 18/08/2022	New Sphinx Authority premises	- Discuss the alignment - Positive and negative impacts - Proposed mitigation measures
	New October Authority	- Head - Deputy heads	18/08/2022	New October Authority premises	- Discuss the alignment - Understand their proposal of a new different alignment - Positive and negative impacts - Proposed mitigation measures The alignment was rejected because it contradicts and challenges the 1) Urban and Infrastructure Planning of the city 2) Oil production and development in the area

					It was advised to consult with the National Company for Oil Production and Development After this meeting which the design consultant has attended, an internal meeting (MoH, MoT, ENR, and WB) took place to change the alignment in the area of New October City to avoid oil production and development works.
FGDs with local residents	Bani Salama Local Unit	13 participants (local residents & local leaders)	09/08/2022	Local Unit premises	-Perceived positive and negative impacts - Proposed mitigation measures related to expropriation of agricultural lands
KIIs with other affected groups	National Company for Oil Production and Development	- CEO deputy - Head of Planning & Monitoring Dept.	23/08/2022	Company premises	- The latest alignment after avoiding the oil production and development works in New October City was disclosed and approved.
	Stella Di Mari	- CEO deputy	24/08/2022	Phone call	-Perceived positive and negative impacts - Proposed mitigation measures related to expropriation of agricultural lands

Second Public Consultation session after changing the route of sub-component 2.1

Based on the changes encountered in the alignment as a result of the above-mentioned stakeholders activities including the public consultation of May 2022, the Project encountered changes in the design, most importantly a change in greenfield alignment (as explained under the project description). Following the update and the finalization of the environmental and social instruments drafts, a public consultation session was held on Thursday the 25th of August, in the Egyptian Railway Club in Nasr City from 11:45 - 14:45. A total of 36 persons attended the public consultation and participated in the discussion. Participants were invited two weeks prior to the event, through various channels including personal invitation letters, personal phone calls, WhatsApp messages and a on ENR official website. The Arabic executive summary of the ESIA was sent with the public invitation and hard copies were made available during the public consultation. The event was also designed to offer virtual opportunity for connection. The Public invitation included a Zoom link which was used by additional stakeholders to connect to the public consultation. Key stakeholders who attended the meeting included but were not limited to:

- Non-Governmental stakeholders (e.g., Stella De Mari Farms, Bani Salama Member of Parliament (Bani Salama-6 October line), and residents from Kafr Dawood (Bashteel-Itay El Baroud line)
- Governmental stakeholders (e.g., MoT, ENR various departments, GARB, October City, Sadat City, Monshaeet El Qanater Markaz, Agriculture Directorate, Ministry of Local Development)

The public consultation entailed detailed non-technical description for the project components including the greenfield alignment which was delivered jointly by ENR and GARB consultant. Findings of the environmental and social instruments particularly the ESIA were presented by ENR consultant. This included summary of the assessments conducted, the identified positive and negative impacts and the proposed mitigation plan. Most of the time of the public consultation was utilized in active engagement from the participants who generally indicated overall support of the project. Participants highlighted number of issues, most importantly: 1) cumulative impact that some land owners may encounter as a result of earlier land acquisition linked with the RRR, in addition to the same under this project, 2) access challenges that could be encountered in certain land plots in case the acquisition results in dividing certain plot (s) into two and request to have tunnels or bridges to facilitate farmers access, 3) request to have passengers' stations and train services on the rail corridor emphasizing the positive socio-economic outcome that such service can have on local residents (e.g., in Bani Salama) 4) dust and construction waste related impacts on agriculture lands, 5) risk of land fragmentation and creation of orphan land as a result of expropriation, particularly in the last 4 km of the alignment. To minimize these risks, participants requested the alignment in this segment to be fine-tuned during the census survey, in consultation with farmers. 6) project alternatives were discussed, including location of the Dry Port, opting for rail to transport freight rather than roads, and 7) citizens frustrations from the railway operation including lack of punctuality in Upper Egypt lines.

Findings from the public consultation were strongly acknowledged by ENR and other organizers and each of the received comments was responded to. Some of the recommendations of the participants will be directly tackled under the project. This includes those related to minimizing impacts on Bani Salama farmers, which will be discussed in more details during the final fine-tunings of the alignment and the census survey, the resettlement plans preparation in consultation with the farmers. MoT also confirmed their commitment to future plan to integrate passengers' railway lines in the new alignment and to study the option of increasing tunnels and bridges for the ring road to enhance access. In relation to Upper Egypt trains' delays , it was explained that those could be partially attributed to the ongoing works linked with signaling upgrades of RISE project. This comment could be addressed through enhancing information

disclosure as part of RISE SEP. On location of the dry port, the location of the starting point of the greenfield, those are part of a larger master plan and the dry port has already been constructed. More details about the comments received and how they were responded to is included in the summary below:

Stakeholder	Comment	Response of MoT/ENR
Bani Salama MP	Some of the residents and landowners who had an experience during previous land acquisition for the RRR may encounter more land acquisition as part of this project. Issues and lesson learnt around damage of land, difficulties in access to land and the necessity for fair compensation need to be taken into account particularly with those encountering accumulated impacts. Along 13 km of land along the RRR in Bani Salama, there are only 2 tunnels which is not sufficient as some owners of land have to walk for almost 20 km to reach the other side of their lands. Accidents do happen when farmers opt to cross the road.	During the final design and the census survey, the consultant will try to pass on the borders of lands and will avoid to the extent possible to pass inside lands. This will be conducted in consultation with landowners. More tunnels, crossing facilities, and bridges will be designed in consultation with local communities around the route. NB: contacts were exchanged during the session
	Residents need two passengers' trains in the morning, and two in the afternoon. This will serve students and workers who travel regularly from Monshaeet El Qanater to 6th of October. Passengers' station to be added on the rail corridor, in Bani Salama.	Initial plan and proposal is to have at least 2 trains in the morning and 2 in the afternoon. Exact timings of such lines will be decided, according to timings of factories shifts and schedule of classes. The future plan will include permanent passenger line on this alignment.
	A dry port in Monshaeet El Qanater will benefit farmers and traders with more access to the market.	There will be service stations for farmers and traders in Bani Salama, Mostaqbal Masr, and Gannet Masr. And a plan for a dry port in El Sadat City, 6th of October and an industrial area in Mostaqbal Masr are under development.
	Set the final station in Qatta not in Bani Salama like the previous scenario to make use of the already existing diversion in El Qatta.	This proposed scenario will imply much more land acquisition and more social impacts. It has been studied and compared already very thoroughly.
	Have the negative impacts on the local residents of Bani Salama been addressed? This needs to be examined in the field and not only on maps.	The current proposed route implies the minimum amount of land expropriation and segmentation of lands. This will also be ensured during the final design/the census survey and during the construction phase as well.
Stella De Mari Farms	The new proposed line is expected to harm the agricultural lands in the area; therefore, it is proposed to transfer 6 October Dry Port to Bani Salama.	6 October Dry Port exists and is already in operation.

Stakeholder	Comment	Response of MoT/ENR
	We need a regular passenger line to also pass by the rail corridor; Bashteel-Itay El Baroud line is very dense and thus always delayed.	The dualization of Bashteel-Itay El Baroud line will help in decreasing the density of passengers on the current single line and delay time of the train. In addition, this corridor while being mainly for freight transportation will be used for passengers as well.
	It is proposed to improve highways and land transportation to avoid high expenses of installing new train lines that implies land acquisition for construction activities. Moreover, freight connections already exist but are not being used. Many delays are occurring on the rail corridor in Upper Egypt segments. For example, we have difficulties in transporting fish from Lake Nasser to Giza; delays of trains rotten the fish.	Railway trains are worldwide the most important element in trade and transportation. There is currently a plan to upgrade and develop an integrated train network. There is currently ongoing project for updating the signaling and is expected upon completion to address all those challenges. The rail line upgrade is taking place while the line is on duty and this might imply some delays or inconvenience, but it does not stop the operation during upgrading.
ENR freight department	Has the economic feasibility changed between the last scenario (Qatta) and the current (Bani Salama) been studied?	The route of the current route is shorter from Giza to 6 October dry port; even shorter than Marzeeq-Wahat route.
Monshaeet El Qanater Markaz	Why not to establish a new railway line parallel to Cairo-Alexandria Desert Road?	There is an integrated transportation network that will interconnect all Egypt. This includes the High- Speed Train, 2 lines of the Light Rail Train, 2 lines of the Monorail. All these will be interconnected through hub station; one of these will be Bashteel Station. The High-Speed Train will pass parallel to Cairo-Alex Desert Road.
	Why not to separate freight lines from passenger lines?	To save expenses. But it is possible to establish a service station in the area between Bani Salama and the RRR.
1 Resident from Kafr Dawood	This project is very beneficial to connect with the New Delta Agricultural Reclamation Project. And it would be more beneficial to add a passengers' line. There is also a need for other internal railways to interconnect industrial areas in different governorates.	Passengers' line will be added, and this will also depend on actual demand on the ground.
	Pedestrian bridges are not useful, especially for elderly, pregnant women, and families with young children. It	Crossing facilities are noted. Escalators in central stations is noted and will be investigated.

Stakeholder	Comment	Response of MoT/ENR
	might be useful to have escalators in central stations	

9.3 Grievance Mechanism (GM)

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 (GM).

As part of ESCP of RISE, improvements to current system are ongoing and will be applicable to this project.

The project will use the project GM (section 9.5.2) that was established as part of ENRRP and linkages to the institutional-level GM of ENR (section 9.5.3) will be established as per the ESCP developed for the Project. The ESIA will be updated once the ESCP is prepared.

Moreover, the project will have a separate GM that handles project workers complaints and grievances, including civil servants assigned to the project. The GM for project workers will be outlined in the project's Labor Management Procedures (LMP) developed for the Project.

9.3.1 The project-level GM

Under RISE, the project is working on improving the grievance mechanism for handling project-level complaints and grievances based on the one that was established under ENRRP with the aim of ensuring that project related complaints are addressed in a timely and transparent manner. The same GM system developed under RISE will be used for CATLDP. Given that the scope of CATLDP has expanded to involve construction of a new line and the construction of parallel trails to the existing ones under the segments in component 2, the project-level GM will be further developed to accommodate the potential grievances expected under the project. For involuntary land take, separate GM will be developed as part of the RP.

The project is likely to involve land acquisition. The Egyptian Survey Authority (ESA) is the only entity that is officially designated to handle land acquisition grievances, since it is the official entity responsible for conducting land expropriation in Egypt, according to Law number 10 of the year 1990 and its amendments on private property expropriation for Public Benefit. Since GM is a tool

to receive feedback from communities on the ground and in order to ensure that the ENR PMU is made aware of these grievances, it is essential to have an ongoing line of communication with ESA throughout the project life cycle. Hence, formal communication by ENR PMU will take place with ESA, prior to any land acquisition to ensure that ENR is continuously informed of all the project-level land acquisition grievances, to enable keeping track and documenting all grievances in the project-level GM log. This will also assist the PMU in monitoring the grievances and ensure appropriate level of compensation due to land expropriation is being given to the PAPs.
Moreover, for land re-possession on ENR right of way, direct communication is conducted through ENR land property officers at the local level. Those officers will be requested through a formal letter from ENR central level to report any complaints received to the social specialist of the PMU to be able to register the complaints and grievances in the GM log and ensure that those are being handled, as per the SEP.

GARB will be in charge of implementing the civil works under component 2 of the project. Hence, it is essential that GARB contractors are made aware of the project-level GM, given that they are an interface with communities and will be sharing the project-level GM and may be receiving complaints on-site. Contractors will report these grievances to the Community Liaison Officer (CLO).

The CLO mentioned above will be hired by ENR to take the responsibility of communicating the grievances received from the project-site and affected communities and from GARB to ENR. Moreover, the appointed CLO will take the role of bridging the communication gap between ENR and GARB on grievances and any community related issues encountered on the ground.

The CLO's job description is provided as follows:

- **Key Accountabilities:**
    - The CLO collects and responds to community concerns and grievances and will require SMP approval before engaging with the community on any issues that have reputational implications for the Project. The CLO will provide input into an annual Social Performance Plan and is accoutable for delivering the agreed upon actions in this plan. He/she will also have responsibilities outlined the SEP/ESMP.
    - This job requires working closely with the Administration Manager, Social Performance Manager, Compensation Department, Environment, Health and Safety Manager within the Project.
- **Specific tasks include:**
    - Planning and implementing the consultation with local communities on issues including impact grievances and negotiation over demands and expectations issues.
    - Maintain excellent relations with local authorities and key formal and informal

leaders in the local communities around the site(s).
- Prepare the annual plan for engagement and consultation activities.
- Set up and manage participatory community meetings and activities.
- Oversee and manage grievance procedures, including follow-up through to closure.
- Participate in the delivery of social impact and risk assessment exercises and follow through the implementation of social risk mitigation measures referred to in the Social Impact Assessment.
- Conduct monitoring and evaluation activities, as asigned by the SEP/ESMP.
- Participate in the regular updates of the stakeholder engagement plan and matrix.
- Prepare the grievance log, and write the Quarterly grievance report collating and analysing grievances along with recommendations to top management.

9.3.2 Grievance Channels

Grievance Channels at the project level:

- Complaint boxes at the entrance of the construction site, with a complaints form
- Submit an oral complaint to the site manager or contractor official
- Two 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)
    - Contractor's official, and it changes from one site to another
    - ENR official (from ENR EAD)

Grievances are documented through the grievance log, which is designed for this project to ensure documentation and follow-up (see Annex 5: Grievance Log).

The contractor is responsible for receiving, following up and resolving complaints, and ENR is responsible for monitoring. An assessment on the current RISE project level GM is going to take place in the coming weeks by ENR with support from the social consultant hired under the project. It aims at assessing the functionality of the GM system, identifying any existing gaps and working on addressing them. The lessons learned from the current assessment will serve the CATLDP project level GM and enhance its operationalization.

9.3.3 Grievance Cycle

As part of the CATLDP implementation, project-level grievances will follow the following cycle. Complainants have the full right to submit their grievance to any of the project-level as well as institutional level channels. While the institutional GM (described below) has not been used by the project yet, linkages will be established, as per the ESCP.

9.3.3.1 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 department of ENR, which directs the contractor to the used mechanism, as well as monitoring and monitoring
- Tier 2: The Social Specialist at Headquarters in Cairo
- 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, will also be able to do so as indicated above. Moreover, complainants will also be able to resort to the court, if they desire.

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 days.

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 ESS10 Bank requirements.

9.3.3.2 Response to Grievances

A best practice standard is to acknowledge receipt of complaints within 2 calendar days and to respond complaints, within a maximum of 10 working days. This is also applicable for cases that do not need any corrective action. For complaints that will be resolved in a longer period due to their complexity, the following steps will be considered:

- The aggrieved person has to be informed of the proposed corrective measure within a maximum of 10 days
- Implementation of the corrective measure and its follow up have to be communicated to the complainant and recorded in the grievance register

Response will be made either verbally or in writing, in accordance with the preferred method of communication specified by the complainant.

The complainant, through the use of the complaint tracking number, can follow up on their complaints through a range of methods including postal mail, e-mail, phone, customer service, and/or project location.

9.3.3.3 Registration of Complaints

The project management will keep a grievance log and the grievances and communications received by the PMU Social Specialist will be registered and appropriate documentation of the process will be kept. 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. Comments will be reviewed and taken into account in the project preparation.

Report on grievance management will be included as part of the quarter project progress reports and annual grievance management reports will also be prepared.

9.3.3.4 Confidentiality

Individuals who submit their comments or grievances have the right to request anonymity. Communication with complainants, in those cases, will depend on the available information complainant has shared. Confidentiality should be declared during the process of disseminating GM information.

9.3.3.5 Management of GM

During construction and operation phases, grievances in relation to construction activities will be managed by the social specialist of the PMU. With regard to complaints submitted through the Institution level channels, direct communication will take place with the social specialist of the PMU.

9.3.3.6 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 (disaggregated by channel, gender, age)
2. Number of grievances resolved
3. Number of unresolved complaints
4. Timeframe for resolving complaints
5. Number and type of dissemination activities implemented
6. Number of complainants responded in a satisfactory manner
7. Timeframe for responding to complaints
8. Dissemination activities implemented
9. Level of satisfaction with solutions
10. Documentation efficiency

The project management will keep a grievance log and the grievances and communications received by the PMU Social Specialist will be registered and appropriate documentation of the process will be kept. 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. Comments will be reviewed and taken into account in the project preparation.
Report on grievance management will be included as part of the quarter project progress reports and annual grievance management reports will also be prepared.

Quarterly Grievance Monitoring Report should be developed to keep track of all grievances submitted. The quarterly reports should include an analysis for the above-mentioned indicators. Moreover, main findings and analyses should be documented internally in an annual report. The report should be developed by the Monitoring and Evaluation staff at ENR headquarters.

9.3.3.7 Disclosure of Grievances

Grievance channels should be disclosed as well as an annual report analyzing the received complaints should be prepared. The annual report will include as indicated previously the above-mentioned indicators. Moreover, any disclosed grievances will be kept anonymous and/or only the annual report will be disclosed.

9.3.4 Current GM Central/ Institution Level Utilized by ENR

In the meantime, ENR has a complaints system for passengers and the public. The management and operation of this institutional level GM are the responsibility of the Complaints and Customer Service Directorate, which is affiliated to the Presidential Affairs Central Directorate. ENR's institutional GM is accessible to project beneficiaries and stakeholders, so it is possible that project related complaints are submitted through the institutional channels. Therefore, linkages between the project GM and the institutional GM of ENR will be established.

9.3.4.1 Grievance Channels at the Central Level

Complaints could be submitted through multiple intake points, including submission by hand, telephone, or by email. Below are the main channels for grievance:

- Complaint boxes in all railway stations
- An email address linked to the ENR website (support@enr.gov.eg)
- A landline disclosed on the ENR website (+2 02 25748279)
- A digital complaint form linked to the website of the Ministry of Transport
- Two telephone lines (01274422925 - 0225753555)
- A hotline (15047)

Through those channels, ENR receives about 1-5 complaints per day, and about 70-80 complaints per month. Complaints are followed up until closure of the complaint. For each of those channels,

employees are working to receive complaints, record them and transfer them to the competent departments. Further assessment of ENR's GM will be taking place under RISE and will benefit CATLDP.

9.3.4.2 Gender-based Violence (GBV) and SEA/SH Grievance Mechanism

ENR, in cooperation with the EBRD and the National Council for Women, launched the (Railway Safetyامان 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.

The campaign operates in eight stations (that are not part of the RISE project) for a period of two weeks. Before launching the campaign, a survey was conducted on a sample of train passengers to receive feedback on usage of the hotline to submit a GBV related complaint, and another evaluation survey will be conducted at the end of the campaign, to know their feedback on the campaign.

Submitted complaints are recorded 1) through customer services who will register the details in a form that was specially prepared for the campaign, and 2) a form designed for complainants to register the details themselves.

A limited number of employees work in the ENR customer service (four female employees work from 8 am until 3pm, and then only one employee work from 3pm until 8 am the next morning). In addition, transportation inspectors are present in trains and station entrances to respond to passenger's complaints. ENR officials also explained that the devices customer service use to receive complaints only enable them to receive one call at a time. This enables them to track all complaints to resolve the complaint or take the necessary measures in a timely manner.
Therefore, the role of the customer service staff is limited to: a) Receive contact b) Record the complaint in Form c) Direct the complainant to another party represented by the station or police overseer available in the stations or the train to take the necessary measures and deal with the complaint.

For the CATLDP project, this campaign information will be made available at the project sites. However, further developments are needed to handle GBV and specifically SEA/SH complaints at the different stages of the project, as per ESS 4. Anonymous channels need to be in place and referral system should be stablished in coordination with relevant national entities in charge (e.g., the National Council for Women). They will be in place once project implementation starts.
Once lessons learned arise from the implementation of the campaign, the project will also take them into consideration as needed and as feasible.

9.3.5 Monitoring and Reporting

ENR's PMU will be responsible for overall monitoring of implementation of the project in compliance with ES safeguards according to defined indicators in the ESMP(s). Monitoring of contractor's implementation of the ESMP will be performed by ENR's environmental and social development officers.

During the construction phase, the contractor will submit monthly reports to ENR's PMU.

During the operation phase, ENR environmental and social specialists will submit monthly monitoring reports to environmental and safety team leader at ENR.

10 CONCLUSION

Positive impacts

For subcomponent 2.1, the new link will result in positive impacts in terms of improving safety across its footprint and reduce the number of incidents. The project will positively contribute to climate change mitigation by improving existing infrastructures and constructing new infrastructures leading to a modal shift of freight and transport from road to rail. This will result in emission reductions in CO_2 emissions estimated at 12,380 tCO_2/yr. Additionally, indirect positive impacts include reducing movement of trucks on roads which will enhance road safety.

From a social standpoint, the project is anticipated to benefit the population of Egypt, as safer mobility will encourage more people to use the rail. Moreover, moving goods on rail will help mitigate traffic incidents and road damages.

For subcomponent 2.2, the signaling moderniation and track upgrades will improve the performance of the existing railway Marazeeq-Wahat and provide more saftey to the surrounding community.

Negative impacts

For subcomponent 2.1, the introduction of a new diesel operated freight train will contribute to increased noise and vibration levels. Receptors identified ninclude residents in Bani Salamah Village, agriculture area and scattered farmhouses in cultivated areas. A noise and vibration model was prepared to identify adequate noise reducing designs. Despite CO_2 savings from the reduced use of trucks, diesel combustion is a significant source of NO_2 and PM with impacts on air quality. Appropriate mitigation measures have been identified and can be greatly minimized in the design phase and through good operational practice. All the impacts identified can be reduced to acceptable levels as proposed in the Environmental and Social Management Plan.

On the social level, the main findings are that stakeholder consultations were very effective in determining the optimum alignment of the new greenfield link. They lead to optimizing segments in the alignment thatare prescribed to avoid negative social impacts consistin of loss of economic livelihood, depreciation and loss of value of land with potentially significant incurred costs to local authorities should the developers pull out and ask for compensation. The impact was assessed as having high significance. The social findings are aligned with CATLDP's RF, SEP and ESCP.

For subcomponent 2.2, the implementation of the signaling modernization and track upgrades will generate potential negative impacts. These impacts appear at different stages namely, construction and operation. The impacts have been identified and observed to be moderate to high in significance. For these, appropriate mitigation measures have been identified and can be greatly minimized in the design phase and through good operational practice. All of the impacts identified

can be reduced to acceptable levels as proposed in the Environmental and Social Management Plan.

Overall, provided the mitigation measures are implemented including, the project will have no significant negative impacts.

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12 ANNEX 1: NATIONAL LEGAL FRAMEWORK

The following is an explanation of the various national laws, regulations and framework related to environmental and social impact assessment studies.

The Egyptian Environmental Law No.4 of Year 1994

The main legal framework for environmental issues is Law No. 4 of 1994 and amended by Law No. 9 of 2009 and Law 105 of 2015 and its implementing regulations amended by Resolution 1095 of 2011 and then Resolution 710 of 2012 and Resolution 964 of 2015 known as the Environmental Protection Law. The Egyptian Environmental Affairs Agency (EEAA) was established by Prime Minister Decree No. 631 of 1982 to be the administrative body responsible for environmental affairs in Egypt. Law 4/1994 states that EEAA is the body responsible for environmental affairs.

In accordance with Article 19 of Law 4 of 1994, the entity responsible for a particular project must undertake an environmental impact assessment study for any new project and for extensions and renovations of existing projects to assess the impacts of the project on the natural and social environment prior to project implementation. The results of this assessment are submitted for review by the EEAA before other government agencies issue licenses Project execution. The law considers the ESIA as a main condition for licensing and thus the project that does not prepare an ESIA or does not abide by the ESIA conditions could be subjected to its license revoke (Articles 10, 12 and 19 of the executive regulations of Law 4/1994, modified by the decree 1741/2005.

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

The Egyptian Environmental Affairs Agency (EEAA) is the governmental entity responsible for the management of environmental issues. The Egyptian law defines three main roles of EEAA:

- Organizing and coordinating most activities in addition to the executive role in the management of nature reserves and pilot projects
- The Authority is responsible for formulating the environmental management policy, developing the implementation plans necessary to preserve the environment, and following up its implementation in cooperation with the competent administrative authorities
- Reviewing and approving environmental and social impact assessment studies

The Environmental Management Unit at Governorate and District level (EMU) 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 are 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 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 are affiliated administratively to the governorate yet are technically affiliated to EEAA
- The governorate has a solid waste management unit at the governorate and district level. The units are responsible for the supervision of solid waste management contracts

The Competent Administrative Authority (CAA) is the entity responsible for issuing licenses for projects construction and operation. The ESIA is considered one of the requirements of licensing. The CAAs is thus responsible for receiving the ESIA forms of studies, check the information included in the documents concerning the location, suitability of the location to the project activity and ensure that the activity does not contradict with the surrounding activities and that the location does not contradict with the ministerial decrees related to the activity. The CAA forwards the documents to EEAA for review. They are the main interface with the project proponents in the ESIA system. The CAA is mandated to:

- Provide technical assistance to Project Proponents
- Ensure the approval of the Project Site
- Receive ESIA Documents and forward it to EEAA
- Follow-up the implementation of the ESIA requirements during post construction field investigation (before the operation license)

After submission of the ESIA for review, the EEAA may request clarifications in the ESIA report within 30 days, including additional mitigation measures, before issuing the approval of the report. The project proponent will have the right to issue an appeal within 30 days from its receipt of the EEAA's decision. It should be noted that once the ESIA has been approved, the ESMP as will be presented in the report, will be considered an integral part of the project; and the proponent will be legally responsible for the implementation of that plan, depending on their involvement in construction or operation.

Environmental and Social Impact Assessment (ESIA)

The EEAA issued, in 2009, sector-specific Guidelines for ESIA preparation. The objective of the guidelines is to:

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

In accordance with these guidelines, the projects are classified according to four categories according to the severity of the potential environmental impacts and place of residence of the establishment and its proximity to the residential areas:

Category (A): Projects with low environmental impacts, category (B): projects with potentially negative environmental impacts but less than category (C), category (B-Scoped): with substantial negative environmental impacts but less than category and category (C): projects with significant negative impacts and this category is required to prepare a full ESIA study.

Based on these categories, the Modernizing the signaling system along the railway corridor Alexandria-Nag Hammadi is classified as scoped "B" defined by Egyptian requirements. The following procedures will be followed to fulfil the requirements of the study:

- The developer/operator (ENR) shall submit a letter to the competent administrative authority or to the licensing authority explaining the nature and activity of the proposed project, which has been classified as a "scoped B" project. The developer will also attach three printed copies and one electronic copy of the ESIA study on the project in accordance with the General Principles and Guidelines by EEAA
- The competent administrative authority (MoT) shall record the documents and verify whether the classification is correct and whether the information contained in the ESIA conforms to the information required in accordance with relevant sector guidelines
- The competent administrative authority shall examine the documents and submit the application formally to the EEAA for review and evaluation
- EEAA shall evaluate the documents and submit to the competent administrative authority its opinion and possible proposals for measures to be taken to ensure the protection of the environment within 30 days of the EEAA receiving the ESIA study. Failure to do so is considered as approval of the evaluation
- EEAA records documents, proposals and records its opinion on ESIA
- The competent administrative authority shall formally notify the developer (the project owner) of the result of the evaluation with a registered letter with acknowledgment of receipt

The competent administrative authorities are responsible for receiving the study and reviewing the data contained therein regarding the site and its suitability to the nature of the project and its commitment to the ministerial decision on the activity and ensuring that the activity does not

conflict with neighboring activities. Then the administrative entity is to send the study to the Environmental Affairs Agency for review. The administrative entity, which is responsible for dealing with the sponsors of the project, is charged with the following:

- Provide technical support to project providers
- Ensure the approval of the project site
- Receive environmental and social impact assessment studies and send them to EEAA
- Follow up the implementation of environmental and social impact requirements through field visits during the construction phase and before the operating license

After the ESIA study is submitted for review, the EEAA may request amendments to the study within a period of 30 days, including additional mitigation measures, before the final approval of the report is issued. The applicant can submit an appeal within 30 days of obtaining the EEAA decision. Once the environmental and social impact assessment has been approved, the environmental and social monitoring plan presented in the report is considered an integral part of the project and the project-based company is committed to implementing this plan, depending on its involvement in the construction and operation phases.

Environmental Register

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

- Emissions from or discharged from the facility
- Safety procedures and environmental monitoring applied in the facility
- Tests, periodic measurements, number of samples, timing and place of withdrawal, measurements, analysis and results
- Appoint a person responsible for review and follow-up

Environmental Protection Regulations for Air Pollution

In accordance with the provisions of Articles 34 to 40, 42, 43 and 47 in Law 4/1994, amended by Law 9/2009, Article 42 and Annex 5 and 6 of the Implementing Regulations.

Air Emissions

The location of the project should be determined so that during the construction and operation phases of the proposed project, emissions in the area (including the proposed project) will not exceed the maximum allowable limits of ambient air pollutants as shown in Table 12-1

Table 12-1: Maximum Limits of Outdoor Air Pollutants (Annex 5 of the Executive Regulations amended in 2012)

Pollutant	Location Area	Maximum Limit [µg/m^3]			
		1hour	8hours	24hours	1Year
Sulphur Dioxide	Urban Industrial	300 350		125 150	50 60
Carbon Monoxide	Urban Industrial	30 mg/m^3	10 mg/m^3	- -	- -
Nitrogen Dioxide	Urban Industrial	300 300	- -	150 150	60 80
Ozone	Urban Industrial	180 180	120 120	- -	- -
Total Suspended Particles (TSP)	Urban Industrial	- -	- -	230 230	125 125
Particulate Matter less than 10 µm (PM_{10})	Urban Industrial	- -	- -	150 150	70 70
Particulate Matter less than 25 µm ($PM_{2.5}$)	Urban Industrial	- -	- -	80 80	50 50
Suspended Particles Measured as Black Smokes	Urban Industrial	- -	- -	150 150	60 60
Lead	Urban Industrial	- -	- -	- -	0.5 1.0
Ammonia (NH_3)	Urban Industrial	- -	- -	120 120	- -

Appendix (6) of the amended executive regulations includes the following decisions: 1095 for 2011, 710 for 2012 and 964 for the year 2015 on the permissible limits for emissions of air pollutants from different sources.

Table 12-2: Maximum allowable emissions from vehicles that operate using gasoline fuel (Table 23 of Annex 6 of the Executive Regulations amended in 2012)

	Before the year 2003		From 2003 to 2009		Year 2010 and later	
Pollutants	**Hydrocarbons HC (ppm)**	**CO%**	**HC (ppm)**	**CO%**	**HC (ppm)**	**CO%**

Maximum allowable Limit	600	4	300	1.5	200	1.2

Measurements should be done at the idle speed from 600 to 900 rpm.

Table 12-3: Maximum allowable emissions from vehicles that operate using diesel fuel (Table 24 of Annex 6 of the Executive Regulations amended in 2012)

Manufacturing Year (model)	**Before the year 2003**	**From 2003 and later**
Smoke density factor K (m^{-1})	2.8	2.65

Measurements are done in accordance with the ISO-11614 international standard.

According to Article 43 of the Law, the owner of an establishment is held to take all precautions and procedures necessary to prevent the leakage or emission of air pollutants inside the work premises except within the permissible limits as defined by the executive regulations of this Law, whether they result from the nature of the establishment activities or from malfunctioning equipment. Table 12-4 provides the maximum (permissible) limits for air pollutants inside workplaces per industry types.

Table 12-4: Maximum permissible limits for air pollutants

Measurement parameter (unit)	**SO_2 (ppm)**	**H_2S (ppm)**	**NO_x (ppm)**	**CO (ppm)**	**CO_2 (ppm)**	**Smoke ($\mu g/m^3$)**
Max. Permissible Limit inside the working environment	2	10	3	25	5000	-
Max. Permissible Limit in the ambient air (1 hour)	300 $\mu g/m^3$	-	300 $\mu g/m^3$	30 $\mu g/m^3$	-	150 $\mu g/m^3$ (24-hour)

Noise

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 Appendix 7 of the Executive Regulations when carrying out production, service or other activities, particularly when operating machinery and equipment or using sirens and loudspeakers. The table lists the maximum permissible noise level limits according to area type as per the following designation:

- Sensitive areas to noise exposure
- Residential suburbs with low traffic flow
- Commercial and administrative areas in city center

- Residential areas with some workshops, administrative activities, or recreational and entertainment activities overlooking public roads less than 12 meters
- Areas overlooking public roads more than or equal 12 meters, or industrial areas with light industries
- Industrial Zone with heavy industries

The applicable maximum noise level for the project activities are shown in Table 12-5:.

Table 12-5: Maximum permissible noise level limits for the project area (from Annex 7 of the Executive Regulations, Table 3)

AREA TYPE	MAXIMUM PERMISSIBLE EQUIVALENT NOISE LEVEL [dB(A_{eq})]	
	Day	Night
	7 AM – 10 PM	10 PM – 7 AM
Areas overlooking public roads more than or equal 12 meters, or industrial areas with light industries	70	60

Other Egyptian Environmental and Social Laws Applicable

Egyptian environmental law covers many aspects, such as air quality, water quality, noise, solid waste management and occupational safety and health. Each of these aspects and permissible limits will be discussed according to their applicability to the project. The governing laws applicable to the scope of this evaluation are:

Environmental framework:

1. 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 of 2017
2. Law No. 38 of 1967 (the Public Cleanliness Law) and its executive regulations issued by the Ministry of Housing dealing with solid waste
3. Law No. 202 of 2020 for solid waste management
4. Law No. 48 of year 1982 on the Nile River, waterways and its executive amendment
5. Law No. 93 of 1962 on industrial wastewater disposal on domestic wastewater network and its implementing regulations
6. Law No. 102 of 1983 regarding the nature reserves, and its complementary decrees in preservation of rare and endangered wild animals

Social framework:

1. Law No. 137 of 1981 (Labor Law) amended by Decree 12 of 2003 and known as the Unified Labor Law

2. Law No. 117 of 1983 Amended by Law No. 12 of 1991 for the Protection of Archaeological Areas and Cultural Heritage
3. The Egyptian Constitution has preserved the right of private property, Egyptian Constitution (1971, amended in year 1980) and Egyptian Constitution (2014, articles 33 and 35). The Egyptian Civil code 131/1948, articles 802-805 recognize private ownership right and stipulates that the owner of a certain property has the sole right of using and/or disposing his property
4. Property expropriation for public benefit is indicated by Law No. 10 of year 1990 and its amendments by law No. 187/2020, No. 24 for the year 2018, and law No. 1 for the year 2015. All laws regulating land acquisition will be applied to this project's scope of work, In case that the project needs lands outside the ENR property
5. Article 306 (a, b) of the Penal low 2018 provides the punishment for harassment, whether verbal or physical
6. Labor Law No. 12/2003, workforce safety and assurance of the adequacy of the working environment should be addressed, and articles on child labor, labor regulations, workers' complaints, percentage of employment with disabilities, and female labor regulations
7. EEAA ESIA guidelines related to the Public Consultation. Paragraph 6.4.3 of EEAA EIA guidelines provides detailed information about the scope of public consultation, methodology and documentation thereof
8. Law no. 94/2003, Protection of communities Human Rights Law. The Law on Establishing the National Council for Human Rights (NCHR) aims to promote, ensure respect, set values, raise awareness and ensure observance of human rights. At the forefront of these rights and freedoms are the right to life and security of individuals, freedom of belief and expression, the right to private property, the right to resort to courts of law, and the right to fair investigation and trial when charged with an offence

Public Cleanliness Law Number 38/1967

Law 38 for the year 1967 amended by law 31/1976 and its Executive Regulations issued by decree 134/1968 prohibit the dumping of solid wastes in any location other than those designated by the municipal authorities. This includes solid waste treatment and disposal, in addition to the temporary storage in undesignated containers. Article 1 of the Ministry of Housing and Utilities decree 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 transportation methods.

The Public Cleanliness Law and its Executive Regulations requires the municipal authority responsible for public cleanliness or the contracted entity assigned by it for the collection, transportation, and disposal of solid wastes, to carry out these processes in accordance with the specifications stipulated in the Executive Regulations and any other regulations by the municipal authority.

Environmental Law 4/1994

In general, the law prohibits the disposal of any solid wastes except in areas designated for this purpose through article 37, and articles 38, 39 and 41 of the executive regulations which require that during excavation, construction or demolition activities, the entity undertaking the work must take the necessary precautions to safely store and transport the resulting wastes in accordance with the set procedure.

Regarding the hazardous wastes, and in accordance with the provisions of articles 29 to 33 of law 4/1994 which is equivalent to law 9/2009 and articles 28, 31 and 33 of the executive regulations, the entity producing hazardous wastes in gaseous, liquid or solid form is committed to collect and transport the generated waste to designated disposal sites which are predetermined by the local authorities, the competent administrative authorities and the Egyptian Environmental Affairs Agency.

The 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 procedure.

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.

Water and Wastewater Management Regulations

Industrial Wastewater Disposal Law 93/1962

The law prohibits the disposal of domestic, industrial and commercial wastewater, treated or untreated, in public drainage system without obtaining a prior approval.

Article 14 of the executive regulations set the parameters required regarding the quality of the wastewater discharged to the public sewage network.

Protection of Nile River Water Law 48/1982

The protection of the Nile River and water was law number 48 for the year 1982 defines the water ways 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 water ways, it is prohibited to dispose or dump any solid, liquid or gaseous waste from all residential, commercial and industrial activities as well as waste water unless an approval is obtained from the Ministry of Water Resources and Irrigation according to the regulations issued in this regard.

Solid Waste Management Regulation No. 202 /2020

This law is issued very recently on 13th of October 2020, the executive regulations will be issued within 6 months and it will take time to in effect.

Article (15): The generator or holder of waste may take all necessary and 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
- 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 agency supervises the organization and planning of integrated municipal waste management processes and prepares forms for the terms and specifications for implementing integrated municipal waste management services, and the ministries and competent authorities should assist the agency in doing so.

The New Urban Communities Authority shall provide the required financial resources to ensure the implementation of integrated management services for municipal waste in urban communities in accordance with the terms and specifications set by the agency, and are defined as contained in the executive regulations of this law.

The competent administrative authority shall be the body responsible for the procedures of offering and contracting for the implementation of integrated municipal waste management services and monitoring the implementation of the contract, and the offering is carried out according to the terms and specifications booklets prepared by the agency.

And the provision of integrated management services for municipal waste through the entities that contract with the competent administrative authority.

In the event that the Prime Minister approves upon a request from the competent administrative authority and a proposal from the competent minister, the competent administrative authority may

implement any of the services of integrated municipal waste management as stipulated in Article (22) of this law.

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. According to the classification of the following categories:

- From two to four pounds per month for residential units
- From thirty pounds to one hundred pounds per month for independent commercial units, and units used as headquarters for self-employment and professional activities
- Not exceeding five thousand pounds per month for governmental establishments, public bodies, public sector companies, public business sector, hospitals, health care facilities, and private educational establishments
- Not exceeding twenty thousand pounds per month for commercial, industrial and tourism establishments, space lands utilized for commercial activities, companies and administrative buildings belonging to the private sector, commercial centers, hotels and sports facilities, and similar establishments or activities

And worship places are exempt from the performance of this fee. Micro enterprises shall be exempt from half of the fees prescribed in this article.

The controls and categories of this fee shall be determined by a decision from the Prime Minister after the approval of the Council of Ministers based on a proposal from the concerned minister, and these categories may be increased every two years with the same tool at the rate of (10%), provided that the total of this increase does not exceed twice the limit of the maximum limit for each category

This fee is collected by electronic payment or in cash by the units of the integrated management of municipal waste in the competent authority or the bodies of the new urban communities, or from a warning in the public or private sector or state agencies.

The obligation to pay the aforementioned fee is without prejudice to special contracts, agreements or protocols that may be concluded by the establishments indicated in clauses (3,4) of the first paragraph of this article regarding municipal waste management services.

The competent local units in the governorates and the new urban community agencies shall establish offices to receive complaints from citizens in the event that they are affected by failure to abide by the provisions of this law and to take necessary action in this regard.

The executive regulations of this law determine the standards and controls necessary for the implementation of this article, including the basis for determining the parties obligated to pay these fees.

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 (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 (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.

Work Environment and Occupational Health and Safety

Several laws and decrees tackle occupational health and safety provisions at the workplace, in addition to Articles 43 – 45 of Law 4/1994, which address air quality, noise, heat stress, and the provision of protective measures to workers. These laws and decrees apply to the work crew that will be involved in construction activities.

Law 12/2003 on Labor and Workforce Safety and Book V on Occupational Safety and Health (OSH) and assurance of the adequacy of the working environment. The law also deals with the provision of protective equipment to workers and firefighting/emergency response plans.

Decree No. 211/2003 (replacing MD 55/1983) specifies the necessary conditions required for a safe working environment with respect to physical, mechanical, electrical, chemical, biological and other hazards. Special chapters provide "Maximum Allowable Concentrations" for more than 600 chemical agents in the working environment, safe levels of physical parameters (heat and cold stress, noise, vibration, illumination, radiation, static electrical fields, classification of jobs according to physical workload, etc.), and a list of suspected chemical carcinogens (86 agents). Specifications are equally provided for construction works (ladders, scaffolds, etc).

Decree No. 126/2003 (replacing MD 75/1993) defines procedures and forms for notification of accidents and diseases at work. It also specifies the type of statistics on major injuries and accidents that should be collected and notified.

Decree No. 134/2003 (replacing MD 116/1991) defines the type of industrial and non-industrial enterprises which should have an OSH department and a joint OSH Committee. It also regulates

training in occupational safety and health for workers/managers involved with OSH in the enterprise. The decree stipulates that every establishment or a branch thereof, at which 50 or more workers are employed, shall assign the industrial safety task to an OSH department and to a joint OSH committee, where some technicians and specialists are working as full-time OSH controllers and supervisors.

Moreover, the following laws and decrees should be considered:

- Minister of Labor Decree 48/1967
- Minister of Industry Decree 91/1985
- Minister of Labor Decree 116/1991

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

Noise and Vibration

Annex 7 of the Executive Regulations 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 12-6: Permissible noise levels inside sites of productive activities
(Table 1, Annex 7 of the Executive Regulations)

No.	TYPE OF PLACE AND ACTIVITY	MAXIMUM PERMISSIBLE EQUIVALENT NOISE LEVEL [dB(A)]	Exposure Duration
1.	a) Workplaces (workshops and industries) with up to 8-hour shifts (licensed before 2014)	90	8
	b) Workplaces (workshops and industries) with up to 8-hour shifts (licensed since 2014)	85	8

For the first item (a, b) the exposure duration shall be decreased by half if the noise level increases by 3 dB (A) combined with using ear plugs. This is to avoid any impacts on the sense of hearing.

The instantaneous noise level shall not exceed 135 dB (A) during working period.

The noise level is measured inside working areas and closed areas in L_{Aeq} according to the international guidelines (Parts 1&2) ISO 9612/ ISO 1996 or the Egyptian Specifications No. 2836 part 1 & 2 and No. 5525 concerning this matter.

Equivalent noise level L_{Aeq} is the average acoustic pressure at the level of measurement (A) during a specific time period and expressed in dB.

Table 12-7: Maximum Permissible Exposure to Heavy Hammers (Table 2, Annex 7 of Executive Regulations)

Peak Noise Intensity Level [dB(A)] L_{cPeak}	135	130	125	120	115
Number of Allowable Strikes during Working Hours	300	1000	3000	10000	30000

The intermittent noise exposure depends on the noise level intensity presented in the previous table (number of strikes per shift).

The hammer strikes are considered intermittent if the duration between strikes 1 second or more. If the duration is less than 1 second, the strikes are considered continuous and the noise level shall comply with Table 1 of Annex 7 of the executive regulations.

Regarding vibration, ministerial decree number 211/2003, table 10 stipulates the threshold limits of exposure to vibration

Table 12-8: The threshold limits of exposure to vibration according to Ministerial Decree 211/2003

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/s2)**
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

Other relevant standards

- Health and Safety "The Control of Vibration at Work Regulations 2005 no.1093"[40]

1. 40 http://www.legislation.gov.uk/uksi/2005/1093/pdfs/uksi_20051093_en.pdf

- For whole body vibration, the daily exposure action value (EAV) is 0.5 m/s^2. If exceeded, action must be taken to reduce workers' exposure to vibration. The daily exposure limit value (ELV) is 1.15 m/s^2, which must not be exceeded

Ambient Air Quality

Annex 8 of the Regulations lists the maximum allowable limits for air contaminants within the working environment.

Boundary limits (threshold limits) of air pollutants in the workplace according to the quality of each industry: Boundary limits are concentrations of chemicals in the air that can be exposed to daily workers without health damage and are divided into three types:

a) Threshold limits - 8 hours: The average pollutant concentration in a normal working day (8 hours), which the worker can be exposed to in 5 days a week throughout his/her work without causing health damage

For total particulates that causes only discomfort and has no significant health effects, the threshold is 10 mg / m^3 and for inhalable particles 3 mg / m^3 (inhalable soil 2.5 micron to 10 microns).

b) Threshold limits - 15 minutes: Pollutant concentration that worker can be exposed to continuously for a short period. For a period of 15 minutes, which may not be exceeded in any case during the working period and that is not repeated more than 4 times per day and the period of 60 minutes should be between each short exposure
c) The ceiling is the limit that cannot be reached even for a moment and when the absorption by the skin is a factor in the increase of exposure is marked (+ skin) in front of the threshold limit, and for simple gases that have little toxic effects is measured oxygen concentration in the air, which may not To be less than (18%)

Considering the provisions of the Labor Law 12 of 2003 and its ministerial decrees, the emission limits of different chemicals in the working environment shall not exceed the limits set out in Table 1. The employer or his authorized representative shall also provide identification cards for the chemicals used or produced within the facility in the Arabic language, provided that they are placed in a file in a visible place in the facility so that they can be accessed, considering the following:

1. Name of chemical, scientific and commercial material, name, address and telephone number of manufacturer and distributor of this material
2. Any hazardous components in the substance, as well as the safe concentration of this component, which can be exposed for 8 hours a day without harm
3. Potential human health risks from exposure to a higher concentration than the safe concentration of the substance, as well as the way the substance is absorbed by the skin, breathing, swallowing, etc., as well as the human organs targeted by this substance

4. First-aid measures to be followed in the event of injury to this substance
5. How the substance can be ignited, as well as the fire extinguishers to be used to extinguish the fires (in the case of flammable substances)
6. The method of preventing accidents and injuries that are expected to occur in the event of leakage or spillage of this substance on the ground or the emission of large quantities of evaporation to the working environment as well as how to contain this leakage and health methods to clean the workplace and follow all safety precautions
7. Information on how to handle the substance and how to correctly store it
8. Personal Protective Equipment (PPEs) that should be used when handling substances to prevent injury
9. Physical and chemical properties of the substances such as: (color - state - odor - solubility - steam pressure - boiling point - freezing - density ...etc.)
10. How the substance becomes hazardous as a result of its interaction with other substances, and the extent of the stability of the material as well as the non-compatible substances that are required to be distant from it
11. The toxicity of the substance and the results of the tests conducted to determine it
12. The effect of the material on the environment and the environmental life around it such as aquatic life, plants, animals and birds, as well as the duration of the material in which it remains dangerous
13. Information on safe and correct ways to dispose of the substance
14. Information on the precautions to be taken when transporting this material by different means of transportation
15. Information on classification of material severity according to specifications and requirements of international organizations
16. Any other information about the material

Table 4 from Annex 8 of the Executive Regulations states the amount of air needed to ventilate the public places.

Table 12-9: Amount of air needed to ventilate the public places

No.	Type of location and activity	Occupancy rate (Person/100m^2)	Minimum external air regeneration rate
1	Administrative buildings		
	• Office	5	10
	• Reception	30	5.5
	• Meeting room	50	8
	• Conference room	50	8
	• Banks	10	8.5

Temperature and Humidity

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

Table 12-10: Thermal exposure limits (heat stress) allowed in the work environment according to the work system (Table 2, Annex 9 of the Executive Regulations)

Work and break system	**Thermal Temperature: Temperature of the Wet Globe Temperature (° C) Average Temperature Exposure in Intermittent Working Condition**		
	Non labor intensive	Average labor intensive	Labor intensive
Continuous work	30 ◦C	27.8 ◦C	25.8 ◦C
75% work, 25% break	30.58 ◦C	28.8 ◦C	26.8 ◦C
50% work, 50% break	31.58 ◦C	29.58 ◦C	28.8 ◦C
25% work, 75% break	32.8 ◦C	31.8 ◦C	30.8 ◦C

Ventilation

Table 4 from Annex 8 of the Executive Regulations states the amount of air needed to ventilate the public places.

Table 12-11: Amount of air needed to ventilate the public places

No.	**Type of location and activity**	**Occupancy rate (Person/100m^2)**	**Minimum external air regeneration rate**
2	Administrative buildings • Office • Reception • Meeting room • Conference room • Banks	 5 30 50 50 10	 10 5.5 8 8 8.5

Laws Related to Traffic

The laws applicable to traffic and road work are governed by Traffic Law No. 66 of 1973, as amended by Law No. 121 of 2008. The law is concerned with traffic planning during the construction of projects. Law No. 140 of 1956 concerning the use and occupation of public roads, and Law No. 84 of 1968 concerning public roads, including highways, main roads and regional road.

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

EEAA EIA Guidelines Related to the Public Consultation

- Conduct a public consultation as part of the ESIA study according to the EEAA guidelines methodology. The involvement of the public and concerned entities in the EIA planning and implementation phases is mandatory for Category C projects through the public consultation process with concerned parties (not required by low for projects of categories B & scoped B)
- Preparation of the Public Consultation Plan before starting the consultation activities in the EIA scoping phase, the project proponent prepares a plan indicating the methodology of the public consultation to be adopted in the two public consultation phases (EIA scoping phase and consultation on the draft EIA). The plan should indicate the concerned parties that will be consulted, method of consultation and other points
- An individual chapter in the EIA will be prepared for public consultation
- Disclosure of relevant material is an important process and should be undertaken in a timely manner for all Category C projects. This process permits meaningful consultations between the project proponent and project-affected groups and local NGOs is required to take place. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties
- Paragraph 6.4.3.1: Scope of Public Consultation
- Paragraph 6.4.3.2: Methodology of Public Consultation
- Paragraph 6.4.3.3: Documentation of the Consultation Results
- Paragraph 7: Requirement and Scope of the Public Disclosure

Cultural Heritage

Archaeological and cultural heritage is protected by the following laws:

- Law 117 of 1983 on the protection of monuments and cultural heritage, amended by Law 12 of 1991

Land Acquisition Laws

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

Property expropriation for public benefit is indicated by Law No. 10 of year 1990 and its amendments by Law No. 24 for the year 2018, and law No. 1 for the year 2015.

This law has specified, through Article 6, the formation of the "Compensation Valuation Commission". This Article states that the commission is established at the Governorate level and consists of a delegate from the relevant Ministry's Surveying Body (as President), a representative of the Agricultural Directorate, a representative of the Housing and Utilities Directorate, and a representative of the Real Estate Taxes Directorate in the Governorate.

The compensation shall be estimated according to the prevailing market prices at the time of the issuance of the Decree for Expropriation. 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). It also includes a provision for the deposit of the value of the compensation in an interest-generating account for the benefit of the affected persons (landowners). Finally, the most recent amendment took place through Law 187/2020 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. In case of delaying the deposit, additional interest should be paid by the project proponent on top of the value of the compensation for the interest of the affected persons (landowners).

Amendments of the law in 2015 has specified the period allowed for submitting a grievance to be 15 days and allowed additional 30 days to submit all relevant documents.

ENR's Approach for Securing Land Plots

Law No. 152 of 1980 establishing the Egyptian National Railways Authority. The law aims to accurately determine the assets of the ENR of public benefit, limiting them to buildings and facilities used in operation, railway lines, crossings and their campuses. While allowing the ENR to exploit the rest of its assets and in-kind allocations that do not fall under the scope of public benefit in all its forms, in addition to Enabling the Authority to dispose of these allocations according to specific controls.

In general, ENR uses their right-of-way for construction of the signaling buildings. In some cases, the land of ENR is rented out to users and in such cases a contract is issued between ENR and the user. In the meantime, ENR ensures to avoid occupied land plots. In the case where a vacant alternative is unavailable and land is being used by users or tenants, ENR issues an

administrative decree for relocation of the occupancies on the required land plot by the respective local entities.

This approach is applied to both squatters and tenants. For the former, those are supposed to have no legal rights under the Egyptian legislation. For the latter, the old and new tenancy contract templates state that ENR retains the right to restore the leased property at the time it wishes. Article 9 of the old contract template states that: "*The Authority [ENR] reserves, for itself, the right to terminate this contract without being held responsible for any disruptions or damages in case it [ENR] sold the rented property or needed it for its purposes or for the purposes of other government institutions or sub-institutions. And it shall be sufficient that the tenant be notified of that one month in advance, through a registered letter, and the tenancy value shall be paid back to him [the tenant], if it was prepaid, for the remaining [tenancy] period as of evacuation of the property.*"

The corresponding stipulation in the new contact template states that: "*The First Party [leaser] shall have the right to terminate the contract in case ENR needs the leased property for future projects.*" However, the old version of the contract template stipulates that dues shall be paid back to the tenant and he/she shall be proactively notified, the new version omits that.

WB Good Practice Note on Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in Investment Project Financing involving Major Civil Works.

WB Recommended Actions to Address Project-Induced SEA/SH Risks

✓ = Actions are recommended given the risk level; ○ = Actions that should be considered to be done, and adopted if appropriate, given the nature of the project and the associated risks; ⊗ = Actions are unlikely needed given risk level

When	Action to Address SEA/SH Risks	Timing for Action	Who is Responsible for Action	Ongoing Risk Management	Whether Action is Recommended or Advisable by SEA/SH Risk Level			
					Low	Moderate	Substantial	High
Identification/Appraisa	**Sensitize the IA** as to the importance of addressing SEA/SH in the project, and the mechanisms that will be implemented.	○ Preparation. ○ Implementation.	○ Task Team.	○ Task team to monitor and provide additional guidance as necessary.	✓	✓	✓	✓
	Include in the **project's social assessment** an assessment of the underlying SEA/SH risks and social situation, using the SEA/SH Risk Assessment Tool to provide guidance and keeping to safety and ethical considerations related to GBV data collection. No prevalence data or baseline data should be collected as part of risk assessments.	○ Preparation. ○ Implementation (before civil works commence). ○ PCN and QER/Decision Review (SEA/SH Risk Assessment Tool).	○ IA for social assessment and ESMP. ○ Contractor for CESMP. ○ Task Team for SEA/SH Risk Assessment Tool.	○ Ongoing review during implementation support missions. ○ Update project ESMP and C-ESMP if risk situation changes.	✓	✓	✓	✓
When	**Action to Address SEA/SH Risks**		**Who is Responsible for Action**	**Ongoing Risk Management**	**Whether Action is Recommended or Advisable by SEA/SH Risk Level**			

		Timing for Action			Low	Moderate	Substantial	High
	Map out GBV prevention and response actors in communities adjoining the project.[41] This should incorporate an assessment of the capabilities of the service providers to provide quality survivor-centred services, including GBV case management, acting as a victim advocate, providing referral services to link to other services not provided by the organization itself.	○ Preparation. ○ Implementation.	○ IA	○ Update mapping as appropriate.	✓	✓	✓	✓
	Are SEA/SH risks adequately reflected in all **E&S project documentation** (i.e., Project ESMP, C-ESMP). Include the GBV service provider mapping in these instruments.	○ Preparation. ○ Implementation (before civil works commence).	○ IA for social assessment and ESMP. ○ Contractor for CESMP.	○ Ongoing review during implementation support missions. Update project ESMP and C-ESMP if risk situation changes.	✓	✓	✓	✓

[41] A mapping exercise of GBV prevention and response actors should ideally be undertaken at a country level and shared with all Task Teams.

	Develop a **SEA/SH Prevention and Response Action Plan** including an **Accountability and Response Framework** as part of the ESMP. The contractor/consultant's response to these requirements will be required to be reflected in the C-ESMP.	○ Preparation. ○ Implementation (before civil works commence).	○ IA	○ Ongoing review during implementation.	⊗	✓	✓	✓

When	Action to Address SEA/SH Action Risks	Timing for	Who is Responsible for Action	Ongoing Risk Management	Whether Action is Recommended or Advisable by SEA/SH Risk Level			
					Low	Moderate	Substantial	High
	Review the **IA's capacity** to prevent and respond to SEA/SH as part of **safeguard preparation**.	○ Preparation. ○ Implementation.	○ Task Team	○ Ongoing review during implementation support missions. Update project ESMP if risk situation changes.	✓	✓	✓	✓

	As part of the **project's stakeholder consultations, properly inform those affected by the project of SEA/SH risks** and project activities to get their feedback on project design and E&S issues. Consultations need to engage with a variety of stakeholders (political, cultural or religious leaders, health teams, local councils, social workers, women's organizations and groups working with children) and should occur at the start and throughout the implementation of the project.	○ Consultations need to be throughout the project cycle, not just during preparation.	○ IA.	○ Monitoring of implementation of SEP. ○ Ongoing consultations, particularly when CESMP is updated.	✓	✓	✓	✓
	Specifically address SEA/SHrelated issues **in** the **SEP** of the project, which will be implemented over the life of the project to keep the local communities and other stakeholders informed about the project's activities.	○ Consultations need to be throughout the project cycle, not just during preparation.	○ IA.	○ Monitoring of implementation of SEP. ○ Ongoing consultations, particularly when CESMP is updated.	○	○	✓	✓

When	Action to Address SEA/SH Risks	Timing for Action	Who is Responsible for Action	Ongoing Risk Management	Whether Action is Recommended or Advisable by SEA/SH Risk Level			
					Low	Moderate	Substantial	High

	Make certain of the availability of an **effective GM** with multiple channels to initiate a complaint. It should have specific procedures for SEA/SH, including confidential reporting with safe and ethical documenting of SEA/SH cases. Parallel GM outside of the project GM may be warranted for substantial to high risk situations.	○ Prior to contractor mobilizing.	○ IA, but discussed and agreed upon with the Task Team.	○ Ongoing monitoring and reporting on GM to verify it is working as intended.	✓	✓	✓	✓
	Ensure **IA has a GBV specialist** to support project implementation.	○ Preparation.	○ IA.	○ Ongoing reporting.	✗	○	✓	✓
	For **supervision,** have a **social /environmental specialist** in the supervising Engineer's team with **GBV specific** skills to supervise issues related to SEA/SH (e.g. supervise signing of CoCs, verify working GM for SEA/SH is in place, refer cases where needed) and work with GBV service providers as entry points into service provision to raise awareness of the GM.	○ During procurement evaluation process.	○ IA.	○ Ongoing reporting.	✗	○	✓	✓

When	Action to Address SEA/SH Action Risks	Timing for	Who is Responsible for Action	Ongoing Risk Management	Whether Action is Recommended or Advisable by SEA/SH Risk Level			
					Low	Moderate	Substantial	High

	Ensure oversight through an independent **Third Party Monitoring (TPM) organization/Independent Verification Agent (IVA)** (civil society organization, international or local NGO, academic partner, private sector firm) **with experienced GBV staff** to monitor implementation of the SEA/SH Prevention and Response Action Plan and ensure all parties are meeting their responsibilities.	○ Preparation.	○ IA.	○ Ongoing reporting.	⊗	⊗	○	✓
	Ensure funding is available for IA to recruit GBV service providers to facilitate access to timely, safe and confidential services for survivors (including money for transportation, documentation fees, and lodging if needed).	○ Preparation	○ IA.	○ IA.	⊗	⊗	○	✓
	For projects that do not use loan/credit/grant proceeds to hire GBV service providers at the start of project implementation, encourage Borrowers to include an escalation clause in the general contract terms and the ESCP should SEA/SH risks become apparent over the course of the project implementation.	○ Preparation.	○ Task Team.	○ Task Team.	✓	✓	✓	✓

When	Action to Address SEA/SH Action Risks	Timing for	Who is Responsible for Action	Ongoing Risk Management	Whether Action is Recommended or Advisable by SEA/SH Risk Level			
					Low	Moderate	Substantial	High
Procurement	Clearly define the SEA/SH requirements and expectations in the **bid documents.**	○ Procurement.	○ IA.	○ Review by Task Team.	✓	✓	✓	✓
	Based on the project's needs, the Bank's SPDs, and the IA's policies and goals, define the requirements to be included in the bidding documents for a **CoC which addresses SEA/SH**.	○ Procurement.	○ IA.	○ Review by Task Team.	✓	✓	✓	✓
	For **National Competitive Bidding (NCB) procurement,** consider integrating the International Competitive Bidding (ICB) SPD requirements for addressing SEA/SH risks.	○ Procurement.	○ IA.	○ IA with review by Task Team.	○	○	✓	✓

	Set out clearly in the procurement documents how adequate SEA/SH-related costs will be paid for in the contract. This could be, for example, by including: (i) line items in bill of quantities for clearly defined SEA/SH activities (such as preparation of relevant plans) or (ii) specified provisional sums for activities that cannot be defined in advance (such as for implementation of relevant plan/s, engaging GBV service providers, if necessary).	○ Procurement.	○ IA.	○ Review by Task Team.	✓	✓	✓	✓

When	Action to Address SEA/SH Risks	Timing for Action	Who is Responsible for Action	Ongoing Risk Management	Whether Action is Recommended or Advisable by SEA/SH Risk Level			
					Low	Moderate	Substantial	High
	Clearly explain and define the requirements of the bidders' **CoC** to bidders before submission of the bids.	○ Procurement.	○ IA.	○ Review by Task Team.	✓	✓	✓	✓

	Evaluate the contractor's SEA/SH Accountability and Response Framework in the CESMP and confirm prior to finalizing the contract the contractor's ability to meet the project's SEA/SH prevention and response requirements.	○ Procurement.	○ IA.	○ Review by Task Team.	⊗	✓	✓	✓
Implementation	**Review C-ESMP** to verify that appropriate mitigation actions are included.	○ Implementation.	○ IA.	○ Review by IA. ○ Review by Task Team.	✓	✓	✓	✓
	Review the GM's reception and processing of complaints to ensure that the protocols are being followed in a timely manner, referring complaints to an established mechanism to review and address SEA/SH complaints.	○ Implementation.	○ Task Team. ○ IA.	○ Ongoing reporting. ○ Monitoring of complaints and their resolution.	✓	✓	✓	✓
When	**Action to Address SEA/SH Risks**	**Timing for Action**	**Who is Responsible for Action**	**Ongoing Risk Management**	**Whether Action is Recommended or Advisable by SEA/SH Risk Level**			
					Low	**Moderate**	**Substantial**	**High**

	Codes of Conduct signed and understood ○ Ensure requirements in CoCs are clearly understood by those signing. ○ Have CoCs signed by all those with a physical presence at the project site. ○ Train project staff on the behavior obligations under the CoCs. ○ Disseminate CoCs (including visual illustrations) and discuss with employees and local communities. ○ Create an appropriate Accountability and Response Framework.	○ Initiated prior to contractor mobilization and continued during implementation.	○ Contractor, Consultant, IA.	○ Review of SEA/SH risks during project supervision (e.g., Midterm Review) to assess any changes in risk. ○ Supervising Engineer reporting that CoCs are signed and that workers have been trained and understand their obligations.[42] ○ Monitoring of GM for SEA/SH complaints. ○ Discussion at public consultations.	✓	✓	✓	✓
	Have project workers and local community undergo **training** on SEA/SH.	○ Implementation.	○ IA, Contractors, Consultants.	○ Ongoing reporting.	✓	✓	✓	✓
	Undertake regular **M&E** of progress on SEA/SH prevention and response activities, including reassessment of risks as appropriate.	○ Implementation.	○ IA, Contractors, Consultants.	○ Monitoring of GM. ○ Ongoing reporting.	✓	✓	✓	✓

When	Action to Address SEA/SH Risks	Timing for Action	Who is Responsible for Action	Ongoing Risk Management	Whether Action is Recommended or Advisable by SEA/SH Risk Level

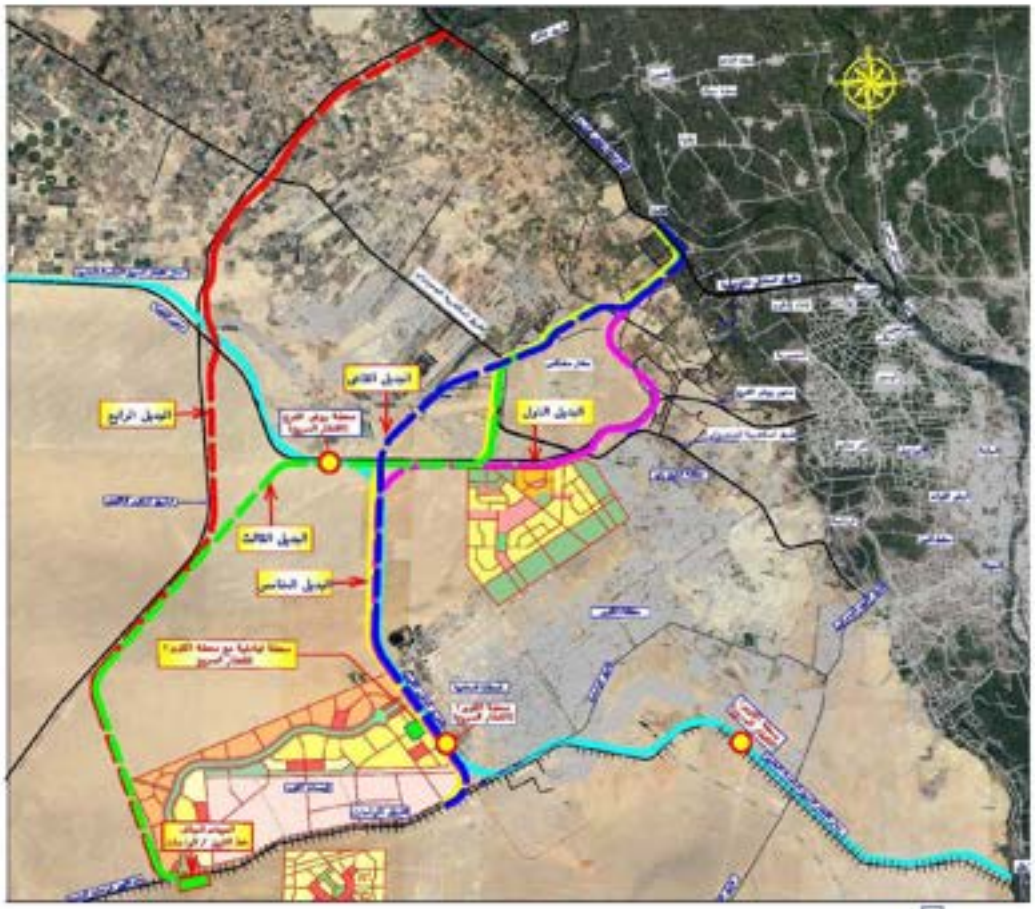
[42] Civil works supervising Engineer's monthly reports should confirm all persons with physical presence at the project site have signed a CoC and been trained.

13 ANNEX 2: AMBIENT AIR AND NOISE MEASUREMENTS

14 ANNEX 3: HYDROLOGY STUDY

جمهورية مصر العربية
وزارة النقل
الهيئة القومية لسكك حديد مصر

الدراسة الفنية لعمل وصلة تتفرع من محطة المناشي للاتصال بخط الواحات البحرية عند كم ٦٦ لربط الميناء الجاف المطلوب إنشاءه بـ ٦ أكتوبر بالموانئ البحرية



تقرير المرحلة الاولي
(الدراسة الهيدرولوجية)

فريق عمل الاستشارى

الباحث الرئيسى

د/ احمد محمود محمود فرج

إعداد المخطط العام

د/ أحمد محمود فرج	خبير تخطيط بدائل المسارات
م/ محمد محمد أبو ضيف	خبير تخطيط بدائل المسارات
م. / أحمد سعيد عبد العظيم	(فريق معاون)

خبراء المساحة الطبوغرافية الحقلية التفصيلية وإنتاج الخرائط الرقمية

ا.د / حسن حنفي	خبير المساحة الطبوغرافية

خبير هيدرولوجى

أ.د/ كمال ميلاد	خبير الهيدرولوجيا
ا.د./ جمال عبد الله السيد عبد العال	خبير الهيدرولوجيا
م/ حسن رمضان السيد	

تصميم المسار النهائى على الخرائط الرقمية والقطاع الطولى

د/ أحمد محمود فرج	
م/ محمد محمد أبو ضيف	خبير تخطيط بدائل المسارات
م/ محمد حامد ناقع	خبير تخطيط بدائل المسارات
م. / أحمد سعيد عبد العظيم	(فريق معاون)

الأعمال الصناعية

أ.د / مظهر محمد صالح حامد	خبير إنشائى للأعمال الصناعية

أعداد مستندات الطرح

د/ أحمد فرج
م/ أحمد السيد
ا.د/ مظهر محمد صالح

المنسق العام للمشروع

م / إبراهيم الدسوقى أحمد

جدول المحتويات

بيان الأشكال

بيان الجداول

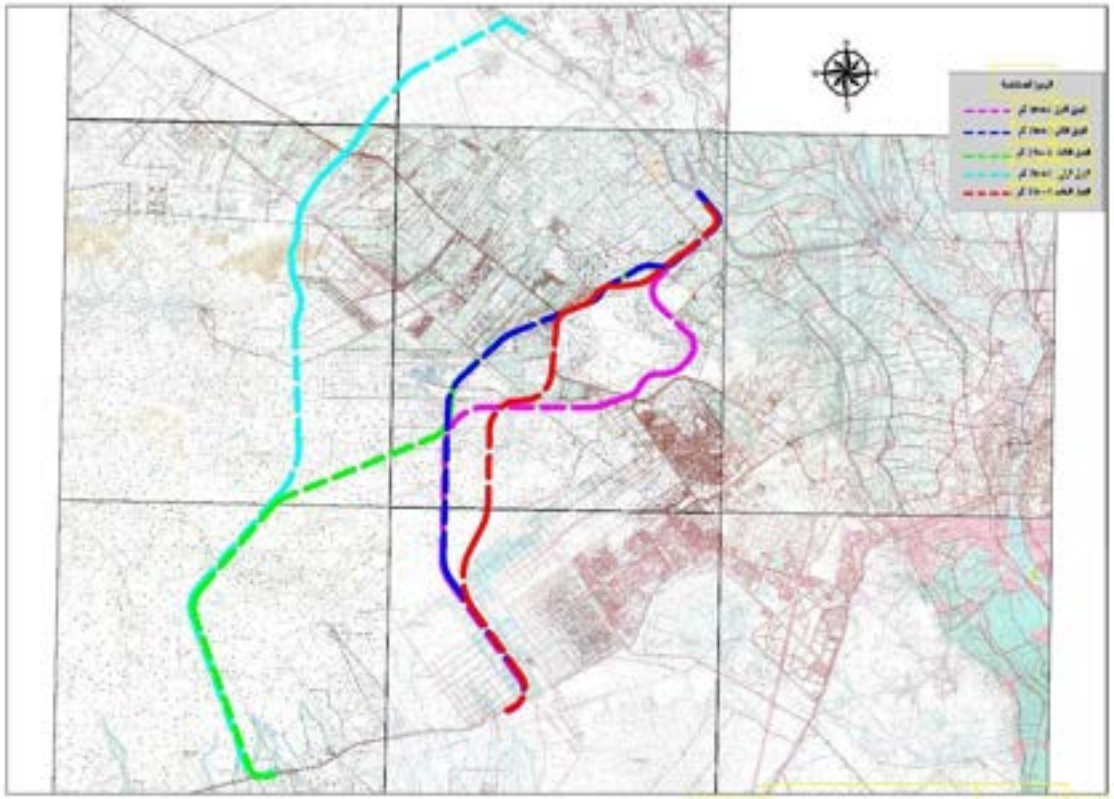
الفصل الأول

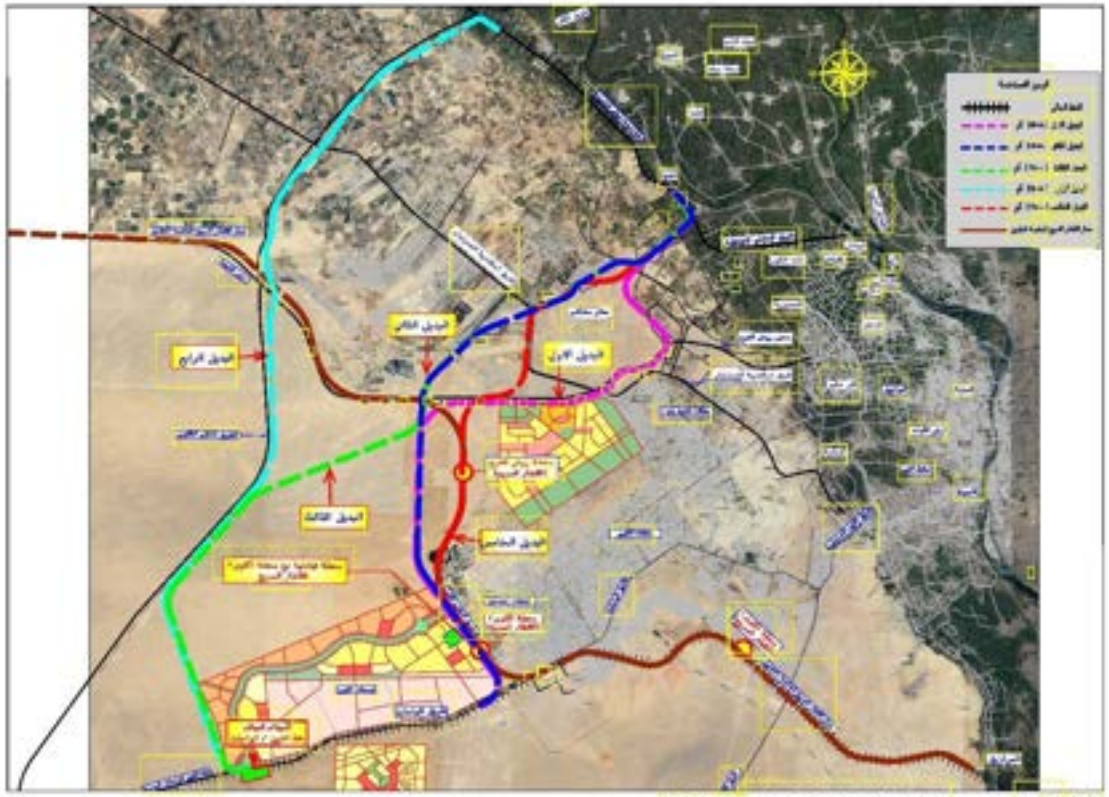
مقدمة

يختص هذا التقرير بالدراسة الهيدرولوجية لبدائل مسار السكة الحديد المقترح المناشى/ مدينة ٦ أكتوبر واقتراح أعمال حمايتها من أخطار السيول. وستتم دراسة البدائل المقترحة وهي عبارة عن خمسة بدائل كما هو مبين على الخريطة الطبوغرافية بالشكل رقم (١-١) وخريطة جوجل ايرث كما هو موضح بالشكل (١-٢).

ويجب الإشارة هنا الى أن هذه البدائل تم اقتراحها من جانب خبراء تخطيط بدائل السكة الحديد اعتمادا على الخرائط الطبوغرافية المتاحة ذات مقياس رسم ١:٥٠٠٠٠ ويجب على مقاولي التنفيذ عمل جميع الرفوعات المساحية الأرضية وتدقيق مواقع تقاطعات الأودية مع البديل الأمثل الذى سيتم اختياره لاحقا من وجهة النظر الهيدرولوجية و الفنية قبل البدء فى اعمال التنفيذ.

يحتوي هذا التقرير على هذه المقدمة، ثم الدراسة الميترولوجية ونتائجها، ثم شرح لمنهجية الدراسات المختلفة التي تم إجراؤها وهي الدراسات المورفولوجية ودراسات جيولوجيا التربة السطحية لأحواض تصريف الأودية والدراسات الهيدرولوجية، ثم عرض لنتائج هذه الدراسات المجمعة لكل وادي مؤثر مع تحديد أعمال درء أخطار السيول التي تم اقتراحها. وقد تمت تلك الدراسات لجميع الأودية على كل البدائل الخمسة.





الفصل الثاني

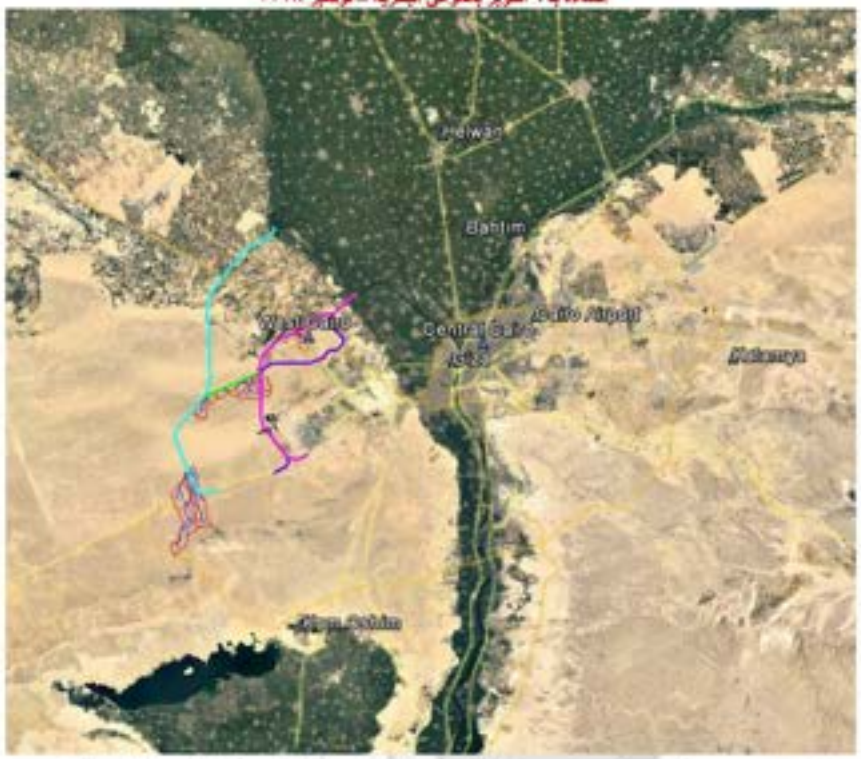
الدراسة الميترولوجية

٢-١ مقدمة

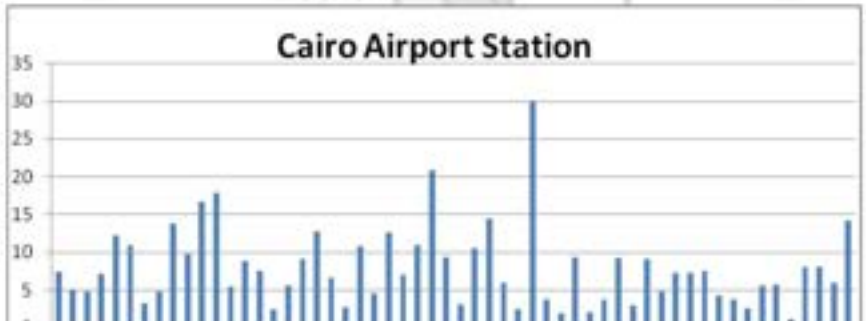
تهتم الدراسة الميترولوجية بتحديد العواصف الممطرة التصميمية التي ستستخدم في الدراسة الهيدرولوجية فيما بعد. ونظرا لأن بيانات الأمطار هي بيانات تم تسجيلها في الماضي بينما الأعمال الصناعية اللازمة لدرء أخطار السيول هي أعمال سيتم انشاؤها في المستقبل، فإنه يلزم التعرف على خصائص الأمطار المسجلة وتحديد أكثر التوزيعات الاحتمالية التي تصف هذه البيانات بأكبر دقة ممكنة، وافتراض أن هذا التوزيع الاحتمالي سوف يظل ممثلا للبيانات في المستقبل، وتحديد بعض المعاملات الاحصائية لاستنتاج العواصف الممطرة التصميمية المطلوبة.

٢-٢ تحديد العواصف الممطرة التصميمية

بعد توقيع احداثيات محطات الأرصاد المناخية الأقرب الى أحواض الأودية المؤثرة على مسار خط السكة الحديد كما هو موضح بالشكل (٢-١)، فقد وجد أن محطة أرصاد غرب القاهرة هي أقرب المحطات لتلك الأودية وبالتالي تعتبر تلك المحطة هي الأنسب لاستخدام بياناتها في الدراسات الميترولوجيه لمنطقة الدراسة. وحيث أن بيانات أقصي مطر يحدث في يوم واحد خلال العام هي البيانات التي تستخدم في دراسات أعمال درء أخطار السيول، فقد تم الحصول على هذه البيانات لمحطة أرصاد غرب القاهرة المناخية منذ عام ١٩٦٠ الى عام ١٩٩٠ بينما تتوافر بيانات محطة أرصاد مطار القاهرة حتى عام ٢٠١٥. وحيث وجد عدم تباين كبير بين بيانات الأمطار على محطات أرصاد القاهرة الكبرى، فقد روى الاعتماد على بيانات محطة أرصاد مطار القاهرة نظرا لحداثتها وطول مدة القياس بها كما هو مبين في الشكل (٢-٢). وقد تم تحليل تلك البيانات احصائيا باستخدام برنامج التحليل الاحصائي Hyfran Plus. ويبين الجدول (٢-١) أهم البيانات الإحصائية الأساسية لمحطة مطار القاهرة.



شكل (١-٢) : مواقع محطات الأرصاد القريبة من أحواض الأودية المؤثرة على خط السكة الحديد

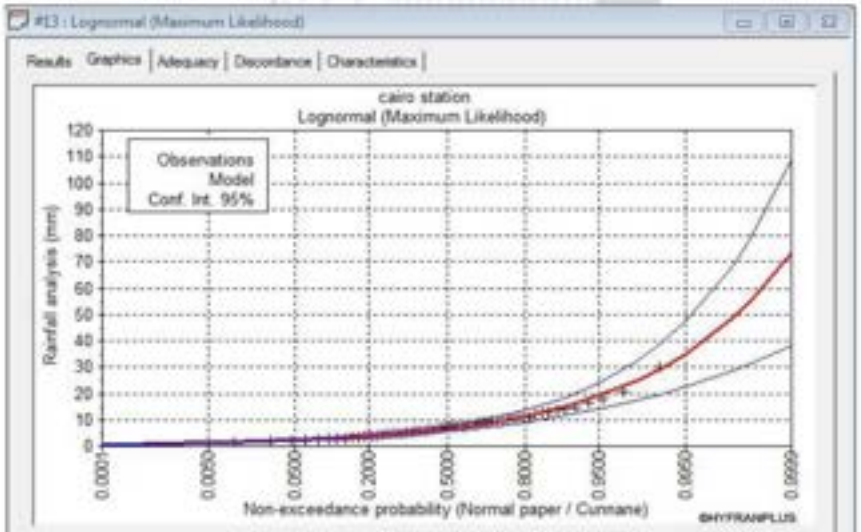


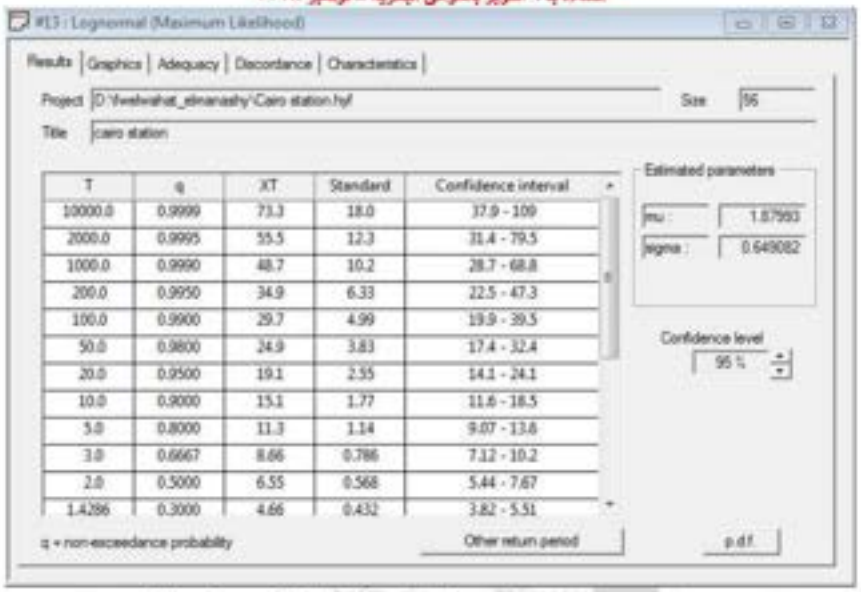
جدول (٢-١) : البيانات الإحصائية الأساسية لمحطة أرصاد مطار القاهرة

المحطة	أقل قيمه (مم)	أقصى قيمه (مم)	المتوسط (مم)	الانحراف المعياري (مم)	معامل الانحراف	معامل التفوس
السويس	١,٢	٣٠	٧,٩٧	٥,٢٣	٠,٦٦	١,٧٦١

كذلك للتعرف على خصائص بيانات الأمطار المسجلة احصائيا فقد تم تجربة أكثر من توزيع احتمالي والمقارنة بين هذه التوزيعات بهدف تحديد أيهما أكثر تمثيلا للبيانات المسجلة. وقد تبين أن التوزيع الاحتمالي Lognormal هو الأفضل، حيث يوضح الشكل رقم (٢-٣) بيانات الأمطار المسجلة والمحسوبة من التوزيع الاحتمالي الذي تم اختباره ويظهر التماثل بينهما لدرجة ثقة ٩٥%.

تلي ذلك استخدام التوزيع الاحتمالي Lognormal لتقدير العواصف المطرة المناظرة لأزمنة تكرارية مختلفة من ٢ إلى ٢٠٠٠ عام كما هو موضح بالجدول (٢-٢). ونظرا لأهمية خطوط السكك الحديدية كأحد أهم وسائل النقل فقد تم اختيار العاصفة المطرة المناظرة لزمن تكراري ١٠٠ عام لتكون العاصفة المطرة التصميمية لجميع أعمال درء أخطار السيول حيث تبلغ قيمتها ٢٩,٧ ملليمتر.





T	q	XT	Standard	Confidence interval
10000.0	0.9999	73.3	18.0	37.9 - 109
2000.0	0.9995	55.5	12.3	31.4 - 79.5
1000.0	0.9990	48.7	10.2	28.7 - 68.8
200.0	0.9950	34.9	6.33	22.5 - 47.3
100.0	0.9900	29.7	4.99	19.9 - 39.5
50.0	0.9800	24.9	3.83	17.4 - 32.4
20.0	0.9500	19.1	2.55	14.1 - 24.1
10.0	0.9000	15.1	1.77	11.6 - 18.5
5.0	0.8000	11.3	1.14	9.07 - 13.6
3.0	0.6667	8.66	0.786	7.12 - 10.2
2.0	0.5000	6.55	0.568	5.44 - 7.67
1.4286	0.3000	4.66	0.432	3.82 - 5.51

جدول (٢-٢) : العواصف الممطرة المناظرة لأزمنة تكرارية مختلفة

الفصل الثالث

منهجية الدراسات المورفولوجية والدراسات الهيدرولوجية

٣-١ الدراسات المورفولوجية

يقصد بالدراسة المورفولوجية أنها الدراسة التي تشتمل على تحديد الأودية المؤثرة على منطقة الدراسة، وكذلك تشتمل على تحديد أهم خصائص أحواض تصريف هذه الأودية المورفولوجية والتي لها علاقة بالتدفق السطحي لمياه السيول حيث توجد علاقة مباشرة بين الخصائص المورفولوجية وتدفقات مياه السيول. ومن أهم هذه الخصائص مساحة حوض التصريف، طول المجرى الرئيسي للوادي، انحدار المجرى الرئيسي، انحدار حوض التصريف، وغيرها.

٣-٢ تحديد الأودية والخصائص المورفولوجية لأحواض التصريف

لتحديد الأودية التي تؤثر على مسارات خطوط السكك الحديدية والحصول على خصائصها المورفولوجية تتم باستخدام برنامج Watershed Modeling System (WMS) المعد بواسطة جامعة Brigham Young University، USA in cooperation with U.S. Army Corps of Engineers. وتغذيته بنموذج الارتفاعات الرقمية (DEM) من موقع وكالة الفضاء الأمريكية ناسا. حيث يتم تحديد الأودية المؤثرة على مسار السكة المعنى بالدراسة، ويتم أيضا التأكد من التقاطعات بعد توقيعها على خرائط جوجل أيرث وكذلك الخرائط الطبوغرافية المتاحة لمنطقة أحواض الأودية المؤثرة، ويتم التأكد من نتائج برنامج WMS مع خرائط جوجل أيرث والخرائط الطبوغرافية. ويوضح الجدول التالي (٣-١) أهم الخصائص المورفولوجية لكل وادي والمستنتجة من برنامج WMS.

٣-٣ تقدير التدفقات السطحية لمياه السيول

يعتبر تحديد هيدروجرافات التدفق السطحي أو الجريان السطحي (Surface Runoff Hydrographs) للأودية المؤثرة على مسارات خطوط السكك الحديدية هو أساس اختيار نوع أعمال درء أخطار السيول وكذلك تصميم تلك الأعمال. ولتقدير التدفق السطحي للوادي المؤثر يتم دمج نتائج الدراسات الهيدرولوجية (العواصف التصميمية المناظرة للأزمنه التكرارية المختلفة) ونتائج الدراسة المورفولوجية (مساحة الحوض، طول المجرى الرئيسي، انحدار المجرى الرئيسي،....) ومخرجات خرائط الهيدرولوجيا السطحية لأحواض الأودية (رقم المنحنى CN) في أحد البرامج المتخصصة في حساب التدفق

جدول (٣-١) : أهم الخصائص المورفولوجية للوادي

الخاصية	الرمز	الأبعاد
مساحة حوض تصريف الوادي	A	Km^2
طول المجرى الرئيسي للوادي	MSL	Km
ميل المجرى الرئيسي للوادي	MSS	m/m
ميل حوض تصريف الوادي	BS	m/m
المسافة من مركز ثقل الوادي إلى المخرج عند التقاطع مع خط السكك الحديدية	CSD	Km
ميل المسافة من مركز الثقل إلى المخرج عند التقاطع مع خط السكك الحديدية	CSS	m/m

٣-٤ عمق المطر الزائد (Excess Rainfall Depth)

يعرف عمق المطر الزائد بأنه عمق الماء المسبب للتدفق السطحي ويساوى عمق المطر الكلى الساقط على حوض الوادي مطروحا منه متوسط الفواقد خلال فترة الهطول. ويتم تقدير عمق المطر الزائد باستخدام طريقة الحفاظ على التربة (SCS Method) والتي يمكن استعراضها في التالي:

$$I_{excess} = (P - 0.2\,S)^2 / (P + 0.8\,S) \qquad (3\text{-}1)$$

$$S = 25.4\{(1000/CN) - 10\} \qquad (3\text{-}2)$$

حيث I_{excess} هو عمق المطر الزائد (مم)، P هو عمق المطر الكلى الساقط (مم)، S هو عمق المياه التي يمكن للتربة أن تحتفظ به (مم)، CN هو رقم المنحنى للتربة السطحية بحوض الوادي والذي تم تقديره من خلال نتائج دراسة جيولوجيا التربة السطحية طبقا لنوع التربة السطحية السائدة وكذلك استخدامات الأراضي في منطقة الدراسة.

٣-٥ زمن التركيز وزمن التأخير (Concentration Time and Lag Time)

يعرف زمن التركيز بأنه الزمن الذى تنتقل فيه المياه الزائدة من أبعد نقطة في حوض تصريف الوادي حتى تصل إلي نقطة المخرج للوادي. بينما يعرف زمن التأخير بأنه الزمن من منتصف هطول العاصفة الممطرة حتى زمن حدوث التصرف الأقصى لحوض تصريف الوادي. ويمكن حساب زمن التركيز من المعادلة التالية:

$$T_c = 0.715\,(1.1 - C_R)\,L^{0.5} / Y^{0.33} \qquad (3\text{-}3)$$

حيث T_c هو زمن التركيز (دقيقة)، L هو طول مجرى الوادي الرئيسي (م)، C_R هو معامل الجريان السطحي، Y هي ميل المجرى الرئيسي (م / م). ويتم تقدير زمن التأخير (Lag Time) بقيمه تساوى ٦٠ % من زمن التركيز.

٣-٦ هيدروجرافات التدفق السطحي (Runoff Hydrographs)

يتم تقدير هيدروجراف التدفق السطحي باستخدام النموذج الرياضي HEC-HMS من خلال تقدير هيدروجراف الوحدة للتدفق السطحي (Unit Hydrograph) الناتج من جريان عمق مطر زائد مقداره ١ سم على سطح حوض تصريف الوادي، ثم يتم تكوين منحنى الوحدة ثم يتم استخدام منحنى توزيع المطر (SCS Type II) مع هيدروجراف الوحدة للحصول على هيدروجراف التدفق السطحي المناظر لعواصف تصميمية ذات طور تكراري محدد. ويمكن استنتاج التصرف الأقصى لهيدروجراف الوحدة من المعادلة التالية:

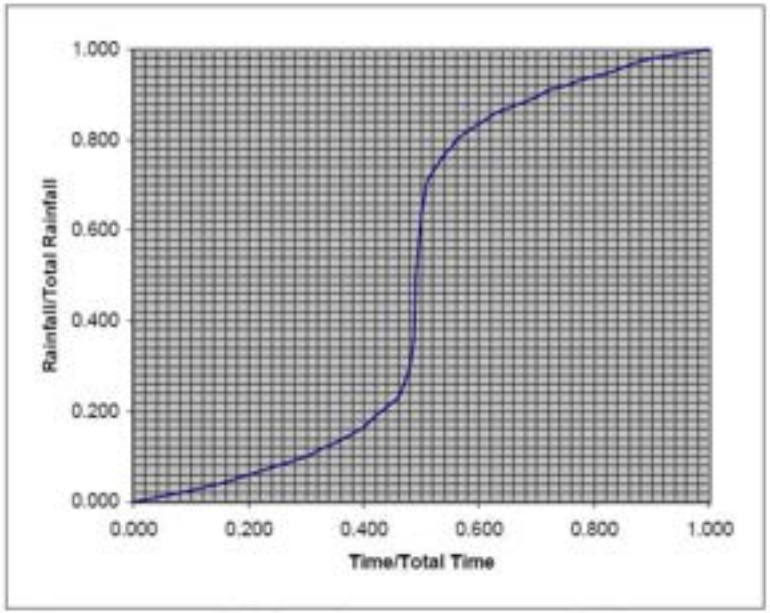
$$q_{PUH} = \frac{2.08A}{0.667T_c} \qquad (3\text{-}4)$$

حيث q_{PUH} هو التصرف الأقصى لهيدروجراف الوحدة (m^3/sec) ويتم التعويض عن زمن التركيز في هذه المعادلة بالساعة. ثم يتم تقدير باقي قيم هيدروجراف الوحدة باستخدام التدفق الأقصى وزمن التدفق الأقصى (T_p) والذى يمكن حسابه من المعادلة التالية:

$$T_p = 0.67\,T_c \qquad (3\text{-}5)$$

ويبين الشكل التالي (٣-١) منحنى توزيع المطر المستخدم مع النموذج HEC-HMS في هذه الدراسة.

Soil Conservation Service Type II Storm Distribution



شكل (٣-١) : منحنى توزيع المطر خلال العاصفة (SCS Type II)

الفصل الرابع

نتائج الدراسة المورفولوجيه

٤-١ مقدمة

يربط خط السكة الحديد المعنى بحمايته من أخطار السيول بين منطقة المناشى ومدينة ٦ أكتوبر وقد تم عمل الدراسة المورفولوجيه لجميع الأودية المؤثرة على خط السكة الحديد وقد تم اقتراح خمسة بدائل لخط السكة الحديد حيث تم تسميتها البديل الأول، والثاني، والثالث، والرابع، والخامس كما بينا سابقا في الفصل الأول. وقد تم عمل الدراسة المورفولوجيه لجميع البدائل وتم تحديد بعض الخصائص المورفولوجيه لأحواض الأودية المؤثرة والتي يتم أخذها في الاعتبار في الدراسة الهيدرولوجية لتحديد تصرفات الأودية المؤثرة على خط السكة الحديد المقترح. وتوضح الأشكال التالية من (٤-١) الى (٤-٥) الأودية المؤثرة على البدائل الخمسة المقترحة من قبل فريق تخطيط بدائل المسارات بفريق الاستشاري وفيما يلي بيان لأهم الخصائص المورفولوجيه للأودية المؤثرة على كل بديل.

٤-٢ تحديد أحواض الأودية المؤثرة:

بعد تطبيق النموذج WMSعلى بيانات خرائط الارتفاعات الرقمية (DEM) لأحواض الأودية المؤثرة وباتباع المنهجية المبينة في الفصل الثالث تم تحديد الأودية المؤثرة على جميع البدائل المقترحة لخط السكة الحديد في منطقة الدراسة وتم التحقق من نتائج النموذج بالاستعانة بالخرائط الطبوغرافية المتاحة وكذلك بخرائط جوجل ايرث، أمكن الحصول على أحواض الأودية المؤثرة.

وقد تم تحديد أهم الخصائص المورفولوجيه لأحواض الأودية المؤثرة والتي يتم أخذها في الاعتبار في الدراسة الهيدرولوجية لتحديد تصرفات الأودية المؤثرة على خط السكة الحديد المراد حمايته من أخطار السيول.

ويجب على مقاولي التنفيذ عمل جميع الرفوعات المساحية الأرضية وتدقيق مواقع تقاطعات الأودية مع البديل الأمثل الذي سيتم اختياره لاحقا من وجهة النظر الهيدرولوجية والفنية قبل البدء في اعمال التنفيذ.

البديل الأول

يتقاطع مع مسار هذا البديل 10 أودية تم ترقيمها من Cat. 1 إلي Cat. 10 كما هو موضح في الشكل (٤-١). تم تحديد كيلومتر السكة الحديد عند تقاطع كل وادي معه كما هو موضح بالجـدول (٤-١). وقد تم تحديد الخصائص المورفولوجية لكل وادي كما هو موضح في الجدول (٤-٢).

جدول (٤-١) : كيلومتر السكة الحديد عند تقاطعات الأودية مع مسار السكة (البديل الأول)

التقاطع مع الوادى	كيلومتر السكة الحديد
Cat. 1	0+500
Cat. 2	21+000
Cat. 3	24+750
Cat.4	27+800
Cat. 5	39+135
Cat. 6	40+000
Cat.7	41+720
Cat. 8	43+000
Cat. 9	43+500
Cat. 10	48+685

جدول (٤-٢) : أهم الخصائص المورفولوجية للأودية المتقاطعة مع السكة (البديل الأول)

الخاصية	A (km^2)	MSL (km)	MSS (m/m)	BS (m/m)	CSD (km)	CSS (m/m)
Cat. 1	48.41	12.11	0.0074	0.017	8.3	0.0067
Cat. 2	4.0	1.57	0.0069	0.014	1.57	0.0069
Cat. 3	6.0	2.11	0.007	0.014	1.86	0.0069
Cat.4	8.72	5.02	0.0061	0.014	3.08	0.0037
Cat. 5	3.41	1.28	0.0072	0.0295	0.84	0.0109
Cat. 6	3.41	1.28	0.0072	0.0295	0.84	0.0109
Cat.7	3.41	1.28	0.0072	0.0295	0.84	0.0109
Cat.8	3.41	1.28	0.0072	0.0295	0.84	0.0109
Cat.9	5.9	2.85	0.0119	0.0287	1.98	0.0137

البديل الثانى

يتقاطع مع مسار هذا البديل 6 وادي تم ترقيمها من Cat. 1 إلي Cat. 6 كما هو موضح سابقا في الشكل (٤-٢). تم تحديد كيلومتر السكة الحديد عند تقاطع كل وادي معه كما هو موضح بالجدول (٤-٣). وقد تم تحديد الخصائص المورفولوجية لكل وادي كما هو موضح في الجدول (٤-٤).

جدول (٤-٣) : كيلومتر السكة الحديد عند تقاطعات الأودية مع مسار السكة (البديل الثانى)

التقاطع مع الوادي	كيلومتر السكة الحديد
Cat. 1	0+500n
Cat. 2	21+000
Cat. 3	23+750
Cat.4	23+750
Cat. 5	34+500
Cat. 6	35+500

جدول (٤-٤) : أهم الخصائص المورفولوجية للأودية المتقاطعة مع السكة (البديل الثانى)

الخاصية	A (km^2)	MSL (km)	MSS (m/m)	BS (m/m)	CSD (km)	CSS (m/m)
Cat. 1	48.41	12.11	0.0074	0.0170	8.36	0.00067
Cat. 2	4.0	1.57	0.0069	0.0141	1.52	0.0068
Cat. 3	3.1	2.94	0.0014	0.0115	1.66	0.0012
Cat.4	4.13	1.97	0.0070	0.0142	1.47	0.0069
Cat. 5	9.29	4.47	0.0068	0.0156	3.24	0.0064
Cat. 6	4.51	1.97	0.0069	0.0143	1.67	0.0069

البديل الثالث

يتقاطع مع مسار هذا البديل 13 وادي تم ترقيمها من Cat. 1 إلي Cat. 13 كما هو موضح سابقا في الشكل (٤-٣). تم تحديد كيلومتر السكة الحديد عند تقاطع كل وادي معه كما هو موضح بالجدول (٤-٥). وقد تم تحديد الخصائص المورفولوجية لكل وادي كما هو موضح في الجدول (٤-٦).

جدول (٤-٥) : كيلومتر السكة الحديد عند تقاطعات الأودية مع مسار السكة (البديل الثالث)

التقاطع مع الوادي	كيلومتر السكة الحديد
Cat. 1	0+060
Cat. 2	1+870
Cat. 3	4+250
Cat.4	6+400
Cat. 5	14+100
Cat. 6	29+675
Cat.7	34+500
Cat. 8	34+860
Cat. 9	36+000
Cat. 10	36+850
Cat. 11	41+750
Cat.12	49+500
Cat. 13	50+500

جدول (٤-٦) : أهم الخصائص المورفولوجية للأودية المتقاطعة مع السكة (البديل الثالث)

الخاصية	A (km^2)	MSL (km)	MSS (m/m)	BS (m/m)	CSD (km)	CSS (m/m)
Cat. 1	5.93	4.48	0.0065	0.0153	3.06	0.0078
Cat. 2	16.6	8.04	0.006	0.0150	5.17	0.0068
Cat. 3	6.33	6.29	0.0075	0.0125	4.78	0.0085
Cat.4	43.0	20.63	0.0065	0.0137	1.19	0.0062
Cat. 5	3.92	4.87	0.0041	0.0109	4.67	0.0042
Cat. 6	3.7	4.07	0.0046	0.0138	4.07	0.0047
Cat.7	3.7	4.07	0.0046	0.0107	4.07	0.0047
Cat.8	5.6	4.08	0.0072	0.0140	2.96	0.0085

البديل الرابع

يتقاطع مع مسار هذا البديل 8 وادى تم ترقيمها من Cat. 1 إلي Cat. 8 كما هو موضح سابقا في الشكل (٤-٤). تم تحديد كيلومتر السكة الحديد عند تقاطع كل وادي معه كما هو موضح بالجدول رقم (٤-٧). وقد تم تحديد الخصائص المورفولوجية لكل وادي كما هو موضح في الجدول (٤-٨).

جدول (٤-٧) : كيلومتر السكة الحديد عند تقاطعات الأودية مع مسار السكة (البديل الرابع)

التقاطع مع الوادى	كيلومتر السكة الحديد
Cat. 1	0+060
Cat. 2	1+870
Cat. 3	4+250
Cat.4	6+400
Cat. 5	14+100
Cat. 6	27+750
Cat.7	36+500
Cat. 8	38+160

جدول (٤-٨) : أهم الخصائص المورفولوجية للأودية المتقاطعة مع السكة (البديل الرابع)

الخاصية	A (km^2)	MSL (km)	MSS (m/m)	BS (m/m)	CSD (km)	CSS (m/m)
Cat. 1	5.93	4.48	0.0065	0.0153	3.06	0.0078
Cat. 2	16.6	8.04	0.006	0.0150	5.17	0.0068
Cat. 3	6.33	6.29	0.0075	0.0125	4.78	0.0085
Cat.4	43.0	20.63	0.0065	0.0137	1.19	0.0062
Cat. 5	3.92	4.87	0.0041	0.0109	4.67	0.0042
Cat. 6	3.19	2.54	0.011	0.0739	2.18	0.0117
Cat.7	3.02	2.12	0.0094	0.0146	2.04	0.0097
Cat.8	31.27	8.73	0.0054	0.0145	5.70	0.0045

البديل الخامس

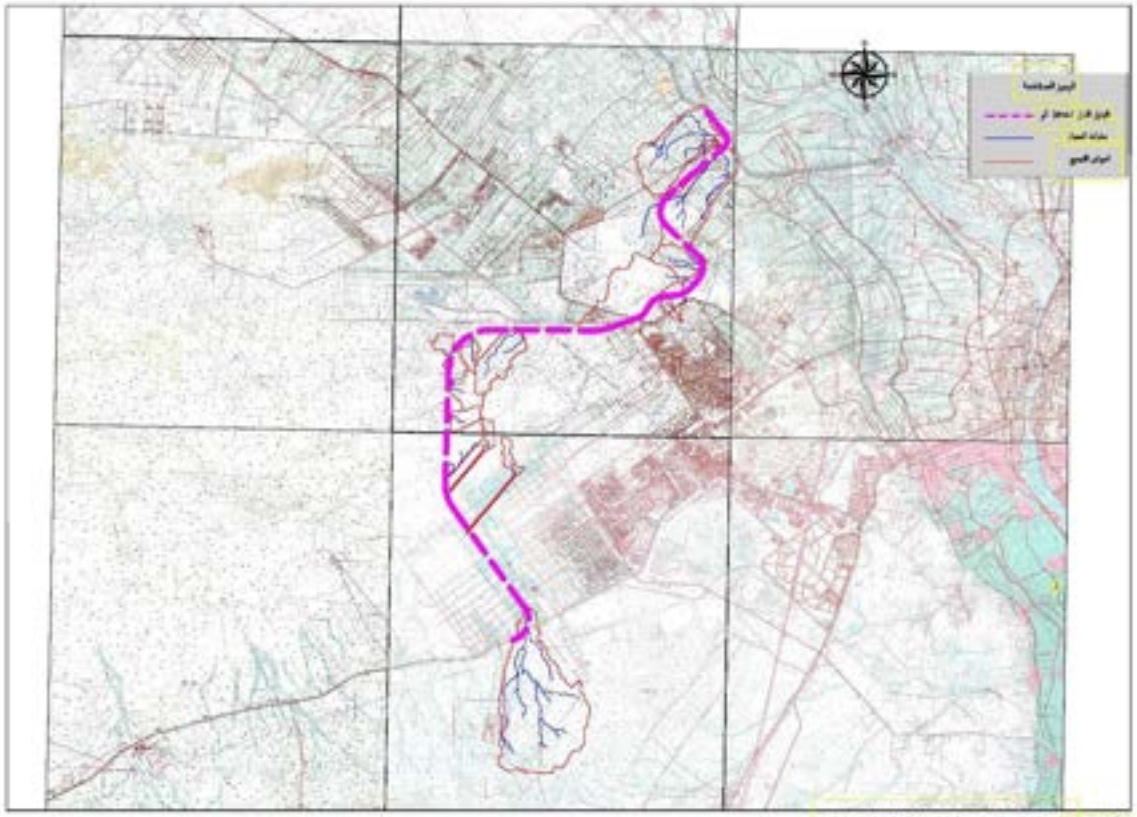
يتقاطع مع مسار هذا البديل 6 وادي تم ترقيمها من Cat. 1 إلي Cat. 6-كما هو موضح سابقا في الشكل (٤-٥). تم تحديد كيلومتر السكة الحديد عند تقاطع كل وادي معه كما هو موضح بالجدول رقم (٤-٩). وقد تم تحديد الخصائص المورفولوجية لكل وادي كما هو موضح في الجدول (٤-١٠).

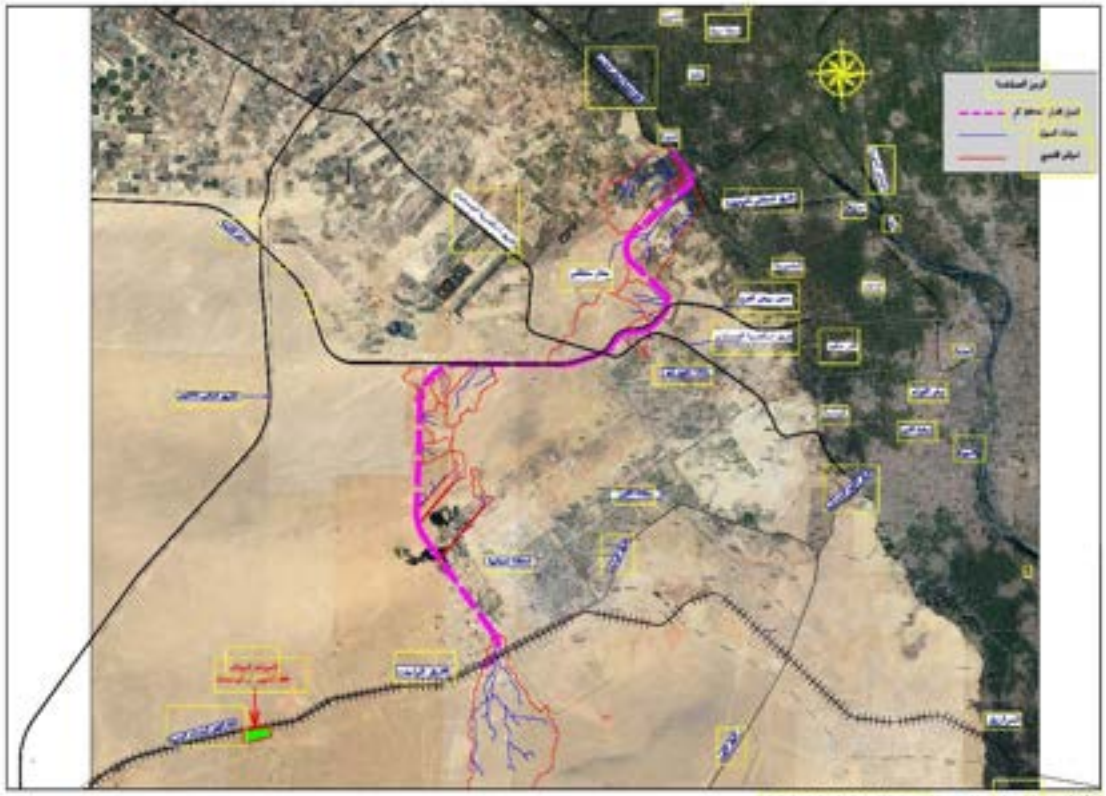
جدول (٤-٩) : كيلومتر السكة الحديد عند تقاطعات الأودية مع مسار السكة (البديل الخامس)

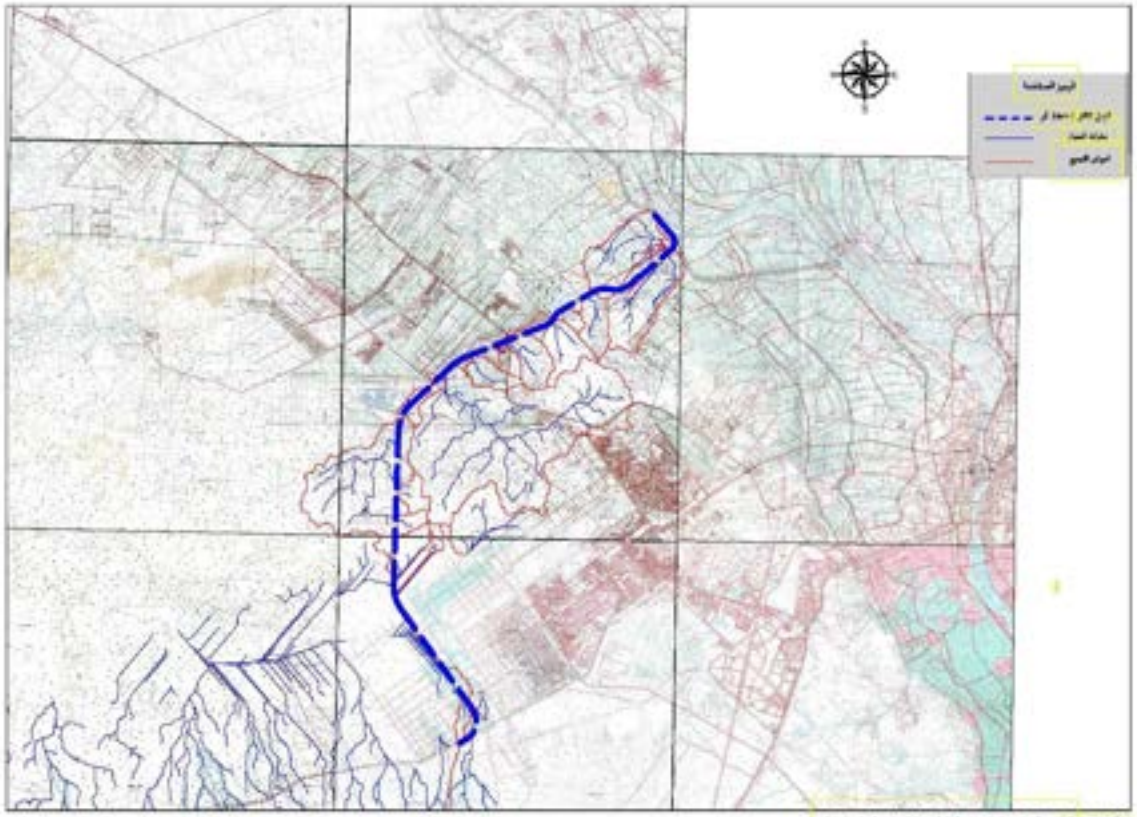
التقاطع مع الوادي	كيلومتر السكة الحديد
Cat. 1	0+500
Cat. 2	22+800
Cat. 3	26+000
Cat.4	33+000
Cat. 5	33+750

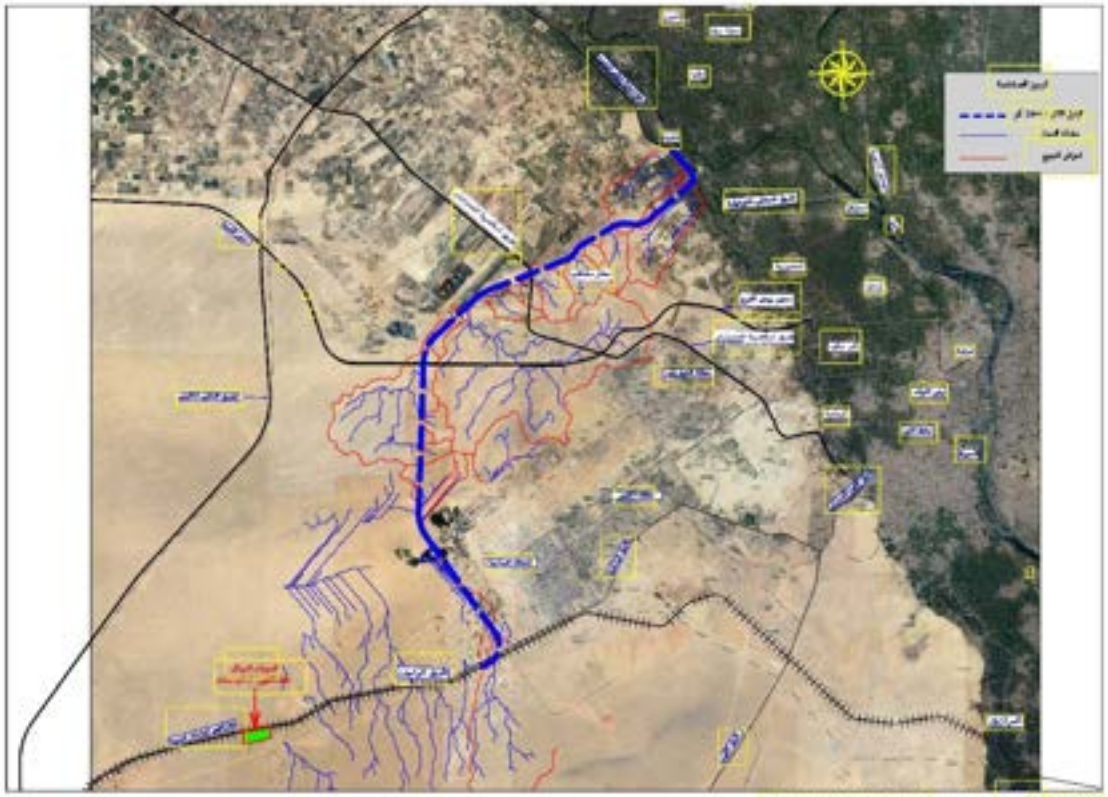
جدول (٤-١٠) : أهم الخصائص المورفولوجية للأودية المتقاطعة مع السكة (البديل الخامس)

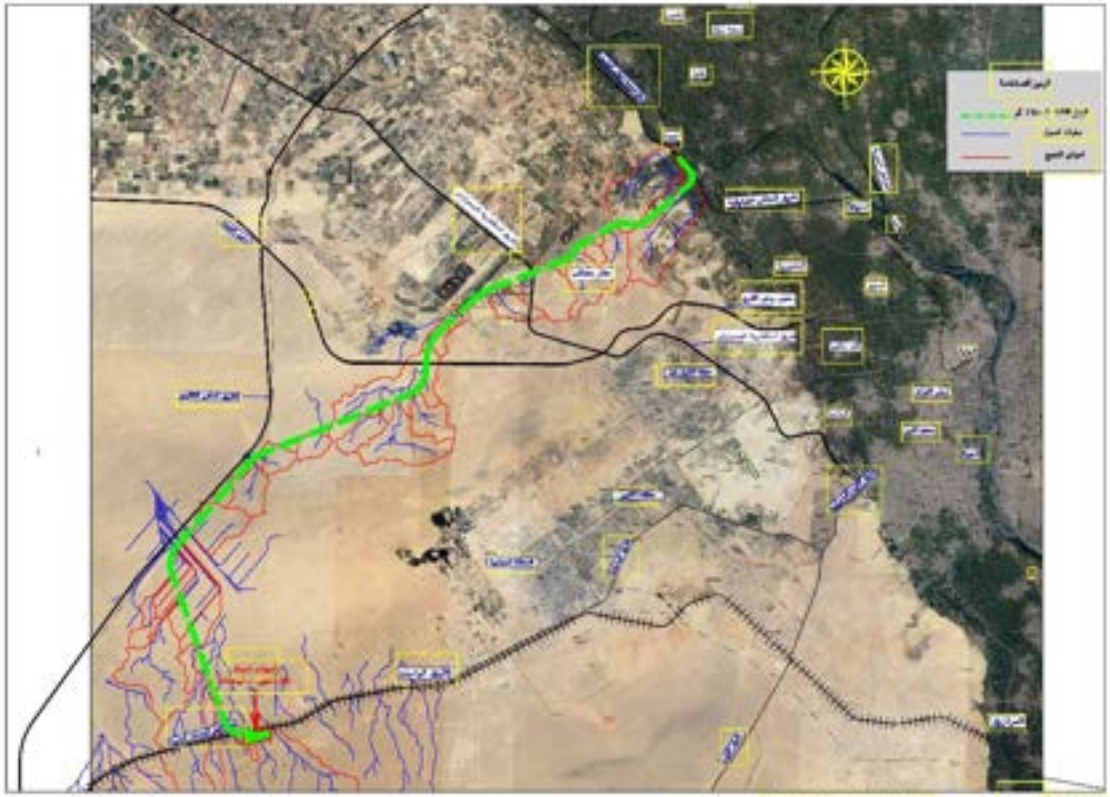
الخاصية	A (km^2)	MSL (km)	MSS (m/m)	BS (m/m)	CSD (km)	CSS (m/m)
Cat. 1	48.81	12.11	0.0074	0.017	8.3	0.0067
Cat. 2	8.72	5.02	0.0061	0.014	3.08	0.0037
Cat. 3	8.72	5.02	0.0061	0.014	3.08	0.0037
Cat.4	9.29	4.47	0.0068	0.0156	3.24	0.0064
Cat. 5	400	1.57	0.0069	.014	0.85	0.0069

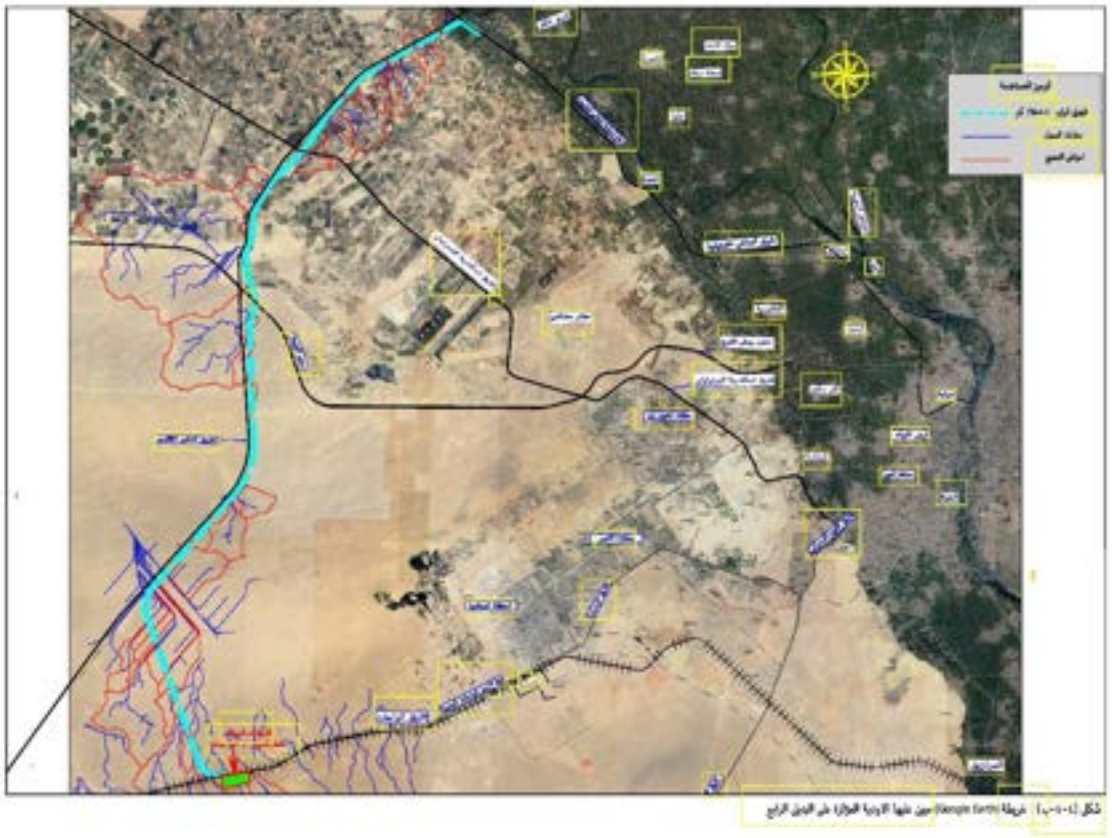


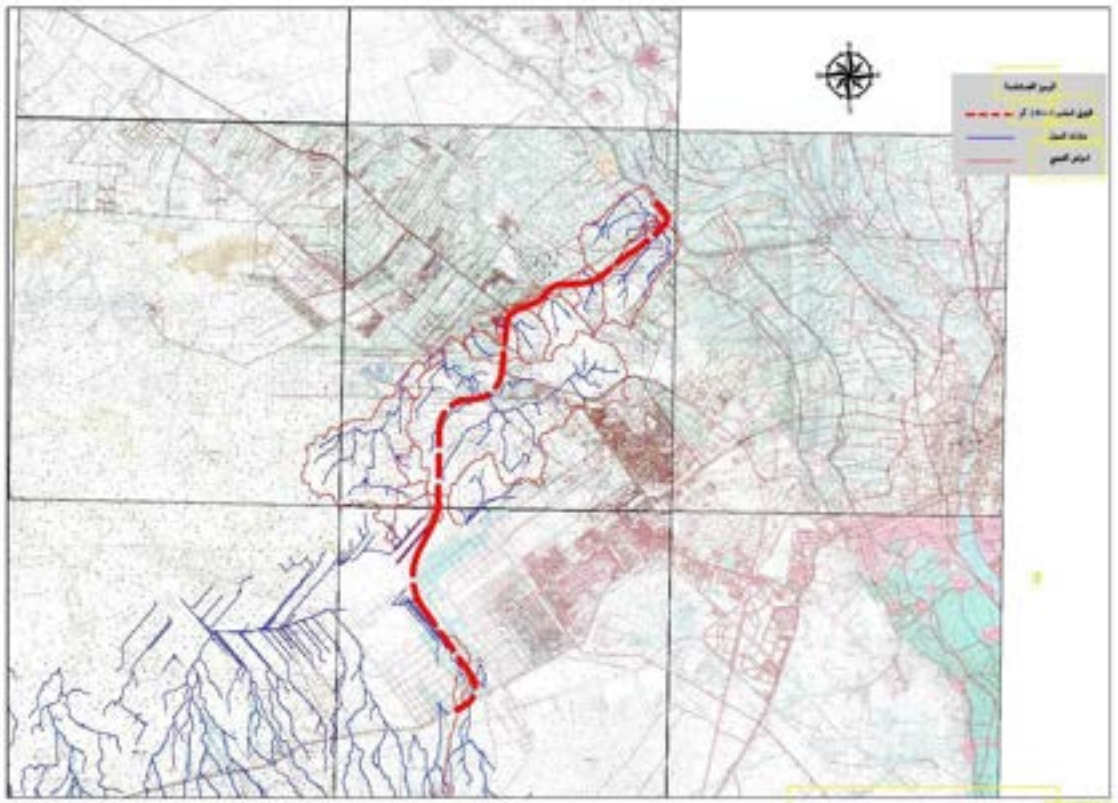


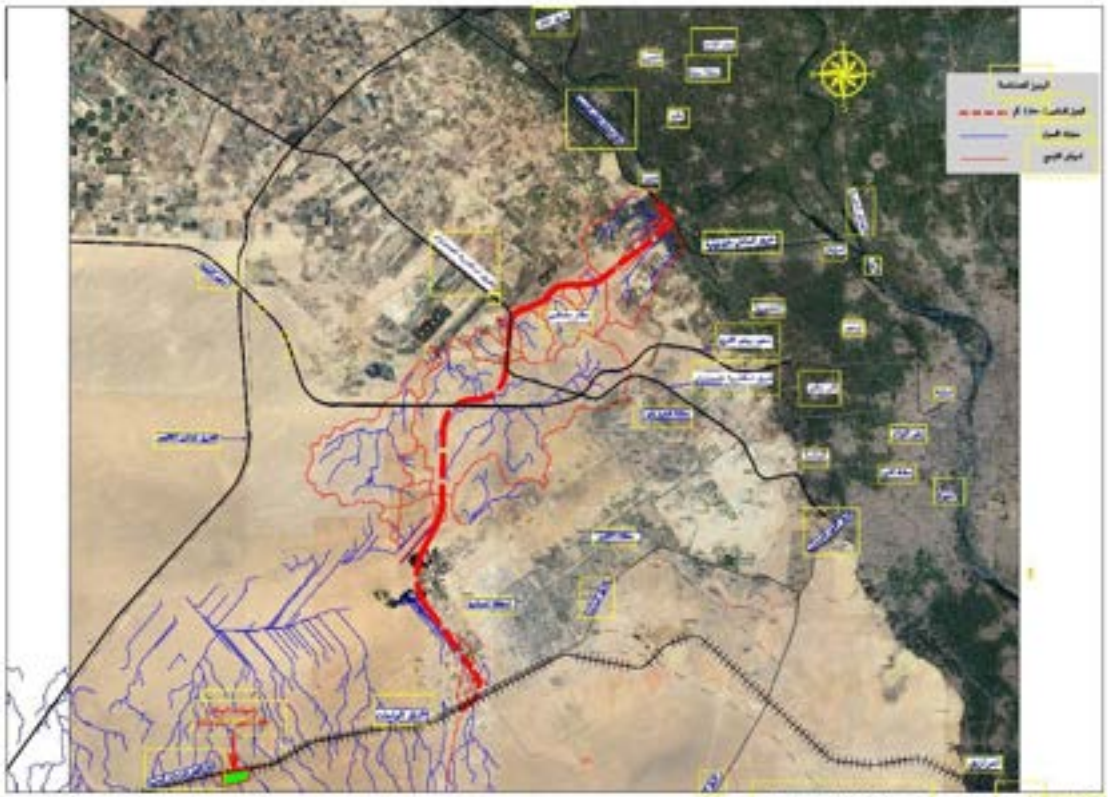












الفصل الخامس

الدراسة الجيولوجية للتربة السطحية

لأحواض تصريف الأودية

٥-١ الوحدات الجيولوجية لأحواض تصريف الأودية

تقع منطقة الدراسة ضمن إقليم الصحراء الغربية شمال غرب مدينة القاهرة والجيزة وتنتهي احواض التصريف الخاصة بها بمنطقة المناشي شمال محافظة الجيزة.

وبدراسة الخرائط الجيولوجية التي تغطي هذه المنطقة وهي المربعات الجيولوجية القاهرة وبني سويف مقياس رسم ١:٥٠٠٠٠٠ أمكن تحديد الوحدات الجيولوجية التالية التي تغطي سطح احواض التصرف لهذه المنطقة:

١- رواسب النيل الأولية Qnt (Protonile deposits)

تتكون من رواسب الحصى والرمل وتتواجد في مخرج حوض التصريف الأكبر وتغطي مجموعه الاحواض الصغيرة في أقصى شمال منطقة الدراسة.

٢- رواسب الكثبان الرملية (Qd)

وتشغل جزء بسيط في أعالي حوض التصريف

٣- تكوين المغرة (Moghra Fm.Tmg)

تتكون من الرواسب الفارية (الرمال والحصى) المختلطة مع رواسب تكونت في بيئة بحرية (كربونات) مع تداخلات من الطين الصفحي (Shale) وتظهر أيضا بعض الأخشاب المتحجرة (silicified wood) ويقل سمك هذه الرواسب من الغرب الي الشرق؛ ويتبع هذا التكوين عصر الميوسين الأسفل (Lower Miocene). ويتواجد في أقصى أعالي حوض التصريف جهة الغرب.

٤- تكوين جبل الخشب (Gebel khashab Fm. Tmk)

هذا التكوين عبارة عن حجر رملي متداخل مع بقايا الأشجار (Petrified wood) ويتداخل مع تكوين مع تكوين المغرة جهة الغرب ويتبع أيضا عصر الميوسين الأسفل (Lower Miocene). ويشغل مساحة حوالي ٧٠% من اجمالي مساحة حوض التصريف كما بالشكل

٥- رواسب عصر البلايوسين ((Undifferentiated Pliocene- Tpl

هي عبارة عن رواسب مختلفة ومختلطة تكونت الثلث الاخير من حوض التصريف الكبير حيث تشغل مساحة حوالي ٢٥ % من اجمالي مساحة هذا الحوض.

٦- تكوين الهاجيف (El-Hagif Fm. Tplh)

يتكون من الحجر الجيري الأبيض المتكون في بيئة بحرية ضحلة متداخل مع المارل في نظام طبقي (Interbedded) ويتواجد في شمال حوض التصريف على نطاق ضيق وذلك في غرب وادي النطرون ومتداخل مع تكوين (Hamza) في شرق وادي النطرون؛ ويتبع عصر البلايوسين الأوسط.

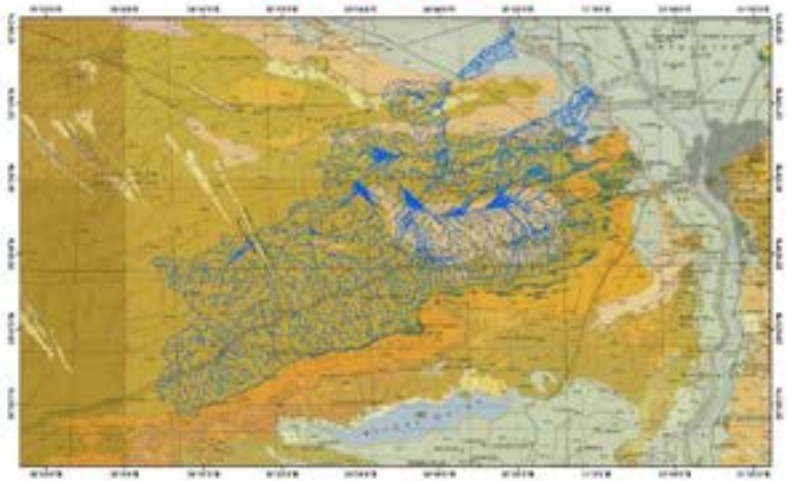
٧- تكوين الجبل الأحمر (Gebel –el Ahmar Fm. Toa)

يتكون من الرمل متعدد الألوان المتكون في بيئة قارية ومختلط مع الحصى والكوارتز ويتميز بوجود اشكال رملية انبوبية (Cylindrical pipes) قرب منطقة القاهرة؛ ويتواجد على أطراف حوض التصريف الكبير الجنوبية ويتبع عصر الأوليجوسين (Oligocene).

٨- البازلت (Basalt -Vb)

يتواجد هذا الصخر في اقصى جنوب حوض التصريف ويعتبر خط تقسيم المياه لهذا الحوض وهو اهم ما يميز عصر الأوليجوسين وما حدث به من حركة أرضية عنيفة أدت الي خروجه الي سطح الأرض.

اما بالنسبة لمجموعه الأحواض الصغيرة جهة الشمال من الحوض الكبير فتغطيها صخور الحجر الرملي (Tmk) وصخور الحجر الجيري والمارل (Tplh) بالإضافة الكثبان الرملية (Qd).



شكل (٥-١) : الخريطة الجيولوجية لأحواض التصريف بمنطقة الدراسة

٥-٢ الجيولوجيا التركيبية (Structural geology)

تشغل منطقة الدراسة جزءا كبيرا من إقليم الصحراء الغربية كما ذكرنا ومتأثره بالعديد من الحركات الأرضية التي ضربت مصر في الأزمنة القديمة والحديثة خاصة الحركة الأرضية البانية للجبال والتي تسببت في نشأة الواحات البحرية وجبال أبو رواش وشبراويت جبال المغارة وريسان عنيزة بشمال سيناء وممتدة حتى فلسطين ولبنان وسوريا ويسمي هذا بالقوس المحوري السوري (Syrian Arc System)؛ هذه الحركة نتج عنها العديد من الصدوع والفوالق والطيات والتي تأخذ اتجاهات عديدة أهمها شرق-غرب وشمال شرق/جنوب غرب. أيضا الحركة الأرضية المتسببة في نشأة البحر الأحمر وخليجي العقبة والسويس والتي تتسبب أيضا في وجود فوالق وصدوع تأخذ اتجاه شمال غرب/جنوب شرق؛ كل هذا له الأثر الكبير في الحسابات الهيدرولوجية وعلى حركة المياه السطحية والجوفية على السواء.

وعلى هذا يمكن اعتبار درجة التشقق متوسطة الي قوية في بعض الأماكن خاصة جنوبي حوض التصريف عند جبل قطراني ولكن وجود الحجر الرملي (Tmk) والذي يغطي الجزء الأكبر من حوض

الفصل السادس

نتائج الدراسة الهيدرولوجية واختيار أعمال الحماية

٦-١ مقدمه

يختص هذا الفصل من هذا التقرير باختيار وتصميم أعمال الحماية من أخطار السيول لخط السكة الحديد المناشى / ٦ أكتوبر. وقد تم عمل الدراسة الهيدرولوجية الكاملة لجميع الأودية المؤثرة على منطقة الدراسة وتم تقدير التدفق الأقصى وحجم التدفق السطحي لمياه السيل المتوقع حدوثه لتلك الأودية لجميع البدائل المقترحة لاختيار وتصميم الأعمال اللازمة للحماية من اخطار السيول.

٦-٢ هيدروجرافات التدفق السطحي لأحواض الأودية

بعد تطبيق المنهجية السابق ذكرها في الفصل الثالث واستخدام نتائج الدراسات الميترولوجيه والمورفولوجيه وتغذية النموذج الرياضي HEC-HMS أمكن تقدير الهيدروجرافات المائية لأحواض تصريف الأودية وتحديد أهم الخصائص الهيدرولوجية وهو قيمة التصرف الأقصى والذي على أساسه يتم اختيار وتصميم العمل الصناعي المناسب لدرء أخطار السيول عن خط السكة الحديد المقترح إنشاؤه. ونظرا لأهمية خط السكة الحديد وتأثير السيول الجارفة عليها فقد روى أن يتم تقدير مياه السيول للعاصفة الممطرة ذات طور تكراري ١٠٠ عام والتي تبلغ حوالي ٣٠ مم والتي على أساسها يتم تصميم الأعمال الصناعية اللازمة لحماية خط السكة الحديد من أخطار السيول. وقد تم زيادة قيمة رقم المنحنى (CN) الى ٨٠ لتأخذ في الاعتبار احتمال تعاقب سقوط الأمطار في فترات وجيزة. وفيما يلى بيان لأهم نتائج الدراسة الهيدرولوجية واختيار أعمال الحماية لكل البدائل:

البديل الأول

ويوضح الجدول التالي (٦-١) يبين أهم خصائص هيدروجرافات التدفق السطحي مثل قيم التدفق السطحي الأقصى (Qp) وحجم التدفق السطحي (V) المناظرة للزمن التكراري ١٠٠ عام بالإضافة الى أعمال الحماية المقترحة للبديل الأول.

جدول (٦-١) : أعمال الحماية من أخطار السيول للمسار البديل الأول

التقاطع مع الوادي	كيلومتر السكة الحديد	قصى تصرف (م³/ثانيه)	حجم التدفق السطحي (م³)	العمل الصناعي
Cat. 1	0+500	6.1	180,000	2 φ 1.8 m
Cat. 2	21+000	1.0	14,800	1 φ 1.5 m
Cat. 3	24+750	1.3	22,200	1 φ 1.5 m
Cat.4	27+800	1.4	32,300	1 φ 1.5 m
Cat. 5	39+135	0.8	12,625	1 φ 1.5 m
Cat. 6	40+000	0.8	12,625	1 φ 1.5 m
Cat.7	41+720	0.8	12,625	1 φ 1.5 m
Cat. 8	43+000	0.8	12,625	1 φ 1.5 m
Cat. 9	43+500	1.3	21,850	Water Pond 100x100x3 m
Cat. 10	48+685	3.5	77,825	Water Pond* 175x175x3 m
اجمالي التكلفة				**9,000,000 L.E**

*ابعاد قاع البحيرة 75x75 وعمق المياه ٣ متر.

البديل الثاني

ويوضح الجدول التالي (٦-٢) يبين أهم خصائص هيدروجرافات التدفق السطحي مثل قيم التدفق السطحي الأقصى (Qp) وحجم التدفق السطحي (V) المناظرة للزمن التكراري ١٠٠ عام بالإضافة الى أعمال الحماية المقترحة للبديل الثاني.

جدول (٦-٢) : أعمال الحماية من أخطار السيول للمسار البديل الثاني

التقاطع مع الوادي	كيلومتر السكة الحديد	قصى تصرف (م³/ثانيه)	حجم التدفق السطحي (م³)	العمل الصناعي
Cat. 1	0+500m	6.1	180,000	3 φ 1.5 m*
Cat. 2	21+000	1.0	14,800	1 φ 1.5 m
Cat. 3	23+750	0.4	11,520	1 φ 1.5 m
Cat.4	23+750	1.0	15,300	1 φ 1.5 m
Cat. 5	34+500	1.6	34,400	1 φ 1.5 m
Cat. 6	35+500	1.0	16,700	Water Pond**

البديل الثالث

ويوضح الجدول التالي (٦-٣) يبين أهم خصائص هيدروجرافات التدفق السطحي مثل قيم التدفق السطحي الأقصى (Qp) وحجم التدفق السطحي (V) المناظرة للزمن التكراري ١٠٠ عام بالإضافة الى أعمال الحماية المقترحة للبديل الثالث.

جدول (٦-٣) : أعمال الحماية من أخطار السيول للمسار البديل الثالث

التقاطع مع الوادي	كيلومتر السكة الحديد	قصى تصرف (م٣/ثانيه)	حجم التدفق السطحي (م٣)	العمل الصناعى
Cat. 1	0+060	1.0	21,950	1 φ 1.5 m
Cat. 2	1+870	2.3	61,450	1 φ 1.5 m
Cat. 3	4+250	1.0	20,450	1 φ 1.5 m
Cat.4	6+400	4.5	159,100	2 φ 1.5 m
Cat. 5	14+100	0.6	14,500	1 φ 1.5 m
Cat. 6	29+675	0.6	13,700	1 φ 1.5 m
Cat.7	34+500	0.6	13,700	1 φ 1.5 m
Cat. 8	34+860	1.0	21,100	1 φ 1.5 m
Cat. 9	36+000	1.8	55,750	1 φ 1.5 m
Cat. 10	36+850	1.3	28,000	1 φ 1.5 m
Cat. 11	41+750	1.0	15,300	1 φ 1.5 m
Cat. 12	49+500	1.6	34,450	1 φ 1.5 m
Cat. 13	50+500	1.0	16,700	Water Pond* 75x75x3 m
أجمالي التكلفة				**5,305,000 LE**

*أبعاد قاع البحيرة 75x75 وعمق المياه ٣ متر.

البديل الرابع

ويوضح الجدول التالي رقم (٦-٤) يبين أهم خصائص هيدروجرافات التدفق السطحي مثل قيم التدفق السطحي الأقصى (Qp) وحجم التدفق السطحي (V) المناظرة للزمن التكراري ١٠٠ عام بالإضافة الى أعمال الحماية المقترحة للبديل الرابع.

جدول (٦-٤) : أعمال الحماية من أخطار السيول للمسار البديل الرابع

التقاطع مع الوادي	كيلومتر السكة الحديد	قصى تصرف (م٣/ثانيه)	حجم التدفق السطحي (م٣)	العمل الصناعي
Cat. 1	0+060	1.0	21,950	1 φ 1.5 m
Cat. 2	1+870	2.3	61,450	1 φ 1.5 m
Cat. 3	4+250	1.0	20,450	1 φ 1.5 m
Cat.4	6+400	4.5	159,100	2 φ 1.5 m
Cat. 5	14+100	0.6	14,500	1 φ 1.5 m
Cat. 6	27+750	0.7	11,800	Water Pond* 75x75x3 m
Cat.7	36+500	0.7	11,200	1 φ 1.5 m
Cat. 8	38+160	4.1	115,700	2 φ 1.5 m
أجمالي التكلفة				3,635,000

*ابعاد قاع البحيرة 75x75 وعمق المياه ٣ متر.

البديل الخامس (A5)

ويوضح الجدول التالي (٦-٥) يبين أهم خصائص هيدروجرافات التدفق السطحي مثل قيم التدفق السطحي الأقصى (Qp) وحجم التدفق السطحي (V) المناظرة للزمن التكراري ١٠٠ عام بالإضافة الى أعمال الحماية المقترحة للبديل الخامس.

جدول (٦-٥) : أعمال الحماية من أخطار السيول للمسار البديل الخامس

التقاطع مع الوادي	كيلومتر السكة الحديد	قصى تصرف (م٣/ثانيه)	حجم التدفق السطحي (م٣)	العمل الصناعي
Cat. 1*	0+500	6.1	180,000	2 φ 1.8 m
Cat. 2	22+800	1.4	32,300	1 φ 1.5 m
Cat. 3*	26+000	1.4	32,300	1 φ 1.5 m
Cat.4	33+000	1.6	34m400	1 φ 1.5 m
Cat. 5	33+750	1.0	14,800	1 φ 1.5 m
أجمالي التكلفة				2,100,000 LE

* يتم رفع منسوب جسر السكة الجديد سيصبح أعلى من الأرض الطبيعية بمسافه ١ تقل عن ٢ متر مع أخذ ذلك فى الاعتبار بتعديل مناسيب السكة قبل وبعد كيلومتر 0+500n و 26+000

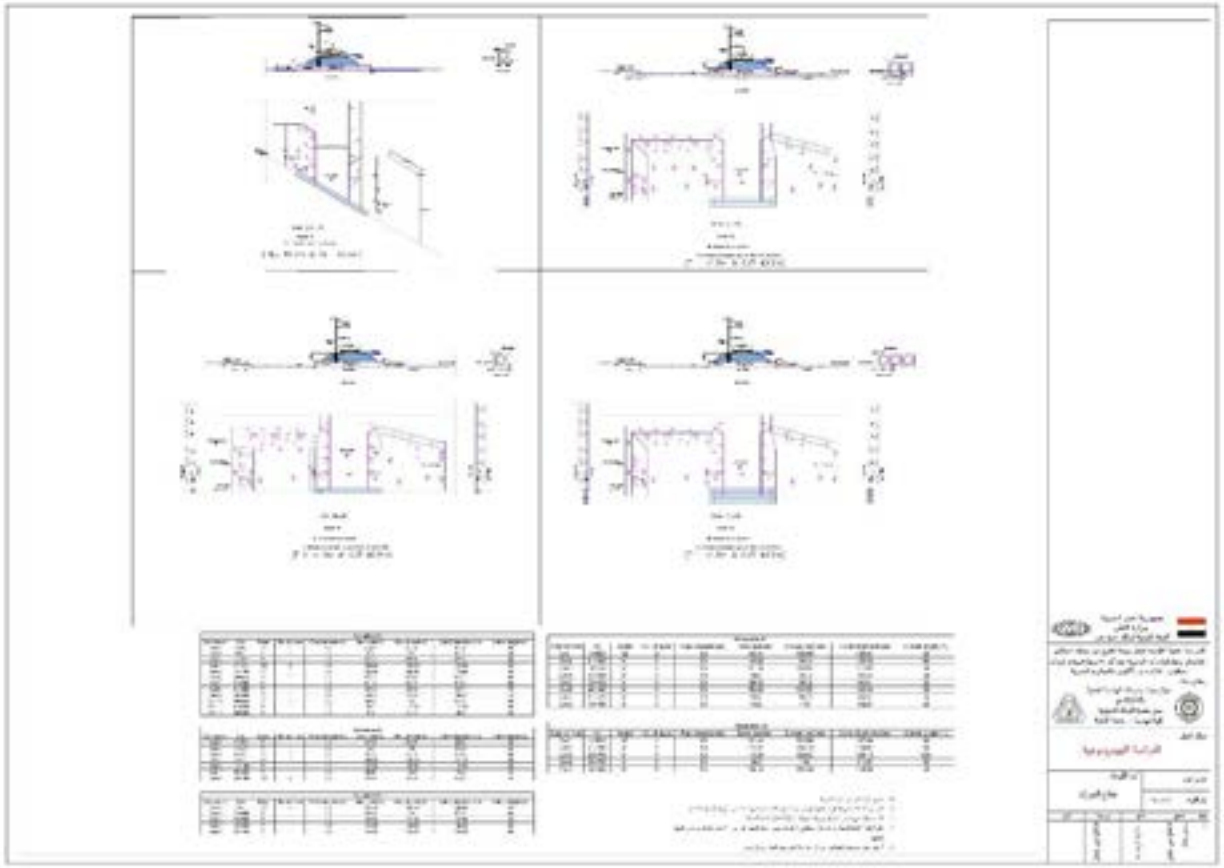
٦-٣ اختيار البديل الأمثل

بعد عمل الدراسة الهيدرولوجية الكاملة على كل البدائل الخامس المقترحة لمسار خط السكة الحديد واختيار أعمال الحماية من أخطار السيول الجارفة والتي تنحصر في اختيار برابخ امبوبيه (مواسير) بقطر لا يقل عن ١,٥ متر في المناطق التي يكون جسر السكة مكون بالردم أو عمل بحيرات صناعيه في المناطق التي يكون فيها جسر السكة مكون بالحفر، تم تقدير التكلفة الاقتصادية لأنشاء تلك الأعمال والتي على أساسها سيتم اختيار البديل الأمثل. وعلى ذلك ومن وجهة النظر الهيدرولوجية فانه يمكن استنتاج الاتي:

أ. طبقا للتكلفة المالية فانه يمكن ترتيب البدائل الخامسة من الأرخص الى الأغلى كالتالي:

البديل الخامس يليه البديل الثاني ثم البديل الرابع والثالث وأخيراً البديل الأول.

ب. يعتبر البديل الخامس هو البديل الأمثل من وجهة النظر الهيدرولوجية حيث تبلغ التكلفة التقديرية لإنشاء أعمال الحماية من أخطار السيول حوالي 2.1مليون جنيه مصري.



15 ANNEX 4: CONTRACTORS' SITE-SPECIFIC PLANS - TOC

NON-EXHAUSTIVE TABLE OF CONTENT FOR CONTRACTORS' SITE SPECIFIC PLANS

ABBREVIATIONS AND ACRONYMS

DEFINITIONS

1 INTRODUCTION

1.1 SCOPE AND OBJECTIVES

1.1.1 Project Description – depending on the scope of each contractor

1.1.4 Contractor Organization Chart for the project

1.1.5 Scope of the Plan

1.3 EFFECTIVE STARTING DATE

2 REGULATORY REQUIREMENTS, STANDARDS AND REFERENCE DOCUMENTATION

2.1 NATIONAL LEGISLATIVE REQUIREMENTS AND STANDARD

2.2 WBG ESF REQUIREMENTS AND STANDARDS

2.3 POLICIES AND PROJECT STANDARDS AND REQUIREMENTS

2.4 REFERENCE DOCUMENTATION

3 ROLES AND RESPONSABILITIES (depending on the scope of each plan - This Section should provide the roles and responsibilities of the contractor staff involved in the plan implementation and management)

3.1 Contractor STAFF Examples:

3.1.1 Project Director

3.1.2 EHSS Director

3.1.3 EHS Manager

3.1.4 HS Officer

3.2 WORKERS

3.3 SUB- CONTRACTORS

4 PROJECT DATA AND INFORMATION (depending on the scope of each plan)

Example for HAZMAT:

4.1 HAZARDOUS MATERIAL TYPOLOGIES AND QUANTITIES

4.2 HAZARDOUS MATERIAL STORAGE AREAS

4.2.1 Fuel Storage System

4.3 HAZARDOUS MATERIAL SEGREGATION

4.4 HAZARDOUS MATERIAL TRANSPORTATION

Example for OHS Plan:

4.1 LOCAL ENVIRONMENTAL CONDITIONS

4.2 SANITARY AND MEDICAL FACILITIES

4.3 EMERGENCY AND PROTECTION EQUIPMENT

4.4 EMERGENCY RESPONSE STAFF

5 IMPACTS AND HAZARDS IDENTIFICATION AND RISKS ASSESSMENT

Example of OHS:

16 ANNEX 5: GRIEVANCE LOG

17 ANNEX 6: FIELD MONITORING CHECKLIST FOR PMU AND ESMP IMPLEMENTATION REPORT INDICATIVE OUTLINE

Table 17-1 shows checklist to guide PMU on field monitoring.

Table 17-1: Checklist to guide field monitoring (to be used by PMU)

CODE	Filed Monitoring of Implementation of ESMP	Compliance/ non compliance	Corrective actions	Comments
AQ1	**Air Quality – Dust and gaseous emissions**			
	• **Are there any visible sources of uncontrolled emissions?** • **Is there an emissions control plan?** • **Are air quality measurements compliant with permissible levels and have measurements been done according to standards?** • **Is all machinery deployed to the field up to standard?** • **Are there internal and/or external complaints? If yes, are there records and documentation of complaint and response measures taken and planned to prevent future occurrences?** • **Are aforementioned elements reported in the Contractor's monthly ES progress report?** • **Are there onsite environmental and social development specialists?**			
NV1	**Noise and Vibration**			
	• **Are there any sources of uncontrolled and/or unnecessary noise and vibration (e.g., machinery running when not needed etc.)** • **Are all workers onsite operating machinery wearing appropriate noise reduction PPE?** • **Are noise and vibration measurements compliant with permissible levels?** • **Are there internal and/or external complaints? If yes, are there records and documentation of complaint and response measures taken and planned to prevent future occurrences?** • **Are equipment maintenance records up to date?** • **Are activities generating high levels of noise and vibration limited to morning schedules and minimal duration (where possible)?**			

• **Are aforementioned elements reported in the Contractor's monthly ES progress report?**				
SG1	**Soil, geology, and topography**			
• **Are there visual disturbances to the topsoil caused by heavy machinery?** • **Is machinery used up to code and maintenance according to schedule?** • **Are there internal and/or external complaints? If yes, are there records and documentation of complaint and response measures taken and planned to prevent future occurrences?**				
RP1	**Resource Efficiency and Pollution Prevention: Energy, Water, Raw Materials, and Waste Management**			
• **Are all plans referenced in the esmp developed and implemented? Plans: waste management plan, water management plan, energy management plan covering all project phases including special emergency plans (e.g., in cases of service ruptures)** • **Have approvals from entities responsible for existing utilities (e.g., coordination with the Giza governorate) been obtained?** • **Are there reported grievances?** • **Is the site well maintained and abiding to good housekeeping practices?** • **Are temporary waste storage areas well maintained?** • **Are there leaks and sources of soil contamination?**				
OHS1	**Occupational Health and Safety**			
• **Are workers wearing appropriate PPE?** • **Is the site properly fenced and signage clearly posted in high danger areas?** • **Are emergency numbers and meeting points clearly visible?** • **Are there logs/registers for training of workers on LMP and OHS plan?** • **Are there reported incidents including severe accidents? If yes, has an incident report been prepared and incident investigated and corrective action defined?** • **Are grievance channels and mechanism visually clear and accessible to all workers (e.g., grievance boxes at the project site, specified phone number, email, social media platform, and physical address for submission of complaints?**				
CHS1	**Community Health and Safety**			
• **Are workers trained on LMP and CoC, and specific provisions related to prevention of GBV, prevention of COVID-19 spread?** • **Has a CHS plan been developed and approved by PMU?**				

• **Are grievance mechanisms and channels disclosed to the community, i.e., proper disclosure of channels?** • **Are there grievances/complaints reported? If yes, have complaints been investigated, addressed?** • **Is the project site properly fenced and inaccessible to local surrounding during construction?** • **Has TTMP been implemented?**				
RCL1	**Risks of Child Labor**			
Are there any workers under 18 contracted by the project? **Are IDs diligently verified for all workers?**				
TLI1	**Temporary Labor Influx**			
• **Are workers trained consistently trains on Code of Conduct, prevention of GBV, prevention of COVID-19 spread** • **Has the Code of conduct been signed by sub-contractor, if any?** • **Have any incidents of CoC violations or other been reported?** • **Are external grievance mechanisms and channels adequately disclosed and known to the surrounding community?**				
GBV1	**Risks of GBV**			
	Are confidential mechanisms, anonymous channels for grievances clearly accessible? Are workers trained and informed on grievances including availability of confidential mechanisms, anonymous channels? Are workers trained on CoC and GBV prevention? Is the CoC signed by sub-contractor? Are there any GBV related incidents reported? If yes, has the incident been investigated, what were response measures taken in what timeframe and what are measures planned to prevent future occurrences?			
CH1	**Cultural Heritage**			
• **Are workers informed on 'chance find procedure'** • **Are there any incidents reported? If yes, have relevant authorities been contacted?**				
COV1	**Prevention of Covid-19 Pandemic**			
• **Has COVID-19 and communicable diseases Management Plan been developed?**				

• **Are protective measures visibly implemented onsite, namely: body-temperature measurements at the entrance of the site, wearing of face-masks, no gatherings or smoking in enclosed areas, provision of soap, water and disinfectants at the site** • **Have workers been trained on COVID-19 prevention and precautionary measures?** • **How many reported infections onsite?**			

ESMP implementation report indicative outline

The ESMP implementation report shall be prepared on a monthly basis following the field monitoring by the PMU and for submission to the Bank. The ESMP implementation report shall report on status of implementation of mitigation measures, compliance with local and WB regulations, where applicable, on internal and external grievances and associated response measures and time and preventative measures, any accidents and associated corrective actions, any incidents of non-compliance.

1- Executive summary
2- Scope of assessment: timeframe, scope of activities, project phase
3- Project Description: brief description project specific activities for which ESMP implementation is assessed
4- Methodology for ESMP implementation assessment: field monitoring, types of documents reviewed and inspected, other references (e.g., personal communication with onsite ES, OHS specialists, site engineer etc.
5- Description of applicable environmental and social receptors, associated monitoring indicator according to ESMP (including legal requirements and approvals and permits, approvals of plans and ES instruments referenced in ESMP including provisions in SEP, LMP), training and capacity building plan, compliance status
6- Reported non-compliances
7- Recommended actions: specified action, role and responsibilities, time frame for implementation
8- Lessons learned
9- Reference list

سجل الشكاوى

الرقم التسلسلي	اسم مقدم الشكوى	موقع العمل	نوع الشكوى (جنائية-اجتماعية-سلامة)	طبيعة الشكوى	تاريخ تقديم الشكوى	الجهة المعنية	الحالة	تاريخ إقفال المشكلة
١								
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