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Ministry of Transport
Egyptian National railways
Egypt National Railways Restructuring Project

Environmental and Social Impact Assessment Study

October 2017

Phase 1: Bani Sweif – Assiut
(Prepared in 2008 by Environmental Quality International)
Phase 2: Assiut – Nag' Hammadi
(Prepared in 2017)

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS 4
TABLE OF TABLES 5
TABLE OF FIGURES 7
1.0 EXECUTIVE SUMMARY 8
1.1 Project Objectives and Description 9
1.2 Legal and Institutional Aspects 10
1.2.1 Relevant Egyptian Legislations. 12
1.2.2 Relevant World Bank Policies 14
1.3 Analysis of Alternatives 15
1.4 Significant Impacts 17
1.4.1 Socio-economic impacts 17
1.4.2 Air Quality impacts 19
1.4.3 Noise impacts 19
1.4.4 Surface Water 21
1.4.5 Solid Hazardous and non-hazardous Waste Impacts 22
1.4.6 Biodiversity 25
1.4.7 Occupational Health & safety 25
1.5 Environmental & Social Management Plan 26
1.6 Public Consultation 45
2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK 49
2.1 Relevant Egyptian Laws and Regulations 49
2.2 Relevant World Bank Policies 50
2.3 Administrative framework 67
3.0 PROJECT OBJECTIVES AND DESCRIPTION 69
3.1 Background 69
3.2 Additional services, land and development requirements 74
4.0 BASELINE DATA 76
4.1 Geographical scope 76
4.2 The Physical and Biological Setting 79
4.2.1 Geomorphology 79
4.2.2 Climate 79
4.2.3 Noise 81
4.2.4 Air Quality 82
4.2.5 Soil and Ground Water pollution 83
4.2.6 Biodiversity 83
4.3 The Socio-economic setting 84
4.3.1 Socio-economic profile of the project area 85
4.3.2 Land Allocation for the CTC in Sohag 86
5.0 IDENTIFICATION OF ENVIRONMENTAL AND SOCIAL IMPACTS 88
5.1 Data sources 88
5.2 Impact Prediction 89
5.2.1 Identification of key impact areas 90
5.2.2 Identification of key project activities 93
5.3 Environmental Impact Assessment methodology 95
6.0 PUBLIC CONSULTATION AND DISCLOSURE ACTIVITIES 98
6.1 Public consultation meetings 99

7.0 ASSESSMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS.....100
7.1 Air Quality Impacts 100
7.3 Surface Water 105
7.5 Biodiversity.....110
7.6 Occupational Health & safety 111
7.7 Land Acquisition impacts..... Error! Bookmark not defined.
7.8 Socio-economic impacts.....113
7.8.1 Local residents of communities adjacent to the train corridor 113
7.8.2 Train Users..... 114
7.8.3 Level Crossing Users 115
8.0 ANALYSIS OF ALTERNATIVES 118
8.1 Alternative 1: No action.....118
8.2 Alternative 2: Implementation of the proposed project. 118
9.0 ENVIRONMENTAL MANAGEMENT PLAN 121
9.1 Institutional Aspects 121
9.2 Environmental and Social Aspects 126
9.2.1 Construction phase impacts..... 126
9.2.2 Operation and maintenance phase impacts 130
9.3 Monitoring Plan 144

Annex 1. Public Consultation Meetings
Annex 2. Preliminary signaling layout plan
Annex 3. Level crossings of initial phase 1: Bani Sweif – Assuit sector and additional phase 2: Assuit – Nag' Hammadi sector of the Cairo – High Dam Railway Line.
Annex 4. Lists of terrestrial fauna of the Nile Valley in Middle Egypt.
Annex 5. A list of common vascular plants of the Nile Valley in Middle Egypt.
Annex 6. Socioeconomic Profile of Selected Governorates
Annex 7. Interview data collection forms
Annex 8. ENR Organizational Structure
Annex 9. A sample declaration and procedure for the establishment of EAD

LIST OF ACRONYMS AND ABBREVIATIONS

ARAP	Abbreviated Resettlement Action Plans
ATP	Automatic Train Protection
CTC	Central Traffic Control
EAD	Environmental Affairs Directorate
EEAA	Egyptian Environmental Affairs Agency
EHSG	Environmental, Health and Safety Guidelines
EIA	Environmental Impact Assessment
EIS	Electronic Interlocking System
EMP	Environmental Management Plan
ENR	Egyptian National Railway
ENRRP	Egyptian National Railways Restructuring Project
EQI	Environmental Quality International
ESMP	Environmental and Social Management Plan
ESIA	Environmental and Social Impact Assessment
GRM	Grievance Redress Mechanism
IEC	International Electrotechnical Commission
PMU	Project Management Unit
MoT	Ministry of Transport
MTB	Main Technical Buildings
MTBH	Mean Time Between Hazards
RAP	Resettlement Action Plans
RPF	Resettlement Policy Framework
SCADA	Supervisory Control And Data Acquisition
SIL	Safety Integrity Level
WB	World Bank

TABLE OF TABLES

Table 1. Institutional strengthening and training for implementation requirements 26

Table 2. Potential environmental and social impacts of the project activities during the construction and operation phases and their proposed mitigation measures. 27

Table 3. Monitoring plan. 38

Table 4. Summary of concerns and issues raised during the consultation meetings. 46

Table 5. Maximum allowable noise intensity in different areas.....**Error! Bookmark not defined.**

Table 6. Permissible exposure times to different sound intensities. ....**Error! Bookmark not defined.**

Table 7. Number of permissible intermittent impacts during the daily working hours **Error! Bookmark not defined.**

Table 8. Permissible outdoor air pollutants limits in microgram per cubic meter unless otherwise specified. ..... **Error! Bookmark not defined.**

Table 9: Covernorates and Administrative Centers (Markaz) linked by the Cairo – High Dam railway line. 86

Table 10: Governorates transected by the Cairo – High Dam railway line and the size of their urban and rural populations. 86

Table 11. Environmental Components (impact areas).....91

Table 12. Construction activities 93

Table 13. Operation activities.....95

Table 14. Composition of population sample interviewed. 99

Table 15. Elements of construction activities that are expected to adversely affect the environment and their direct and indirect impacts.....116

Table 16. Institutional strengthening and training for implementation requirements 127

Table 17. Potential environmental and social impacts of the project activities during the construction and operation phases and their proposed mitigation measures. 131

Table 18. Monitoring plan. 146

TABLE OF FIGURES

Figure 1. Geographical location of the Cairo – High Dam railway line showing main population centers serviced by the Bani Sweif – Assuit and the additional phase of Assuit – Sohag - Nag' Hammadi section of the line. 11
Figure 2. Attendance structure of Public Consultation Meetings held in Cairo (72 attendants), Minya (112 attendants) and Sohag (63 attendants)…….…….30
Figure 3. Existing interlocking mechanical system 70
Figure 4. Level crossing in Sohag: a) Level crossing open b) level crossing gradually closing 75
Figure 5. Geographical location of the Cairo – High Dam railway line showing main population centers serviced by the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section of the line. 77
Figure 6. Details of the geographical relations of the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section. 78
Figure 7. A Landsat Imagery showing main topographic features of the Nile Valley and adjacent desert covering the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi sector…… 52
Figure 8. Existing Flora along the train corridor between Assiut and Nag' Hammadi……58
Figure 9. Land allocated for Sohag's CTC……...61
Figure 10. Existing buildings on the land allocated for the CTC 88

1.0 EXECUTIVE SUMMARY

Environmental Quality International (EQI) has been commissioned by the Egyptian National Railways (ENR) to undertake an Environmental/Social Impact Assessment (ESIA) for the Egyptian National Railways Restructuring Project (ENRRP) and prepare an ESIA report in accordance with the environmental procedures and guidelines of the Egyptian Environmental Affairs Agency (EEAA), and the World Bank's Operational Policies (OP 4.01) on Environmental Assessment. The scope of work covered by this ESIA consists of the modernization of the signaling system on the Bani Sweif – Assuit Line (Cairo to Aswan Route) and the creation of a central traffic management facility in Minya and an additional phase from Assuit – Sohag - Nag' Hammadi with a new central traffic management facility in Sohag. The ESIA for this component was prepared at the same time the ESIA of the ENRRP project was prepared in 2008, however it was prepared as a stand alone ESIA since the ENRRP project financing did not cover this component. Subject to the additional financing for ENRRP project, the Egyptian government has requested an additional loan to finance the component of Bani-Sweif- Assuit line and the central traffic management facility in Minya. This ESIA document has been updated in 2017 to account for the additional phase Assuit – Sohag - Nag' Hammadi. To satisfy the bank requirements on environmental assessment, this ESIA, updated under the auspices of ENR, will be submitted for approval by EEAA, and disclosed in-country in both English and Arabic, and on the Bank info shop prior appraisal according to the Egyptian and Bank relevant policies and procedures. According to Bank safeguards policies, this component subject to the additional financing retains the same category B of the parent project ENRRP. The costs associated with the EMP implementation and monitoring of this component were included in the costing of the original EMP of ENRRP project. Therefore, the costs of the EMP of the additional financing to ENRRP in this document reflect the total costs associated with ENRRP and the additional financing combined.

To undertake the assignment, EQI has mobilized a multidisciplinary team of experts to address the multitude of elements of this ESIA. Throughout the assignment, the team worked closely with technical representatives of the ENR, consultants responsible for the development of ENRRP, and representatives of civil society in the various sectors of the project area, as well as relevant local and central government organizations. This executive summary presents the main findings of the ESIA.

The objective of the ESIA is to identify and examine the potential socio-cultural, economic, physical, and biological impacts of the proposed component of the project, propose measures to mitigate its adverse impacts, and develop plans for managing and monitoring its environmental.

This executive summary outlines the environmental and social sensitivities of the project area, potentially significant impacts of the proposed project and plans for their mitigation. Detailed information on the environmental and socio-economic settings of the project area, components and activities of the proposed project and the results of the environmental and social impact assessment studies are presented in the body of the report.

1.1 Project Objectives and Description

The Egyptian National Railways (ENR) is currently developing a 2007 to 2011 modernization investment program, which will finance improvement of signalling 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 proposed project, a component of which is covered by this ESIA, has been developed on the basis of that strategy. That component consists of modernizing the signaling system of the Bani Sweif – Assuit section of the Cairo – High Dam line and creating a Central Traffic Control (CTC) facility in Minya. The ESIA study has been extended to cover the additional phase of Assuit – Sohag - Nag' Hammadi. During this additional phase, it has been planned to build the CTC in Sohag (Land allocated), and 16 Main technical buildings (MTB) along the railway line, with an area of 400 m^2 each (Lands still to be allocated). Figure 1 shows the geographical relations of the project.

Modernization of basic elements of the signalling systems will include introducing a modern Electronic Interlocking System (EIS) to replace the existing mechanical system. The project also includes the introduction of a new telecommunication system with optic fiber transmission network to link the CTC tower with secondary towers along the line. The new setup will include a computerized train tracking system, capable of tracking train by number, type, location, and speed and detecting delays and operation malfunctions.

The computer based CTC will provide the main functions of command and monitoring, evaluation, presentation of train graph, information event recording system, dispatcher communication system, uninterrupted power supply, etc. The new, computerized facility will be provided with proper, automated, back-up systems. In case of interruption of the main power system, CTC and stations (vital functions) shall be fed by uninterrupted power source over buffer charged accumulators that can give steady energy. Energy of signal equipment between stations will be provided from uninterrupted power source.

The system will also include the automation of level crossings to enhance the safe and efficient operation of these vital elements of the railway line. This will include the introduction of automatic, visual and audio warning, signaling and gate operation. The automated level crossing systems will also include the introduction of automatic train

approach control systems. Heads of existing signal lights will be also be replaced with new heads that are visible at larger distances. Signaling system, protection systems in level crossings, train and security brake systems to be established will be in conformity with 160 km/hour train speed.

Communication and power cables will run parallel to the tracks and no less than two meter on either side. The cables will be placed at least one meter below the ground surface. The process for laying the cables will be largely automated and highly efficient requiring only limited interruption in the operation of the line and its facilities. Cables will also run under water to cross the Ibrahimiya Canals just south of Assuit. For the waterway crossings of the additional phase, the cables will run underneath the bottom of the canal with no physical connection with the water body.

1.2 Legal and Institutional Aspects

The Environmental and Social Impact Assessment for project is required to meet the legal and regulatory requirements of the Egyptian Environmental Affairs Agency (EEAA), and the World Bank on Environmental Assessment. The Egyptian Government has signed and ratified a number of international conventions on the environment, which are considered an integral part of the environmental legislative framework of Egypt.

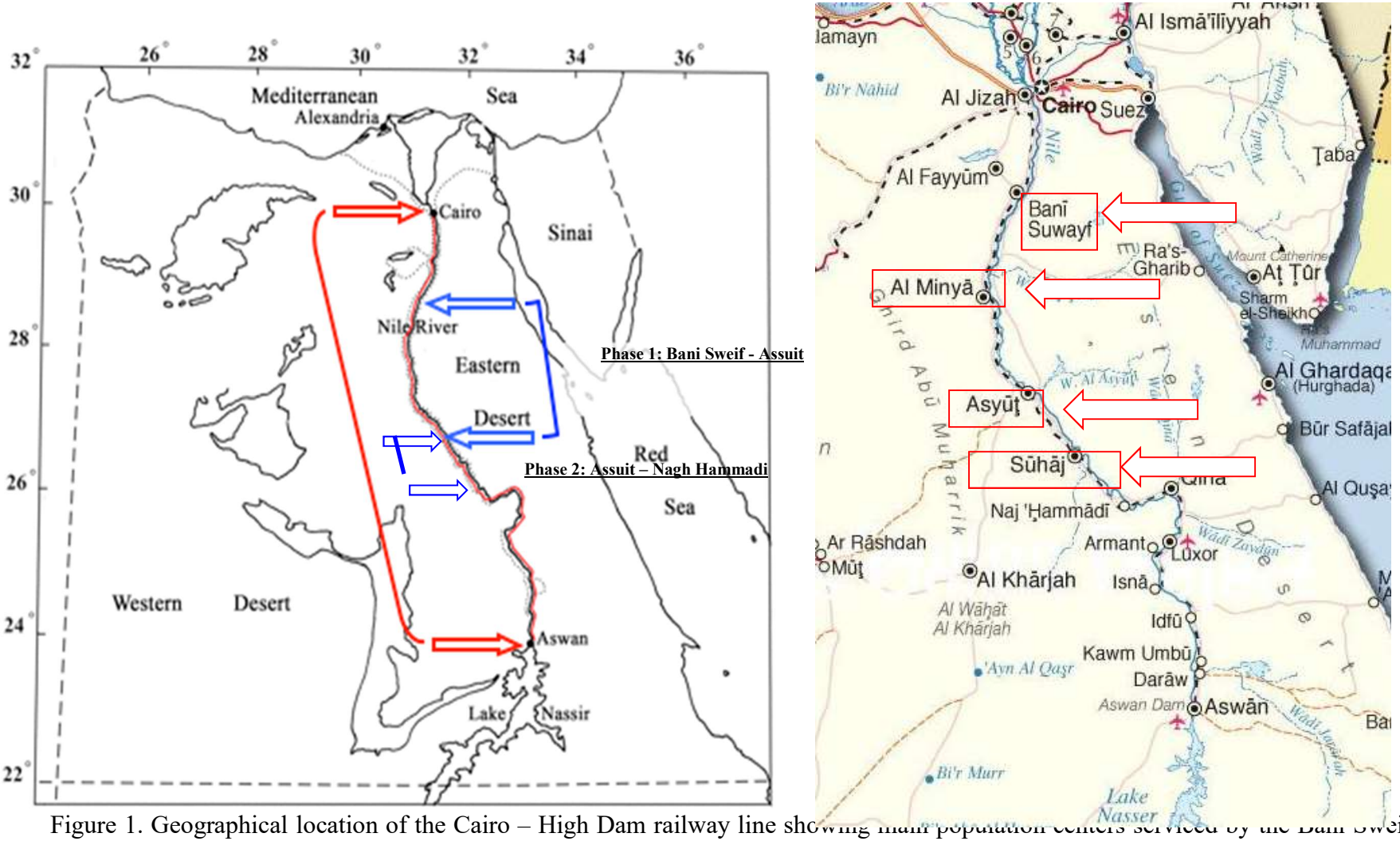


Figure 1. Geographical location of the Cairo – High Dam railway line showing main population centers serviced by the Bani Sweif – Assuit and the additional phase of Assuit – Sohag - Nag' Hammadi section of the line.

1.2.1 Relevant Egyptian Legislations.

Law number 4 of 1994, commonly known as the Law on Protection of the Environment is the most important element of the environmental legislations in Egypt. It is the main legal instrument dealing with environmental issues in Egypt, particularly the protection of the environment from pollution, and preserving it from deterioration. The executive regulations of Law 4 of 1994 define the permissible levels for air quality, water quality, noise, and solid waste management.

According to Article 1, the legal entity responsible for a given project is required to carry out an assessment of the project's potential impact on the natural and socio-cultural environment before implementing that project. The findings of the assessment are submitted to the Egyptian Environmental Affairs Agency for review and approval before other relevant governmental authorities can issue their permits for implementing the project.

The category of environmental assessment for a given project depends on the nature of the project as well as the environmental and social settings of its influence area. According to Article 1 of the Executive regulations of Law 4, three types of environmental/social assessment are considered. Environmental Impact Assessment, which represents the highest level of detail for environmental assessments, is defined as the "studying and analyzing the environmental feasibility of proposed projects whose construction or activities might affect the safety of the environment". The Executive Regulations of that law, state that "all infrastructure projects …. are among developments subject to environmental impact assessments" and define the requirements for the EIA. Accordingly, and following consultation with EEAA representatives, it was concluded that the ENRRP is treated as a "Black" project requiring a full ESIA.

The following are Articles of Law number 4 of 1994 that are expected to have relevance to the project

- Articles 42 of the law and 44 of its executive regulations on maximum permissible noise levels.
- Articles 40 of the law and 42 of its executive regulations on maximum permissible pollution levels resulting from burning fuel.
- Articles 36 of the law and 37 of its executive regulations on maximum permissible pollution levels in exhaust gases.
- Articles 35 of the law and 34 of its executive regulations on maximum permissible levels of pollutants in ambient air.

- Article 43 of the law on the necessary precautions to ensure a safe and healthy work environment.
- Article 32 of the law on handling of hazardous materials.

Other relevant legislations and regulation include

- Several laws and decrees covering occupational health and safety provisions at the work place. These laws and decrees apply to the work crew that will be involved in different construction activities. The following laws and decrees should be considered:
  - Minister of Manpower Decree 48/1967
  - Law 137/1981: Labour and Workforce Safety,
  - Minister of Manpower Decree 55/1983,
  - Minister of industry Decree 91/1985 for implementing Law 21/1985,
  - Minister of Manpower Decree 116/1991, and
- The Agricultural Law 53 of 1966, which is the main legislation protecting wildlife and specially birds and wildlife. The law and its executive regulations which provide lists of legally protected wildlife species will be the main legal reference for identifying the significance of potential impact of the project on wildlife.
- The Prime Ministerial Decree 631 of 1982 establishing the Egyptian Environmental Affairs Agency (EEAA) as the competent body for environmental matters.
- Law 48/1982 on the Protection of the Nile River and the Waterways from Pollution.
- Law number 93/1962 on standards for the discharge of wastewater to the sewerage network.
- Law number 38 of 1967 amended by Law number 31 of 1976 and Law number 4 of 1994 on public cleanliness and collection and disposal of solid waste.

A number of new laws and decrees which are applicable to the additional phase of Assuit – Sohag - Nag' Hammadi, are listed below:

- Amendments of Law 4/1994 by Law 9/2009 and law 105/2015 and its modified Executive regulations.
- Law 12/2003 and its executive regulations, on occupational health and safety.
- Decree 44/2000 on discharge of liquid wastewater
- Law 117/1983 and Law 119/2008 on Antiquities protection

A number of international conventions signed by Egypt and ratified by the Egyptian parliament are relevant to the project as part of the national legislative framework. These are

- International Plant Protection Convention (Rome 1951). The convention includes measures for the protection of natural vegetation cover.
- African Convention on the Conservation of Nature and Natural Resources (Algeria 1968) including threatened species of plants and animals and their natural habitats.
- Convention on Wetlands of International Importance Especially as Waterfowl Habitats (Ramsar, 1971). The convention identifies wetlands of international importance for resident and migratory birds. Some of the northern Delta lakes are among the wetland areas identified in the convention.
- UNESCO Convention for the Protection of the World Cultural and Natural Heritage (Paris, 16 November 1972) including archeological sites.
- Convention for the Protection of Migratory Species of Wild Animals (Bonn, 1979). The convention covers migratory bird flights across Egypt in autumn and spring.
- Protocol Concerning Mediterranean Specially Protected Areas and Biological Diversity Convention (1992).
- United Nations framework convention on climate change (New York 1992). The convention covers measures to control greenhouse gas emissions from different sources including transportation.
- Convention on biological diversity (Rio de Janeiro 1992), which covers the conservation of habitats, animal and plant species, and intraspecific diversity.

1.2.2 Relevant World Bank Policies

A project considered for finance by the World Bank is screened to determine the extent of Environmental Assessment it requires. The project is assigned to one of four project categories requiring different levels of environmental assessments, depending on its type, location, and the significance of its potential environmental impacts. As indicated in the Terms of Reference provided by the Client, the Egyptian National Railway Re-construction Project is considered a Category B project. The environmental assessment studies summarized in this report follow the guidelines stipulated in the World Bank's Operational Policies (OP 4.01) on Environmental Assessment for Category B projects.

1.3 Analysis of Alternatives

This analysis has is herein undertaken at two levels. The first level considers two project alternatives; project implementation alternative and the no action alternative. These two alternatives were analyzed in terms of both positive and negative impacts. At the second level of analysis, the preferred alternative is subjected to further analysis of alternatives. In this analysis the relative environmental and social merits of elements and activities of the selected project alternative are considered. These alternatives are evaluated and compared, and the optimal one selected.

Alternative 1. No action. To continue operating the Bani Sweif – Assuit and additional phase, Assuit – Nag' Hammadi section of the Cairo – High Dam Line with the existing, mechanical signaling system, with its frequent breakdowns and inefficient operational capabilities places a major burden on the ENR's efforts to improve its services to the public and overcome its major financial difficulties. It is expected that difficulties facing ENR will aggravate and will become more difficult to resolve without the implementation of the proposed project. Without the project, the railway service on the Cairo – High Dam line will further deteriorate affecting the millions of users of that vital line.

Alternative 2. Implementation of the proposed scheme for modernizing the signaling system on the Bani Sweif – Assuit and the additional phase of Assuit – Sohag - Nag' Hammadi section of the Cairo – High Dam Line and creating a CTC in Minya and an additional CTC in Sohag. The project will provide the badly needed renovation and replacement of elements of the outdated mechanical signaling system along this most important railway line in the Egyptian railway network. Once completed, the project will improve the railway service of the Cairo – High Dam Line considerably. Positive impacts of the project on the railway service include the following:

- Improved train operation safety.
- Improved operation safety of level crossings.
- Reducing trip time as a result of increased train travel speed.
- Increasing the number of trains that can safely use the line per unit time.
- Reduce operational delays.

Although the economic cost of the proposed project is relatively high, the modernization of the outdated system is highly justifiable to ensure the safe and efficient operation of the railway service along that line. On the other hand, the ENR sees the modernization of the signaling system as an inevitable action that has to be undertaken sooner or later. The operation of the highly efficient modern system will also reduce cost of operation per traffic

unit and will contribute to the ENR's efforts to reduce loses and increase revenue generating potential.

Within the framework of this alternative, a number of negative impacts are expected to occur during the construction phase of the project. These impacts are all temporary in nature, lasting only during the construction process and can be readily mitigated or tolerated. Project elements and activities that are expected to result in these negative impacts are herein considered in terms of possible alternatives to mitigate their adverse impacts.

1. **Construction planning**:

Alternative a: Construction work to take place on several sites in parallel to reduce duration of construction activities.

According to this alternative, construction activities will be scheduled to allow working in parallel on several elements of this activity along the entire line. While this will shorten the time required to complete the construction process and minimize the duration of adverse impact associated with these activities, it may considerably intensify the severity of some of the expected impacts. For instance, longer train delays as a result of reducing speed at several construction sites.

Alternative b: Construction work to proceed on fewer sites in parallel to reduce intensity of construction-related impacts.

This alternative will restrict construction activities to a small sector of the corridor at any given time, thus reducing the generalized negative impacts of construction considerably. It will however, extend the duration required to complete the project. Localized impacts will remain unchanged.

2. **Transportation of construction material and waste**:

Alternative a: Construction material and waste will be mostly transported using trucks.

This will contribute to traffic congestion problems particularly in areas close to construction sites.

Alternative b: Construction material and waste will mostly transported using trains as much as practically possible.

This will minimize potential traffic problems that might be caused by using trucks. Material may be transported from point of origin to nearest railway terminal equipped for loading and unloading of such material. It will then be transported by trains to or from construction sites.

3- **Land Alternatives**:

In the selection for the location of the CTC and the MTBs, the common practice of ENR is that they use their land located within their ROW (approximately 9 meters on both sides of the track). The land alternatives selection, which usually has technical criteria, always take into consideration also screening out of any private land and avoiding any land with uses (even if owned by ENR).

1.4 Significant Impacts

1.4.1 Socio-economic impacts

Initial impact screening identified three community groups that might experience substantial socio-economic impacts as a result of the project.

- Train users
- Local residents of communities adjacent to the train corridor
- Frequent users of level crossings

After identifying the potentially impacted populations, the fieldwork was conducted in three governorates namely, Bani Sweif, Minya and Assuit, which highly represents Sohag and Qena's governorates; the two additional governorates potentially impacted by the additional phase of Assuit – Sohag - Nag' Hammadi. Different tools were utilized in the selected governorates in order to solicit information regarding the socio-economic impacts of the project's interventions. Accordingly, field surveys, as well as public consultation sessions were employed with different target groups represented potentially impacted populations.

A sample of 1166 respondents including representatives of the three target groups of train passengers, local residents and level crossing users were randomly selected. Survey results provided quantitative information pertaining to the number of respondents that are affected by the project components and activities. The sample was selected from two villages in Bani Sweif (Tazmant and Al-Kafour); and three villages in Minya (Bani Mazar, Al Mawada, and Maghagha) and the city of Cairo.

On the other hand, two public consultation meetings were held in Minya (112 participants) and Cairo (72 participants). Participants of public consultation sessions represented civil society, government officials and other stakeholders. Annex 1 shows a list of affiliations of represented participants. Public consultation sessions offered qualitative information regarding the ways in which respondents are affected as well as their suggestions for mitigating the negative impacts. The findings outlined below are based upon the results of the field survey as well as that of the stakeholders meetings and the two public consultation meetings.

An additional public consultation was held in Sohag (63 participants) for the second phase extending Bani Sweif – Assuit line up-to Nag' Hammadi, passing by Sohag (Annex 1 includes summary of the consultation).

1.4.1.1 Local residents of communities adjacent to the train corridor

A sample of 816 residents representing rural and urban areas was used to assess reaction of communities near the railway corridor to the expected construction work required for the installation of the new signaling system. Residents' reactions varied according to the proximity of their residence or place of work to the railway corridor. In that sample, this distance ranged between a maximum of 800 meters and a minimum of 100 meters. While close to 58% of the respondents expressed their concern about the possibility of experiencing unacceptably high noise level during construction work, the remaining 42% of the respondents either though that they can tolerate the high noise level or were not at all concerned about it. Out of those concerned about the noise, 38% felt that excessive noise can hinder ability to concentrate (e.g. during studying, working or even watching television) and 47% expected to suffer sleeping disturbance. Few individuals living immediately next to the railway corridor complained about the excessive noise generated by passing trains and particularly, what they considered the unnecessary and excessive use of the train siren while passing through cities. A number of these local residents also complained that the uploading and mechanical shaking and sifting of ballast gravel of basaltic fragments during ballast replacement work, generates unbearable noise. It was generally clear, therefore, that excessive noise associated with different construction activities is one of the main impacts that should be mitigated. For most respondents, construction noise becomes a major, particularly unacceptable nuisance if it occurs at night.

Fewer people were concerned about the possibility of the possible generation of dust and other air pollutants (including noxious fumes generated during asphalting work) during some of the construction activities.

1.4.1.2 Train Users

Close to three hundred passengers responded to the train users' survey questionnaire. Passengers were selected from two trains namely; train number 935, which serves the Sohag to Alexandria route; and train number 990, which serves Minya to Luxor.

Out of the responding passenger sample, 52% used trains for frequent business-related travel, 29% used it for irregular personal travel, and 19% for other purposes. Out of the all the respondents, only 1% use the train for daily commuting to work, 20% use it once a week, 16% once every two months, 45% once a month and 18% less frequently than once a month.

In addition, 57% of responding passengers spend between three to six hours on their train journey, while 43% spend between seven to twelve hours on the train. Of all respondents, 19% considered their journey duration acceptable, while 72% considered it too long journey.

With regards to respondents' reactions towards the effect of the expected delays due to construction work, 75% expressed their willingness to accept the delay as a temporary inconvenience that is outweighed by the benefits associated with the modernization of the railway lines and services. On the other hand, 20% of the respondents felt that construction delays are unacceptable, but will still use the train. Close to 3% of the respondents, considered the expected delays unacceptable, stating that they will have to use other modes of transportation during the construction period. The remaining 2% identified other options.

Among those who expect to be forced to use other modes of transportation, 29% were concerned about the higher cost of alternative transportation modes and its implications on family budgets. Very few individuals also expected some salary deduction due to being late for work; or excessive frustrations due to the lengthy train trips.

1.4.1.3 Level Crossing Users

Level crossing users (vehicle passengers and drivers, and pedestrians) were similarly interviewed to solicit their reactions towards the project. Out of the 1199 respondents, 95% use the level crossing on a daily basis, while 5% used less than once a week. Alternatives for the level crossing users were not available for all respondents. Only 40% mentioned that they can identify and resort to nearby alternatives, whilst 60% stated that other available crossings are too far away for their use. On the other hand, 93% of the respondents accepted to resort to alternative crossings during the construction period compared to 5% who disagreed to resort to alternative (apparently to resort to illegal crossing of the tracks). Drivers and passengers of vehicles frequently using the level crossing often expected traffic problems when level crossing become partly or totally closed during construction. Certain level crossings are already heavily congested. Closing these crossings, partly or totally, even for a short period of time is expected to result in some traffic flow problems that require careful planning to mitigate.

1.4.2 Air Quality impacts

Certain construction activities (e.g. asphalting, excavation of foundations and cable trenches, etc.) are expected to generate dust, fumes and other forms of air pollution as listed below:

- Dust emissions

- Exhaust of power generators and vehicles transferring the raw materials and/or those disposing the excavated soil and construction waste.
- Exhaust of construction equipment

Although these pollutants are expected to be generated in relatively small quantities during some of the construction activities, community living very close to the construction sites may potentially be affected. These impacts will also affect construction crews at the work sites. Although these impacts are all temporary in nature, occurring only during the actual construction work, which will be undertaken mostly for a few hours to few days at any given site, mitigation measures are considered to be necessary.

Mitigation and monitoring measures for air quality

Mitigation measures

Implement a construction site management plan including the following measures:

- Store construction materials in pre-identified storage areas.
- Cover friable materials during storage.
- Wet the network of unpaved roads on site. The use of water should be restricted to extremely active areas.
- Regulation of speed to a suitable speed (20 kmh) for all vehicles entering the site's boundaries.
- Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fume.

Monitoring Measures

- Number of dust complaints from workers and residents
- Number of complaints that were resolved and time it took to resolve them
- Visual inspection of vehicles and equipment operating along the railway corridor

1.4.3 Noise impacts

Various mechanical/electrical equipment, will be needed during the construction activities described in the previous section. These include bulldozers, trucks, pavers, and other equipment. The operation of these equipment are the main potential source of noise emissions during the construction and decommissioning phases.

The vulnerable groups who are susceptible to the construction noise are the following:

- Onsite Workers; who are the most exposed to the highest noise levels generated from different construction activities due to their proximity to the noise sources.

Neighboring communities and other sensitive receptors along the 170 km railway corridor.

The noise emitted during the construction activities along the railway corridor , including the construction of the MBTs, are expected to decrease from 95 dB at source down to 50dB at around 50 m away from source – a distance which is equivalent to the right-of-way around the railway corridor. The source is a moving point, the location of which depends on where the main construction activities are taking place. The potential generated noise will mainly affect the workers on site. The impact is assessed as shown in the table below and should be considered of Minor significance. This should be fully controlled by applying proper health and safety procedures.

Mitigation and monitoring measures for noise impacts

Mitigation measures

On site Construction noise shall be mitigated to ensure a safe work environment by implementing an on site occupational health and safety plan, which considers national and international requirements.

The plan shall include the following measures:

- Protective hearing equipment shall be made available to all workers in noise critical areas
- Training on how and when to use protective hearing equipment shall be conducted as part of the workers' induction sessions.
- Place visually clear instructions in areas where noise emissions are significant.

Other mitigation measures to reduce the noise impacts off-site include the following:

- Optimize the use of noisy construction equipment and turn off any equipment if not in use.
- Regular maintenance of all equipment and vehicles
- Stop all construction activities during the night
- Communicate the construction schedule with neighboring communities and sensitive receptors
- Implement a project specific GRM

Monitoring measures

- Number of noise complaints from workers and neighboring communities in the affected locations.
- Number of complaints that were resolved and time it took to resolve them

1.4.4 Surface Water

For the new additional phase of Assiut – Sohag – Nag' Hammadi , it is planned that the underground cables pass underneath the bottom of any waterway, with no physical connection with the water body so impacts on surface water quality are considered of minor

significance. Mitigation measures comprise of proper handling of solid hazardous and non-hazardous waste as detailed in the following section.

1.4.5 Solid Hazardous and non-hazardous Waste Impacts

The non-hazardous wastes generated on site during the construction phase normally have a high recycling potential. If not recycled they would be sent to landfills or randomly dumped and burned, which would be a loss of natural resources.
Random dumping and accumulation of wastes on or around the site would cause a negative visual impact to workers as well as users of the surrounding areas. It could also block the roads, increase the rate of accidents. Accumulated wastes may be burned, a practice commonly found in Egypt, which could emit toxic emissions especially if plastic substances were among the waste streams.
Accumulation and/or uncontrolled disposal of organic wastes (food residuals) would also result in potential impacts on the health and hygiene of both general public and on-site workers by attracting vermin to the site such as birds, rodents or insects which can act as disease vectors. This will result in spread of disease, and disruption of the natural ecosystem. Odour may also be generated following long periods of accumulation due to the decomposition of some organic wastes, which will be an annoyance to both general public and on-site workers.

Leaching to soil may occur in areas where accumulated waste is in direct contact with the soil. This would lead to a direct impact on the groundwater quality.

The impacts due to non-hazardous waste generation during the construction phase is considered of moderate significance. The impact of non-hazardous waste generation is expected to be fully controlled by implementing the mitigation and monitoring measures listed below.

The storage and disposal of hazardous waste streams have to be carefully performed as to abide by the existing legal framework. In addition to that, these hazardous wastes if not handled, stored and disposed of according to engineering best practice would have major and irreversible effect as follows:

- Mishandling and uncontrolled disposal of hazardous liquid and solid wastes would have major health impacts for on-site workers, inhabitants in the project's area of influence, people who get in contact with waste during transportation and disposal, and flora and fauna exposed to such wastes.
- Uncontrolled disposal of hazardous wastes, in particular in liquid form, would cause soil contamination through direct contact or leaching.
- Air quality could also be affected since uncontrolled dumping of hazardous and non-hazardous materials would result in most of the cases to open burning and potential release of toxic emissions.

The impacts listed above should be considered of Moderate significance and will be fully controlled by implementing the mitigation and monitoring measures listed in the following section.

Mitigation and monitoring measures

A waste management plan complying with international best practice and relevant Egyptian regulations and covering all types of construction waste (hazardous and non-hazardous) shall be developed and implemented by the construction contractors and made applicable to all sub-contractors. This plan shall define exact procedures and locations for waste management and disposal. The waste management plans should also refer to health and safety procedures, and emergency procedures for containing and managing accidental spillages.

Mitigation measures for non-hazardous wastes

- Implement a segregation system based on compatibility of different waste streams during each phase of project implementation
- Specify an area/containers for non-hazardous wastes which accommodate for the generated segregated streams
- Dispose of non-recycled wastes in the nearest landfill; the location of which needs to be confirmed at the beginning of the construction phase.
- Register the amounts of disposed of wastes and keep waste disposal and transportation receipts/manifests.

The measures listed above represent the minimum measures to be included in the waste management plan,which will be prepared and implemented by the contractor.

Monitoring measures for non-hazardous wastes

- Regular inspection of the waste storage area
- Regular inspection of the site(s) in general to identify random disposal of waste materials.
- Regular inspection of the waste disposal manifests.

Mitigation measures for hazardous wastes

The measures listed below represent the minimum measures to be included in the waste management plan, which will be prepared and implemented by the contractor.

a) General measures

- All types of hazardous waste can only be transported by licensed hazardous waste service providers and disposed of in licensed landfill. Both, the service providers and

disposal sites have to be identified at the beginning of construction works. At the time of producing this study, the only hazardous waste disposal site is the Nasreya hazardous Waste Centre in Alexandria.
- The different types of hazardous wastes should not be mixed.
- Spent mineral oils shall be collected, stored in sealed containers and recycled using a licensed company which also has to be identified by the contractor

b) Adopting an Identification system for hazardous wastes generated on site

The Contractor shall be able to identify the different potential hazardous wastes. Identification shall be performed according to the Egyptian hazardous waste classification system by the contractor's in-house staff or with the aid of an independent waste management consultant appointed by the contractor.

c) Storage and Management of the waste accumulation area

The waste storage area for hazardous wastes shall be fenced, secured with limited admission and shaded from rain and sun heat/light.:

- The storage area must have a water supply
- A hazardous waste label that has a "Hazardous Waste" mark on it must be placed on the container while still at the generation point.

d) Emergency Response

For the purpose of first response, when a hazardous substance release is first discovered or witnessed, the individual of concern who had to be previously trained would initiate an emergency response sequence by notifying the proper authorities of the release. The individual will take no further action beyond self-evacuation and notification. The aim of the response at this level is limited to protect nearby persons, property, or the environment from the effects of the release. No trials are performed at this stage to actually stop the release. This level of response includes;
- actions to contain the release from a safe distance
- prevent its spreading
- evacuation

Monitoring measures for hazardous wastes generated
- Regular inspection of the hazardous waste storage area
- The spent oil containers are inspected monthly for leaks or any other form of damage and are kept in good condition.
- Regular inspection of the site to identify randomly dumped hazardous waste materials.

Inspection of HW disposal receipts and manifests.

1.4.6 Biodiversity

Habitats along the railway corridor covered in this project are all man made. None of these habitats is considered threatened and none seems to be necessary for the survival of any threatened species of animals or plants. Wildlife of the Nile Valley is among the most diverse of any of the terrestrial habitat in the country. This wildlife consists mainly of species that are able to tolerate human activities and manage to survive in the habitats he created. The railroad corridor is part of the man-made landscape and will continue to be so after the implementation of the signaling modernization project. There is no indication that construction work and subsequent operation of the lines after completion of the project will have any irreversible or significantly adverse impacts on wildlife and habitats in areas adjacent to these lines. Wild fauna and flora along the railway corridor are expected to tolerate disturbances associated with construction activities of the project

1.4.7 Occupational Health & safety

As previously described, the construction phase of the project will encompass different activities, which are expected to affect occupational health and safety for workers.

Due to the high probability of occurrence and the high risk involved, the occupational safety and health impacts during the construction phase should be considered of major significance.

The potential impacts will have to mitigated as follows, which have to be also included as binding clauses for the Contractor:

- Develop an occupational health & safety mitigation plan according to the Egyptian legislation and international best practices.
- Obtain approval on the developed occupational health & safety plan from ENR and PMU prior to starting construction activities.
- Implement the occupational health & safety plan during all construction phases.

1.5 Environmental & Social Management Plan

Table 1. Institutional strengthening and training for implementation requirements

Institutional Strengthening Activity	Position(s)	Responsibilities		Cost Estimates (LE)
		Implementation	Supervision	
Establishing the Environmental Affairs Directorate (EAD) of the ENR.	▪ Director ▪ Environmental Engineer/Manager ▪ Environmental Specialist ▪ Environmental Specialist	Institutional capacity building consultant	- ENR Management	175.000
Training of EAD staff	▪ Director ▪ Environmental Engineer/Manager ▪ Environmental Specialist ▪ Environmental Specialist	Training and environmental consultant	- ENR Management	140.000
Environmental awareness	ENR general staff EAD site inspectors	Public awareness and environmental consultant	- ENR Management	290.000
Training of environmental inspectors	Staff of different ENR departments and operations regions	Training and environmental consultant	- ENR Management	230,000

Table 2. Potential environmental and social impacts of the project activities during the construction and operation phases and their proposed mitigation measures.

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Pre-Construction/ Design Phase						
Land allocation for CTC and MTBs along the railway corridor	Land acquisition/ Livelihood or assets impacts	-ENR to maintain their avoidance strategy for any land with any uses as a priority action. -RPF was prepared stipulating the principles to be followed in case this impact is encountered. RAPs and ARAPs should be prepared as needed for individual cases where land and livelihoods loss will be encountered as an impact. - All efforts be made to allow for harvesting of crops prior to any land-related impacts. - GRM to be developed and used	PMU with support from the WB	PMU Director	TBD	The contractor should comply with the avoidance strategy of ENR and should provide regular reporting supporting that to ENR. If the technical requirements of certain location made it impossible for the contractor to secure full avoidance, the various options should be discussed with ENR and reported to the Bank and actions should be taken accordingly (including preparing safeguards instrument such as RAP/ARAP)
Construction Phase						
Construction activities at areas accessible to the public.	Safety risk to the public at or near construction sites.	- Construction sites closed to the public.	Contractor	PMU	To be covered as part of the construction cost	
Construction activities at all areas	Potential negative impacts on local communities, or	- ENR to conduct site specific information sharing session and consultation prior to the commencement of any works.	PMU and the Contractor	PMU	To be covered as part of the construction cost	

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
	local environment and potential risk of escalated concerns/complaints without being managed properly	- Ensure that the local communities have access to the ESMP in local language and are aware of the contractors' commitments. - ENR to strengthen the existing GRM system and ensure operationalization of multi-channels project level Grievance Redress Mechanism (GRM) - ENR to ensure dissemination of the GRM to local communities and potential PAPs prior to starting construction activities. - Maintain solid documentation for the received complaints during the the construction phase and track the level of responsiveness (provision of feedback) .				
	Social conflicts and potential inconvenience caused be labor coming from outside the project area (labor influx).	- Provision of information regarding Worker Code of Conduct in local language(s) and follow up on compliance. - Encourage the common practice of using local workers as this will reduce the transaction cost and will eliminate the risk of labor influx. - Provision of cultural sensitization training for workers regarding engagement with local community. - Share with community and implement the approved GRM at all times during the construction phase and track the level of responsiveness (provision of feedback) .	Contractor	PMU	To be covered as part of the construction cost	

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
	Increased risk of illicit behavior and crime.	- Ensure timely and sufficient payment to the contractors and sub-contractors workers - Creation of supervised leisure areas in workers' camp (if applicable); - Enforce the national law; - Introduction of sanctions (e.g., dismissal) for workers involved in abuse or inappropriate activities; - Provision of substance abuse prevention and management programs.	Contractor	PMU	To be covered as part of the construction cost	
	Occupational health and Safety impacts for workers	- Develop an occupational health& safety mitigation plan according to the Egyptian legislation and international best practices. - Obtain approval on the developed occupational health& safety plan from ENR prior to starting construction activities. - 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 life insurance against any potential accidents.	Contractor	- EAD - ENR	To be covered as part of the construction cost	
	Risk of child labor	Include clear and explicit measures in the contractors' contract to 1) prohibit labor under 18 years old in the main contract, 2) stipulate that this contract should go to all the sub contract as a binding condition.	Contractor	ENR	Part of the contractual agreement	

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
	- Dust air pollution and noise generation from construction activities, vehicles and equipment	- Excavation and construction material should be covered to minimize spillage and dust generation. - Vehicles delivering construction material or waste should be covered to avoid material spillage. - Vehicles uploading material should maintain the lowest possible fall height to reduce noise and dust generation. - All construction activities should be carried out during the day time to minimize noise disturbance to communities near work sites. - Workers exposed to noise exceeding permissible levels should wear hearing protection. - No exposed, hot power cables should be left unattended at any time. - Old, often contaminated ballast basalt should be removed to a government-designated dumpsite for disposal or for decontamination for future use. - Transportation of old ballast should be only in covered tracks to avoid spillage. - Construction waste should be disposed of at dumpsites designated by local governments. - Construction sites should be closed to the public.	Contractor	-ENR -EAD -Third party construction supervision	To be covered as part of the construction cost	

Table 2, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Construction Phase, *continued*						
	Impacts due to un-proper handling of solid non-hazardous and hazardous wastes	***Mitigation measures for non-hazardous wastes*** • Implement a segregation system based on compatibility of different waste streams during each phase of project implementation • Specify an area/containers for non-hazardous wastes which accommodate for the generated segregated streams • Dispose of non-recycled wastes in the nearest landfill; the location of which needs to be confirmed at the beginning of the construction phase. • Register the amounts of disposed of wastes and keep waste disposal and transportation receipts/manifests. ***Mitigation measures for hazardous wastes*** The measures listed below represent the minimum measures to be	Contractor	-ENR -EAD -Third party construction supervision	To be covered as part of the construction cost	

		included in the waste management plan, which will be prepared and implemented by the contractor. *e) General measures* • All types of hazardous waste can only be transported by licensed hazardous waste service providers and disposed of in licensed landfill. Both, the service providers and disposal sites have to be identified at the beginning of construction works. At the time of producing this study, the only hazardous waste disposal site is the Nasreya hazardous Waste Centre in Alexandria. • The different types of hazardous wastes should not be mixed. • Spent mineral oils shall be collected, stored in sealed containers and recycled using a licensed company which also has to be identified by the contractor *f) Adopting an Identification system for hazardous wastes generated on site* The Contractor shall be able to identify the different potential hazardous wastes. Identification shall be performed according to the Egyptian hazardous waste				

		classification system by the contractor's in-house staff or with the aid of an independent waste management consultant appointed by the contractor. *g) Storage and Management of the waste accumulation area* The waste storage area for hazardous wastes shall be fenced, secured with limited admission and shaded from rain and sun heat/light.: • The storage area must have a water supply • A hazardous waste label that has a "Hazardous Waste" mark on it must be placed on the container while still at the generation point. *h) Emergency Response* For the purpose of first response, when a hazardous substance release is first discovered or witnessed, the individual of concern who had to be previously trained would initiate an emergency response sequence by notifying the proper authorities of the release. The individual will take no further action beyond self-evacuation and notification. The aim of the response at this level is limited to protect nearby persons, property, or the environment from the effects of the release. No trials are				

		performed at this stage to actually stop the release. This level of response includes; • actions to contain the release from a safe distance • prevent its spreading • evacuation				

Table 2, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Construction Phase, *continued*						
Reduction of train speed at work sites	- Longer train trip time - Unexpected train delays	- Construction scheduling should be negotiated with the contractors to minimize train delays. - Train re-scheduling should be undertaken taking into account the expected delays and showing new departure and arrival times during the construction work - A plan for making alternative means of transportation available in case of significant train delay should be developed and implemented.	ENR Contractor	- MoT - ENR -EAD	To be covered as part of the construction cost	- Some train users may become forced to use other, more costly mode of transportation. - Shifting to other transportation modes will reduce the number of train passengers, reducing demand on goods and services offered by businesses in the vicinity of train stations.

Table 2, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Construction Phase, *continued*						
Construction at level crossings (Partial or complete closure of the crossing to pedestrian and vehicle traffic)	Increased traffic congestion at certain level crossings - Interrupting normal movement of people and goods. - Increased illegal track crossing.	- Work should be so planned as to avoid the complete blockage of level crossing, as much as practical. - Concentrating work in level crossings during times of reduced traffic, possibly during the night, as long as noise level can be kept at an acceptable level. - In cases where a level crossing has to be completely closed during construction, an alternative crossing should be identified and advertised to the public in advance. Traffic detours will have to clearly marked and provided with proper direction signage for incoming traffic. - Law enforcement authorities (Traffic Police) should take charge of controlling vehicular and pedestrian traffic flow and preventing illegal track crossings	Contractor ENR	- EAD - Local law enforcement authorities (Traffic Police)	To be covered as part of the construction cost	- Traffic congestion or reduced traffic flow in areas leading to or from level crossings. This, in turn, will temporarily increase noise and air pollution with vehicle emission of slow moving vehicles. - Delay to work

Table 2, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Operation and Maintenance Phase						
Operation Phase – all activities	Potential negative impacts on local communities or local environment	- Assess and improve the exiting GRM of the ENR - Share with community and effectively implement the GRM	PMU – Social Officer	PMU - Director		
Operation and maintenance of trains at increased travel speeds	- Accidents due to inadequate traffic and pedestrian control at level crossings. - Accidents due to illegal pedestrian crossing	- Improving control of traffic and pedestrian crossing at level crossings. - Assessing the need to consider universal accessibility measures to prevent accidents to persons with limited mobility, including persons with disabilities, the elderly, etc.	EAD Railway Police Traffic Police	ENR		Training of operators of trains and signaling system
		Repair of protective railway corridor walls in densely populated area.	EAD	ENR	Should be covered as part of the project contract	
		A public awareness campaign on railway safety.	EAD	ENR	600,000	The campaign should be implemented in parallel with the construction phase of the project.
Operation and maintenance of trains.	None	–	EAD	ENR	To be covered as part of the project contract	Training of operators of trains and signaling system
Operation and maintenance of automated signaling system	None	–	EAD	ENR	To be covered as part of the project contract	Training of operators of trains and signaling system

Table 3. Monitoring plan.

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
Pre-Construction/ Design Phase							
ENR to maintain their avoidance strategy for any land with any uses as a priority action. -RPF was prepared stipulating the principles to be followed in case this impact is encountered. - All efforts be made to allow for harvesting of crops prior to any land-related impacts. - RAPs and ARAPs should be prepared as needed for individual cases where land and livelihoods loss will be encountered as an impact. - GRM to be strengthened and made operational	- Number of Complaints - Number of complaints that were resolved and the time it took to resolve them - Preliminary assessment report of land and livelihoods/assets loss for selected locations for MTBs - RAPs & ARAPs	Construction sites of MBTs	Review and audit	Weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-
Construction Phase							
- ENR to conduct site specific information sharing session and consultation prior to the commencement of any works. - Ensure that the local communities have access	Documentation of the sharing sessions and consultations ESMP in Arabic	Construction sites	Review and audit	At the beginning of the construction phase then weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
to the ESMP, RPF and subsequent ARAP/RAPs in local language and are aware of the contractors' commitments. - ENR to strengthen the existing GRM system and ensure operationalization of multi-channels project level Grievance Redress Mechanism (GRM) - ENR to ensure dissemination of the GRM to local communities and potential PAPs prior to starting construction activities. - ENR to ensure dissemination of the GRM to local communities and potential PAPs prior to starting construction activities. - Maintain solid documentation for the received complaints during the construction phase and track the level of responsiveness (provision of feedback) .	GRM in place and known to local community						
Provision of information regarding Worker Code of Conduct in local	GRM in place and known to local community	Construction sites	Review and audit	At the beginning of the	Contractor - EAD site inspectors	- EAD - ENR	-

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
language(s) and follow up on compliance. - Encourage the common practice of using local workers as this will reduce the transaction cost and will eliminate the risk of labor influx. - Provision of cultural sensitization training for workers regarding engagement with local community. Share with community and implement the approved GRM at all times during the construction phase and track the level of responsiveness (provision of feedback) .	Number of Complaints Training records			construction phase then weekly	- Independent consultant		
- Develop an occupational health& safety mitigation plan according to the Egyptian legislation and international best practices. - Obtain approval on the developed occupational health& safety plan from ENR prior to starting construction activities. - Implement the occupational health& safety plan during all construction phases.	Occupational Health & safety Plan approved document H&S incidents	Construction sites	Review and audit	At the beginning of the construction phase then weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
Ensure that all workers under both the contactors and the sub-contractors are covered by life insurance against any potential accidents.							
Include clear and explicit measures in the contractors' contract to 1) prohibit labor under 18 years old in the main contract, 2) stipulate that this contract should go to all the sub contract as a binding condition.	Related clauses in the contract	N/A	Review	At the beginning of the construction phase then weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-
- Measures for minimizing dust generation. - Measures for minimizing noise generation (including disallowing ballast sifting at the site). - Proper storage of construction material - Measures for safe disposal of solid waste (including old ballast basalt). - Daily work schedule - Measures to protect work environment - Construction site is closed to the public	Check - Application of dust suppression measures - Application of noise suppression measures - Application of workers' health and safety procedures - Adherence to work schedule - Implementation of solid waste management plan - Complaints of noise, dust or other air pollution recorded and validated	Construction sites	- Health and safety inspection protocol - Review weekly logs of complaints of noise, dust and other air pollution	Weekly	- Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	- Training EAD staff (140,000) - Training EAD site inspectors (290,000) - Institutional capacity building consultant's fees (175,000)

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
- GRM development and implementation	-Number of Complaints	Construction sites	Data analysis	Weekly	Contractor	PMU	_
Strengthening the capacity of the newly assigned social specialists on issues related to land acquisition, citizen engagement and handling grievance	Number of training conducted Number of staff trained Field reports reflecting the learning from the training				ENR		150,000
Construction scheduling to minimize train delays	Adherence to construction schedule	Construction sites	Adherence to schedule	Bi-monthly	- Contractor - EAD site inspectors	- EAD - ENR	_

Table 3, continued

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
Construction Phase, *continued*							
Train re-scheduling during construction work	Revised train schedule announced and applied	Train stations	- Train delays - Passengers' complaints recorded	Bi-monthly	- EAD site inspectors	- EAD - ENR	_
- Alternative means of transportation developed and implemented	Availability and cost of alternative transportation	Selected population centers (e.g.Cairo, Bani-Sweif, Minya, Assuit, Sohag and Qena)	- Transportation cost - Average trip time - Passengers' complaints recorded	Bi-monthly	EAD site inspectors	- EAD - ENR	_
Planning construction work on level crossings to - avoid complete crossing blockage. - concentrate work during times of reduced traffic. - assign alternative crossing routes. - Law enforcement authorities (Traffic Police) should take charge of controlling vehicular and pedestrian traffic flow and preventing illegal track crossings	- Traffic flow across level crossings and their vicinity.	- Selected level crossings and population centers.	Extent of traffic congestion at crossings. Complaints of crossing users and other citizens recorded.	Daily at construction sites	- Contractor - EAD Site Inspectors	- EAD - ENR - Relevant traffic department	_

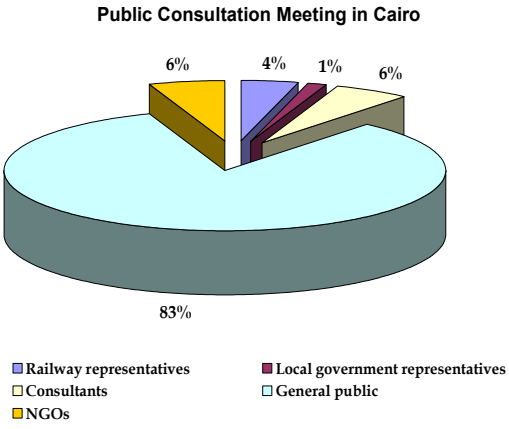
Table 3, continued

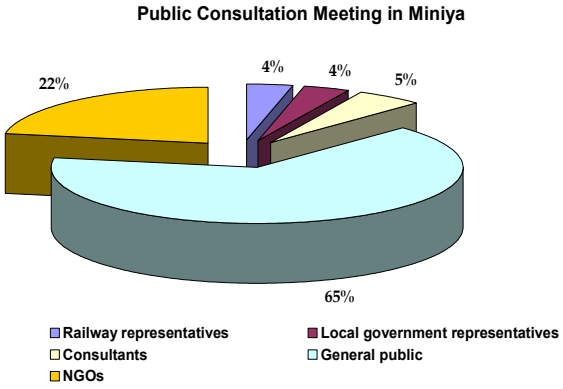
Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
Operation Phase							
Improving control of traffic and pedestrian crossing at level crossings.	Management of traffic and pedestrian crossing at level crossings.	Level crossings along the two project lines	Control and safety aspects	Every three months	EAD	ENR	-
Repair of protective railway corridor walls in densely populated area.	Conditions of railway corridor walls	Densely populated areas along the two project lines	-	Every three months	EAD	ENR	-
Grievance Redress Mechanism Implementation	Number of Complaints	Railway corridor	Data analysis	Daily	ENR	PMU	
A public awareness campaign on railway safety,	Frequency of illegal crossing at formal and informal crossing sites.	Selected sample level crossings and informal crossing sites.	-	Every three months	EAD	ENR	-

1.6 Public Consultation

Two public consultation meetings were held; one in Minya and one in Cairo to discuss the ENRRP and its expected impacts. The two meetings held in Minya and Cairo, were advertised in a major newspaper (Annex 1) and the public at large was invited. Figure 2 shows the attendance structure of these two meetings. Information on the project as well as a summary of the findings of the ESIA was posted on EQI's website for public review prior to the consultation meetings.

An additional public consultation was held in Sohag (63 participants) in October 2017 for the second phase extending Bani Sweif – Assuit line up-to Nag' Hammadi (Annex 1 includes summary of the consultation).





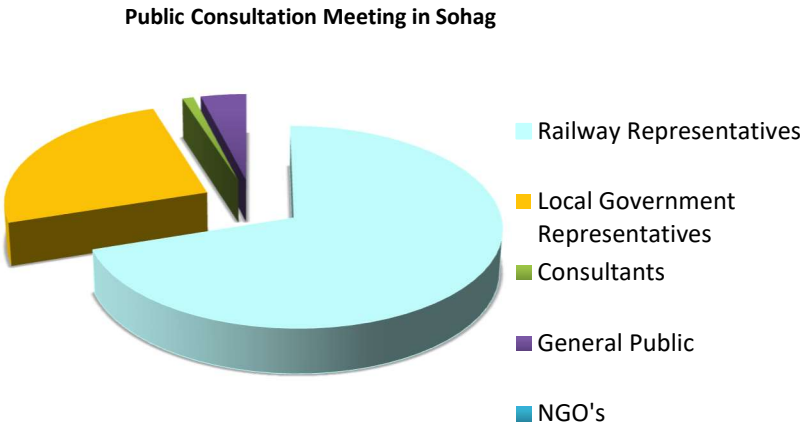


Figure 2. Attendance structure of Public Consultation Meetings held in Cairo (72 attendants), Minya (112 attendants) and Sohag (63 attendants).

The meetings attracted a pool of stakeholders representing different sectors of the society, including social and economic class, gender, and affiliations (Annex 1). Table 4 summarizes main issues and concerns raised during the two public meetings.

Table 4. Summary of concerns and issues raised during the consultation meetings.

Concerns and Issues raised	**Incorporation in the assessment**
Whether proposed modernization of the signaling system would really improve the railway service as other components such the passenger cars, engines and passenger service are in extremely poor conditions	The project was clearly introduced as a part of a larger modernization scheme that will cover all the services of the ENR.
Training of train drivers and operators will be crucial for the proper operation of the new system. Has training been planned as part of the project	ENR representative declared that training on the use and operation of the new system is part of the project.
Construction waste may cause pollution of areas adjacent to the railway corridor, particularly the Ibrahimiya Canal.	Measures to mitigate potential pollution resulting from construction waste have been included in the EIA report.
The duration of the proposed project is not clear. People's willingness to tolerate negative impacts or inconveniences will not continue if these inconveniences remain for too long.	The issue of planning and scheduling construction activities that are expected to have negative impacts has been addressed in the Environmental Management Plan.
Would the project in any way lead to the termination of the service now offered by the slow, third class trains? Are there plans to increase the fares for the generally poor users of these trains?	ENR expert stated that third class trains will not be cancelled, but increasing the fares for passengers using these trains cannot be ruled out.
Will there be an alternative to the train once there is a delay/construction?	Making available some kind of alternative transportation in cases of significant train delay during construction activities has been added as a mitigation measure.
How would the project deal with traffic problems when heavily used level crossings are completely or partly closed due to construction activities.	Mitigation measures to deal with traffic problems have been covered in the mitigation plans.
Construction work on the railway corridor will result in the generation of noise and	Measures to mitigate the potential impacts due to excessive noise and emission of

hazardous fumes that will affect residents close to the work area.	potentially hazardous fumes have been included in the ESIA's mitigation plan.

Table 4, continued

Concerns and Issues raised	**Incorporation in the assessment**
A campaign to raise awareness of train users to reduce the comm. vandalism and theft of train equipment is needed.	A public awareness campaign has been suggested as a component of the EMP.
Train delays due to construction work can be better tolerated if a new train schedule is prepared, with the expected delay included and properly announced to the users.	This issue has been included among the suggested mitigation measures in the EIA.
Additional concerns raised during Sohag's public consultation (more detailed comments and responses are included in Sohag Public Consultation Annex 1)	
There should be an assigned phone number for complaints pertaining to the project and at each of the construction sites.	- Developing a GRM system by the Contractor was included as a mitigation measure in the ESMP - Assessing & Improving the existing GRM system of ENR, has been also included as a mitigation measure in the ESMP - Besides developing the system(s), ENR & the Contractor should clearly inform the community that these systems exist.
Has an environmental & social management planbeen developed for the project? most importantly for the construction phase? Does the plan also consider waste management? In addition to, noise pollution resulting from the traffic control signals? During one past experience, upgrade of Girga railway bore negative health effects on people who were suffering from chest or	This has been addressed in the ESIA study.

respiratory diseases, due to the considerable amounts of dust.	
Is there any type of compensation for damage?	There is generally a system within ENR whereby damages are avoided in the first place by using the land that belong to ENR and giving priority to the land that is free of any occupation and uses. Compensating the damages will depend on the nature of damage, which will be assessed (including compensation where relevant) in more details when the exact locations of the project components are known. The right to submit a complaint will be guaranteed to all affected persons and a robust GRM system will be established for this purpose and disseminated to local communities.

2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The Environmental/Social Impact Assessment for the Egyptian National Railways Restructuring Project is required to meet the legal and regulatory requirements of the Egyptian Environmental Affairs Agency (EEAA), and the World Bank's Operational Policies (OP 4.01) on Environmental Assessment. Furthermore, the Egyptian Government has signed and ratified a number of international conventions on the environment. These conventions are, therefore, considered an integral part of the environmental legislative framework of Egypt.

2.1 Relevant Egyptian Laws and Regulations

The main legal instrument dealing with environmental issues in Egypt is Law number 4 of 1994, commonly known as the Law on Protection of the Environment. The law deals mostly with the protection of the environment against pollution. The Prime Ministerial Decree number 631 of 1982 established the Egyptian Environmental Affairs Agency (EEAA) as the competent body for environmental matters in Egypt. Law number 4 also stipulates the role of the EEAA as the main regulatory agency for environmental matters.

According to Article 1, the legal entity responsible for a given project is required to carry out an assessment of the project's potential impact on the natural and socio-cultural environment before implementing that project. The findings of the assessment are submitted to the Egyptian Environmental Affairs Agency for review and approval before other relevant governmental authorities can issue their permits for implementing the project. According to that article, Environmental Impact Assessment is defined as "studying and analyzing the environmental feasibility of proposed projects whose construction or activities might affect the safety of the environment". For any given project, one of three categories of environmental/social assessment, representing different levels of detail are considered, depending on the nature of the project and the environmental and social settings of its influence area. The Executive Regulations of Law 4 of 1994, also state that "all infrastructure projects …. are among developments subject to environmental impact assessments" and define the requirements for the EIA. Accordingly, and following consultation with EEAA representatives, it was concluded that the ENRRP is treated as a "Category C Project" which requires a full ESIA.

Law 4 of 1994 and its executive regulations define the permissible levels for air quality, water quality, noise, and solid waste management. According to article 1.1 of the Environmental Law number 4 of 1994, environment is defined as: "*The biosphere which encompasses living organisms together with the substances it contains and the air, water and soil that surround*

it, as well as the establishments set up by man". Law 4 of 1994 and its Executive Regulations are, therefore the main legal instrument dealing with environmental issues in Egypt, particularly the protection of the environment from pollution, and preserving it from deterioration. According to that law, environmental pollution, degradation, and protection are defined as follows:

> ***Environmental Pollution:***
>
> *Any change in environmental properties which may result directly or indirectly in harming living organisms or establishments or in affecting the ability of people to lead a normal life.* Article 1.7
>
> ***Environmental Degradation:***
>
> *Effect on the environment that reduces its value, or changes its nature, depletes its resources or harms living organisms or monuments.* Article 1.8
>
> ***Environmental Protection:***
>
> *Protecting and promoting the components of the environment and preventing or reducing their degradation or pollution. These components encompass air, seas, internal waters, including the river Nile, lakes and subterranean water, land, natural protectorates, and other natural resources.* Article 1.9

Other relevant articles of Law number 4 of 1994 are

- Articles 42 of the law and 44 of its executive regulations on maximum permissible noise levels.
- Articles 40 of the law and 42 of its executive regulations on maximum permissible pollution levels resulting from burning fuel.
- Articles 36 of the law and 37 of its executive regulations on maximum permissible pollution levels in exhaust gases.
- Articles 35 of the law and 34 of its executive regulations on maximum permissible levels of pollutants in ambient air.
- Article 43 of the law on the necessary precautions to ensure a safe and healthy work environment.
- Article 32 of the law on handling of hazardous materials.

Other relevant legislations and regulation include several laws and decrees tackled occupational health and safety provisions, namely:

- Minister of Manpower Decree 48/1967
- Law 137/1981: Labour and Workforce Safety,
- Minister of Manpower Decree 55/1983,
- Minister of industry Decree 91/1985 for implementing Law 21/1985,
- Minister of Manpower Decree 116/1991, and
- The Agricultural Law 53 of 1966, which is the main legislation protecting wildlife and specially birds and wildlife.
- The Prime Ministerial Decree 631 of 1982 established the Egyptian Environmental Affairs Agency (EEAA) as the competent body for environmental matters.
- Law 48/1982 on the Protection of the Nile River and the Waterways from Pollution.
- The Law 102 of 1983 concerning Natural Protectorate.
- The Prime Ministerial Decree 1067/1983 designates the Egyptian Environmental Affairs Agency (EEAA) as the authorized administrative body charged with the implementation of law 102 of 1983.

A number of new laws and decrees which are applicable to the additional phase of Assuit – Sohag - Nag' Hammadi, are listed below:

- Amendments of Law 4/1994 by Law 9/2009 and law 105/2015 and its modified Executive regulations.
- Law 12/2003 and its executive regulations, on occupational health and safety.
- Decree 44/2000 on discharge of liquid wastewater
- Law 117/1983 and Law 119/2008 on Antiquities protection

2.2 Relevant World Bank Policies

A project considered for finance by the World Bank is screened to determine the extent of Environmental Assessment it requires. The project is assigned to one of four project categories requiring different levels of environmental assessments, depending on its type, location, and the significance of its potential environmental impacts. As indicated in the

Terms of Reference provided by the Client, the Egyptian National Railway Re-construction Project is considered a Category B project. The environmental assessment studies summarized in this report follow the guidelines stipulated in the World Bank's Operational Policies (OP 4.01) on Environmental Assessment for Category B projects. (OP 4.12) was triggered for the new phase and the prepared RPF covered all the gaps between the requirements of OP 4.12 and the national laws and procedures in Egypt and proposed measures to bridge those gaps. During the course of the project implementation, the RPF should be applied and in case the project requires any land that would result in the loss of assets of livelihoods impacts, a Resettlement Action Plan (ARAP) or and Abbreviated Resettlement Action Plan (ARAP) should be prepared and implemented by ENR as needed in light of OP 4.12 principles and requirements.

In general, ENR does not acquire private land plots for construction of the signaling buildings. Instead, they only use their right-of-way, which is sometimes squatted or rented out for modest fees. However, in some cases there are some uses on the land including tenancy between ENR and individuals. The RPF aims to: 1) ensure that efforts are exerted to avoid occupied land plots to the farthest possible extent; 2) minimize any potential negative impacts on land users and 3) mitigate for any potential asset or livelihoods damage. The RPF entails requirements related to compensating all PAPs for the loss of properties and livelihoods resulting from displacement and resettlement, as well as assisting these PAPs in relocation and rehabilitation. The RPF shall be the key reference for management of land acquisition issues and addressing involuntary resettlement under the project; and in case of discrepancies between the national laws and the requirements of OP 4.12, the latter shall supersede.In addition, due to the nature of the ENRRP activities, the General guidelines on Environmental, Health and Safety Guidelines (EHSGs) in particular the General Guidelines and Sector Guidelines for Construction and Decommissioning should be used as appropriate[1].

[1] See ifc.org/ehsguidelines

2.2.1 Safeguard Policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.0 1)	X	
Natural Habitats (OPBP 4.04)		X
Pest Management (OP 4.09)		X
Cultural Property (OPN 1 1.03, being revised as OP 4.1 1)		X
Involuntary Resettlement (OPBP 4.12)	X	
Indigenous Peoples (OP/BP 4.10)		X
Forests (OP/BP 4.36)		X
Safety of Dams (OPBP 4.37)		X
Projects in Disputed Areas (OP/BP 7.60)'		X
Projects on International Waterways (OP/BP 7.50)		X

Articles of Law number 4 of 1994 are presented below for the different elements of the physical environment, and compared against IFC Requirements (Table 1.7.1 of the IFC General EHS Guidelines).

2.3 Gap Analysis of National Environmental Requirements and IFC Requirements for Key Environmental aspects

Whenever there is a discrepancy between national requirements and international requirements, the international requirements shall be adopted

2.3.1 Air Quality

2.3.1.1 Regulations

Issue	Requirements of Egyptian legislation		Requirements of WB	
	Reference	***Inflections***	***Reference***	***Inflections***
Air Quality	**Article 34 of Law 4/1994** amended by law 9/2009 and **Article 34** of its Executive Regulation (ERs), and Decree 710/2012 Annex 5 of the ERs	Standards of outdoor air pollutants	OP 4.01 IFC GENERAL EHS GUIDELINES	Ensure the environmental sustainability of investment projects Ambient air quality
	Executive regulation and Decree 1095/2011) Annex 6 Table 12	States that it is not allowed using the Asphalt mixing units at a distance less than 500 m away from a residential building.		

2.3.1.2 Standards and limits

Issue	Requirements of Egyptian legislations µg/m³				Requirements of WB µg/m³			
Ambient air parameters	***Ambient air pollutants threshold (Egyptian)***				***Ambient air pollutants threshold According to WHO***			
Exposure period	1 hr	8 hr	24 hr	1 year	1 hr	8 hr	24 hr	1 year
Carbon monoxide CO mg/m³	30	10	N/A	N/A	N/A	N/A	N/A	N/A
Sulfur dioxide SO_2 µg/m³	300	N/A	150	60	N/A	N/A	125	N/A
Nitrogen oxides NO_x µg/m³	300	N/A	150	60	200	N/A	N/A	40
Particulates PM_{10} µg/m³	N/A	N/A	150	70	N/A	N/A	150	70
Particulates $PM_{2.5}$ µg/m³	N/A	N/A	80	50	N/A	N/A	75	35
TSP µg/m³	N/A	N/A	230	125	N/A	N/A	230	80
Ozone	180	120	N/A	N/A	N/A	160	100	N/A

All parameters (are µg/m³) unless otherwise noted. Nm3 is at one atmospheric pressure, 0 degree Celsius;
- N/A = not applicable; NDA = Non-degraded airshed; DA = Degraded airshed (poor air quality); Airshed should be considered as being degraded if nationally legislated air quality standards are exceeded or, in their absence, if WHO Air Quality Guidelines are exceeded significantly;

Max. Emission allowable limit for mix Asphalt units (mg/m³)		
Total VOCs	CO	Total particulate matters
50	500	50

2.3.2 Water Quality

2.3.2.1 Regulations

Issue	Requirements of Egyptian legislations		IFC Requirements	
	Reference	*Inflections*	*Reference*	*Inflections*
Water Quality	**Article 60,** The Executive Regulations of Law 48 for the year 1982	Standards of Ambient water quality of this document	IFC PS3	Ensure the environmental sustainability of investment projects
	Article 61 The Executive Regulations of Law 48 for the year 1982	maximum limits for draining the processed liquid industrial wastes into freshwater bodies and groundwater reservoirs	IFC GENERAL EHS GUIDELINES	Discharges of process wastewater, sanitary wastewater, wastewater from utility operations or storm water to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria
	Ministerial Decree No. 44/2000 Decree amending Law 93/1962	Controlling the discharge of wastewater into the sewage system and public network,	IFC general EHS GUIDELINES	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.
	law 93/1962 and Ministerial Decree No. 44/2000	It encompasses this statement: it must be to acquire the wastewater discharge licenses from the concerned authorities during		

	the construction and operation phase.	
Law 38/1967 and its executive regulations (decree 134/1968)	Concerning cleanliness and sanitation and regulates the collection, transportation, storage and disposal of solid waste.	

2.3.2.2 Standards and Limits for Ambient Water Quality

	P	Requirements of Egyptian legislations (mg/l)
Ambient water quality	C	Not exceeding 100 degrees
	T	500
	T	Five degrees above the average
	D	Not less than 5
	H	Not less than 7 and not exceeding 8.5
	A	Not exceeding 6
	C	Not exceeding 10
	O	Not exceeding 1
	A	Not exceeding 0.5
	N	Grease and oils
	T	Not exceeding 150 and not less than 20
	S	Not exceeding 200
	M	Not exceeding 0.001
	Ir	Not exceeding 1
	M	Not exceeding 0.5
	C	Not exceeding 1
	Zi	Not exceeding 1
	D	Not exceeding 0.5
	N	Not exceeding 45
	Fl	Not exceeding 0.5
	P	Not exceeding 0.02
	A	Not exceeding 0.05
	C	Not exceeding 0.01

	C	Not exceeding 0.05
	C	Not exceeding 0.1
	L	Not exceeding 0.05

2.3.2.3 Standards and Limits for discharge of liquid industrial effluent into freshwater bodies

Issue	parameters	Effluent threshold (Egyptian requirements)		Effluent pollutants threshold (IFC requirements)
		The Nile river from the borders of South Egypt till the Delta Barrages	The Nile branch , Rayahat, Canals and Groundwater Reservoirs	
Water Effluent discharge	pH	6 – 9 pH	6 – 9 pH	6 – 9 pH
	Color	Free from colored substances	Free from colored substances	N/A
	Chemically consumed oxygen(Permanganate)	15	10	N/A
	Absorbed biotic oxygen	30	20	N/A
	TSS	30	30	50
	TDS	1200	800	N/A

Oil and grease	5	5	10
Oils, greases and resinsPhosphate (non-organic)	1	1	N/A
Total residual chlorine	N/A	N/A	0.2
Copper (Cu)	1.0	1.0	0.5
Iron (Fe)	1.0	1.0	1.0
Zinc (Zn)	1.0	1.0	1.0
Manganese	0.5	0.5	N/A
Silver	0.5	0.5	N/A
Detergent	0.05	0.05	N/A
Chromium – Total (Cr)*	0.05	0.05	0.5
Lead (Pb)*	0.05	0.05	0.5
Cadmium (Cd)*	0.01	0.01	0.1
Mercury (Hg)*	0.001	0.001	0.005
Arsenic (As)*	0.05	0.05	0.5

	Heavy metals group a for all stared ones	1	1	
	Sulfides	1	1	-
	Temperature increase by thermal discharge from cooling system	Effluent temperature should not exceed 35 °C	Effluent temperature should not exceed 35 °C	Water temperature increase < 3 °C *
All parameters are in (mg/m3) unless otherwise noted ***: At the edge of a scientifically established mixing zone**				

2.3.3 Noise

2.3.3.1 Regulations

	(Egyptian requirements)		**(IFC requirements)**	
	Article	Inflections	Reference	Inflections
Noise	**Article 42** of Law 4/1994 amended by law 9/2009 and **Article44** of ERs (amended by Decree 1095/2011 amended by Decree 710/2012).	Maximum allowable limits for ambient noise intensity	OP 4.01	Ensure the environmental sustainability of investment projects

		Maximum exposure duration		
			IFC GENERAL EHS GUIDELINES Table 1.7.1 Table 2.3.1	Maximum increase in background nearest receptor location off-site. Noise limits for different working environments are provided

2.3.3.2 Standards and Limits for Ambient Noise

	Egyptian Law 4 Requirements				IFC Requirements		
		Permissible limit for noise intensity decibel			Receptor	One hour L_{Aeq}(dBA)	
Noise	TYPE OF AREA	DAY 7 a.m. to 10 p.m.	NIGHT 10 p.m. to 7 a.m.			Day time From 10 pm to 7 am	night time from 22: 00-7:00
	Sensitive Areas (schools-hospitals- public parks- rural areas)	50	40		Residential	55	45

	Residential areas in with limited traffic and public services are available	55	45		Industrial	70	70
	Residential areas in the city where commercial activities are available	60	50				
	Residential areas located adjacent to roads which width is less than 12m, and workshops or commercial or entertainments activities are found	65	55				
	Areas located adjacent to roads which width is 12m or more, or light industrial areas.	70	60				
	Industrial areas (heavy industries)	70	70				

2.3.3.3 Standards and Limits for Noise Levels in the Work Environment

	Egyptian Law 4 Requirements				**IFC Requirements**	
Noise	TYPE OF PLACE AND ACTIVITY	MAXIMUM PERMISSIBLE NOISE [level equivalent to decibel (A)]		Location /activity	Equivalent level LAeq,8h	Maximum LAmax,fast

Work place with up to 8 hour shifts and aiming to limit noise hazards on sense of hearing*	85	Heavy Industry (no demand for oral communication)	85 dB(A)	110 dB(A)
Hospitals, clinics, public offices, etc	45	Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
Administrative offices – control rooms	65	Open offices, control rooms, service counters or similar	45-50 dB(A)	N/A
Work rooms for computers, typwriters or similar equipment	65	Individual offices (no disturbing noise)	40-45 dB(A)	N/A
Work rooms for activities requiring routine mental concentration	60	Hospitals	30-35 dB(A)	40 dB(A)

*: If the measured noise at the workplace increased over the maximum allowable limit by 3 dBA, the exposure period shall be reduced to half of the exposure period. In addition, wearing proper ear muffs is a must.
Noise level at any time at the work place shall not exceed 135 dBA
Noise shall be measured inside working environment in LAeq unit in accordance with ISO 9612/ ISO 1996 or Egyptian standards

2.3.4 Land and livelihoods related laws and procedures:

This is explained in full details in the RPF

Biodiversity

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

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

Work Environment

Several laws and decrees tackle occupational health and safety provisions at the work place. These laws and decrees apply to the work crew that will be involved in different construction activities. The following laws and decrees should be considered:

- Minister of Manpower Decree 48/1967.
- Law 137/1981: Labour and Workforce Safety.
- Minister of Manpower Decree 55/1983.
- Minister of industry Decree 91/1985 for implementing Law 21/1985.
- Minister of Manpower Decree 116/1991.
- Article 43 of Law number 4 on the necessary precautions to ensure a safe and healthy work environment.

Waste Management

Law number 38 of 1967 amended by Law number 31 of 1976 and Law number 4 of 1994 on public cleanliness and collection and disposal of solid waste control the collection and disposal of solid waste. Article 32 of the law provides the regulatory framework for the handling of hazardous materials, including hazardous waste.

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

- International Plant Protection Convention (Rome 1951). The convention includes measures for the protection of natural vegetation cover.
- African Convention on the Conservation of Nature and Natural Resources (Algeria 1968) including threatened species of plants and animals and their natural habitats.
- Convention on Wetlands of International Importance Especially as Waterfowl Habitats (Ramsar, 1971). The convention identifies wetlands of international importance for resident and migratory birds. Some of the northern Delta lakes are among the wetland areas identified in the convention.
- UNESCO Convention for the Protection of the World Cultural and Natural Heritage (Paris, 16 November 1972) including archeological sites.
- Convention for the Protection of Migratory Species of Wild Animals (Bonn, 1979). The convention covers migratory bird flights across Egypt in autumn and spring.
- Protocol Concerning Mediterranean Specially Protected Areas and Biological Diversity Convention (1992).
- United Nations framework convention on climate change (New York 1992). The convention covers measures to control greenhouse gas emissions from different sources including transportation.
- Convention on biological diversity (Rio de Janeiro 1992), which covers the conservation of habitats, animal and plant species, and intraspecific diversity.

Land Acquisition:

A Resettlement Policy Framework (RPF) has been prepared in accordance with the principles of the Bank OP 4.12. The RPF also looked in details at the legal and administrative aspects related to land acquisition as per the national law in Egypt (including ENR internal procedures.

2.3 Administrative framework

The Egyptian National Railways (ENR) is the legal entity responsible for all aspects of the design and implementation of the project and the subsequent operation of the modernized

signaling system and the new track sectors. Environmental aspects of the project, including the implementation of the legally required environmental management and mitigation plans will the responsibility of the yet to be created Environmental Affairs Directorate (EAD) of the ENR. The EAD has already been set up & it was locally approved by the ENR. It is already practicing its tasks but still needs the final approval from the organization and management affairs.

According to Law number 4 of 1994, the ESIA report should be submitted by the legal entity responsible for the project (ENR) to the Egyptian Environmental Affairs Agency for review and approval by before the ENR can proceeds with the construction activities of the project. The EEAA may require some revisions in the ESIA report, including additional mitigation measures before issuing the approval of the report. It should be noted that once the ESIA has been approved, the mitigation plan as presented in the report will be considered an integral part of the project and the ENR will be legally responsible for the implementation of that plan.

Although most of the expected construction activities of the project will take place within the railway corridor and will not require prior permits from other authorities outside the ENR, work at level crossings may entail some traffic detours that will require coordination with relevant local authorities, particularly local Traffic Police of different governorates.

3.0 PROJECT OBJECTIVES AND DESCRIPTION

3.1 Background

The railroad system was established in Egypt in 1852 and has since played a major role in transporting passengers and cargo throughout Egypt. Statistics for 2007 shows that Egypt has 135,000 km of tracks covering a distance of 9,528 km. There are 28 railway lines, 1,800 trains and 796 passenger stations. Railway lines transport an average of 60,000 million passengers/km per annum. The railway system also provides cargo services and transports 4,500 million ton/km per annum.[2]

The railway system of Egypt is operated by the Egyptian National Railways (ENR), a public authority under the Ministry of Transport. The network is very densely used, averaging around 11 million traffic units per km of line.

At the present time, the entire railway network is covered with a microwave telecommunication system allowing voice communications between dispatchers (located in ten regional traffic control centres) and train drivers, and between regional offices and the headquarters in Cairo. An electric color-light, Automatic Block Signaling System is installed on the following lines:

- Cairo/Alexandria (208 Km, installed in 1980 and 1987).
- Giza/Beni Suef (125 Km, installed in 1990).
- Cairo/Giza/Bortos (31 Km, installed in 1984).
- Asyut/Sohag (90Km, installed in 1962 and modified for double track in 1990).
- El Manashi/Etay El Baroud (122Km, installed in 1986.
- Abu Qir line (19Km, installed in 1988).
- Kobri El Limoun/El Tawdeeb (5Km, installed in 1998).
- Qaliub/Shibin El Qanater (18Km, EIS system, under construction).

While most of the network operates by outdated mechanical traffic control systems, the following lines are equipped with Central Traffic Control systems:

- Cairo/Qaluib.
- Qaluib/Benha.
- Cairo/Giza/Bortos.
- El Manashi/Etay El Baroud.

[2] Year Book (2007), Egypt State Information Service.

- Giza/Beni Suef.

ENR is currently developing a 2007 to 2011 modernization investment program, which will finance improvement of signalling 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 modernization scheme covered by this EIA is based on the recommendations of that strategy.

Within the framework of that scheme, a project for the modernization of the Bani Sweif – Assuit and an additional phase from Assuit – Nag' Hammadi signalling system has been proposed and is herein covered by this ESIA. The project includes introducing a modern, Solid State, Electronic Interlocking System (EIS) designed in modular systems to replace the existing mechanical system (Figure 3). It also includes a Central Traffic Management Center in Minya and the introduction of a new telecommunication system with optic fiber transmission network to link the CTC tower with secondary towers along the line. The new setup will include a computerized train tracking system, capable of tracking train by number, type, location, and speed and detecting delays and operation malfunctions.

Figure 3. Existing interlocking mechanical system

The new phase of Assiut – Sohag – Nag' Hammadi is approximately 170 km linking three governorates Assuit, Sohag and Qena; which will include the construction of one CTC in Sohag and 16 MTBs along the train corridor. The location for the CTC has been identified and land has been allocated. However, the locations are yet to be identified for the 16 MTBs.

This project is expected to considerably improve the safety of operation of the Cairo – High Dam Line and is expected to reduce accidents caused by human error or failure of the existing, outdated signaling system now in use at certain sectors of that line. It is also expected to allow a much safer operation of the large number of level crossings along this line.

The project covers the following basic elements of the signalling systems (Annex 2):

a) Automatic block signaling system.

b) Remote control of signaling equipment.

c) Electronic Interlocking Systems.

d) Level crossing protection system.

e) Assembling of Cables and cabling equipment related with all signaling and telecommunication systems.

f) CTC computer based Command Center.

g) Diagnosis systems for all components.

h) Complete power supply system with SCADA (*Supervisory Control And Data Acquisition)* management system.

i) Training of operation and maintenance staff,

The computer based CTC will provide the main functions of command and monitoring, evaluation, presentation of train graph, information event recording system, dispatcher communication system, uninterrupted power supply, etc. The Local Command Console functions in main stations, which will include command of signals, switches, shunting activities, etc. and will interface with the CTC, will be also provided. The new, computerized facility will be provided with proper, automated, back-up systems. Energy of CTC and stations shall be provided from two independent sources. In case of interruption of the main power system, CTC and stations (vital functions) shall be fed by uninterrupted power source over buffer charged accumulators that can give steady energy. Energy of signal equipment between stations will be provided from uninterrupted power source.

The system will also include the modernization of automated counter flow junctions and signaling. It is expected that locations for 14 of these counter flow interlockings will be selected for the final design of the system.

The system will also include the automation of level crossings (Annex 3) to enhance the safe and efficient operation of these vital elements of the railway line. This will include the introduction of automatic, visual and audio signaling and gate operation. The automated level crossing systems will also include the introduction of automatic train approach control systems. Heads of existing signal lights will be also be replaced with new heads that are visible at larger distances. Signaling system, protection systems in level crossings, train and security brake systems to be established will be in conformity with 160 km/hour train speed. Figure 4 shows one of the main level crossings of Sohag at midday.

This project, however, does not include the introduction of an Automatic Train Protection (ATP) system, the role of which is to ensure train drivers respect the indications given by way-side signals, which will be installed as a separate project.

Communication and power cables will run parallel to the tracks and no less than two meter on either side. The cables will be placed at least one meter below the ground surface. The process for laying the cables will be largely automated and highly efficient requiring only limited interruption in the operation of the line and its facilities.

The following concepts and main requirements will be used for the elaboration of the preparation of the functional specifications and the preliminary design of the signaling system on Bani Sweif – Assuit and the additional phase from Assuit – Nag' Hammadi line:

- Signaling system, protection systems in level crossings, train and security brake systems to be established will be in conformity with 160 km/hour train speed;
- Signal system will be SSI (Solid State Interlocking) and will be designed in modular systems;
- CTC center and Local Command Console functions (command and monitoring, evaluation, presentation of train graph, information event recording system, dispatcher communication system, uninterrupted power supply, etc.);
- Main characteristics of track circuits (type of track circuits to be used, ballast impedance, detection of complete section rail broken) and of switch engines (mode of connection to interlocking to provide a safe locking, type of operating energy, manual operation included, etc.);
- Main characteristics of protection system of level crossing (UIC 760, 761, 762 standards, adjustable and synchronous informing time to be maintained according to

train speed and / or train existence, lighted and noised warning devices to be used in all level crossing protection systems, for level crossings determined by ENR barrier handled protection devices to be used, etc.);

- Energy of signal equipment between stations will be provided from uninterrupted power source;
- Energy of CTC and stations shall be provided from two independent sources. In case of interruption of the main power system, CTC and stations (vital functions) shall be fed by uninterrupted power source over buffer charged accumulators that can give steady energy
- Safety level shall be SIL 4 (Safety Integrity Level 4) as defined in IEC 61508 standard or equivalent. The safety level must be in the range of 1EXP9 hours for a MTBH (Mean Time Between Hazards);
- Main characteristics of communication cables (fiber optic option to be evaluated) and of signal cables will be described;
- Transmission and communication systems main characteristics to provide voice and data transmission on fiber-optic cable for telecommunication and signaling installations and computer systems;

Diagnosis system for controlling the status of all components and reporting to the maintenance center;In addition to basic components of the new signaling system, such as power cables, optic fibers, automatic inter-lockings, light signals, etc. a variety of standard construction material will be utilized at construction sited. The construction of the CTC facility in Minya and the dispatchers towers and blocks along the line will require the on-site storage of construction material. The quantity of construction material to be delivered to and/or stored at a given construction site is difficult to estimate on the basis of the information available from the client at this stage of the project. Considering the generally small sizes of the buildings involved (or the renovation of existing ones), it is expected that such construction material will not constitute a factor that is likely to have any significant impact.

Similarly, construction waste is expected to be minimal in view of the nature of the work involved. According to the ENR engineers and the consultant responsible for the design of the signaling system, most of the excavated dirt during the process of construction of the power and communication cable trenches will be used for backfilling. The remaining part is expected to be removed by the contractor and disposed of at the official dump sites nearest to the construction site. The route and site for final disposal of construction waste will depend

on the location of the construction site and the type of transportation used for moving that waste.

As train speed is expected to increase following the replacement of the old tracks, passing trains may represent a more significant hazard to the large number of people who habitually cross the tracks illegally. This is particularly true at the old track sections where trains have run at very slow speeds for many years.

Government development plans are not expected to affect the spatial relationships of the railway corridor in these very old sections of the Nile Valley[3] and the present-day land use patterns are not expected to change in the foreseeable future. Future horizontal expansion of urban centers in the Nile Valley, with possible encroachment on the railway corridor is unlikely in view of the current government policies of prohibiting construction on agricultural land. However, population growth is likely to continue, resulting in considerable vertical expansion that will turn many of the small villages into densely populated urban centers.

3.2 Additional services, land and development requirements

According to documents provided by the client, the project does not require significant additional infrastructure services such as water, electricity, or emergency services. New and independent sources of electricity for the automation of the signaling system have been designed into the signaling modernization scheme. Backup power generation facilities have also been included in the design. All elements of the project will be constructed on land own by ENR and within the railway track corridors or yards. In most of the cases, the land owned by ENR is free of occupations and this is that type of land that ENR usually give priority to select for CTC and the MTBs. In the meantime, some of the land owned by ENR are rented to individuals as means for supporting local farmers and to generate revenue. The land with uses should be avoided to the maximum possible in selecting the location of the CTC and the MTBs. If this is not a technically feasible option, that appropriate resettlement instrument as needed (RAP/ARAP) should be prepared in light with the prepared and disclosed RPF. The project does not require any new land acquisition for the operation activities. Similarly, no additional developments are required as a consequence of the project.

[3] General Organization for Physical Planning.

Figure 4. Level crossing in Sohag: a) Level crossing open b) level crossing gradually closing And c) level crossing completely closed.

4.0 BASELINE DATA

4.1 Geographical scope

This component of the ENRRP covers the replacement of the train signaling system of the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section of the Cairo – High Dam Railway Line. The line serves all Upper Egypt governorates passing through virtually all its towns, large and small and the great majority of its villages. The line runs in the Nile Valley west of the Nile River up to Nag' Hammadi, where it crosses to the eastern side of the river where it runs up to its terminal station in Aswan.

Table 9 shows governorates and main towns along the Cairo - High Dam Line and those along the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section of the line where project construction activities are expected to take place. Figure 5 shows the geographical location of the Cairo – High Dam railway line and the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section where the project will be implemented. Figure 6 shows details of the geographical relations of the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section.

The Bani Sweif to Assuit section of the Cairo - High Dam Line extends for a total of 165 km linking the three Middle Egypt governorates of Bani Sweif, Minya and Assuit. (Fig. 5). Throughout most of its route, the line runs parallel to the Cairo – Upper Egypt Rural Highway (Agricultural Highway) and across the Ibrahimiya Canal. It passes by numerous villages and other small, rural settlements.

On the other hand, the Assuit to Nag' Hammadi section of the Cairo – High Dam Line extends for a total of approximately 170 km linking three governorates Assuit, Sohag and Qena.

Table 9. Governorates and main towns linked by the Cairo – High Dam railway line. Towns along the Bani Sweif – Assuit and additional phase from Assuit to Nag' Hammadi section of the line where project construction activities are expected to take place are shown in bold letters.

Governorate	Main Towns
Cairo	--
Giza	El Giza, El Badrashin, El Saff, El Ayyat, Embaba, Atfih, Ossim, Kirdasa, El Hawmdiya, El Fashn.
Bani Sweif	**El Wasta, Bani Sweif, Beba, El Fashn**
El Minya	**Maghagha, Bani Mazar, Samalut, El Minya, Abu Qurqas, Mallawy**
Assuit	**Dairut, Manfalut, Assuit**, Abu Tig
Sohag	Tahta, Sohag, Girga, El Baliena
Qena	Nag' Hammadi , Dishna, Qena, Qoos

Luxor	Luxor
Aswan	Idfu, Kom Umbo, Aswan

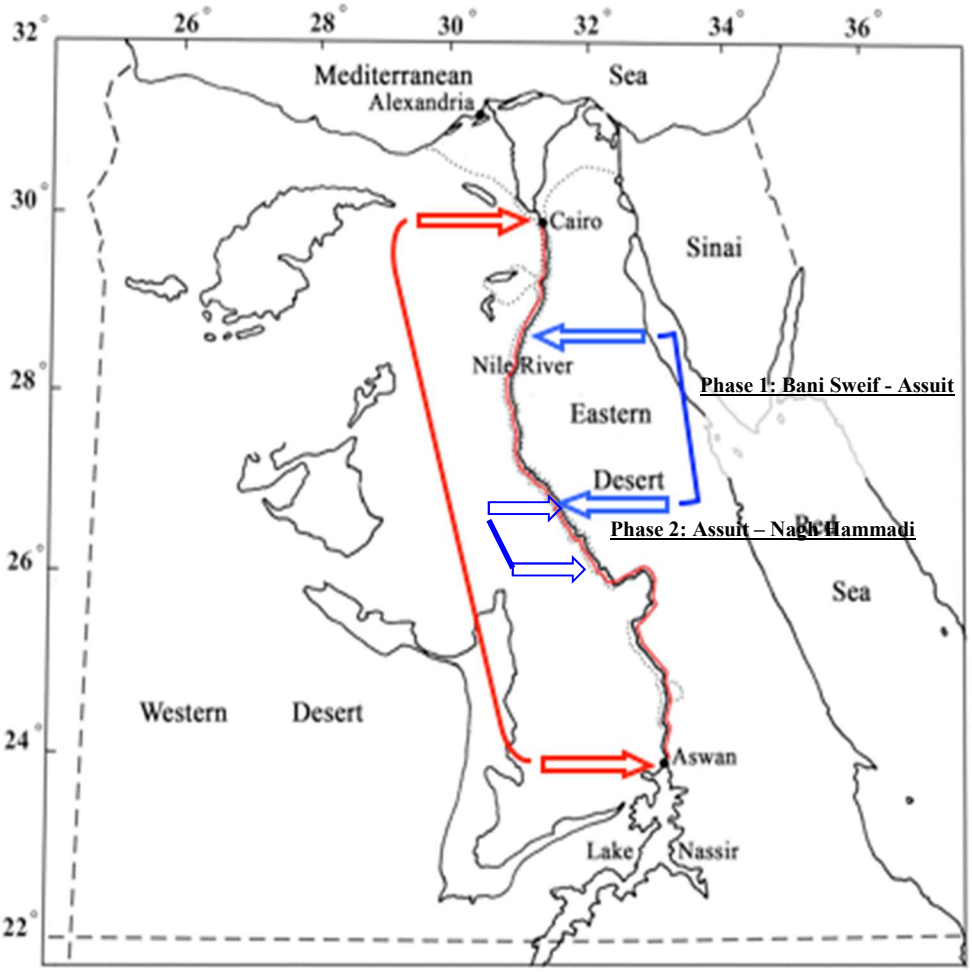


Figure 5. Geographical location of the Cairo – High Dam railway line showing main population centers serviced by the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section of the line.

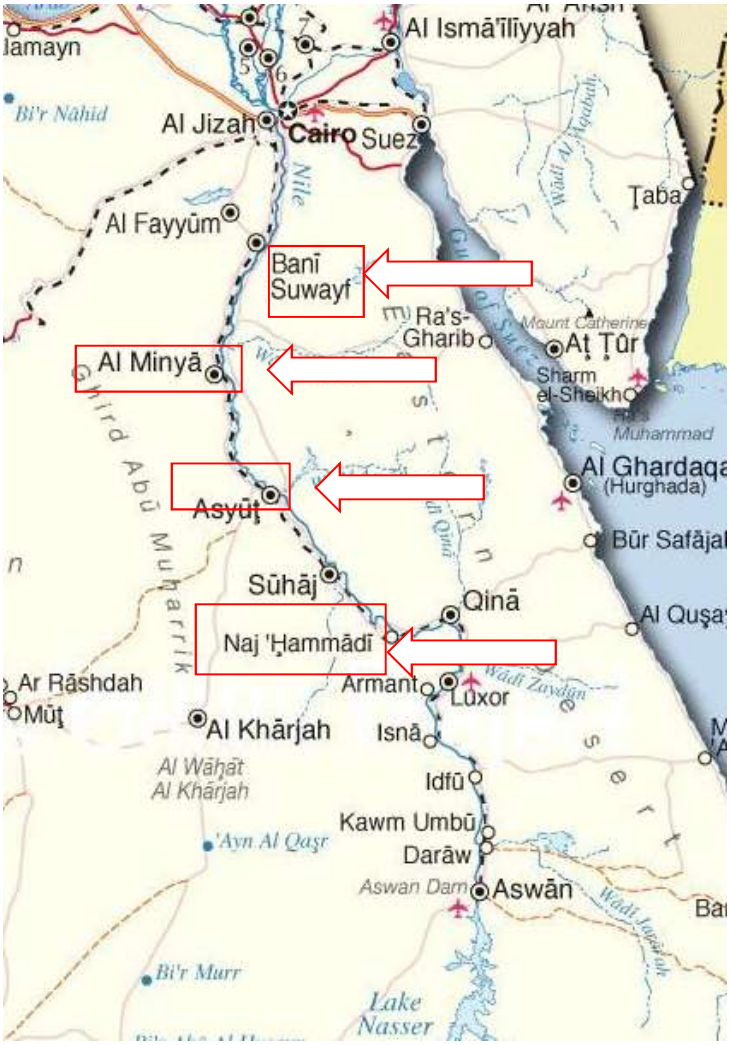


Figure 6. Details of the geographical relations of the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section.

4.2 The Physical and Biological Setting

The project will be undertaken in the intensively cultivated, densely populated Nile Valley, one of most densely populated regions in the world. The narrow flood plain of the Nile River constitutes a typical riverine oasis in the extremely arid region of eastern Sahara. The area has been settled since prehistoric times and its natural ecology has been almost totally obliterated by thousands of years of human activities. Agriculture and its associated irrigation and drainage infrastructure, as well as the great variety of life support systems and facilities for its multi-million inhabitants have created man-made ecosystems that have been in place for thousands of years. It should be mentioned that Since the project extends over 170 km, the feasibility of updating some baseline data within the time scope available for the assessment was deemed difficult. Hence, and particularly for noise level, the worst case of an ambient noise level of 45 dB (relatively low value) is assumed when assessing the impacts. The following are the main features of the physical and biological setting of that region.

4.2.1 Geomorphology

South of the large and intensively cultivated Nile Delta, the present-day flood plain of the Nile River, which is generally known as Upper Egypt, becomes very narrow, particularly on the eastern side, where the river washes the feet of the sedimentary hills of the Eastern Desert in places. The average width of the Nile Valley is only about 10 km. That narrow flood plain is bordered on its eastern side by a tableland of limestone from Cairo to Esna, and sandstone from Esna to Aswan (Fig. 7). In the recent geological past the river appears to have been larger and much more vigorous as evident in the larger terraces marking the considerably larger flood plain of that ancient river. The present-day flood plain is covered with Nile sediments and is intensively cultivated.

Throughout the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi section of the Nile Valley, most of the villages, towns and cultivated land are located west of the river. Only recently have patches of land on the eastern side of the river been cultivated. Urban centers that have been located on the western bank of the river in that part of the valley for millennia are now extending across the river to the eastern bank. New urban communities such as New Bani Sweif, New Minya, New Assuit, New Sohag and New Qena are the eastern extensions of the ancient urban centers on the west bank.

4.2.2 Climate

Climate of Egypt is mostly hyper-arid, with the exception of coastal areas, which enjoy a slightly milder, arid climate due to the maritime effect of the Mediterranean Sea. Precipitation rate 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 province

Figure 7. A Landsat Imagery showing main topographic features of the Nile Valley and adjacent desert covering the Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi sector.

The temperature regime in Egypt is governed mainly by the latitudinal location and the maritime effect of the Mediterranean and the Red Sea. Summer is generally hot (mean of the hottest month between 20 and 30˚ C), or very hot (mean of the hottest month more than 30˚ C). Winter is either warm (mean of the coldest month between 20 and 30˚ C), or mild (mean minimum of the coldest month of 10-20˚ C) except on the highlands where the winter is cool with a mean minimum of the coldest month between 0 and 10˚ C. The coldest month is between December and February, and the hottest month is between June and August in hyper-arid provinces.

Relative humidity is controlled mainly by the relative proximity to the Mediterranean and the Red Sea. The lowest records are those of inland locations of the arid and hyper-arid provinces and the highest are those of locations closer to the Mediterranean coast and the Nile Delta within the arid province. The lowest records of relative humidity are generally those of late spring whereas the highest records are those of late autumn and early winter.

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 (*Khamasin*). 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 evaporative power of the air in the hyper-arid provinces of Egypt varies in January from 3.6-7.9 mm/day and in June from 14.0-24.3 mm/day.

4.2.3 Noise

Maximum permissible limits of sound intensity are given in the Executive Regulations of Law number 4 of 1994 and are discussed in Chapter 2 of this report. According to these regulations, noise intensity during an eight-hour work shift should not exceed 90 decibels. Intermittent noise levels louder than that level is permissible for specified periods of time. Article 42 of the Law 4 of 1994 requires that all organisations and individuals to maintain emanating sounds from different operating machinery or other sources below the permissible

limits. Licensing authorities are to ensure that in a given area, the overall emanated sounds from fixed sources are within the allowable limits. In addition, licensing authorities are to ensure that machinery and equipments selected by establishments fulfil the law's requirements.

With the greatly varied physical setting, background noise level along the Bani Sweif –Assuit and additional phase from Assuit – Nag' Hammadi railway corridor is expected to vary considerably. Noise levels are also expected to vary at different times of day as a result of variation of levels and types of human activities. Due to the lack of comprehensive data on baseline conditions regarding noise levels in the project area, permissible noise standards given in the Egyptian legislations will be used as basis for comparing present and potential, project-induced changes in noise levels. Although this limits the level of certainty regarding predicted impacts of the project on noise level, it provides a reasonable, albeit qualitative assessment of potential noise impact of the project and its activities during the construction phase.

For the operation phase, a study on railway noise in the city of Assuit[4], noise measurements showed that the noise generated by passing trains exceed the acceptable levels set by Egyptian noise standards of Law number 4 of 1994 and its executive regulations. The study showed, however, that railway is the second significant source of noise in that city, with road traffic being the most significant source of noise. Sound levels as high as 80 dB and higher were recorded in residential areas during train passage. According to that study, 51.3% of dwellers of Assuit heard railway noise. Sixty seven percent of those who heard railway noise felt highly annoyed.

4.2.4 Air Quality

The Executive Regulations of Law 4 of 1994 defines the national air quality standards for outdoor air in terms of maximum permissible limits of air pollutants and exposure period. These standards are reviewed and discussed in Chapter 2 of this report. Air pollution levels are expected to vary considerably from one place to another along the railway corridor which runs through the highly diverse settings of the Nile Valley. No comprehensive statistics is available on the background levels of the air pollutants along the railway lines covered in this project or its adjacent population centers. Similar to the situation with noise baseline data, the present assessment will only provide a qualitative evaluation of the impact of the project on air quality in comparison with the relevant national air quality standards.

[4] S. A. Ali. 2005. Railway noise levels, annoyance and countermeasures in Assiut, Egypt. Applied Acoustics 66, 105-113.

4.2.5 Soil and Ground Water pollution

Both Law 4/1994 and Laws 48 of 1982 provide specific stipulations regarding soil and groundwater contamination with the objective of preventing pollution of superficial and deep ground water resource as well as soil. No data is available on the extent of soil and ground water contamination in the project area. However, the well known extensive use of pesticides, chemical fertilizers and other agrochemicals, as well as the great variety of poorly maintained industrial operations in the area, and the lack of domestic waste water treatment and disposal throughout most of the area makes it likely that considerable soil and water pollution occurs.

4.2.6 Biodiversity

Pristine natural habitats do not exist in most of the areas of the Nile Valley, including those covered in this project. Nevertheless, cultivated areas and even urban areas of the valley support considerable wildlife. Several species of mammals, birds and reptiles have successfully adapted to living in close proximity of man and his activities in these densely populated areas. Annex 4 shows lists of common wild mammals, birds, reptiles and amphibians of the Nile Valley. Wild flora occurs as weeds in cultivated fields and grows spontaneously in a great variety on banks of irrigation and drainage canals and at the edges of the railway embankment. Annex 5 shows a list of common wild plants seen in the vicinity of the railway corridor in the Nile Valley.

The railway track corridor of Upper Egypt has been in place for more than a century and is already part of the man-made landscape of the Nile Valley. 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.

Breeding colonies of the once declining, but now very common Cattle Egret (*Egretta ibis*) are found at several localities along the Ibrahimiya Canal, not far from the railway corridor. Many other bird species feed in habitats associated with that canal and the adjacent cultivated fields. Among the more visible bird species are the Spur-winged Plover, the Pied Kingfisher, the Common Kestrel, the Black-shouldered Kite and Palm Dove. Mammals include several rodents, the Egyptian Red Fox, the Egyptian Mongoose, and the Egyptian Wolf. Reptiles include the Bean Skink, the African Beauty Snake, the Egyptian Cobra and others.

Figure 8. Existing Flora along the train corridor between Assiut and Nag' Hammadi

4.3 The Socio-economic setting

Egypt is administratively divided into twenty-six governorates in addition to the City of Luxor which is given a special administrative status similar to that of a governorate. Each governorate is further divided into a number of Administrative Centers "Marakez"[5]. Egypt has a total of 180 of these Administrative Centers, 213 Cities, 74 Neighborhoods and 4,632 Villages[6]. A governorate is either fully urban or a mixture of urban and rural. Fully urban

[5] Earth Trends Country Profiles (2003), Population, Health and Human Well Being - Egypt

[6] Year Book (2007) Egypt State Information Service.

governorates have no Administrative Centers and are administratively comprised of Cities only[7]. Egypt has four urban governorates, which are Cairo, Alexandria, Port Said and Suez[8].

4.3.1 Socio-economic profile of the project area

The Cairo – High Dam railway line runs through the densely populated Nile Valley in Upper Egypt. Socioeconomic features of the influence area of the project vary considerably along that long stretch of the valley. Communities inhabiting that area include affluent communities of high economic sectors of Cairo and Giza, as well as poorest of the poor of the Egyptian society in informal urban areas and in remote villages of Upper Egypt. The greatest part of the railway corridor runs through rural areas where the main economic activity is agriculture. A great variety of crops are cultivated in that part of the valley but the most common are wheat, corn, cotton, and vegetables, as well as groves of citrus and other fruit trees. The line also cuts through urban areas with more diverse economic activities.

The line provides a railway linkage for ten governorates with a total human population of more than 41 millions, a little more than one half of whom lives in urban areas. Table 9 shows the governorates transected by this line and the size of their urban and rural populations. The line represents the most important transportation service for passengers including tourists traveling archeological attractions of Upper Egypt. The line is also a key transportation artery for cargo within Upper Egypt and between Upper Egypt and Cairo.

The Bani Sweif – Assuit and additional phase from Assuit – Nag' Hammadi sector of the Cairo – High Dam railway line passes through five governorates in the middle sector of Upper Egypt (Table 10). The socioeconomic settings of these five governorates are covered in some detail in Annex 6.

Areas around the main train station in larger towns are usually the local hubs of economic activities. Some of the businesses in these areas are directly dependent on the operation of the railway service (such as local passenger transportation, restaurants, coffee shops, etc.). Others benefit from high demands for goods and services created by the movement of the large number of train users who frequent the train station area.

The railway corridor is walled within urban areas, allowing vehicular traffic and pedestrian crossing through level crossings that have different degrees of traffic control measures. These level crossings invariably form traffic bottlenecks, particularly in larger, more crowded area.

7 Information and Decision Support Center (2006), Concept for Urban and Rural: Between International and Local definitions.

Informal crossings created by breaching the protective walls are extremely common and create a major hazard to its users and the passing trains.

Table 5: Governorates and Administrative Centers (Markaz) linked by the Cairo – High Dam railway line.

Governorate	Markaz
Cairo	--
Giza	El Giza, El Badrashin, El Saff, El Ayyat, Embaba, Atfih, Ossim, Kirdasa, El Hawmdiya, El Fashn.
Bani Sweif	El Wasta, Bani Sweif, Beba, El Fashn
El Minya	Maghagha, Bani Mazar, Samalute, El Minya, Abu Qurqas, Mallawy
Asusuit	Dairut, Manfalut, Assuit, Abu Tig
Sohag	Tahta, Sohag, Girga, El Baliena
Qena	Nag' Hammadi, Dishna, Qena, Qoos
Luxor	Luxor
Aswan	Idfu, Kom Umbo, Aswan

Table 6: Governorates serviced by the Cairo – High Dam railway line and the size of their urban and rural populations.

Governorate	Urban	Rural	Total
Cairo	7,786,640		7,786,640
Giza	3,676,034	2,596,953	8,869,524
Bani Sweif	5,232,539	1,757,988	6,990,527
Fayoum	564,596	1,948,196	2,512,792
Minya	787	3,392,728	3,393,515
Assuit	906,864	2,534,733	3,441,597
Sohag	801,360	2,945,017	3,746,377
Qena	643,097	2,358,397	3,001,494
Aswan	502,863	681,579	1,184,442
Luxor	213,819	237,499	451,318
Total	**20,328,599**	**18,453,090**	**41,378,226**

4.3.2 Land Allocation for the CTC in Sohag

As mentioned in the Project Description section, land has been selected and allocated for the CTC planned to be built in Sohag. The land is completely empty with no current formal or informal uses (Figure 9). In addition to the CTC, the land will also host a warehouse and a workshop. The land has been previously used by the Ministry of Petroleum and hosts an old oil storage tank and a few empty buildings (Figure 10). There no plans to demolish the existing storage tank and buildings but rather to reuse them where possible. As part of ENR

responsibility, they should promptly work to protect the land and prevent any potential future illegal uses that could result in any unnecessary claims in the future.

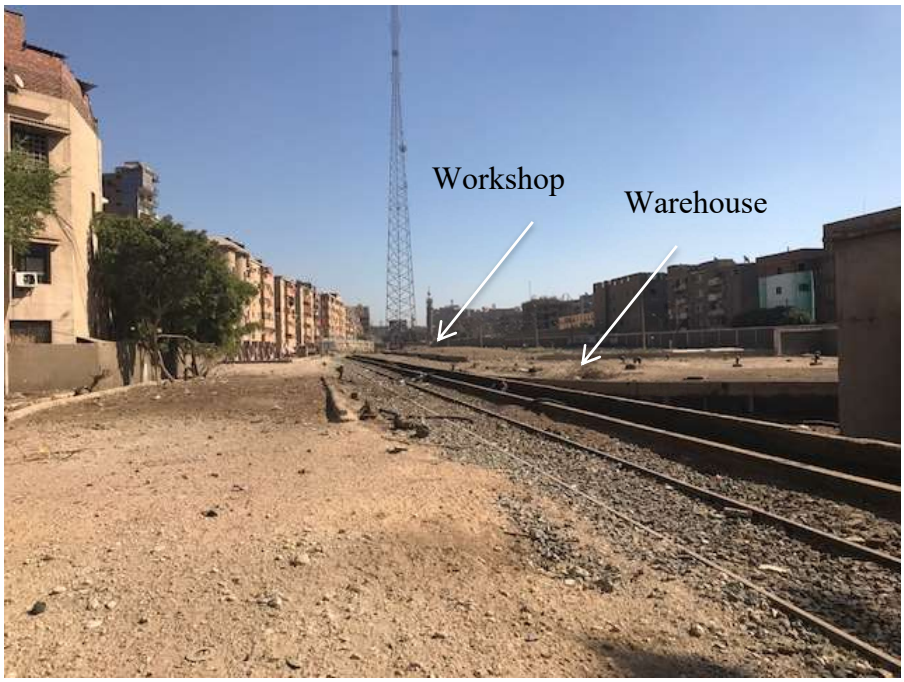


Figure 9. Land allocated for Sohag's CTC

Figure 10. Existing buildings on the land allocated for the CTC

5.0 IDENTIFICATION OF ENVIRONMENTAL AND SOCIAL IMPACTS

5.1 Data sources

The following are the main sources of data used in the environmental/social impact studies summarized in this report:

Review of available data on the existing environmental conditions in the area. This included a review of existing maps of the area, of recorded climatological, geological, geomorphological, hydrological and air quality data, and of available information on flora, fauna and biotic habitats. Data on the demographic and socioeconomic setting in the project area was obtainable from numerous government publications and research papers. Information on the existing conditions of the railway system and facilities were obtained from several documents provided by the client.

Examination of the project plans. A detailed examination of the project documents was undertaken. These documents consisted of available project plans and project description included in the Terms of Reference prepared by the client for the engineering team. The general layout of the signal modernization plan is presented in Annex 2.

The literature review and the examination of the project plans and documents allowed the identification of information gaps that need to be filled through field data collection and areas of environmental concern that require detailed examination through the ESIA studies.

Field data collection. The ESIA team conducted data collection field visits to the project area. Detailed information on the existing signaling system and its operational conditions was collected. The team also surveyed a number of towns and villages in the Bani Sweif – Assuit

sector to gather site-specific data on the existing socioeconomic and environmental setting and to identify any particularly sensitive elements in these sites. In fact, the surveys results can be considered representative of Sohag and Qena's governorates as they have a similar socio-economic background as Bani Sweif and Assuit. Visits to specific sites of potentially special significance have also been made to gather data necessary for assessing their sensitivities to project activities. Other visits to examine certain sites have been undertaken to address certain issues of environmental/social significance (e.g. the operation of particularly crowded level crossings).

5.2 Impact Prediction

The proposed project is expected to result in both positive and negative impacts. Expected positive impacts are:

- Improved train operation safety.
- Improved operation safety of level crossings.
- Reducing trip time as a result of increased train travel speed and reducing operational delay.
- Increased line capacity as a result of introducing contra flow operations.

A number of adverse impacts of the project have been identified based on the findings of the initial scoping activities, and the public consultation meetings and interviews. Most of these adverse impacts are expected to occur during the construction process and will be temporary in nature. They will affect both the communities close to the construction sites as well as users of the railway line, regardless of where they live. Impacts of construction work on the day-to-day operation of the railway line will affect larger sectors of the society, particularly those using the train. Impacts on the physical environment and the ecology of the project area appear to be minor. Accordingly, the ESIA will closely investigate the socio-economic impacts of the construction process and activities of the project. Two impact groups namely will be covered. These are the impacts on users of the train lines (including daily commuters and other passengers), and those that will affect communities residing or working near the construction sites. The first group of impacts includes widespread impacts that will affect most or the entire influence area of the project. Examples of such impacts are train delays resulting from construction activities, which will affect the great majority of the commuters and other users of a train line. The second group of impacts is the site-specific, local impacts. These impacts are expected to be restricted to specific sites and communities along the railway line (such as access restriction during construction at certain level crossings, noise, air, and water pollution generated during extended construction activities at certain sites).

Based on the findings of the scoping exercise, the EIA activities will focus more on the following issues:

5.2.1 Identification of key impact areas

The project is intended to enhance the efficiency and safety of operation of the Egyptian railway system. The impact of the project on factors that affect the fulfillment of these objectives, and their environmental cost are therefore considered in this analysis. Areas to be mostly affected by the project are based upon the relative advantage of the new facilities introduced into the railway lines in terms of efficiency of use of existing lines, increased speed and reduced trip time, improved operation safety, and reduced noise level.

Environmental and social settings of the project influence area may be divided into a number of elements that represent the basic structural and functional building units of that area. Each of these elements is characterized by a number of attributes, which control the nature and role of that element within the local environmental/social setting. These elements may become affected by the project and/or its activities, resulting in either positive or negative impacts that will eventually be manifested in changes in the prevailing environmental setting. An exhaustive list of these environmental and social elements of the construction site and adjacent areas, and their attributes has been constructed on the basis of this analysis and are shown in Table 11. The list is made on the basis of the results of the extensive survey of the project areas, which are summarized the Baseline Data section of this report. Each of the environmental elements with its special attributes thus represents a potential impact area.

The ecological characteristics of the project area are the most fundamental natural attributes that might become affected by the project. Biodiversity at the levels of the habitats and species, as well as natural topography and drainage regimes represent the cornerstone of the ecology of that vast area. Factors that alter these attributes will have significant impacts on the ecology of the area as a whole. It should be noted, however, that these basic elements of the natural ecology of the project construction sites and surrounding area have been radically altered, or eliminated all together as a result of thousands of years of intensive human activities, effectively replacing the natural ecosystems of this vast area with a man made environment.

Air quality, including levels of common air pollutants resulting from motor vehicles and a multitude of industrial emissions, such as gaseous and particulate matter emissions is among the key environmental elements of the project area. Noise is another common environmental nuisance in the area near the railway lines. Project construction sites in area with high human population densities are expected to present a noise pollution problem. Solid waste, which

includes domestic, industrial and construction waste, is a common source of pollution in areas around railway corridor, where illegal dumping has been a common practice for many years.

Socio-economic conditions are generally considered the most important impact area of large-scale development projects. ENRRP involves the railway service that is being used by millions of Egyptians. It also covers a very large geographical area along almost the entire length of the Egyptian Nile Valley. Communities that are expected to be affected by the project therefore, include those living in areas adjacent to the railway corridor, daily commuters using different sections of the lines, and the general populations of the areas linked by the lines who directly or indirectly benefit from the railway service to different degrees. Communities that may be potentially impacted by construction activities at certain sites were identified on the basis of the following criteria:

- Proximity to site of construction activities
- Type of construction activity
- Size and duration of the construction activities
- Population size and density.
- Presence of heavily used level crossings
- Presence of schools, hospitals, residential area

Public services and infrastructure represent another important impact area that might potentially be affected by the project. This includes elements such as public transportation, local traffic and traffic control services, emergency services and public safety, and to a lesser extent education, and health care, shopping, and employment opportunities which can be indirectly influenced by the project construction activities.

Table 11 shows a list of environmental and social aspects related to the project' activities during the construction and operation phases.

Table 7. Environmental and social aspects

Ecological Characteristics

Natural habitats
Flora
Fauna
Threatened biodiversity
Natural drainage
Surface features
General environmental quality

Air Quality

Water Quality

Surface water

Ground water

Noise Level

Socioeconomic Elements

Local economy

Business opportunities

Property value

Employment opportunities

Local wage structure

Commuting cost

Commuting time

Commuting means

Accessibility to public services

Community development potential

Land use pattern

Public and Private Services

Railway service

Table 11, continued

Availability

Reliability

Trip time

Delays

Safety of operation

Operation of level crossings

Safety of level crossings

Drinking water supply

Sewage services

Energy services

Education

Health care facilities

Housing

Emergency services

Traffic flow

Need for other forms of transportation

Parking

Public security

Shopping

The Egyptian National Railway System

Fulfillment ENRRP objectives

Improved operation efficiency
Improved operation safety
Improved railway service to the public

Aesthetic and Cultural Aspects

Attractiveness
View opportunities
Landmarks and historical sites
Archeological sites

Conformity with Environmental Laws and Regulations

5.2.2 Identification of key project activities

Two phases of the project are considered in this analysis. These are the construction phase, and the operation phase. Components and activities involved in each of these project phases are identified on the basis of careful scrutiny of the project plans as well as extensive discussions with engineers and ENR experts involved in the project. The lists of these components and activities provide the basis for the environmental impact analysis. Examination of these exhaustive lists revealed that some items appear to potentially impact different environmental and socio-economic components. Items considered to be of a potential impact, along with relatively sensitive elements of the environment, are considered in the impact analysis sections of the ESIA study, which deals with the impact prediction and evaluation.

Construction Phase:

Most of the potentially adverse impacts of the project are expected to occur during the construction phase of the project. Construction will involve activities that may affect the local communities and environmental conditions at the construction sites and may also directly or indirectly affect the surrounding areas. Construction process will also certainly result in temporary impacts that will affect users of the lines or those directly or indirectly dependent on the services rendered by these lines. Environmentally important activities of the construction phase are listed in Table 12.

Table 8. Construction activities

- Communication and power cables

  - Excavation work
  - Removal of old cables
  - Disposal of old cables
  - Installation of optic fibers cables
  - Installation of power cables
  - Storage and disposal of construction solid waste
- Installation of track-side signals and signaling equipment
- Installation of block systems, telecommunications, and interlocking equipment
- Automated level crossing systems
  - Blocking level crossings
  - Traffic detours
- Central Traffic Control (CTC) building, Main Technical buildings (MTB) and train dispatch towers
  - Foundation work
  - Concrete mixing, casting and curing operations
  - Soil replacement
  - Transport of construction material
  - Storage of construction material
  - Operation of heavy equipment
  - Mechanical equipment installation
  - Finishing work (painting, tiling, plumbing, and electrical, etc.)
  - Noise pollution
  - Air pollution
  - Hazardous emissions (e.g. asphalting...)
  - Storage and disposal of construction solid waste

Table 12, continued

  - Disposal of construction liquid waste
  - Disposal of excavated material
  - Water consumption
  - Workers' transportation and accommodation
  - Workers' activities
  - disposal of old basalt

Operation Phase:

The daily commuting time will be reduced for users of these lines as a result of the modernized railway system. This may attract more commuters to using the train rather than other modes of transportation, which will contribute to reducing car traffic congestion and air pollution resulting vehicular emission.

Environmental and socio-economic consequences of activities associated with the day-to-day operation of the Cairo – High Dam railway line are mostly related to the improved safety and efficiency of the railway service along this line. With the modern signaling systems, the possibility of increasing the average and the maximum train speed along these lines is likely to be considered. While the current maximum speed on the two lines is 120 km/hr, a maxim speed of 140 to 160 km/hr may be considered. With the extremely common illegal pedestrian and vehicle crossing of the railway tracks all along these lines, as well as the apparent inadequate control over open level crossings, the issue of safety becomes even more pressing. Train drivers have invariably expressed there deep concern regarding the frequent illegal crossing and the hazard this poses to the safety of the train and its passengers, as well as to the violators.

Environmentally important activities of the operation phase are listed in Table 13.

Table 9. Operation activities

Line Operation
- Telecommunication systems
- Automated Central Traffic Control
    - Automated signaling system
    - Electronic Interlocking System
    - Automated counter flow junctions and signaling
    - Train tracking system

Air Quality

Noise

Railway Service Quality
Table 13, continued

- Increased average and maximum train speed
- Reduced operational delays
- Improved operation safety
- Improved operational safety of level crossings.

Other public Transportation
- Use of other transportation means
- Traffic congestion
- Vehicular emissions

5.3 Environmental Impact Assessment methodology

General Methodology

The methodology used for the impact assessment was a semi-quantitative process, based on scores. The overall score for the significance of the impacts was evaluated taking into accounts the following four factors:

A. Probability of occurrence
B. Spatial scale
C. Temporal scale
D. Intensity of the impact (which also considers the sensitivity of the receptors)

A. Probability of occurrence

Three probability levels were used as shown below

Probability score	Criterion
1	High and very high probability of occurrence, 75-100% confidence that the impact will take place
0.5	Medium probability of occurrence, 25-75% confidence that the impact will take place
0.25	Low probability of occurrence, less than 25% confidence that the impact will take place

B. Spatial scale

Spatial Scale criterion adopted for the impact assessment is shown below

Score	Criterion
1 (Site)	Impact area is up to 1 km^2
2 (Limited)	Impact area is up to 10 km^2
3 (Area)	Impact area is up to 100 km^2
4 (Regional)	Impact area exceeds 100 km^2

C. Temporal scale

Temporal Scale criterion adopted for the impact assessment is shown below

Score	Criterion
1 (Short-Term)	Impact duration up to 3 months
2 (Medium-Term)	Impact duration from 3 months to 1 year
3 (Long-Term)	Impact duration from 1 to 3 years
4 (Permanent)	Impact duration for more than 3 years

D. Impact intensity

The impact intensity criterion adopted for the impact assessment is shown below

Score	Criterion
1 (Negligible)	Environmental changes are within the existing limits of natural variations
2 (low)	Environmental changes exceed the existing limits of natural variations. Natural environment is completely self-recoverable.
3 (Medium)	Environmental changes exceed the existing limits of natural variations and result in damage to the separate environmental components. Natural environment remains self-recoverable.
4 (High)	Environmental changes result in significant disturbance to particular environmental components and ecosystems. Certain environmental components lose self-recovering ability.

E. Integrated Assessment of Impact

The overall assessment (i.e.score) for the impact of concern will be the multiplication result of the B. Spatial score, C. Temporal score, and D. Intensity score. The overall score will determine the category of severity (i.e. impact significance) based on the score range it falls into. The upper and lower limits of each impact significance category, assuming a probability of occurrence of 1 (A. Probability score) are shown below.

Impact Parameters				Overall Score		
Spatial Scale	Temporal Scale	Impact intensity	Probability of occurrence		Score range	Impact Significance
Site [1]	Short-term [1]	Negligible [1]	1	1	1-8	Minor
Limited [2]	medium-term [2]	Low [2]	1	8		
Area [3]	Long-term [3]	Medium [3]	1	27	9-27	Moderate
Regional [4]	permanent [4]	High [4]	1	64	28-64	Major

6.0 PUBLIC CONSULTATION AND DISCLOSURE ACTIVITIES

Public consultation and disclosure activities consisted of a stakeholder interviews and two public consultation workshops. These activities covered components of the Egyptian National Railways Restructuring Project, which consisted of the modernization of the Arab El Raml – Alexandria, the replacement of 200 km of tracks in Upper and Lower Egypt, and Modernization of the Bani Sweif – Assuit and additional phase from Assuit – Nagh Hammadi signaling system[9].

Interviews were conducted with various knowledgeable individuals to collected data on the project and its activities, as well as to assess public perspectives on different issues related to its positive and negative impacts. These include engineers and other representatives of the ENR, consulting engineering team responsible for the design of the signaling system; train drivers, representatives of the EEAA (in relevant EEAA Branch Offices), local government officials, shopkeepers and residents near expected project activity areas, commuters and other users of the train line and other stakeholders. The initial impact screening process has therefore identified the following three target groups that might experience substantial socio-economic impacts as a result of the project have been identified.

- Train users
- Local residents of communities adjacent to the train corridor
- Frequent users of level crossings

These three, potentially impacted populations, were then sampled in three governorates namely, Bani Sweif, Minya and Cairo. It is assumed that the collected samples also represent Sohag and Qena's governorate as they have a relatively similar socio-economic background. Different tools were utilized in the selected governorates in order to collect information regarding the potential socio-economic impacts of the proposed project. Meetings with stakeholders were carried out by the field team in collaboration with the Assuit Businessmen Association (ABA) and its branches in Upper and Lower Egypt. ABA's efficient public outreach capabilities were instrumental in allowing the exploration of public opinion and concerns of a good, representative sample of the society in the limited time frame of the study. Annex 7 shows interview and data collection forms used in the public scoping interviews. These include forms for train users, users of level crossings, and residents in areas adjacent to construction sites. A total of 1166 individuals representing different groups that are likely to be affected by the project were interviewed (Table 14).

[9] The modernization of the Arab El Raml – Alexandria, the replacement of 200 km of tracks in Upper and Lower Egypt components of the ENRRP have been covered in a separate ESIA.

Table 10. Composition of population sample interviewed.

Markaz	Village	Sample composition
Residents close to railroad corridor		
Bani Sweif	Tizment	149
Minya	El kofoor	92
	Beni Mazar	133
	El Moda	273
	Maghagha	100
Total	**5 Villages**	**747**
Frequent users of level crossings		
Bani Sweif	Tizment	25
Minya	El kofoor	31
	Beni Mazar	19
	El Moda	22
	Maghagha	22
Total	**5 Villages**	**119**
Train users		
Cairo – High Dam		150
Cairo – Alexandria		150
Total		**300**
Total Sample		**1166**

6.1 Public consultation meetings

The results of the impact analysis were presented to key stakeholders in two public review meetings; one held in Upper Egypt in the town of Minya and the other in Lower Egypt in Cairo. The two public consultation meetings were announced in a paid advertisement in major newspaper, with an invitation to the general public to participate. Information on the project as well as a summary of the findings of the ESIA was posted on EQI's website for public review prior to the consultation meetings. An additional public consultation was held on October 11th 2017 for the second section of the Cairo – High Dam Line that runs from Assuit to Nag' Hammadi.

The first public consultation meeting was Held at the Cleopatra Hotel in Minya on 2 April, 2008 and was attended by 112 participants representing different sectors of the society, representatives of relevant government officials including the Egyptian National Railways, the local government of Minya and Bani Sweif, and the Egyptian Environmental Affairs

Agency. Representatives of a number of NGOs also attended. The Cairo public consultation meeting was held in the Egyptian National Railway Club in Nasr City on 3 April 2008 and was attended by 72 individuals, representing a diverse group of stakeholders. Affiliations of participants of the two workshops are listed in Annex 1.

In these public consultation meetings, the project, its objects, components and activities were introduced. Participants were provided with information gleaned from the results of the impact analysis studies on the potential impacts of the project and its activities on existing environmental conditions at the project site, and the adjacent influence areas. The public review also allowed stakeholders to participate in the identification of other areas of concern if they have not already been included in the study scope. These concerns were then further investigated in the impact analysis section of the study.

7.0 ASSESSMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS

Construction activities are expected to result in a number of adverse impacts on physical elements of the environment, which in turn will have significant impacts on communities in areas adjacent to construction sites. Construction activities will also directly affect large sectors of the populations all along the Cairo – High Dam Line by affecting the operation of the railway service and its associated elements such as the level crossings. Elements of construction activities that are expected to adversely affect the environment and their direct and indirect impacts are shown in Table 15 and are discussed in detail below.

7.1 Air Quality Impacts

Certain construction activities (e.g. asphalting, excavation of foundations and cable trenches, etc.) are expected to generate dust, fumes and other forms of air pollution as listed below:

- Dust emissions
- Exhaust of power generators and vehicles transferring the raw materials and/or those disposing the excavated soil and construction waste.
- Exhaust of construction equipment

Although these pollutants are expected to be generated in relatively small quantities during some of the construction activities, community living very close to the construction sites may potentially be affected. These impacts will also affect construction crews at the work sites. Although these impacts are all temporary in nature, occurring only during the actual construction work, which will be undertaken mostly for a few hours to few days at any given site, mitigation measures are considered to be necessary.

		Impact parameters			
Impact	Probability of Occurrence (P)	Temporal Scale (A)	Spatial Scale (B)	Intensity (C)	P*(A)*(B)*(C) Overall Score
Air Quality Impacts during the construction phase	1	1	2	3	6

Mitigation and monitoring measures

Mitigation measures

Implement a construction site management plan including the following measures:

- Store construction materials in pre-identified storage areas.
- Cover friable materials during storage.
- Wet the network of unpaved roads on site. The use of water should be restricted to extremely active areas.
- Regulation of speed to a suitable speed (20 kmh) for all vehicles entering the site's boundaries.
- Implement preventive maintenance program for vehicles and equipment working on site and promptly repair vehicles with visible exhaust fume.

Monitoring Measures

- Number of dust complaints from workers and residents
- Number of complaints that were resolved and time it took to resolve them
- Visual inspection of vehicles and equipment operating along the railway corridor

7.2 Noise Impacts

Various mechanical/electrical equipment, will be needed during the construction activities described in the previous section. These include bulldozers, trucks, pavers, and other equipment. The operation of these equipment are the main potential source of noise emissions during the construction and decommissioning phases.

The vulnerable groups who are susceptible to the construction noise are the following:

- Onsite Workers; who are the most exposed to the highest noise levels generated from different construction activities due to their proximity to the noise sources.
- Neighboring communities and other sensitive receptors along the 170 km railway corridor.

Noise impact assessment methodology

Based on experience from other similar projects, tools and equipment that may be utilized during the construction phase are shown below together with their expected noise emission level

Equipment	Sound Level at operation in dB(A) (20 feet from the equipment)	
	Average	Range
Front End Loader	88	85-91
Back Hoe	86.5	79-89
Bull Dozer	96	89-103
Roller	90	79-93
Grader	<85	
Truck	96	89-103
Paver*	101	100-102
Concrete Mixer	<85	
Concrete Pump*	< 85	
Crane*	100	97-102
Derrick	<85	
Power Units:		
Generators	<85	
Compressors	<85	
Other Equipment:		
Poker Vibrator	94.5	87-98
Compressed Air Blower	104	
Power Saw	88.5	78-95

It is therefore expected that the noise emitted from the use of equipment could be further increased due the noise emitted from power generators, air compressors, etc and it has been assumed that a **95 dB** at source would be representable of such interactions.

The noise propagation from source has been modeled according to ISO 9613-2 and the significance of the noise impacts is described below.

The noise emitted during the construction activities along the railway corridor , including the construction of the MBTs, are expected to decrease from 95 dB at source down to 50dB at around 50 m away from source – a distance which is equivalent to the right-of-way around the railway corridor. The source is a moving point, the location of which depends on where the main construction activities are taking place. The potential generated noise will mainly affect the workers on site. The impact is assessed as shown in the table below and should be considered of Minor significance. This should be fully controlled by applying proper health and safety procedures.

		Impact parameters			
Impact	Probability of Occurrence (P)	Temporal Scale (A)	Spatial Scale (B)	Intensity (C)	P*(A)*(B)*(C) Overall Score
Noise Impacts during the construction phase	1	2	1	2	4

Mitigation and monitoring measures

Mitigation measures

On site Construction noise shall be mitigated to ensure a safe work environment by implementing an on site occupational health and safety plan, which considers national and international requirements.

The plan shall include the following measures:

- Protective hearing equipment shall be made available to all workers in noise critical areas
- Training on how and when to use protective hearing equipment shall be conducted as part of the workers' induction sessions.
- Place visually clear instructions in areas where noise emissions are significant.

Other mitigation measures to reduce the noise impacts off-site include the following:

- Optimize the use of noisy construction equipment and turn off any equipment if not in use.
- Regular maintenance of all equipment and vehicles
- Stop all construction activities during the night
- Communicate the construction schedule with neighboring communities and sensitive receptors
- Implement a project specific GRM

Monitoring measures

- Number of noise complaints from workers and neighboring communities in the affected locations.
- Number of complaints that were resolved and time it took to resolve them

7.3 Surface Water

For the new additional phase of Assiut – Sohag – Nag' Hammadi , it is planned that the underground cables pass underneath the bottom of any waterway, with no physical connection with the water body so impacts on surface water quality are considered of minor significance. Mitigation measures comprise of proper handling of solid hazardous and non-hazardous waste as detailed in the following section.

		Impact parameters			
Impact	Probability of Occurrence (P)	Temporal Scale (A)	Spatial Scale (B)	Intensity (C)	P*(A)*(B)*(C) Overall Score
Impacts on Surface water during the construction phase	1	2	1	2	4

7.4 Solid Hazardous and non-hazardous Waste Impacts

The following are the types of wastes expected to be generated on site during the construction phase.

Non Hazardous wastes

- Food residuals
- Paper, plastics, and glass
- Concrete, bricks
- Steel, metals
- Wood
- Excavated soil
- Water collected during dewatering activities (potentially contaminated with sewage)
- Old cesspit content
- Sewage and waste resulting from on site workers
- Empty Sacks

Hazardous wastes

- Waste electrical and electronic equipment (WEEE)

- Empty chemical containers
- Spent chemicals and oils

The NH wastes generated on site during the construction phase normally have a high recycling potential. If not recycled they would be sent to landfills or randomly dumped and burned, which would be a loss of natural resources.
Random dumping and accumulation of wastes on or around the site would cause a negative visual impact to workers as well as users of the surrounding areas. It could also block the roads, increase the rate of accidents. Accumulated wastes may be burned, a practice commonly found in Egypt, which could emit toxic emissions especially if plastic substances were among the waste streams.
Accumulation and/or uncontrolled disposal of organic wastes (food residuals) would also result in potential impacts on the health and hygiene of both general public and on-site workers by attracting vermin to the site such as birds, rodents or insects which can act as disease vectors. This will result in spread of disease, and disruption of the natural ecosystem. Odour may also be generated following long periods of accumulation due to the decomposition of some organic wastes, which will be an annoyance to both general public and on-site workers.

Leaching to soil may occur in areas where accumulated waste is in direct contact with the soil. This would lead to a direct impact on the groundwater quality.

As illustrated in the table below, the impacts due to non-hazardous waste generation during the construction phase is considered of MODERATE significance, mainly due to the proximity of receptors. The impact of NH waste generation is expected to be fully controlled by implementing the mitigation and monitoring measures listed below.

		Impact parameters			
Impact	Probability of Occurrence (P)	Temporal Scale (A)	Spatial Scale (B)	Intensity (C)	P*(A)*(B)*(C) Overall Score
Non-hazardous Waste generation					

Loss of natural resources	1	3	1	1	3
Health impacts	1	3	2	2	**12**
Soil and groundwater	1	3	1	2	6
Surface water	1	3	1	2	6
Occupational health and safety	1	3	1	1	3
Air quality due to open burn	0.5	3	1	2	3
Visual Impacts	1	3	1	3	9

The storage and disposal of hazardous wastes streams have to be carefully performed as to abide by the existing legal framework. In addition to that, these hazardous wastes if not handled, stored and disposed of according to engineering best practice would have major and irreversible effect as follows:

- Mishandling and uncontrolled disposal of hazardous liquid and solid wastes would have major health impacts for on-site workers, inhabitants in the project's area of influence, people who get in contact with waste during transportation and disposal, and flora and fauna exposed to such wastes.
- Uncontrolled disposal of hazardous wastes, in particular in liquid form, would cause soil contamination through direct contact or leaching.
- Air quality could also be affected since uncontrolled dumping of hazardous and non-hazardous materials would result in most of the cases to open burning and potential release of toxic emissions.

The impacts listed above are evaluated as presented in the Table below. Most of the impacts should be considered of Moderate significance and will be fully controlled by implementing the mitigation and monitoring measures listed in the following section.

		Impact parameters			
Impact	Probability of Occurrence (P)	Temporal Scale (A)	Spatial Scale (B)	Intensity (C)	P*(A)*(B)*(C) Overall Score
Hazardous Waste generation					
Loss of natural resources	1	3	1	1	3
Health impacts	1	3	2	4	24
Soil and groundwater	1	3	1	3	9
Surface water	1	3	1	3	9
Occupational health and safety	1	3	1	4	12
Air quality due to open burning	1	3	1	4	12
Visual Impacts	1	3	1	3	9

Mitigation and monitoring measures

A waste management plan complying with international best practice and relevant Egyptian regulations and covering all types of construction waste (hazardous and non-hazardous) shall be developed and implemented by the construction contractors and made applicable to all sub-contractors. This plan shall define exact procedures and locations for waste management and disposal. The waste management plans should also refer to health and safety procedures, and emergency procedures for containing and managing accidental spillages.

Mitigation measures for non-hazardous wastes

- Implement a segregation system based on compatibility of different waste streams during each phase of project implementation
- Specify an area/containers for non-hazardous wastes which accommodate for the generated segregated streams
- Dispose of non-recycled wastes in the nearest landfill; the location of which needs to be confirmed at the beginning of the construction phase.
- Register the amounts of disposed of wastes and keep waste disposal and transportation receipts/manifests.

The measures listed above represent the minimum measures to be included in the waste management plan,which will be prepared and implemented by the contractor.

Monitoring measures for non-hazardous wastes

- Regular inspection of the waste storage area
- Regular inspection of the site(s) in general to identify random disposal of waste materials.
- Regular inspection of the waste disposal manifests.

Mitigation measures for hazardous wastes

The measures listed below represent the minimum measures to be included in the waste management plan, which will be prepared and implemented by the contractor.

i) General measures

- All types of hazardous waste can only be transported by licensed hazardous waste service providers and disposed of in licensed landfill. Both, the service providers and disposal sites have to be identified at the beginning of construction works. At the time of producing this study, the only hazardous waste disposal site is the Nasreya hazardous Waste Centre in Alexandria.
- The different types of hazardous wastes should not be mixed.
- Spent mineral oils shall be collected, stored in sealed containers and recycled using a licensed company which also has to be identified by the contractor

j) Adopting an Identification system for hazardous wastes generated on site

The Contractor shall be able to identify the different potential hazardous wastes. Identification shall be performed according to the Egyptian hazardous waste classification

system by the contractor's in-house staff or with the aid of an independent waste management consultant appointed by the contractor.

k) Storage and Management of the waste accumulation area

The waste storage area for hazardous wastes shall be fenced, secured with limited admission and shaded from rain and sun heat/light.:

- The storage area must have a water supply
- A hazardous waste label that has a "Hazardous Waste" mark on it must be placed on the container while still at the generation point.

l) Emergency Response

For the purpose of first response, when a hazardous substance release is first discovered or witnessed, the individual of concern who had to be previously trained would initiate an emergency response sequence by notifying the proper authorities of the release. The individual will take no further action beyond self-evacuation and notification. The aim of the response at this level is limited to protect nearby persons, property, or the environment from the effects of the release. No trials are performed at this stage to actually stop the release. This level of response includes;

- actions to contain the release from a safe distance
- prevent its spreading
- evacuation

Monitoring measures for hazardous wastes generated

- Regular inspection of the hazardous waste storage area
- The spent oil containers are inspected monthly for leaks or any other form of damage and are kept in good condition.
- Regular inspection of the site to identify randomly dumped hazardous waste materials.
- Inspection of HW disposal receipts and manifests.

7.5 Biodiversity

Habitats along the railway corridor covered in this project are all man made. None of these habitats is considered threatened and none seems to be necessary for the survival of any threatened species of animals or plants. Wildlife of the Nile Valley is among the most diverse of any of the terrestrial habitat in the country. This wildlife consists mainly of species that are able to tolerate human activities and manage to survive in the habitats he created. The railroad corridor is part of the man-made landscape and will continue to be so after the implementation of the signaling modernization project. There is no indication that

construction work and subsequent operation of the lines after completion of the project will have any irreversible or significantly adverse impacts on wildlife and habitats in areas adjacent to these lines. Wild fauna and flora along the railway corridor are expected to tolerate disturbances associated with construction activities of the project.

7.6 Occupational Health & safety

As previously described, the construction phase of the project will encompass different activities, which are expected to affect occupational health and safety for workers.

Due to the high probability of occurrence and the high risk involved, the occupational safety and health impacts during the construction phase should be considered of MAJOR significance.

The potential impacts will have to mitigated as follows, which have to be also included as binding clauses for the Contractor:

- Develop an occupational health & safety mitigation plan according to the Egyptian legislation and international best practices.
- Obtain approval on the developed occupational health & safety plan from ENR and PMU prior to starting construction activities.
- 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 life insurance against any potential accidents.

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 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.
- Training on handling of UXO/ERW
- 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.
- If work involving the use of flammable materials is being carried out, stop people smoking 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).
- Marking excavation holes with physical boundaries (barriers, tape or fence)
- The contractor should 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”

7.7 Land Acquisition impacts

The project will include the construction of one CTC in Sohag with a number of associated facilities namely; a warehouse and a workshop, and 16 MBTs along the train corridor. The land has been already allocated for the CTC, which is free of informal and/or formal uses. There are no therefore any likely livelihoods impacts resulting from the usage of this land for the construction of CTC and associated facilities.

However, the lands required for the construction of the 16 MBTs have not been yet identified. Although these lands fall under the mere ownership of ENR, the surrounding community and/or individuals might be currently using them formally or informally. A resettlement Policy Framework (RPF) has been developed to serve as a guidance for any Resettlement

Action Plans (RAP) or abbreviated Resettlement Action Plans (ARAP) which will be required to reduce /mitigate potential livelihood impacts resulting from the project's implementation.

7.8 Socio-economic impacts

Socio-economic impacts of the project are expected to affect the three sectors of the communities described above. Expected impacts affecting each of these communities are covered in this section.

7.8.1 Local residents of communities adjacent to the train corridor

Along the 250 kilometers of the Upper Egypt railway line covered by this project, the railway corridor cuts through a number of densely populated towns and villages. Homes, a variety of workplaces, schools and other establishments may be located very close to the railway corridor. Because of their close proximity to the railway corridor, residents of these homes and users of other establishments are particularly vulnerable to adverse impacts associated with the construction work. Noise, dust and other types of air pollution associated with construction work affect these people more than any other sectors of the community (possibly with the exception of the work crews). Transportation, storage and handling of construction material and waste are more likely to affect these people than any other members of these communities.

Concerns of local communities regarding potential impacts associated with the construction phase of the project varied according to the proximity of their residence or place of work to the railway corridor. This distance ranged in the survey sample between a maximum of 800 meters and a minimum of 100 meters. Those that are particularly close to the corridor were deeply concerned about the noise, dust and what they presumed to hazardous fumes. It was generally clear, however, that excessive noise associated with different construction activities is one of the main impacts that should be mitigated. For most respondents, construction noise becomes a major nuisance if it occurs at night. Fewer people were concerned about the possible generation of dust and other air pollutants (including noxious fumes generated during asphalting work) in some of the construction activities. Concern with fumes and dust was progressively less often expressed as the residence or place of work became farther away from the tracks.

In a sample of 816 individuals representing rural and urban areas close to 58% expressed their concern about the possibility of experiencing unacceptably high noise level during

construction work. The remaining 42% of the respondents either though that they can tolerate the high noise level or were not at all concerned about it. Out of those concerned about the noise, 38% felt that excessive noise can hinder ability to concentrate (e.g. during studying, working or even watching television) and 47% expected to suffer sleeping disturbance.

On the other hand, few individuals living immediately next to the railway corridor complained about the excessive noise generated by passing trains and particularly, what they considered the unnecessary and excessive use of the train siren while the train is passing through cities.

7.8.2 Train Users

Disturbance of the normal operations of the trains as a result of construction work will directly and indirectly affect a large number of people who depend on trains as a cheap, safe and reliable mode of transportation. Three hundred passengers responded to the survey questionnaire. Passengers were selected from two trains namely, train number 935, which serves the Sohag to Alexandria route; and train number 990, which serves Minya to Luxor, both passing through the Assuit – Bani Sweif section. Out of this passenger sample, 52% used trains for frequent business-related travel, 29% used it for irregular personal travel, and 19% for other purposes. Out of all the respondents, only 1% use the train for daily commuting to work, 20% use it once a week, 16% once every two months, 45% once a month and 18% less frequently than once a month. In addition, 57% of responding passengers spend between three to six hours on their train journey, while 43% spend between seven to twelve hours on the train. Of all respondents, 19% considered their journey duration acceptable, while 72% considered it too long journey.

With regards to respondents' reactions to the effect of the expected delays due to construction work, 75% expressed their willingness to accept the delay as a temporary incontinence that is outweighed by the benefit associated with the modernization of the railway lines and services. On the other hand, 20% of the respondents felt that construction delays are unacceptable, but will still use the train. Close to 3% of the respondents, considered the expected delays unacceptable, stating that they will have to use other modes of transportation during the construction period. The remaining 2% identified other options.

Among those we expect to be forced to use other modes of transportation, 29% were concerned about the higher cost of alternative transportation modes and its implications on family budgets. Very few individuals also expected some salary deduction due to being late for work; or excessive frustrations due to the lengthy train trips.

7.8.3 Labor related risks:

ENR's contractors mobilize diverse range of labor to fulfill the various tasks associated with the project. For the signaling modernization component and given the fact that CTCs and MBTs establishment involves a lot of traditional construction work, the reliance on the local labor is very high in this component. The common practice is to mobilize labor from the local areas. The local labors do not require accommodation in the project site and no construction camps are needed. For the external engineers and technicians whose qualifications might not be available on the local level, depending on the mode of their functions and their duty stations, they either travel every day to their home towns or they are accommodated by the contractors in flats in the nearest cities. According to ENR, almost 80% of the workers in the signaling components are local workers. According to the Bank investigations, field observations and discussions with ENR, no previous misconduct has been previously reported in any of the project locations. It is also worth mentioning the international contractors working for ENR has clear code of conduct for their teams and they obliged all the sub-contractors (some of them are international) working with them to adhere to labors standards and appropriate behaviors. However, one of the identified gaps is the fact that some of the casual workers under the sub-contractors are sometime not covered by insurance.

On the risk related to child labor, and despite the fact that this is a dominant practice in different construction activities in Egypt, the contractors of ENR (Thales is mobilized to carry out the signaling modernization under the new geographic scope. This is the same contractor who has been working with ENR earlier in the project) is applying strict measures to eliminate child labor in the project. Very close monitoring from their management is applied in the field and on the deployed sub-contractors.

Measures to deal with any potential risks related to labor have been included in the ESMP specifically to deal with any potential misconducts from the side of the sub-contractors.

7.8.4 Level Crossing Users

Many of the level crossings along the railway lines covered in this study often create traffic bottlenecks, particularly where the line runs through a crowded urban area or where it transects a heavily used road. Interruption of the flow through these bottlenecks, without providing alternative routes can result in major traffic problems not only at the level crossing itself, but also at a much larger traffic spillover areas.

A sample of users of level crossings (vehicle passengers and drivers, and pedestrians) was interviewed to assess their reactions to the project. The sample consisted of 1199 individuals, 95% of whom use the level crossings daily, while only 5% use level crossings less than once a week. Only 40% mentioned that they can identify and resort to nearby alternatives, whilst 60% stated that other available crossings are too far away for their use. On the other hand,

93% of the respondents accepted to resort to alternative crossings during the construction period compared to 5% who were not willing to resort to alternative (apparently to resort to illegal crossing of the tracks). Drivers and passengers of vehicles frequently using the level crossing often expected traffic problems when level crossing become partly or totally closed during construction. Certain level crossings are already heavily congested. Closing these crossings, partly or totally, even for a short period of time is expected to result in some traffic flow problems that require careful planning to mitigate.

Safety of pedestrians and vehicular traffic crossing the tracks at level crossings (or at informal crossing sites) is also an issue that should be taken into consideration. There is a number of public safety risks associated with the construction process. These will include those related to the use of heavy construction equipment in areas accessible to the public, as well as the transportation and handling of construction material and larger items through public area.

Table 11. Elements of construction activities that are expected to adversely affect the environment and their direct and indirect impacts.

Project Activity	**Potential Environmental /Social Impacts**	
	Direct Impacts	**Indirect Impact**
Construction activities at areas accessible to the public.	Safety risk to the public at or near construction sites.	
• Installation of communication and power cables, block systems, interlocking equipment, track-side signals, automated level crossing systems and signaling equipment - Excavation work - Removal of old cables - Disposal of old cables - Installation of optic fibers cables - Installation of power cables - Storage and disposal of construction solid waste • Construction of new dispatcher towers and renovation of existing dispatcher towers and the CTC building in Minya.	• Generation of dust and noise from construction activities, vehicles and equipment • Hazardous emissions (e.g. asphalting, rail welding, operation of vehicles and other equipment)	• A major nuisance to communities near work site, particularly if taking place at night. • Threat to public health in areas adjacent to work site.

Reduction of train speed at work sites	• Longer train trip time • Unexpected train delays	• Train delay may result in delayed arrival to work or business, schools, etc. Unexpected delay is more difficult to deal with. • Some train passenger might have to resort to other, often more expensive modes of transportation.

Table 15, continued

Project Activity	**Potential Environmental /Social Impacts**	
	Direct Impacts	**Indirect Impact**
Construction at level crossings (Partial or complete closure of the crossing to pedestrian and vehicle traffic)	• Increased traffic congestion at certain level crossings • Interrupting normal movement of people and goods. • Increased illegal track crossing.	• Traffic flow problems at areas in the general neighborhood of the level crossing. • Difficult accessibility to certain areas • Difficulties of access to emergency services and vehicles. • Delay to work, business or schools.

8.0 ANALYSIS OF ALTERNATIVES

Analysis of alternatives will be undertaken at two levels. At the first level two alternatives are considered; the project alternative and the no project alternative. These two alternatives are analyzed below and have been discussed at length in the two public consultation meetings. At the second level of analysis, the preferred alternative will be subjected to further analysis of alternatives. In that analysis the relative environmental and social merits of elements and activities of the preferred alternative will be considered. These alternatives, which may include alternative designs, construction methods, building material, and management systems, will be evaluated and compared.

8.1 Alternative 1: No action.

To continue operating the Bani Sweif – Assuit and additional phase from Assuit – Nagh Hammadi sector of the Cairo – High Dam Line with the severely outdated mechanical signaling system with its very limited operational capabilities places a major additional burden on the ENR's efforts to improve its services to the public and to overcome its major financial difficulties. Many of the present financial difficulties also stem from the frequent breakdowns of the existing systems, and the resulting uneconomical use of the line and its equipment. In addition, the present mechanical signaling system is highly vulnerable to human error and has been blamed for some of the accident that occurred in the past few years. It is expected that difficulties facing ENR will grow worse if not addressed now and will become more difficult and more costly to resolve without the implementation of the proposed project. Without the project, the railway service on the Cairo – Alexandria line will further deteriorate affecting the millions of users of that vital line.

8.2 Alternative 2: Implementation of the proposed project.

Implementation of the proposed project will provide the badly needed modernization and replacement of elements of the outdated mechanical signaling system along this most important railway line and will directly benefit the very large number of users of that line. Once completed, the project will contribute to improving the railway service of the Cairo – High Dam Line considerably. Positive impacts of the project on the railway service include the following:

- Improved train operation safety.
- Improved operation safety of level crossings.
- Reducing trip time as a result of increased train travel speed,

- Allow more trains to safely use the line per unit time, and will reduce operational delays.

Despite the high economic cost of the proposed project, the ENR sees that the modernization of the existing, outdated system is highly justifiable to ensure the safe and efficient operation of the railway service along that line. To the ENR, and public at large, the modernization of the railway system is an inevitable investment that has to be undertaken sooner or later. The operation of the highly efficient modern system will also reduce cost of operation per traffic unit and will contribute to the ENR's efforts to reduce loses and increase revenue generating potential.

On the other hand, a number of negative impacts are expected to occur during the construction phase of the project. These impacts are all temporary in nature, lasting only during the construction process and can be readily mitigated or tolerated. Project elements and activities that are expected to result in these negative impacts are herein considered in terms of possible alternatives.

1. Construction scheduling:

Alternative a: Work to proceeded on several sites in parallel to reduce the total construction time.

According to this alternative, construction activities will be scheduled to allow working in parallel on several elements of this activity along the entire line. While this will shorten the total construction time and minimize the duration of adverse impact associated with these activities, it may considerably intensify the severity of some of the expected impacts. For instance, train delays as a result of reducing speed at several construction areas will be one of the negative aspects of this alternative.

Alternative b: Construction work to proceed on fewer sites in parallel to reduce intensity of construction-related impacts.

This alternative will restrict construction activities to small sector of the corridor at any given time, thus reducing the negative impacts of construction considerably. It will however, extend the duration required to complete the project.

Alternative c: Construction work to proceed intensively on predefined, relatively large "construction sectors" of the line, one at a time, to minimize generalized impacts and to allow their better management.

This alternative calls for dividing the Bani Sweif – Assuit and additional phase from Assuit – Nagh Hammadi line into small number of "construction sectors" and to implement all construction activities in each sector at the same time before starting in a new sector.

Concentrating all construction activities at each of these sectors will restrict most of the adverse impacts to smaller, more manageable section, allowing better management of these impacts. As most of the train delays will be caused by the de-acceleration and acceleration of trains approaching and leaving a construction area, larger construction sectors of the corridor will result in shorter delays than several, smaller construction sites scattered along the length of the line. The definition of the construction sectors can take into account the fact that a delay of about 30 minutes in the Cairo – Assuit trip time was perceived as acceptable by most of the users of that line.

2. Transportation of construction material and waste.

Alternative a: Construction material and waste will mostly be transported using trucks.

This will contribute to traffic congestion problems, particularly in areas close to construction sites.

Alternative b: Construction material and waste will mostly transported using trains as much as practically possible.

This will mitigate potential traffic problems that might be caused by using trucks. Material may be transported from point of origin to nearest railway terminal equipped for loading and unloading of such material. It will then be transported by trains to or from construction sites.

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The following Environmental & social management plan(EMP) is developed to ensure the effective and sustainable mitigation of the adverse impacts of the project. The plan consists of the following three components:

9.1 Institutional Aspects

1.1.1. Institutional and Organizational Arrangement of ENR

ENR serves as the implementing agency of the project under the oversight o f a Steering Committee, which mainly combines Ministries of Transport, Finance, Investment and International Cooperation. As ENR does not have experience with World Bank projects before the Railway Restructuring, it was considered particularly important that a Project Management Unit (PMU) be established within ENR to coordinate and implement project activities and to liaise with the Bank. The PMU is headed by a director, who reports directly to ENR's Chairman and General Manager.

The below institutional structure of the project shows that the PMU's setup basically supports finance, procurement, environment, social and reporting. Under the ENR, the EAD has already been set up & it was locally approved by the ENR. It is already practicing its tasks but still needs the final approval from the organization and management affairs. Currently, there are about six environmental specialist in EAD. Although the structure of EAD ddid not include any position for a staff member responsible for the social aspects related to the project nonetheless, this position has been now filled by ENR and two social specialists were assigned to the PMU in November 2017. This has been communicated as a key requirement given the key social dimension that ENR has to deal with. Nonetheless, EAD still lacks fundamental support to be functional and to play its expected role as per the Environmental and Social Management Plan (ESMP) of the Project. Adequate equipment and expanding training to be beyond theoretical courses to include on-job-learning on monitoring & site inspection is required.

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

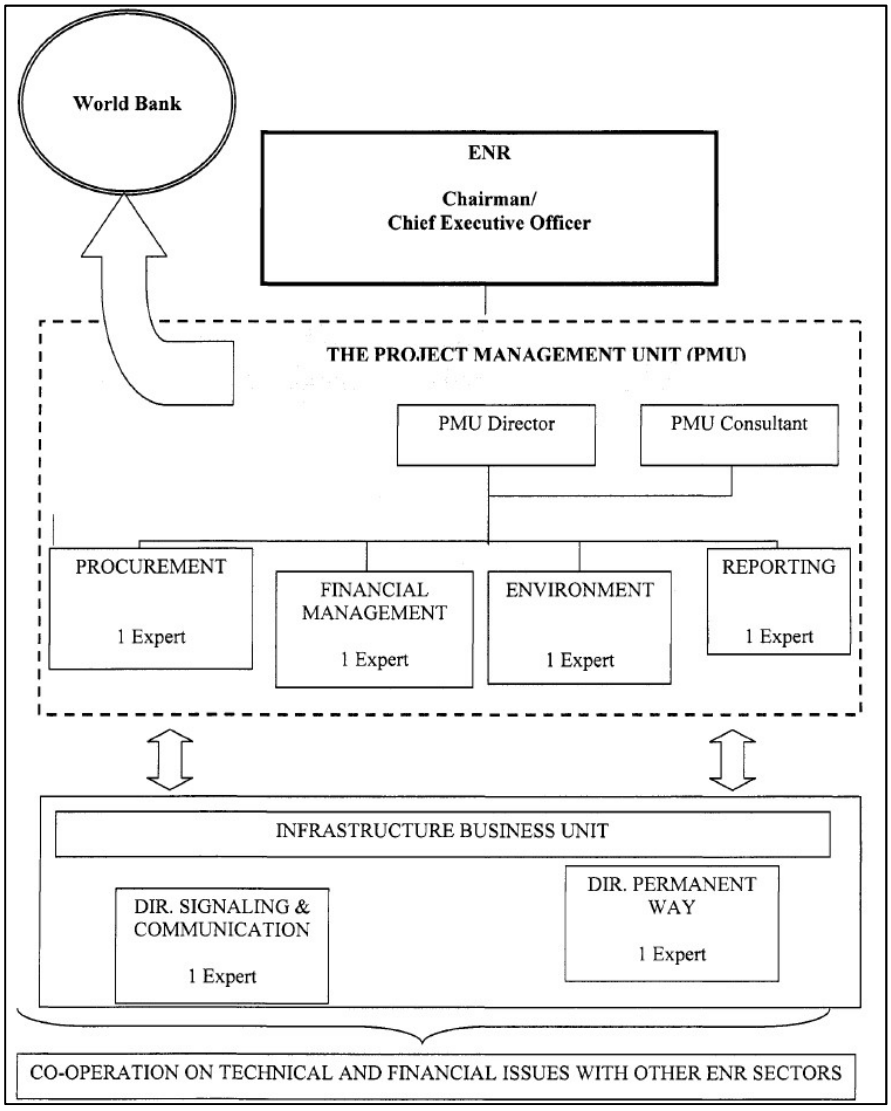
- Conduct environmental inspection activities for railways replacement, development and maintenance activities (including replacement and renewal of signaling systems, and various construction and maintenance activities of service workshops).

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

The role of the social officer will be critical in reaching out to the locations, conducting consultations, monitoring the implementation of all the social measure associated with the ESMP, ensuring the grievance system is operational, examining the need for preparing RAPs/ARAPs and participating in the process of the RAP/ARAP preparation and monitoring. The social officer should be also monitoring the complaints received from PAPs and ensuring that prompt response is offered to deal with their concerns. The Bank will be offering the capacity building support needed for the assigned social officers to enable them to fulfill the main responsibilities that are summarized in the box below.

The main tasks of the social officer include:

- Conduct consultations and information sharing sessions with the communities and other stakeholders adjacent to the project sites,
- Monitor the implementation of all the social measure associated with the ESMP
- Help in designing and operationalizing the grievance redress system related to the project
- Ensure that key project information and safeguards requirements are disclosed transparently on the local level
- Consult with PAPs to discuss and agree on the alternatives and the type of compensation that is convenient for both PAPs and ENR
- Participate in the process of disbursing compensations and keep track record of the compensation process documentation
- Handle grievance and respond to complaints of PAPs
- Lead the preparation process of the RAP and ARAP
- Monitor implementation of the resettlement activities
- Propose and take appropriate corrective actions as needed during the course of implementing the resettlement plans



GRIEVANCE REDRESS MECHANISM

ENR has a department for complaints at their headquarters in Cairo, to which any person can file a complaint. ENR has also dedicated 2 phone lines (01274422925 - 0225753555) in addition to a hotline (147) for complaints related to ENR in general. Those channels are widely used by any person who might have issues related to the operation of the trains or internal issues related to ENR. No specific channel (s) dedicated for the project has been yet established. Some of the contractors used to disseminate their phone numbers on the ground to allow people to communicate in case they have any complaint. However, this practice has

been done on individual basis and documentation of complaints has been always a big challenge. Since the project's geographic scope will be extended, a multi-stage mechanism shall be adopted to ensure that any project related complaints from the affected stakeholders are dealt with promptly and in a satisfactory manner. The Bank is currently supporting ENR to strengthen the existing GRM and ensure that project tailored channels are available to deal with any social issues at large. With support from the Bank, it is expected that ENR will start strengthening the GRM system to meet number of key minimum requirements including:

- Strong dissemination for the designed system to ensure that all potential affected stakeholders are aware of the system and that it is reachable to the local/sites level.
- Multiple channels including new channels to allow for better access for the project affected persons. The proposed channels (uptake locations) will consider the nature of the potentially affected communities and will build on the existing resources on the ground (e.g. social officers of ENR and the contractors team could be among the uptake locations). The design of the channels should be allowing the complainer to escalate to higher level of channels and to appeal.
- Clear timeframe should be set for responding to complaints and should be shared with the potential affected communities. For the complaints that are directly related to the works and are under the full control of the contractor, a time frame of 3 working days should be followed. For the type of complaints that are beyond the control of ENR and the contractor, a timeframe of 7 working days should be followed.
- The complainers should be given the option of filling anonymous complaints (e.g. complaints could be defined through a tracking number and not the name of the complainer if he/she prefers not to reveal his/her name).
- ENR should set a system for documenting and sorting the complaints.
- For all types of complaints, ENR should be providing feedback to complainers in maximum 3 working days from receiving the complaints.
- Regular reporting on complaints should be submitted to the Bank in the progress report.

1.1.2. Other support entities

Ministry of Agriculture

The Agriculture Directorate: is responsible for developing price lists for all types of crops that might be affected

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 indvidual consultations related to the resettlment
- Publish PAPs lists in the agriculture association

Governorate Authority and Local Governmental Units are responsible for

- Providing the persmissions and approvals on lands to be temporarly expropriated
- Provide the plots of lands required for the construction of Pressure Reduction Stations
- Participate with the Compensation Committee during the payment of compensation

In support of these guiding principles, and to achieve the integration of the institutional organizations in environmental management activities the following are suggested:

- Giving proper attention to environmental awareness activities in collaboration with the EEAA, which can provide awareness material and technical assistance, the ENR and the EAD should prepare and print awareness material for use dissemination to the ENR staff and the public using the railway service. EAD can seek and obtain technical assistance in implementing environmental awareness activities from the EEAA or expert help from private consultants.
- EAD should assign a representative at each geographical division of the ENR or in every major project the ENR is implementing. The representative should liaison between the EAD and these entities and should be responsible for monitoring environmental issues on day to day basis, reporting his/her findings to the EAD.
- An Environmental Affairs Committee should be created within the ENR. This committee should have representations from the EAD, as well as the directories of project management, planning, contracting, and legal affairs. The committee should review, adopt and authorize the application of rules, regulations, and procedures developed by the EAD.

The above guiding principles represent key components that should be considered when developing the institutional basis for environmental management responsibilities in the ENR. Annex 9 presents a sample administrative procedure for the establishment of EAD. Training needs will be determined on the basis of the educational background and experience of candidates for different EAD positions. Table 18 shows steps in the establishment of EAD.

9.2 Environmental and Social Aspects

Potentially adverse impacts of the project are expected to occur mostly during the construction phase and to a much lesser extent during the operation of the railway line following the completion of the project. Elements of the environmental/social impact mitigation plan are described in detail below and summarized in Table 16.

9.2.1 Construction phase impacts

a. Installation of communication and power cables, block systems, interlocking equipment, track-side signals, automated level crossing systems and signaling equipment.

Table 12. Institutional strengthening and training for implementation requirements

Institutional Strengthening Activity	Position(s)	Responsibilities		Cost Estimates (LE)
		Implementation	Supervision	
Establishing the Environmental Affairs Directorate (EAD) of the ENR.	▪ Director ▪ Environmental Engineer/Manager ▪ Environmental Specialist ▪ Environmental Specialist	Institutional capacity building consultant	- ENR Management	175,000
Training of EAD staff	▪ Director ▪ Environmental Engineer/Manager ▪ Environmental Specialist ▪ Environmental Specialist	Training and environmental consultant	- ENR Management	150,000
Environmental awareness	ENR general staff EAD site inspectors	Public awareness and environmental consultant	- ENR Management	290,000
Training of environmental inspectors	Staff of different ENR departments and operations regions	Training and environmental consultant	- ENR Management	240,000
Strengthening the capacity of the newly assigned social specialists on issues related to land acquisition, citizen engagement and handling grievance	ENR Social Specialists	Bank team and social development and resettlement consultants/trainers	- ENR Management (with support from the Bank)	150,000

b. Construction of new dispatcher towers and renovation of existing dispatcher towers and the CTC building in Minya.

Potentially adverse impacts associated with these activities are dust and noise generation both from the actual construction work and from the operation of construction vehicles and equipment. They also include Hazardous emissions (e.g. asphalting and emission resulting from the operation of vehicles and other equipment). The extent of these impacts varies according the magnitude and type of construction.

The following mitigation measures are required and should be included in the construction tender documents and subsequent construction contracts:

1. Excavation and construction material should be covered so as to minimize spillage and generation of dust.
2. As much as practically possible, construction material and waste should be transported to and from construction sites using cargo trains.
3. Vehicles delivering construction material to, or removing construction waste from the work sites, should be covered to avoid material spillage.
4. Vehicles uploading material should maintain the lowest possible fall height to reduce noise and dust generation.
5. All noise-generating, construction activities should be carried out during the day time hours to minimize noise disturbance to communities near work sites.
6. Workers exposed to noise exceeding permissible levels should wear hearing protection.
7. No exposed, hot power cables should be left unattended at any time.
8. Construction waste should be disposed of at dumpsites designated by local governments
9. Storage of construction material should be allowed only at ENR designated sites or ENR's storage yards in a way that will not affect traffic or pose any risk to communities adjacent to the railway corridors.

ENR construction crews should strictly observe the following measures:

1. Vehicles or train cars delivering construction material to, or removing construction waste from the work sites, should be covered to avoid material spillage.

2. Storage of construction material should be allowed on ENR's storage yards in a way that will not affect traffic or pose any risk to communities adjacent to the railway corridors.

c. Reduction of train speed at construction sites

Reduction of train speed at construction sites will result in longer train trip time and unexpected train delays. Some train users may become forced to use other, more costly modes of transportation. In addition, shifting to other transportation modes will reduce the number of train passengers, reducing demand on goods and services offered by businesses in the vicinity of train stations.

The following mitigation measures are required and should be reflected in construction contracts:

1. Construction scheduling should be negotiated with the contractors and authorized by the ENR to minimize train delays and associated adverse impacts. A construction schedule based on restricting work to one of a number of pre-determined construction sector at one time (Alternative 2c in the Analysis of Alternatives section of this report) should be a scheduling requirement. The expected "scheduled trip delay" should not exceed about 30 minutes.
2. Train re-scheduling should be undertaken, taking into account the expected delays and showing new departure and arrival times during the construction work
3. In cases where extended, significant train delay becomes unavoidable, a plan for making alternative means of transportation available should be considered and possibly negotiated with other MoT departments, local governments or private transportation contractor. This may include augmenting services on relevant public bus lines, creating a scheme of incentives for micro-bus and taxi services to operate at affected areas, or directly engaging a private transportation contractor to provide a temporary replacement of the interrupted service using ENR's passenger services infrastructure.

d. Construction at level crossings, with partial or complete closure of the crossing to pedestrian and vehicle traffic

Construction at level crossings may require partial or complete closure of the crossing to traffic and pedestrian. Impacts associated with this include increased traffic congestion at

certain level crossings, interruption of normal movement of people and goods across the tracks, and increased illegal track crossing. Impacts also include traffic congestion or reduced traffic flow in areas leading to or from level crossings. This, in turn, will temporarily increase noise and air pollution with emission of slow moving vehicles. It will also cause problems due to delay in arrival to work, schools, etc.

The following mitigation measures should be included in the construction contracts:

1. Work should be so planned as to avoid the complete blockage of any level crossing, as much as practical.
2. Concentrating work in level crossings during times of reduced traffic, possibly during the night, as long as noise level can be kept at legally permissible levels.
3. In cases where a level crossing has to be completely closed during construction, an alternative crossing should be identified and advertised to the public in advance. Traffic detours will have to be clearly marked and provided with proper direction signaling for incoming traffic.
4. Adequate coordination should be maintained with law enforcement authorities (Traffic Police) to take charge of controlling vehicular and pedestrian traffic flow and preventing illegal track crossings

9.2.2 Operation and maintenance phase impacts

Following the completion of the signaling system modernization, it is expected that trains will be operated at increased travel speeds. This is expected to increase the risk of accidents at level crossings. Risk of accidents will particularly increase to pedestrians crossing at informal crossings which occur in many places all along the lines. This is particularly the case at areas where deteriorating track or signal conditions have, for years required that trains travel at much reduced speeds. Users of informal crossings at these areas, who have grown accustomed to the slow train speeds, will be exposed to a much great risk with the unexpectedly fast trains. Awareness raising effort will be essential to reduce this risk.

Required mitigation measures are as follows:

- Management of vehicle and pedestrian traffic at level crossings should be improved.
- Protective walls of railway corridor in densely populated area should be repaired and regularly inspected and maintained to prevent informal crossing.
- A public awareness campaign on railway safety should be designed and implemented,

Table 13. Potential environmental and social impacts of the project activities during the construction and operation phases and their proposed mitigation measures.

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Pre-Construction/ Design Phase						
Land allocation for CTC and MTBs along the railway corridor	Land acquisition/ Livelihood or assets impacts	-ENR to maintain their avoidance strategy for any land with any uses as a priority action. - All efforts be made to allow for harvesting of crops prior to any land-related impacts. -RPF was prepared stipulating the principles to be followed in case this impact is encountered. RAPs and ARAPs should be prepared as needed for individual cases where land and livelihoods loss will be encountered as an impact. - All efforts be made to allow for harvesting of crops prior to any land-related impacts. - GRM to be developed and used	PMU with support from the WB	PMU Director	TBD	The contractor should comply with the avoidance strategy of ENR and should provide regular reporting supporting that to ENR. If the technical requirements of certain location made it impossible for the contractor to secure full avoidance, the various options should be discussed with ENR and reported to the Bank and actions should be taken accordingly (including preparing safeguards instrument such as RAP/ARAP)
Construction Phase						
Construction activities at areas accessible to the public.	Safety risk to the public at or near construction sites.	- Construction sites closed to the public.	Contractor	PMU	To be covered as part of the construction cost	

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Construction activities at all areas	Potential negative impacts on local communities, or local environment and potential risk of escalated concerns/complaints without being managed properly	- ENR to conduct site specific information sharing session and consultation prior to the commencement of any works. - Ensure that the local communities have access to the ESMP in local language and are aware of the contractors' commitments. - ENR to strengthen the existing GRM system and ensure operationalization of multi-channels project level Grievance Redress Mechanism (GRM) - ENR to ensure dissemination of the GRM to local communities and potential PAPs prior to starting construction activities. - Maintain solid documentation for the received complaints during the the construction phase and track the level of responsiveness (provision of feedback) .	PMU and the Contractor	PMU	To be covered as part of the construction cost	
	Social conflicts and potential inconvenience caused be labor coming from outside the project area (labor influx).	- Provision of information regarding Worker Code of Conduct in local language(s) and follow up on compliance. - Encourage the common practice of using local workers as this will reduce the transaction cost and will eliminate the risk of labor influx.	Contractor	PMU	To be covered as part of the construction cost	

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
		- Provision of cultural sensitization training for workers regarding engagement with local community. - Share with community and implement the approved GRM at all times during the construction phase and track the level of responsiveness (provision of feedback) .				
	Increased risk of illicit behavior and crime.	- Ensure timely and sufficient payment to the contractors and sub-contractors workers - Creation of supervised leisure areas in workers' camp (if applicable); - Enforce the national law; - Introduction of sanctions (e.g., dismissal) for workers involved in abuse or inappropriate activities; - Provision of substance abuse prevention and management programs.	Contractor	PMU	To be covered as part of the construction cost	
	Occupational health and Safety impacts for workers	- Develop an occupational health& safety mitigation plan according to the Egyptian legislation and international best practices. - Obtain approval on the developed occupational health& safety plan from ENR prior to starting construction activities.	Contractor	- EAD - ENR	To be covered as part of the construction cost	

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
		- 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 life insurance against any potential accidents.				
	Risk of child labor	Include clear and explicit measures in the contractors' contract to 1) prohibit labor under 18 years old in the main contract, 2) stipulate that this contract should go to all the sub contract as a binding condition.	Contractor	ENR	Part of the contractual agreement	
	- Dust air pollution and noise generation from construction activities, vehicles and equipment	- Excavation and construction material should be covered to minimize spillage and dust generation. - Vehicles delivering construction material or waste should be covered to avoid material spillage. - Vehicles uploading material should maintain the lowest possible fall height to reduce noise and dust generation. - All construction activities should be carried out during the day time to minimize noise disturbance to communities near work sites.	Contractor	-ENR -EAD -Third party construction supervision	To be covered as part of the construction cost	

Project Activity	Potential Environmental /Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
		- Workers exposed to noise exceeding permissible levels should wear hearing protection. - No exposed, hot power cables should be left unattended at any time. - Old, often contaminated ballast basalt should be removed to a government-designated dumpsite for disposal or for decontamination for future use. - Transportation of old ballast should be only in covered tracks to avoid spillage. - Construction waste should be disposed of at dumpsites designated by local governments. - Construction sites should be closed to the public.				

Table 17, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Construction Phase, *continued*						
	Impacts due to un-proper handling of solid non-hazardous and hazardous wastes	***Mitigation measures for non-hazardous wastes*** • Implement a segregation system based on compatibility of different waste streams during each phase of project implementation • Specify an area/containers for non-hazardous wastes which accommodate for the generated segregated streams • Dispose of non-recycled wastes in the nearest landfill; the location of which needs to be confirmed at the beginning of the construction phase. • Register the amounts of disposed of wastes and keep waste disposal and transportation receipts/manifests.	Contractor	-ENR -EAD -Third party construction supervision	To be covered as part of the construction cost	

		Mitigation measures for hazardous wastes The measures listed below represent the minimum measures to be included in the waste management plan, which will be prepared and implemented by the contractor. *m) General measures* • All types of hazardous waste can only be transported by licensed hazardous waste service providers and disposed of in licensed landfill. Both, the service providers and disposal sites have to be identified at the beginning of construction works. At the time of producing this study, the only hazardous waste disposal site is the Nasreya hazardous Waste Centre in Alexandria. • The different types of hazardous wastes should not be mixed. • Spent mineral oils shall be collected, stored in sealed containers and recycled using a licensed company which also has to be identified by the contractor				

		n) Adopting an Identification system for hazardous wastes generated on site The Contractor shall be able to identify the different potential hazardous wastes. Identification shall be performed according to the Egyptian hazardous waste classification system by the contractor's in-house staff or with the aid of an independent waste management consultant appointed by the contractor. *o) Storage and Management of the waste accumulation area* The waste storage area for hazardous wastes shall be fenced, secured with limited admission and shaded from rain and sun heat/light.: • The storage area must have a water supply • A hazardous waste label that has a "Hazardous Waste" mark on it must be placed on the container while still at the generation point. *p) Emergency Response*				

		For the purpose of first response, when a hazardous substance release is first discovered or witnessed, the individual of concern who had to be previously trained would initiate an emergency response sequence by notifying the proper authorities of the release. The individual will take no further action beyond self-evacuation and notification. The aim of the response at this level is limited to protect nearby persons, property, or the environment from the effects of the release. No trials are performed at this stage to actually stop the release. This level of response includes; • actions to contain the release from a safe distance • prevent its spreading • evacuation				

Table 17, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Construction Phase, *continued*						
Reduction of train speed at work sites	- Longer train trip time - Unexpected train delays	- Construction scheduling should be negotiated with the contractors to minimize train delays. - Train re-scheduling should be undertaken taking into account the expected delays and showing new departure and arrival times during the construction work - A plan for making alternative means of transportation available in case of significant train delay should be developed and implemented.	ENR Contractor	- MoT - ENR -EAD	To be covered as part of the construction cost	- Some train users may become forced to use other, more costly mode of transportation. - Shifting to other transportation modes will reduce the number of train passengers, reducing demand on goods and services offered by businesses in the vicinity of train stations.

Table 17, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Construction Phase, *continued*						
Construction at level crossings (Partial or complete closure of the crossing to pedestrian and vehicle traffic)	Increased traffic congestion at certain level crossings - Interrupting normal movement of people and goods. - Increased illegal track crossing.	- Work should be so planned as to avoid the complete blockage of level crossing, as much as practical. - Concentrating work in level crossings during times of reduced traffic, possibly during the night, as long as noise level can be kept at an acceptable level. - In cases where a level crossing has to be completely closed during construction, an alternative crossing should be identified and advertised to the public in advance. Traffic detours will have to clearly marked and provided with proper direction signage for incoming traffic. - Law enforcement authorities (Traffic Police) should take charge of controlling vehicular and pedestrian traffic flow and preventing illegal track crossings	Contractor ENR	- EAD - Local law enforcement authorities (Traffic Police)	To be covered as part of the construction cost	- Traffic congestion or reduced traffic flow in areas leading to or from level crossings. This, in turn, will temporarily increase noise and air pollution with vehicle emission of slow moving vehicles. - Delay to work

Table 17, continued

Project Activity	Potential Environmental and Social Impacts	Proposed Mitigation Measures	Institutional Responsibilities		Cost Estimates (LE)	Comments
			Enforcement	Coordination		
Operation and Maintenance Phase						
Operation Phase – all activities	Potential negative impacts on local communities or local environment	- Assess and improve the exiting GRM of the ENR - Share with community and effectively implement the GRM	PMU – Social Officer	PMU - Director		
Operation and maintenance of trains at increased travel speeds	- Accidents due to inadequate traffic and pedestrian control at level crossings. - Accidents due to illegal pedestrian crossing	- Improving control of traffic and pedestrian crossing at level crossings. - Assessing the need to consider universal accessibility measures to prevent accidents to persons with limited mobility, including persons with disabilities, the elderly, etc.	EAD Railway Police Traffic Police	ENR		Training of operators of trains and signaling system
		Repair of protective railway corridor walls in densely populated area.	EAD	ENR	Should be covered as part of the project contract	
		A public awareness campaign on railway safety.	EAD	ENR	600,000	The campaign should be implemented in parallel with the construction phase of the project.
Operation and maintenance of trains.	None	–	EAD	ENR	To be covered as part of the project contract	Training of operators of trains and signaling system

Operation and maintenance of automated signaling system	None	–	EAD	ENR	To be covered as part of the project contract	Training of operators of trains and signaling system

9.3 Monitoring Plan

Monitoring plan is summarized in Table 18. It consists of the following components:

a. Noise, air quality and workplace health and safety monitoring.

The application of the following mitigation measures need to be monitored throughout construction activity:

1. Measures for minimizing dust generation.
2. Measures for minimizing noise generation.
3. Proper storage of construction material.
4. Measures for safe disposal of solid waste.
5. Daily work schedule
6. Measures to protect work environment

The following should be specifically monitored by EAD staff and site inspectors operating at each of the construction sites.

1. Application of dust suppression measures
2. Application of noise suppression measures
3. Application of workers' health and safety procedures
4. Adherence to work schedule
5. Disposal of construction waste practice

To ensure the effectiveness of these measures, complaints made by the public, their representatives, government environmental inspectors, or members of work crew should be regularly investigated and reported to EAD. A log of these complaints should constitute an important means for monitoring not only the extent of adherence to mitigation plan, but also the effectiveness of that plan.

b. Construction scheduling to minimize train delays

This should be negotiated with the construction contractor before signing the contract. EAD site inspectors should monitor contractor's adherence to construction schedule. An inspector should visit each construction site at least once every two weeks and report his/her findings to the EAD.

Train re-scheduling during construction work, taking into account expected delay is one of the key mitigation measures, EAD site inspectors should check at least once every two weeks to see if revised train schedule has been issued and adequately announced and applied. The site inspector should also record train delays if any, and check and record passengers' complaints.

In cases where major delay in the operation of any sector of the line for extended periods of time becomes unavoidable, ENR should consider negotiating with other departments of the Ministry of Transport, local governments or an independent contractor feasible means for providing alternative means of transportation. The adequacy of this emergency transportation should be monitored by EAD site inspectors. Passengers' complaints should be validated and reported to EAD.

ENR should negotiate with the construction contractor, construction plans for level crossings to avoid complete crossing blockage whenever possible. The plan should seek to concentrate work, whenever feasible, during times of reduced traffic. The plan should clearly assign alternative crossing routes based on adequate traffic analysis. Coordination with law enforcement authorities (Traffic Police) will be essential to ensure that they take charge of controlling vehicular and pedestrian traffic flow and to prevent illegal track crossings. EAD site inspectors and staff should monitor traffic flow condition across level crossings and their vicinity on daily basis when work is affecting important level crossings. EAD Staff and site inspectors should report the traffic conditions to EAD, and ENR management.

Table 14. Monitoring plan.

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
Pre-Construction/ Design Phase							
ENR to maintain their avoidance strategy for any land with any uses as a priority action. -RPF was prepared stipulating the principles to be followed in case this impact is encountered. RAPs and ARAPs should be prepared as needed for individual cases where land and livelihoods loss will be encountered as an impact. - GRM to be developed and used	- Number of Complaints - Number of complaints that were resolved and the time it took to resolve them - Preliminary assessment report of land and livelihoods/assets loss for selected locations for MTBs - RAPs & ARAPs	Construction sites of MBTs	Review and audit	Weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-
Construction Phase							
- ENR to conduct site specific information sharing session and consultation prior to the commencement of any works. - Ensure that the local communities have access to the ESMP, RPF and subsequent	Documentation of the sharing sessions and consultations ESMP in Arabic GRM in place and known to	Construction sites	Review and audit	At the beginning of the construction phase then weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
ARAP/RAPs.in local language and are aware of the contractors' commitments. - ENR to strengthen the existing GRM system and ensure operationalization of multi-channels project level Grievance Redress Mechanism (GRM) - ENR to ensure dissemination of the GRM to local communities and potential PAPs prior to starting construction activities. - Maintain solid documentation for the received complaints during the construction phase and track the level of responsiveness (provision of feedback) .	local commmunity						
Provision of information regarding Worker Code of Conduct in local language(s) and follow up on compliance.	GRM in place and known to local community Number of Complaints	Construction sites	Review and audit	At the beginning of the construction phase then weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
- Encourage the common practice of using local workers as this will reduce the transaction cost and will eliminate the risk of labor influx. - Provision of cultural sensitization training for workers regarding engagement with local community. Share with community and implement the approved GRM at all times during the construction phase and track the level of responsiveness (provision of feedback) .	Training records						
- Develop an occupational health& safety mitigation plan according to the Egyptian legislation and international best practices. - Obtain approval on the developed occupational health& safety plan from ENR prior to starting construction activities.	Occupational Health & safety Plan approved document H&S incidents	Construction sites	Review and audit	At the beginning of the construction phase then weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
- 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 life insurance against any potential accidents.							
Include clear and explicit measures in the contractors' contract to 1) prohibit labor under 18 years old in the main contract, 2) stipulate that this contract should go to all the sub contract as a binding condition.	Related clauses in the contract	N/A	Review	At the beginning of the construction phase then weekly	Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	-
- Measures for minimizing dust generation. - Measures for minimizing noise generation (including disallowing ballast sifting at the site). - Proper storage of construction material - Measures for safe disposal of solid waste	Check - Application of dust suppression measures - Application of noise suppression measures - Application of workers' health and safety procedures - Adherence to work schedule	Construction sites	- Health and safety inspection protocol - Review weekly logs of complaints of noise, dust and other air pollution	Weekly	- Contractor - EAD site inspectors - Independent consultant	- EAD - ENR	- Training EAD staff (140,000) - Training EAD site inspectors (290,000) - Institutional capacity building consultant's fees (175,000)

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
(including old ballast basalt). - Daily work schedule - Measures to protect work environment - Construction site is closed to the public	- Implementation of solid waste management plan - Complaints of noise, dust or other air pollution recorded and validated						
Strengthening the capacity of the newly assigned social specialists on issues related to land acquisition, citizen engagement and handling grievance	Number of training conducted Number of staff trained Field reports reflecting the learning from the training				ENR		150,000
- GRM development and implementation	-Number of Complaints	Construction sites	Data analysis	Weekly	Contractor	PMU	_
Construction scheduling to minimize train delays	Adherence to construction schedule	Construction sites	Adherence to schedule	Bi-monthly	- Contractor - EAD site inspectors	- EAD - ENR	_

Table 18, continued

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
Construction Phase, *continued*							
Train re-scheduling during construction work	Revised train schedule announced and applied	Train stations	- Train delays - Passengers' complaints recorded	Bi-monthly	- EAD site inspectors	- EAD - ENR	_
- Alternative means of transportation developed and implemented	Availability and cost of alternative transportation	Selected population centers (e.g.Cairo, Bani-Sweif, Minya, Assuit, Sohag and Qena)	- Transportation cost - Average trip time - Passengers' complaints recorded	Bi-monthly	EAD site inspectors	- EAD - ENR	_
Planning construction work on level crossings to - avoid complete crossing blockage. - concentrate work during times of reduced traffic. - assign alternative crossing routes. - Law enforcement authorities (Traffic Police) should take charge of controlling vehicular and pedestrian traffic flow and preventing illegal track crossings	- Traffic flow across level crossings and their vicinity.	- Selected level crossings and population centers.	Extent of traffic congestion at crossings. Complaints of crossing users and other citizens recorded.	Daily at construction sites	- Contractor - EAD Site Inspectors	- EAD - ENR - Relevant traffic department	_

Table 18, continued

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency of Measurement	Responsibilities		Cost (LE)
					Implementation	Reporting	
Operation Phase							
Improving control of traffic and pedestrian crossing at level crossings.	Management of traffic and pedestrian crossing at level crossings.	Level crossings along the two project lines	Control and safety aspects	Every three months	EAD	ENR	-
Repair of protective railway corridor walls in densely populated area.	Conditions of railway corridor walls	Densely populated areas along the two project lines	-	Every three months	EAD	ENR	-
Grievance Redress Mechanism Implementation	Number of Complaints	Railway corridor	Data analysis	Daily	ENR	PMU	
A public awareness campaign on railway safety,	Frequency of illegal crossing at formal and informal crossing sites.	Selected sample level crossings and informal crossing sites.	-	Every three months	EAD	ENR	-

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