



**Egyptian National Authority for
Tunnels (NAT)**

Environmental and Social Impact Assessment Report

High Speed Rail-Green Line
Non-Technical Summary

25 November 2022

Project No.: 0626724

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25 November 2022

Environmental and Social Impact Assessment Report

High Speed Rail Green Line, Egypt – Non-Technical Summary

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Acronyms and Abbreviations

Name	Description
CEMP	Community Engagement Management Plan
CHMP	Cultural Heritage Management Plan
CLO	Community Liaison Officers
DMP	Dust Management Plan
E&S	Environmental and Social
EEAA	Egyptian Environmental Affairs Agency
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EN	European Standards
ENR	Egyptian National Railways
ERM	Environmental Resources Management
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FGD	Focus Group Discussions
GHG	Greenhouse Gases
GM	Grievance Mechanism
GRM	Grievance Redress Mechanism
H&S	Health & Safety
HSR	High-Speed Rail
IAQM	Air Quality Management
IFC	International Finance Corporation

LRP	Livelihood Restoration Plans
MoT	Ministry of Transport
NAT	National Authority of Tunnels
NGO	Non-Governmental Organisations
NTS	Non-Technical Summary
OCC	Operational Control Centre
OHS	Occupational Health and Safety
PAP	Project Affected Persons
RAP	Resettlement Action Plan
RoW	Right of Way
SEP	Stakeholder Engagement Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank

1. INTRODUCTION

The development of the Public Transportation Sector in Egypt and development of railway networks within the country are two economic development priorities in the Sustainable Development Strategy: Egypt 2030 Vision. Given that the current Egyptian National Railways (ENR) railway system is unable to meet the increased passenger demands and continuous economic development, the Egyptian Government is currently working on multiple development projects focused on modernizing the railway systems in Egypt and enhancing their capacity. The transport sector's development in Egypt is guided under the strategic direction of Egyptian President Abdel Fattah el-Sisi.

One of the executive decisions of the President was to implement as part of the Egypt 2030 Vision the country's first modern, electrified high-speed rail (HSR) network. In total, three HSR lines are foreseen extending for approximately 2000 km in total: the Green Line (subject of this ESIA), a Blue Line running from Cairo south to Aswan, and a Red Line running from Luxor to Hurghada.

The HSR project is considered a "Project of National Importance", and is being promoted strongly on behalf of the President by the Minister of Transport, Kamel al-Wazir.

1.1 What is this Document?

The Egypt High Speed Rail Project (HSR) consists in the design, construction, commissioning and operation of the country's first high-speed train system. The network of three lines (referred to as the Green, Blue and Red Lines) will extend for approx. 2,000 km, connecting Cairo, Upper Egypt, the Red Sea and the Mediterranean (see Figure 1-1)¹:

- Green Line: the track extends from Ain Sukhna to Hadaik October, then branches in the south to Fayoum / Beni Suef to connect with the second line and branches in the north to Alexandria, El Alamein and Marsa Matrouh, with a length of about 660 km.
- Blue Line: the line starts from Fayoum station / Beni Suef to Abu Simbel city, with a length of 1,100 km west of the western desert road, provided that the stations are established in the areas that intersect the Nile axes.
- Red Line: The track extends from the interchange station with the second line (Qena station, which will be implemented with the second line) and then extends east to Hurghada and then to Safaga Port with a length of about 225 km.

The Green Line is expected to be constructed first, followed by the Blue and Red lines.

Funding for realization of the Green Line will be partially obtained from international banks, which have requested investigation of potential impacts of the Project² on the environment and on the people (social impacts). As a major long-term infrastructure, the HSR Project is considered "High Risk" as it has the *potential* to cause significant environmental and social (E&S) impacts associated with the construction and operation of the proposed railway system. Consequently, extensive studies were made by international and local experts (ERM and EcoConServ) for a period of over one year and resulted in many 100s of pages compiled in the Environmental and Social Impact Assessment (ESIA) Report and other related documents. The ESIA also includes many actions (so-called "mitigation measures") to be undertaken to avoid or at least minimise the potential risks and impacts of the Project to acceptable levels.

This document is a Non-Technical Summary (NTS) of the main findings of the ESIA studies conducted for the HSR Green Line Project.

¹ Electric Express Train October.ppt provided by SYSTRA on 17 October 2022

² Note. The term "Project" in this document refers to the HSR Green Line

The NTS is intended to be an easy to understand summary of the information that is provided in the full ESIA study. The purpose of the NTS is to facilitate the public and the Project stakeholders understanding of:

- The Project need and background;
- Project description and main components;
- The ESIA process, including stakeholder engagement and grievance mechanism;
- The potential adverse and positive environmental and social effects of the Project; and
- The mitigation measures that will be implemented to avoid or reduce adverse effects and enhance the benefits.

The Ministry of Transport (MoT) is the owner of the HSR Project through the National Authority of Tunnels (NAT). NAT is being supported for the management and implementation of this Project by the international transport consultant, Systra.

The Construction Phase of the Project is divided into two main Work Packages which are coordinated by both NAT and Systra:

1. **Work Package 1:** includes major civil works such as: line alignment, earthworks, construction of stations, bridges, etc. and which will be executed by Egyptian contractors; and
2. **Work Package 2:** includes the rails, electrification and controls, provision of rolling stock by the international partnership of Siemens and its Partners (also known as Siemens/CJV-Consortium³).

1.2 Where to get more information?

The intention of NAT is to make it easy for the public to become informed about the Project, and to invite the public to provide their views and comments (whether positive or negative) about the Project.

For any questions, complaints or concerns about the ESIA process or the HSR Project in general, or to receive further information, please contact **NAT** through the contact details stated below:

Mobile: +20 2 25742968

Website: <http://www.nat.gov.eg/Default.aspx>

³ The term "Siemens/CJV-Consortium" refers to one or more open consortium/consortia to be established by and amongst Siemens Mobility Egypt LLC, Siemens Mobility GmbH and the Construction Joint Venture, which consists of Orascom Construction S.A.E. and The Arab Contractors (Osman Ahmed Osman & Co)



Figure 1-1: The Three High Speed Rail Routes. Source: SYSTRA

2. PROJECT DESCRIPTION

2.1 General Overview- Why is this Project Needed?

Egypt is currently served by a rail network of over 10,000km length, but which has far exceeded its maximum capacity caused by steep population increase over the past century. The existing lines suffer from the lack of daily maintenance, poorly maintained carriages and outdated state of existing infrastructure. Operational conditions are overall poor and inefficient, with frequent breakdowns and accidents with multiple fatalities. Nearly all of the locomotives are diesel-fuelled; only a small portion of the network is electrified.

The role of modern and efficient transportation is important to improve the infrastructure, the economy and communal safety of the Egyptian population. Over the years, numerous transportation projects, particularly in the major cities of Cairo and Alexandria have been introduced.

The proposed 1,985-kilometer HSR network has been introduced to respond to the above-listed challenges by offering a fast, efficient and safe mode of transportation for both passengers (speeds up to 230 km/hr) and freight (up to 120 km/hr) and providing new connection possibilities between Egyptian ports, industrial zones, new development zones and the new administrative capital. For example, the Green Line Project will provide a direct route from the Red Sea port of Ain Sokhna to the new Alamein City on the Mediterranean coast in only three hours. The new network is expected to significantly transform the country's rail transport and mobility system.

The Egypt HSR (also known in Egypt as the Electric Express Train) is in alignment with Egypt's Vision 2030⁴, aiming to enhance Egypt's transportation infrastructure, by widening its current transportation network, and better serving communities in new urban districts where access to sustainable transportation modes is currently unavailable. In addition, the Green Line (and the additional proposed Blue and Red lines) will allow for the transport of local materials to industrial zones across the country, thus promoting industrial growth across the nation, as well as urban, tourism and commerce development.

The Project aligns with the Objective 1 of Egypt Vision 2030 “to improve the quality of life of life and standard of living of the Egyptian citizens” as well as Objective 3 “to promote competitive and diversified economy” through which job opportunities can be created.

⁴ Egypt Vision 2030 strategy represents the plan for the Country and Egypt's general objectives for 2030

2.2 Route of the HSR Green Line

The HSR Green Line will be of 590 km⁵ in length running from Marsa Matrouh to Ain El Sokhna.



Figure 2-1 HSR Green Line Alignment

The Green Line will have 21 new stations and one depot (nearby October Gardens), which will provide the following services:

- **Regional passenger service-** operated by 34 commuter trains, stopping at each station and with a maximum train speed of 160 km/h;
- **Express passenger service-** operated by 15 express trains, stopping only at major selected stations and with a maximum train speed of 230 km/h; and
- **Freight train service-** operated by 15 locomotives with maximum train speed of 120 km/h, running only between Ain Sokhna and Borg El Arab with stops at New Capital and Sadat Stations, .

⁵ As of May 2022 there has been a recent amendment to the design of the HSR Greenline, and the total length of the network has increased from 590 km to 660 km by integrating the initial segment of the Blue Line that connects October Gardens to Fayoum. This segment has only been added as part of the Green Line's contractual arrangements between NAT and Consultants only for construction purposes but will remain under the planned operations of the Blue Line. This ESIA was based on the 590 km version of the alignment whereas the additional segment has been studied separately and an ESIA Addendum was prepared by ERM/ECS (dated 05 October 2022).



Figure 2-2 Types of Rolling Stock

Source: Siemens, 2021

All of the stations and the track alignment are completely new construction and not based on any previously existing railway tracks. When selecting the alignment of the Green Line, NAT has attempted to minimize land acquisition needed as well as possible impacts on the environment and the people living nearby.

2.3 Key Features of the HSR Green Line

The most important civil engineering components of the HSR Green Line are presented in the table below:

Table 2-1 Project’s Key Elements

Component	Details
Length of main track	590 km
Number of Stations	21
Cross Sections	The HSR will be a double track railway
Junctions	1
Overpasses	There is a total of 15 overpasses/HSR bridges across the alignment that are primarily crossing existing roads and ENR routes.
Bridges	The Green Line HSR alignment crosses about 220 roads at about 465 locations. The alignment traverses through road networks at these intersections via bridges.
Culverts	There is expected to be 216 culverts, with different dimensions depending on the outcomes from the hydrological study per Sector
Train stations	21 stations in total. Three types of stations will be built as part of the HSR Project: <ul style="list-style-type: none"> ■ Regional Stations; ■ Express Station; ■ Terminal stations
Main Depot	There is one primary “main depot” located near the October Gardens station, where most of the heavy maintenance works of the trains will take place.
Main HSR Greenline Administrative Building	The primary administrative center and “OCC” control room for the HSR will be a new 3-storey building located at the October Gardens Main Depot.
Traction Supply Stations (TSS)	There will be 10 new TSS built along the alignment and related equipment to convey electricity from the Egypt electric power grid to the new railway.

The following photos illustrate some of the key elements of the Project. For instance, Figure 2-3 below presents a pedestrian crossing (here built to enable people crossing a large road). The similar type of structure will be used along the HSR.



Figure 2-3 Example of Pedestrian Crossings

Some sections of the Green Line will be built “at grade” (meaning at the ground level) and provided with fences and barrier to avoid people and animals entering the railway area. At some places (crossing of roads, rivers/canals, other linear infrastructures and in urban areas or close to most of the stations), the railway will instead be built up higher using bridges and overpasses. The following photo shows an example of High Speed Railway bridges (existing HSR connecting Marseille to Paris in France) crossing a valley and the A8 highway near Aix En Provence (France).



Source: ERM, 2022

Figure 2-4: Example of Bridge Crossing an Existing High way Road (France)

The Green Line will include one bridge crossing the River Nile, near Helwan. The following picture presents a view of the Imbaba Bridge crossing the Nile (about 495 m). This bridge is currently the only railway bridge across the Nile in Cairo.



Source: By Hossam el-Hamalawy (CC BY SA 2.0)⁶

Figure 2-5: Imbaba Bridge – ENR Bridge crossing the Nile River

A total of 21 train stations will be constructed along the Green Line, which will provide different train service types such as: express, regional or freight. Figure 2-6 and Figure 2-7 are taken from the construction progress of two of the main stations that will provide regional service and express service.



Figure 2-6 Photos from the Mohamed Naguib station (*regional station type*)

Source: EcoConServ, March 2022

⁶ [https://en.wikipedia.org/wiki/Imbaba_Bridge#/media/File:Imbaba_Bridge_\(271400956\).jpg](https://en.wikipedia.org/wiki/Imbaba_Bridge#/media/File:Imbaba_Bridge_(271400956).jpg)

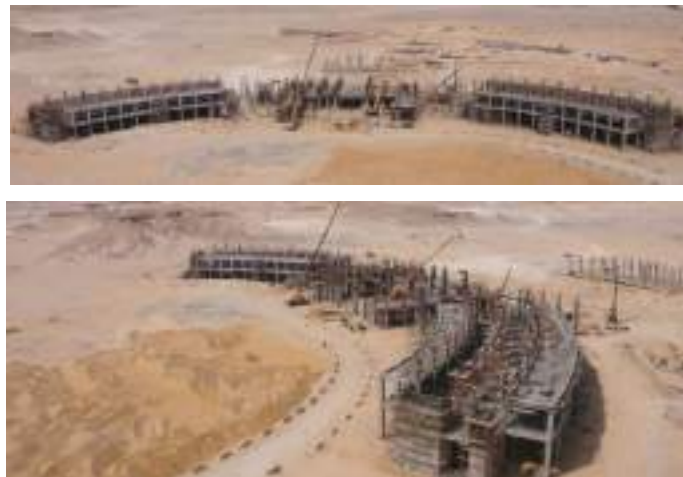


Figure 2-7 Photos from the Ain Al Sohkna station (*express station type*)

Source: EcoConServ, March 2022

Furthermore, the Operation Control Centre (OCC) is the primary administrative and management hub for the high-speed rail system operations. It is located in the main administrative building in the October Gardens depot and is a three- storey building.



Source: Siemens, 2021.

Figure 2-8 Layout of an Operation Control Centre

Achieving a safer mode of transportation is one of the main objectives of the Project, this is why the HSR overall (including the Green Line), will be designed, constructed and operated in accordance with the highest international specifications and best practices. All equipment and products will be provided by high quality international suppliers and meet the requirements for similar high-speed rail operations in European countries. Also, to provide the best comfort and less disturbance possible to the local communities, noise and vibration levels from the operation of the HSR will be minimized in accordance with European Standards (EN) and Egyptian Environmental Protection Standards.

2.4 Construction Works

Construction works of some parts of the Green Line originally commenced in 2021. At the time when this ESIA was prepared (mid-2022) construction works were underway on most of the stations and several sections of the alignment. Final construction of the HSR Green Line including the railway route, stations and the depot, is expected to be finalized by 2025. However, it is important to emphasize that any possible disturbance to surrounding communities (such as construction noise or limited accessibility) will only be limited to a few months as the construction is fragmented into smaller sections and will progress quickly in most sections.

Typical machinery and equipment for such large infrastructure project will be found on site such as: bulldozers, cranes, excavators, bobcats, graders, lorries, loaders and other equipment.

Furthermore, construction of the Green Line is expected to employ overall approximately 15,000 - 18,000 workers during peak construction times. The majority of the workforce (85%) will be sourced by local Egyptians, usually residing near the respective construction area.

2.5 Operational Phase

Service operations are planned to start by 2026. It is estimated that around 100 passenger trains will be servicing normal operations throughout the year. During a certain number of days per year, traffic will be reduced slightly to enable the operating company to carry out routine maintenance activities on the line.

Peak travel times are expected to be between 07:00 to 09:30 in the morning and between 17:00 to 19:30 in the evening. The operating service provider will also take in consideration increased passenger demands during special occasions (Ramadan period and other civic, sports or religious events) and provide additional service trains. The HSR Green Line will provide service for circa 500 seated passengers per train and a maximum of 600 passengers per train (including tip-up seats and standing passengers).

The Project mechanical components are designed for a lifespan of approximately 15 years. After this period, the HSR system's physical and electrical components will be upgraded to match more advanced technologies and better standards in place.

3. HOW WAS THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONDUCTED?

3.1 General ESIA Process

The impact assessment process predicts and describes environmental and social (E&S) impacts that are expected to occur for different phases of the HSR Project; based on this assessment the appropriate set of actions is defined to help avoid or minimize the impacts (all this is described in the full ESIA report). Subsequently, a monitoring and evaluation programme is implemented to assess the how effective the mitigation measures proposed are (described in the Environmental and Social Management Plan – ESMP).

The ESIA for the HSR Project was carried out using different scientific methodologies to comply with the EIA Regulations of Egypt and good international practice and standards as defined by the WorldBank/IFC. The main ESIA steps are described below.

3.2 Initial Desk Study

The first ESIA step included a review of relevant literature related to the HSR Project and project areas. Much of the background information on the project was collected from NAT and Systra – which included the project design, plans, project coverage as well as other assessments. In addition, relevant district and regional profiles were used as sources of data and information that describe baseline conditions.

3.3 Stakeholder Consultation

Stakeholder engagement – meaning discussions with institutional stakeholders (governorate authorities), nearby residents, affected persons and other interested parties - was done within the ESIA process to gather information, to disclose the project to affected people and to gather their perceived Project-related concerns.

A Stakeholder Engagement Plan (SEP) has been prepared to coordinate stakeholder engagement and project disclosure. The SEP was also used as a tool to enable NAT to align with international best practice for engaging stakeholders and to ensure that this has been done in line with a culturally appropriate approach. The SEP includes a Stakeholder Identification, a Stakeholder Analysis, Engagement Planning, and the Development of a Communication Strategy. Further information on the Stakeholder Engagement is given in chapter 4 of this NTS.

3.4 Data Collection and Observations

Interviews and documentation methods were supplemented by physical observations to identify features within the specific route (Right-of-Way) of the HSR Green Line Project. Environmental and social specialists conducted several fieldwork trips in the Project areas.

The fieldwork involved physical surveys, social-economic surveys, verification of secondary information, and consultation in order to gather information on physical, biological, cultural and social-economic aspects of the HSR Green Line Project through sampling, site walkovers and engagement with local stakeholders.

3.5 Impact Assessment

The impact assessment evaluates how the proposed Project activities will have an effect onto the baseline environmental and socio-economic conditions of the Project site. The result is an identification of potential environmental and social impacts of the proposed HSR Green Line Project. Many impacts are minor and can easily be remedied; other impacts are more significant and will require specific measures to fix them.

At this stage, a key benefit of the ESIA process is that initial results of the impact assessment can be passed on to the Project designers so that they can improve the Project design to avoid subsequent negative impacts - and to enhance the positive impacts.

A key guiding assumption in the ESIA Report is that the HSR Project will be designed, constructed, operated and maintained with due care for safety and environmental matters using current and practical engineering designs and methods that also meets good international practice for such projects.

3.6 Identification of Mitigation Measures

The Environmental and Social Management Plan (ESMP) for the HSR Project details environmental and social actions – the so-called Mitigation Measures - to minimize the potential impacts identified in the ESIA. This also includes the requirement for both NAT and Systra to establish and implement an Environmental and Social Management System (ESMS) for the Project to ensure that sufficient staff, resources and processes are in place to successfully implement the ESMP. Further information regarding the management and monitoring of project impacts is given in chapter 6 and 7 of this NTS.

The Mitigation Hierarchy:

In accordance with good international practice, Mitigation Measures are selected according to the so-called "Mitigation Hierarchy". This means that the first preference is to find design or process methods to avoid/prevent an impact in the first place (eg using non-toxic chemicals); the next preference is to employ measures to minimize the risk of impact (eg proper chemical containers and worker training to avoid spills/leaks), followed by protective equipment to minimise the effects of an impact (eg spill trays and clean-up kits, proper gloves for workers). For more information, please refer to Figure 3-1 below.

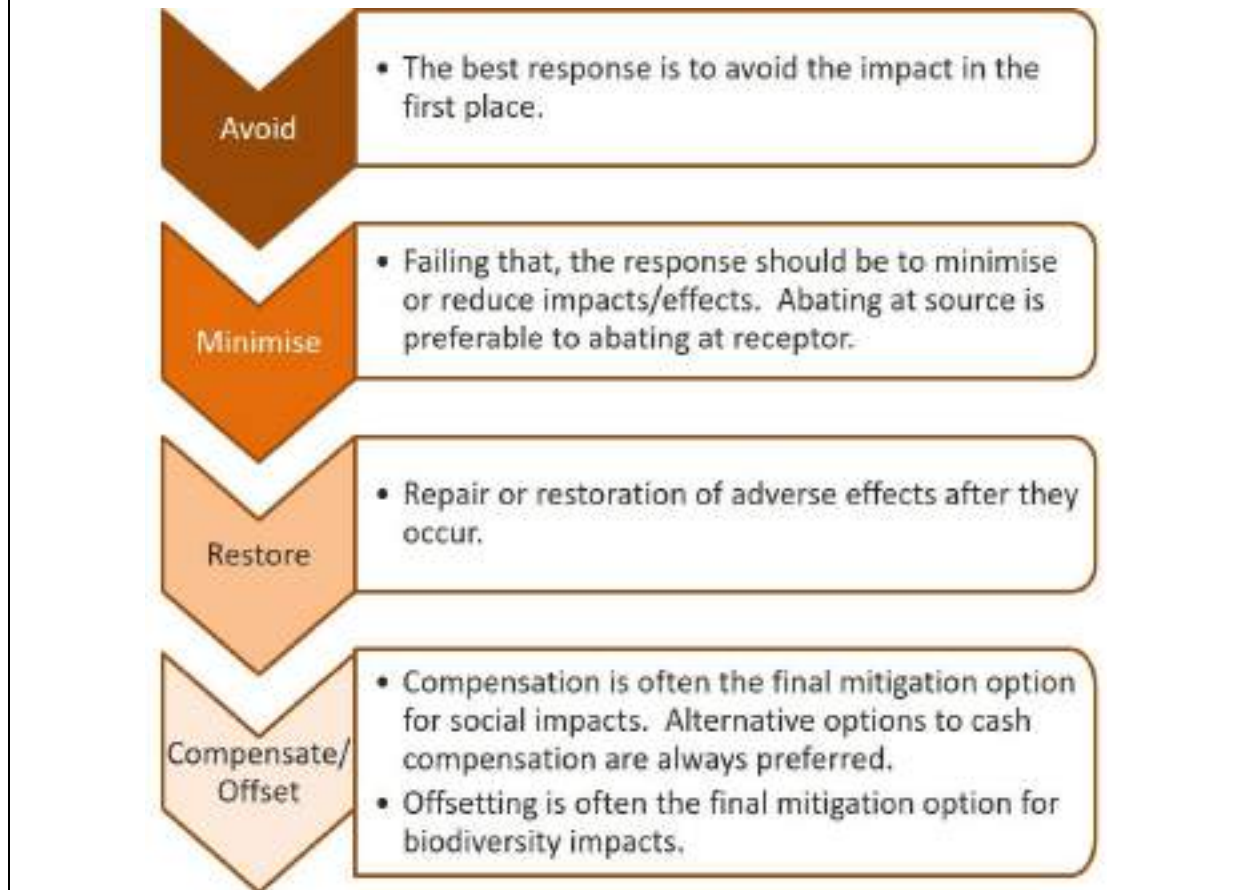


Figure 3-1 Mitigation Hierarchy

4. WHAT STAKEHOLDER ENGAGEMENT HAS TAKEN PLACE?

4.1 General Approach

The term “stakeholders” refers to local residents, public institutions, private organisations and other persons who may be (positively or negatively) affected by the Project or are otherwise interested in the Project.

Stakeholder engagement, as a part of the ESIA process, is all about how MoT/ NAT provide Project information to the stakeholders – and asks them about their views of the Project, including any comments, suggestions, questions or complaints. This two-way process of stakeholder engagement is a very important part of the overall HSR Project, beginning prior to start of construction and continuing through the operations.

The principal entities identified for this ESIA Study included government ministries, departments or agencies at national, district and local levels, private companies, non-government/civil-society organisations (NGOs), community-based organizations, user groups and people directly affected by the Project, such as goods and services providers.

4.2 Stakeholder Engagement Plan (SEP)

The SEP is a separate document describing the mechanisms by which involved people, communities and other stakeholders are informed about the Project and given opportunities to provide comments and input to the Project development. The SEP describes the engagement already undertaken in the past as well as meetings and other events planned for the future. In line with current international best practice, the SEP aims to ensure that engagement with stakeholders is free of interference and intimidation; engagement should also be relevant, understandable and provide accessible information in a culturally appropriate way. The SEP thus allows affected people to give their opinions and concerns and allow that these concerns influence Project decisions.

The SEP activities extend throughout the Project construction and operation phases as well as disclosure of the Project ESIA Package.

This SEP is a *‘living document’* and will be regularly updated as the Project progresses and, for example:

- new stakeholders are identified for the Project;
- more details become available on preferred means of engagement by stakeholders;
- more resources are needed for implementing the SEP;
- responsibilities for implementation change or are delegated.

A key part of the SEP is the so-called “Grievance Mechanism”, which provides an easy way for every person affected by the HSR Project to submit their comments, questions or complaints (so called “grievances”) to the responsible project managers of the project developer.

4.3 Stakeholder Engagement Activities

The following section present the stakeholder engagement conducted to date and the ones planned for the future, as presented in the SEP.

4.3.1 Pre-scoping Consultations

Pre-Scoping consultations took place in March and April 2021 between EcoConserv (on behalf of NAT) and selected stakeholders:

- Ministry of Antiquities (date: 04/04/2021)
- SUMED Corporation (date: 05/05/2021)
- GASCO Corporation (date: 05/05/2021)
- The Egyptian National Railways (ENR) (date: 31/03/2021)
- Sixth of October City Authority (date: 28/03/2021); Wadi al-Natrun City Authority (date: 06/04/2021); Department of Urban planning in Alexandria Governorate (date: 07/04/2021)

4.3.2 Scoping Consultations

During the preparation of the Scoping Report for the Project, a number of meetings were held with government authorities (January 2022) to verify and analyse data collected through desktop study and collect initial views of the key stakeholders. The list of stakeholders contacted, date, and key issues identified during scoping are summarised in the ESIA.

Following the issue to NAT of the Draft Scoping Report (December 2021), the following Governorate representatives were met. The purpose of the engagement was the presentation of the Scoping Report and the remaining work for the ESIA preparation.

4.3.3 ESIA Baseline Surveys and Project Disclosure

Stakeholder engagement during the ESIA phase consisted of (i) briefing Project stakeholders on the details of the Project and the ESIA process, the associated timeline; (ii) consulting stakeholders of the Project on the potential impacts of the Project on their living conditions and their activities to collect their opinions, fears, and suggestions; and (iii) collect primary socio-economic data to inform the ESIA.

Focus Group Discussions (FGDs), Key Informants Interviews (KIIs), ground truthing and field observations have been organized between February 7th and 26th 2022.

4.3.4 Planned Engagement during the ESIA Disclosure Process

The last stage of the ESIA process is “Disclosure”, which consists of publicly disclosing a draft version of the complete impact assessment, i.e. the Final Draft ESIA Report. The Final Draft ESIA report and supplementing documents (“ESIA package”), including the Non-Technical Summary, Environmental and Social Management Plan (ESMP) and SEP, will be made widely available to the public for comment via the Project website and hard copies available (at least the summaries in case of large documents) for inspection at a number of specified locations.

Two Public Consultation and Disclosure events will be organized by the ESIA consultant in close cooperation with NAT (likely one event in Cairo/Giza and another event in Alamein/Alexandria) and other key relevant organizations. The main objective of the Public Consultation is to engage local key stakeholders and involve them in the revision of the draft findings of the ESIA including the study of the various alternatives. Public Consultation sessions are a key requirement for the IFC as part of the Disclosure and Information Sharing Policy. It is also a key condition stipulated by law under the Egyptian guidelines for the preparation of ESIA.

This process permits meaningful consultations between the project proponent and project-affected groups and local NGOs is required to take place. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties (English and Egyptian versions of the ESIA Package will be available on the Project website). These meetings will be widely advertised and interested individuals and organisations will be invited to come along to hear about the

Project, review information, talk to members of NAT and the ESIA team and provide comments on the Project and its impacts.

All comments, questions and other input from the public will be logged and then considered by NAT and the ESIA team. Where feasible and relevant, changes will be made in the Project planning/design/implementation to address concerns raised. These changes will be reflected in revisions to the Project as appropriate, and the revised final ESIA Report. In addition, a brief Consultation Report will be prepared that summarises the key comments received during disclosure and explains how these comments are reflected in the Project and the final ESIA Report. This Consultation Report will be made public on the website.

4.3.5 Post ESIA Stakeholder Engagement

Engagement is an ongoing process of sharing information, understanding stakeholder issues, and responding to questions and concerns. After the ESIA/EIA Phase, NAT will be in charge of stakeholder engagement through the construction, operation and closure phases of the Project. Following disclosure of the ESIA, stakeholder engagement will continue to be carried out by NAT for the Green Line Project in line with the SEP, which will be updated at least biannually (every 6 months) through construction and annually during operations, or more frequently, as required, based on stakeholder feedback and changes to Project planning. The community relations team will carry out updates to the SEP, with the following intent:

- To make sure stakeholder lists and mapping remains accurate;
- To review and amend, if necessary, information dissemination and engagement practices in order to continue to meet the needs of stakeholders;

To review and assess stakeholder participation in order to revise, if necessary, the frequency, means and format of engagement to meet accessibility and participation requirements of all stakeholders.

5. THE MAIN FINDINGS OF THE ESIA

5.1 Summary of the Study and Key Findings

The ESIA has identified potential impacts (both positive and negative) to the physical, natural and socio-economic environments. In order to avoid, minimise and reduce negative impacts, and to ensure opportunities for the enhancement of positive impacts are realised, an overall Environmental and Social Management Plan (ESMP), other detailed Management Plans, and associated Procedures have already been developed for the Construction phase and will be developed for the Operation phase, prior to operation of the Green Line.

More in detail the ESIA presents an assessment of baseline conditions and the related impacts for the following components:

- **Physical Environment:** describing the atmosphere (the air we breathe and the climate), noise and vibrations (the sound landscape or “soundscape” that surrounds us and that we can hear and feel through vibrations), the earth in terms of landforms and geology (soils, rocks, mountains, deserts), the water (the Nile River, other streams and canals, wadis, the groundwater used for irrigation and drinking), the landscape (described in terms of what we can see along the Green Line and how the railway will be once constructed).
- **Biological Environment:** describing the natural areas, the animals, the plants found along the green line and its vicinity;
- **Social Environment:** describing the population, status of current infrastructure (schools, public utilities, health institutions, etc.) as well as the economic conditions of the communities along the Green Line;
- **Cultural Heritage:** describing cultural heritage resources (objects of archaeological value and interest, sites under the UNESCO World Heritage list) and classifying them according to their value and sensitivity to potential impacts (high, medium and low)

A summary of key impacts is shown below in Table 5.1.

The table shows a wide range of potential impacts from both the Construction and Operational phases of the Project.

For each type of impact an assessment is made of how significant the impact might be – firstly assuming the “pre-mitigation” situation - and then assuming the “post-mitigation” situation after the additional mitigation actions are undertaken to reduce the impact to people or the environment.

Also shown are a number of impacts that are positive.

Table 5-1 Summary of the key impacts identified

Identified Impact	CONSTRUCTION PHASE		OPERATION PHASE	
	Pre-mitigation significance	Post-mitigation significance	Pre-mitigation significance	Post-mitigation significance
Physical				
Air Quality- Traffic	Minor	Negligible to Minor	Minor	Minor
Air Quality- Dust	Major	Negligible to Minor	N/A	N/A
Soil Loss / Soil Degradation	Moderate	Minor to Moderate	Negligible	N/A
Geomorphological setting / Stability risks / Soil erosion	Negligible to Moderate	Negligible to Minor	Moderate	Minor
Degradation of Surface and Groundwaters	Minor to Major	Minor	Minor	N/A
Impact to Landscape	Negligible to Minor	N/A	Negligible to Minor	N/A
Noise (Construction Noise – Railway Noise)	Major	Minor to Moderate	Major	Major
Construction Vibration	Major	Negligible to Minor	N/A	N/A
GHG Emissions	Major	Major	Moderate	N/A
Net GHG Emissions	N/A	N/A	Positive	N/A
Biological				
Impacts on Terrestrial Habitats / Flora	Negligible to Moderate	Negligible to Minor	Minor to Moderate	Negligible to Minor
Impacts on Aquatic Habitats, Flora/Fauna	Moderate to Major	Minor to Moderate	Minor to Moderate	Negligible
Impacts on Terrestrial Fauna	Negligible to Moderate	Negligible	Moderate	Minor
Impacts on Protected / Internationally designated areas	Negligible to Minor	Negligible to Minor	Negligible to Minor	Negligible to Minor
Social				
Loss of residential structures / Operation: Permanent loss of livelihoods and household income	Major	Minor to Moderate	Major	Minor to Moderate

Identified Impact	CONSTRUCTION PHASE		OPERATION PHASE	
	Pre-mitigation significance	Post-mitigation significance	Pre-mitigation significance	Post-mitigation significance
Loss of (or access to) commercial, business, and non-residential structures / Operation: Changes in land values due to building restrictions	Major	Minor to Moderate	Moderate	Minor
Impacts on natural resources (loss of agricultural and grazing land)	Major	Minor to Moderate	N/A	N/A
Direct and indirect Employment Opportunities	Positive	N/A	Positive	N/A
Economic impacts from Taxes and Fees, Procurement and Worker Spending	Positive	N/A	N/A	N/A
Long-term benefits of capacity enhancement	Positive	N/A	N/A	N/A
Road Safety	Moderate	Minor	N/A	N/A
Site Trespassing and Injury	High	Minor	N/A	N/A
Environmental Health (mainly dust and noise)	High	Minor	Major	Minor
Increased Transmission of Communicable Diseases and Sexually Transmitted Diseases	Moderate	Minor	N/A	N/A
Increased risk of Gender-based Violence and Harassment	Moderate	Minor	Major	Minor
Increased Pressure on Health Care	Minor	Minor	N/A	N/A
Use of Security Personnel	Minor	Negligible	N/A	N/A
Disruption to infrastructure and utilities	Major	Minor	N/A	N/A
Disruption to water pipeline during construction	Moderate	Minor	N/A	N/A
Community Severance	Major	Minor	N/A	N/A
Unmet Expectations of Benefits	Moderate	Minor	N/A	N/A
Business Infrastructure	N/A	N/A	Positive	N/A
Loss of (or access to) communal resources / infrastructure / social services	N/A	N/A	Moderate	Minor
Cultural Heritage				
Direct impacts of earthworks on High sensitivity Cultural Heritage Resources	Major	N/A	N/A	N/A

Identified Impact	CONSTRUCTION PHASE		OPERATION PHASE	
	Pre-mitigation significance	Post-mitigation significance	Pre-mitigation significance	Post-mitigation significance
Direct impacts of earthworks on High sensitivity Cultural Heritage Resource UNESCO World Heritage Site	Moderate	N/A	N/A	N/A
Direct impacts of earthworks on Medium sensitivity Cultural Heritage Resources	Major	N/A	N/A	N/A
Direct impacts of earthworks on Low sensitivity Cultural Heritage Resources	Moderate	N/A	N/A	N/A
Indirect Impact of Restriction of access and Visual impact on High sensitivity Cultural Heritage Resources	Moderate	N/A	Negligible	N/A
Indirect Auditorial and Dust impacts on High sensitivity Cultural Heritage Resources	Negligible	N/A	Negligible	N/A
Indirect Impact of Restriction of access and Visual impacts on Medium sensitivity Cultural Heritage Resources	Minor	Negligible	Negligible	N/A
Indirect Auditorial and Dust impacts on Medium sensitivity Cultural Heritage Resources	Negligible	N/A	Negligible	N/A

Appropriate mitigation measures are described in the complete ESIA study and supporting documents to remedy the potential negative impacts shown in the above table to an acceptable level.

In general, the associated negative impacts can be minimized largely through good engineering design and envisaged construction practices and through implementing construction and operations-phase environmental and social management systems. Specific mitigation measures have been suggested in the study to avoid and minimize the inherent adverse impacts.

The ESIA concludes that the implementation of the proposed Green Line HSR will entail overall acceptable level of impacts, provided that the recommended mitigation measures are adequately put in place in a timely manner.

MOT/NAT and its contractors are committed in implementing all the recommendations given in the ESIA and to further carrying out the environmental auditing and monitoring schedules, and a budget to implement such has been, and will be, made available for their implementation.

5.2 What is the Main Potential Environmental Impacts?

5.2.1 Green House Gases related impacts

The High-Speed Green Line Project, is expected to have significant Greenhouse Gas (GHG) emissions during both its construction and operation phases.

During construction the overall significance of impacts is “Major” considering that the project-wide GHG emissions are about 300,000 t CO₂e per year and the scale of its impacts is classified, according to IFC standards, as *Large* (100,000 – 1,000,000 t CO₂e threshold). Construction activity impacts will be occurring on a continuous basis during the construction period, along the several work fronts. Mitigation measures intended to manage the impact connected to GHG emissions are described below.

- Transport logistics (locations/routes) will be optimized to ensure efficient carriage of raw materials and promote fuel efficiency
- Vehicle idling times will be reduced through focus on scheduling of construction operations.
- The use of fuel-efficient transportation vehicles will be prioritised and regular maintenance of vehicles ensured.
- Energy efficiency usage among workers will be promoted.

After the implementation of mitigation measures the impact still results in a Major Impact significance, as recommended mitigation measures at this stage would not significantly change the overall magnitude.

Measures to significantly reduce emissions during construction are limited. For example, it is unrealistic that diesel-powered vehicles will be replaced by electric or other non-fossil fuel powered engines during the construction period. The amount of earthworks needed, or the fuel consumed, will be reduced where feasible to save costs. Thus, only marginal reductions in fuel/energy use are expected.

In accordance with the international requirements, NAT will compile annual data on GHG emissions during construction and report these to the appropriate Egyptian authorities (i.e. EEAA) and to the lenders. As part of the reporting, NAT will assess if any further mitigation measures may be feasible to help reduce GHG emissions.

Nevertheless, the longer-term impact on GHG emissions will be Positive (as shown in the above table), because the operations of the HSR will emit far lower GHG emissions than would a diesel-fueled train system or transport over the long-distances by airplane or car.

5.2.2 Impacts on Air Quality

The Project has the potential to adversely impact local air quality due to generation of construction dust and pollutant emissions from construction traffic and operational traffic. Construction dust is likely to have the largest magnitude of risk due to the arid desert environment of much of the route; however, noting that through most of the route there are no sensitive receptors. Construction and Operational

traffic are likely to have negligible to small impacts as based on modelling the traffic numbers are unlikely to reach a high enough number to cause a significant effect.

With mitigation there are opportunities to avoid the impacts relating to the above arising, including dust dampening procedures and effective management of trackout, demolition, earthworks and construction. For traffic measures, these can include optimisation of access routes, tie-ing into existing public transport, and optimisation of stations location, design and layout to minimise traffic impacts. However, this will depend on the effectiveness of the mitigation implementation in reality. If mitigation is not applied correctly or thoroughly there is the potential for moderate to severe impacts for construction dust.

The following mitigation measures for construction dust are recommended in accordance with Institute of Air Quality Management (IAQM) guidance for high risk sites⁷ and IFC best practice⁸. A dust management plan (DMP) should be developed and implemented as a basic-embedded measure (as part of the CEMP). The mitigation set out below is deemed sufficient to render residual impacts acceptable:

- Communications: community engagement before work commences on site and a mechanism to record and respond to complaints (part of the Stakeholder Engagement Plan (SEP) and Grievance Mechanism (GM));
- Site Management: record all dust and air quality complaints in the GM, identify cause(s), take appropriate measures to reduce emission; record any exceptional incidents that cause dust and/or air emissions;
- Monitoring: undertake daily on-site and off-site inspection, carry out regular site inspections to monitor compliance with the DMP, increase the frequency of site inspections when activities with a high potential to produce dust, monitoring in line with the local environmental authority (the EEAA, Egyptian Environmental Affairs Agency) requirements;
- Preparing and Maintaining the Site in Sensitive Construction Locations: such as machinery and dust causing activities are located away from receptors, erect solid screens or barriers around dusty activities, control site runoff of water or mud, remove materials that have a potential to produce dust from site as soon as possible, cover or fence stockpiles to prevent wind whipping;
- Operating vehicle/machinery: impose and signpost a maximum-speed-limit of 25 km/h on surfaced and 15 km/h on unsurfaced haul roads and work areas; only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction;
- Measures specific to construction activities (excavations, access roads, etc): amongst several measures such as vegetate exposed areas/soil stockpiles to stabilise surfaces, where it is not possible use mulches or surface sealants, store dusty materials in bunded/fenced area, fine powder materials delivered in enclosed tankers, bags are sealed after use, paved surfaces clean and free of dust and debris, binding agent-assisted dust sweeper(s) on the access and local roads, vehicles (trucks) entering and leaving sites covered to prevent escape of materials during transport.

⁷ IAQM 2014. Guidance on the assessment of dust from demolition and construction. Version 1.1. <https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>

⁸ IFC 2007. General EHS Guideline: Construction and Decommissioning <https://www.ifc.org/wps/wcm/connect/7d708218-2a9e-4fcc-879d-9d5051746e7d/4%2BConstruction%2Band%2BDecommissioning.pdf?MOD=AJPERES&CVID=ls62NKq>

5.2.3 Impacts on Noise

The assessment of the potential noise and vibration impacts analysed both potential impacts arising from the construction and operation of the Green Line. Baseline surveys have been carried out and extensive mapping analysis has been used to enable noise levels from the railway alignment to be assessed.

The construction of the Project will progress along the route, and will result in a noise and vibration impact on a short-term basis as the construction approaches and moves past each settlement. Impacts from structures and borrow pits would affect receptors over a relatively small area, but for a longer period during the temporary construction phase. The efficacy of potential mitigation in the form of noise barriers in typical situations has been tested via modelling; based on these results, the way in which noise mitigation will be prioritised in the final railway design

Noise impacts can be caused by noise emissions from construction equipment (earthmovers, etc.), and construction vehicles carrying materials and spoil to and from the locations where work is taking place along the railway. Construction materials will be delivered from borrow pits where concrete batching facilities will be located. The assessment considered different construction activities (Cuttings, Demolitions, Embankment, Viaducts, Over/under bridge, Culvert, Borrow pit, Ballast, Train Station) defining noise levels. Large magnitude construction noise impacts are anticipated in where the alignment will be very close to receptors (within large magnitude impact zones) in many areas. For these reasons a number of mitigation measures have been defined in order to properly mitigate impacts. The key measures are (among several):

- stationary noisy equipment will be sited as far away as possible from receptors, and orientated away from the receptors
- alternatives to audible reversing alarms
- Where practicable
- hydraulic or electric-controlled units
- acoustically treated enclosures
- Throttle settings will be reduced
- Equipment will be regularly inspected
- Use of mufflers or silencers
- Storage of excavated material between the construction site and the sensitive use building to form a noise barrier (with cover to avoid dust erosion) or installation of other (temporary) noise barriers.
- Taking advantage of the natural topography for noise shielding.
- Implementation of speed limits
- Reducing Project traffic
- Limiting hours of operation for specific equipment or operations (e.g. trucks or machines operating in or passing through community areas).

The assessment of impacts - subsequent to implementation of mitigation measures - resulted in a minor to moderate significance. However, compliance monitoring to undertaken on a regular basis with direct measurement at critical receptor locations will be implemented.

Rail noise during operations depends on the types of trains, track-type driving, driving speed. The noise from railway operation in very densely populated areas can pose a challenge. The assessment made use of Egyptian standards and guidelines and those issued by the IFC/ WB EHS Guidelines to determine if noise from operations may be significant. The potential significance of impacts was assessed based on the assumption that noise barrier of 3 meters height will be used at receptors along the route where moderate to major impacts are predicted without such barriers. The ESIA describes the impacts after the implementation of mitigation measures still resulting in a “major”. In fact, the

implementation of mitigation measures decreases the length of impact zones, thus decreasing significantly the number of potential impacted receptors. As an example, a receptor belongs to sensitive areas to noise (schools, hospitals, libraries, public gardens, resorts, and rural areas), located at a distance of 200 m from the alignment was within the major impact zone based on the pre-mitigation assessment. With the implementation of the 3 meter height noise barriers, these receptors are now within the minor impact zone. It is also noted that the assessment is based on the available data. This included a number of conservative assumptions including simplified ground height data and the use of a maximum likely constant speed for the trains. As the Project design is refined, it would be possible to show a more specific assessment of the need for mitigation, which is likely to reduce the noise levels and therefore the areas that are affected. Further mitigation measures will also be considered during detailed design.

5.2.4 Waste Management & Soil and Water Pollution

The waste streams from construction activities as well as from workers at the project site can create impacts to the environment if not managed properly. The solid wastes include waste rocks, spoil, rubbles, tree logs, metals, glasses, papers etc. while the liquid waste include sewage, oils etc.

These wastes, if not well handled, can further change the aesthetic nature of the project area and can even lead to water pollution in case of improper disposal of oils.

Small-scale and short-term water pollution may result during construction of drainage structures and bridges.

5.3 What is the Main Potential Social Impacts?

5.3.1 Land related impact

The Green Line crosses both inhabited and desert areas and densely populated and constructed area. The Egyptian government, through NAT, will acquire the land that is required for the construction of the HSR Project. Land will be acquired on a permanent and temporary basis depending on the specific project needs. The Project components requiring permanent land take and expropriation include the HSR Footprint and RoW (i.e. the rail track itself, stations, deposit and stabling area, crossings, associated facilities and drainages). Additional areas for access roads, borrow pits and the site construction camps will be required temporarily during construction. Permanent land acquisition has the potential to result in displacement of households, community assets, infrastructures, land and of business activities displacement. Moreover, construction of the HSR will require additional acquisition of land for camps, laydown areas and other construction related activities, although these will be temporary and limited to the construction phase.

To avoid, minimize and reduce environmental and social impacts and specifically avoid as much as possible residential structures, NAT has analysed several routing options. Wherever possible, NAT will make sure that existing utilities remain in place or are incorporated into the new works. In locations where this is not possible, the utilities shall be diverted.

Land use will vary within the RoW, but for most of the Project alignment these will be within the 30m RoW, including the space for the maintenance/access road and fixed installations. In populated areas where an access road is not required, the RoW can be as narrow as 18 m. In addition to the stations and depots, the HSR Project will require also the construction of overpasses, underpasses, bridges, viaducts and culverts. A number of lengthy bridges have been included in the Project design to reduce as much as possible interactions with the local urban and agricultural areas and reduce land take and its impacts.

The following restrictions will apply to the 30m RoW:

Construction Restrictions	Operation Restrictions
<ul style="list-style-type: none"> ■ Permanent removal of all houses and structures. ■ Land clearance and removal of all crops and vegetation. No new trees or crops. ■ No pedestrian access during construction and operation. 	<ul style="list-style-type: none"> ■ No pedestrian access. ■ No houses/structures, or crops and permanent plantations (except the landscaping work within Project scope).

Based on the limited information available at this stage, it is not possible to determine the exact number of land plots (agricultural, residential, or other), structures and households that will be affected. A Project specific Resettlement Action Plan (RAP) will be prepared by NAT detailing land acquisition, number, status and eligibility of PAPs and compensations, in compliance with the Resettlement Framework adopted in 2021 and Egyptian legislation. Special attention is given in the RAPs for vulnerable persons (e.g. illiterate, poor, disabled).

A Grievance Redress Mechanism (GRM) will be made available to all Project Affected Persons PAPs, it will be part of the RAP.

During the future operational phase of the Project, no additional land acquisition and displacement activities will be required.

The HSR Project will lead to a possible separation/severance of communities in the Project areas. Some people may also find it difficult to access local infrastructure, social facilities (e.g. schools, mosques) and agricultural areas. Wildlife and livestock will also not be able to move freely in search of pasture, water and breeding ground in these areas. There may also be informal tracks or pathways used by community members to access infrastructure or for moving livestock to water or grazing, which also may become affected.

However, the potential HSR impacts on access have been reduced by appropriate mitigation measures, including for example:

- Provision of overpasses and bridges for use by people and animals for crossing the railway line;
- Railway fencing to avoid illegal overpasses;
- Regular stakeholder engagement to identify additional access needs and availability of the Grievance Mechanism.

5.3.2 Community Health and Safety related impact

The railway will pass through some highly populated areas. This could affect the health, safety and security of the communities both during the construction and operation phases. During construction, impacts on community health and safety are expected to result mainly from air emissions from construction vehicles and dust and increased background noise levels, in addition to:

- Safety risks to the public at or near the construction sites.
- Increased incidence of communicable diseases (e.g. COVID 19) due to the presence of workers
- Personal safety and well-being impacts associated with increased traffic and road accidents, worker influx (the latter in particular for women), risk of site trespass.

The impacts on the community health, safety and security will be localized and can have significant effects. Appropriate measures of management have been identified through the ESIA and are implemented within the ESMP. These include, for example:

- Preparation and implementation of a Community, Health, Safety and Security Plan for construction works; a Traffic and Access Management Plan, Emergency Preparedness and Response Plans for construction and for operations, Workers Management Plan and Code of Conduct to mitigate workers' influx risks;

- A Community Safety Operation Management Plan (including Emergency Preparedness and Response Plan) will be developed to support the Environmental and Social Operation Management Plan and address additional mitigation measures required during the operation of the railway to protect people and animals from accidents and measures to reduce risks to women passengers.

5.3.3 Disruption to infrastructure and utilities

Construction activities will induce impacts on utilities and infrastructure, mainly due to site clearance works, excavation and movement of soil, embankment construction, and construction of the various elements of the railway (except along desert/ not inhabited areas). This is likely to generate pressure on existing local utility supplies (which already have temporary disruption), disturbance to traffic and transportation due to road crossings, and short-term planned and unplanned disruption to electricity, telecommunication, sewage, storm water lines, natural gas and water supply for irrigation, domestic, drinking and industrial purposes.

A Public Utilities Enhancement Plan will be developed by NAT before the beginning of the construction phase, to include a set of specific impact prevention and mitigation measures. A detailed pre-construction survey will be signed off by landowners and conducted to identify infrastructure at risk. Infrastructure relocated by the Project (electricity, telecommunication, sewage, natural gas distribution, storm water lines and water supply, etc.) will be developed in a way that allows neighbouring communities to benefit from them after construction is over. Special attention will be paid to the settlements with poor access to infrastructure and services and in the RoW of the HSR. The Public Utilities Enhancement Plan will be developed in close coordination with local utilities companies, authorities at the regional and local level and communities to ensure the appropriateness of the relocation and improvements. Community Liaison Officers (CLOs) will be present at work fronts to ensure that impacts from planned disruptions are minimised and that unplanned disruptions are properly managed.

5.4 What are the main Potential Impacts on Cultural Heritage?

Through the baseline study, 152 Cultural Heritage resources were identified within the study area of the Green Line HSR Project. Within these sites, 15 are designated resources, including the UNESCO World Heritage Site 'Memphis and its Necropolis'; in addition, out of the sites, 57 are qualified as high sensitivity, 44 medium and 50 low sensitivity Cultural Heritage receptors.

Impacts during the construction phase include:

- Physical ground disturbance through earthworks: a direct impact, ground disturbance and earthworks associated with the construction phase have the potential to partially or wholly remove Cultural Heritage resources;
- Restriction of access: restriction zones associated with the construction phase have the potential to temporarily or permanently restrict the access for traditional users or researchers to existing Cultural Heritage resources;
- Visual: The construction of temporary or permanent structures has the potential indirectly impact built and living Cultural Heritage through the introduction of intrusive visual elements to the physical environment or 'setting' where the resource draws value from its surroundings;
- Auditorial: The construction phase has the potential to introduce intrusive auditorial (noise) elements through associated construction works to the physical environment or 'setting' of Cultural Heritage resources; and
- Dust: The construction phase has the potential to introduce intrusive dust elements through associated works to the physical environment or 'setting' of Cultural Heritage resources.

In order to address the potential impacts NAT will implement a comprehensive Cultural Heritage Management Plan (CHMP), including specific measures and mitigations to ensure that impacts from

planned disruptions are minimised and that unplanned disruptions are properly managed. This plan also includes a Grievance Mechanism through which people can directly address their concerns regarding the Project.

Regarding operations, no direct impacts were identified, but three indirect ones were:

- Restriction of access: the potential to permanently restrict access for traditional users or researchers to existing Cultural Heritage resources;
- Visual: the potential to introduce mobile intermittent intrusive visual elements to the physical environment or 'setting' of Cultural Heritage resources; and
- Auditorial: the potential to introduce intermittent intrusive auditorial elements to the physical environment or 'setting' of Cultural Heritage resources.

Seeing that these impacts are considered negligible, no mitigation measures are considered to be needed.

The Government of Egypt is holding close formal discussions with the UNESCO bodies to agree on appropriate protective measures for the HSR crossing of the UNESCO World Heritage Site (WHS) 'Memphis and its Necropolis', near Saqqara. The HSR alignment runs largely parallel to the old single-track railway and the recently built Ringroad Motorway in this area, thus minimizing potential impacts to the WHS.

5.5 Climate Change

The risks of climate change on the Project were assessed in a Climate Change Risk Assessment (CCRA) per international standards, considering both Physical risks and Transition risks.

Physical

The Physical CCRA involves the high-level screening of construction and operation of the Project facilities against a range of physical climate hazards, considering current data and future climate projections in different locations along the rail line for 2030 and 2050.

The climate data and trend results show that for the Project region:

- **Extreme heat** periods will *increase* over the whole Project area in the future;
- **Wildfire** burned area is minimal for the most of the Project, only likely present for the middle Section in the Nile Delta. The chance of wildfires is projected to *decrease* in the future;
- **Flooding** is only likely present at the Nile River crossing and in Section A (the Eastern Desert area) due to flash flooding. The chance of river flooding is projected to *decrease* in the future, while the chance of flash flooding projected to remain *similar* to current baseline conditions;
- **Water Scarcity**, is a *major risk* under current baseline and future conditions to the whole Project;
- **Sandstorms** are likely present in the whole Project area and projected to *increase slightly* over the next decades.

The risk review assessed how these above physical climate trends might impact the Project in its construction and operation phase. The key results and the planned mitigation measures are:

- **Extreme Heat** can affect workers during construction and operations due to heat stress, and may also cause damage to the rail tracks and affecting train operations.
 - Mitigation: Weather will be monitored and shading/cooling areas provided for workers where needed.
 - Mitigation: The design of the rail tracks anticipates that higher temperatures are predicted for the future; appropriate monitoring and warning systems will be in place to facilitate quick repairs in case of damages.

- **River flooding and flash-flooding** may cause delays to the construction of the Project, damage infrastructure from floods, inundate access roads preventing workers and personnel accessing the Project sites and disrupting the supply of energy to the Project.
 - Mitigation: river flooding has already been appropriately addressed by Emergency Management Plans for the Project.
- **Water Scarcity** may result in lack of available drinking water to the workforce during construction and users in the stations or neighbouring communities during the operation.
 - Mitigation: weather conditions and water supply and demand will be monitored by the Project team and sufficient drinking water will be in place during construction and operation. Design recommendations are made to consider water re-use technology or grey water use where feasible.

Transitional

The term “Transition Risks” is defined as the business-related risks to the long-term success of the HSR Project as Egypt’s economy and society (and the world) undergoes a transition toward a low-carbon and more climate-friendly future. These transition risks can include policy and regulatory risks, legal risks, market and technological risks, and reputational risks.

The HSR Project, as a safe, modern and efficient electrified railway, is fully aligned with the Egyptian commitments to reducing carbon emissions and with government policies on sustainable growth, such as Egypt’s National Climate Change Strategy 2050, Sustainable Development Strategy: Egypt Vision 2030, Cairo Vision 2050 etc.

The Transition CCRA shows that some of the transition risks (such as higher electricity prices) could potentially lead to an increase in costs for operations and replacement of equipment over the long run. However, there are also several transition opportunities that would help improve the revenues of the railway, such as higher costs for diesel fuel and kerosene, which would make train travel on the HSR more cost-effective for travellers and cargo transporters compared to use of car, truck or airplane. Taking both risks and opportunities into account, the opportunities for the HSR Project from society’s transition to a low carbon economy appear to outweigh the risks.

Hence, the HSR Project is expected to benefit from the low carbon transition on a net basis.

5.6 Human Rights

The ESIA study covers a list of social topics related to human rights such as:

- Community health and safety; (as discussed above in Section 5.3.2);
- Women rights and gender equality; and
- Security and safety.

Community Health and Safety: As described above in Section 5.3.2, the construction and operation of the HSR can affect the health, safety and security of the local communities; these may especially affect vulnerable persons (such as poor, illiterate and others) who are less able to adapt to changes and/or utilize the Grievance Mechanism.

To address these potential impacts on human rights of local community residents, a wide range of mitigation measures/actions has been identified in the ESIA, and these will be compiled by NAT in a series of management plans that will be implemented by NAT and/or the construction contractors. The implementation of all of these actions by the contractors will be monitored by NAT, and also the independent experts of the financial lenders to the Project will conduct periodic monitoring of both NAT and the contractors. Furthermore, NAT is obligated to engage social experts whose job will be to liaise closely with the local communities and ensure that Project impacts are minimized and the concerns/human rights of local residents can be addressed as far as feasible.

Women rights and gender equality: According to a review by the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) Committee on Egypt's record on women human rights and gender equality, women face significant barriers to access justice following incidents of sexual and Gender-based Violence (GBV). Considering this information, within the scope of the Project, NAT will develop a package of trainings for construction workforce on respecting local communities and vulnerable populations, with a special focus on gender, Human rights and Gender-based Violence and Harassment (GBVH) risks awareness. The training should also include clear guidelines to create a secure environment for women and children in the area, for example: prohibition of workers from bothering people from the local community.

The design of the railway stations and the trains will include gender considerations, such as separate waiting areas at the stations or train compartments reserved for women.

The railway operator will be obliged to implement a specific Hiring Management Plan that includes special consideration to encourage employment of women.

Security and Safety: The use of security personnel during the construction phase could lead to tensions (in particular during the land acquisition phase) as, if not properly trained, they may misuse their status and be abusive to local persons or apply excessive force. It is assumed that unarmed security personnel will be hired by NAT (or by its contractors) during construction to prevent unauthorized access to the construction sites and offices. Security personnel might constitute risks to the community if they are not appropriately trained, as they may misuse their status and be abusive to local persons or apply excessive force in their handling/apprehension of potential trespassers or other unauthorized persons. Therefore, NAT will develop a Security Management Plan including the following measures:

- A Security Management training will be provided to security personnel. Security Arrangements will be based on the Voluntary Principles for Security and Human Rights⁹ which are international best practice. This involves e.g. the selection based on a careful background screening of security forces, their training with regards to Human Rights and a careful monitoring of their services.;
- Violation of the required standards will result in corrective actions, including termination of sub-contracts with security firms. Sufficient training including clear instructions on the objectives and the permissible actions will be provided to the security personnel. The instructions will be based on the relevant Egyptian law and will be communicated as terms of employment and reinforced through periodic professional training. Given regular contact with the local populations, training on Grievance Mechanism, will also be provided to the security staff as part of their periodic professional training.

In addition to the above listed risks, the physical and economic resettlement process for the Project will follow Egyptian laws and international standards. This will help protect the human rights of the persons whose property/farmlands are affected by the Project, and/or whose livelihoods may be negatively impacted. The lenders will require frequent monitoring of the resettlement process to ensure that affected persons are compensated as appropriate and are given the opportunity to maintain or improve their livelihoods.

Overall, besides all of the above measures, any affected person (from public or workers) has the right to make complaints with respect to human rights or any other matters via the public Grievance Mechanism established by NAT. If the proposed resolution via NAT is not satisfactory to the complainant, they can in any case file a formal complaint to the responsible legal authorities based on their constitutional right.

⁹The Voluntary Principles on Security and Human Rights is a collaborative effort by governments, major multinational extractive companies, and NGOs to provide guidance to companies on tangible steps that they can take to minimize the risk of human rights abuses in communities. Available from: <https://www.voluntaryprinciples.org/wp-content/uploads/2019/12/TheVoluntaryPrinciples.pdf>

6. HOW WILL THE IDENTIFIED RISKS BE MANAGED?

The Environmental and Social Management Plan (ESMP) and more detailed topic-specific management plans describe the environmental and social mitigation and monitoring measures, the criteria for their successful implementation and the organizational measures to be implemented during the construction and operation of the Project. The ESMP is included in the ESIA package of documents, which is made publicly available. As the Project progresses, the ESMP will be regularly reviewed and updated to reflect any changes in the implementation and organization as well as in regulatory requirements.

The ESMP for the HSR Project details environmental and social actions to minimize the potential impacts, and includes the requirements of an Environmental and Social Management System (ESMS) and an Environmental and Social Monitoring Plan. The ESMS in turn includes other management plans that are key to an adequate implementation of the HSR Project, such as a Waste Management Plan, Health & Safety (H&S) Plans for construction works, an Emergency Preparedness and Response Plan, a Traffic Management Plan, a Chemical Accident and Spills Management Program and others.

In addition to these management plans, other key components of the HSR Project's ESMS include training, audits and inspections and reporting.

7. HOW WILL THE IMPLEMENTATION BE MONITORED?

The Project's Environmental and Social Monitoring Plan (ESMP) provides the mechanism to monitor the environmental and social impacts of the Project implementation to reduce their negative effects and to introduce standards of good practice to be adopted for all further Project works. The Monitoring Plan is thus very important to ensure that the numerous mitigation measures foreseen for the Project are indeed implemented as planned – and achieve the desired beneficial results.

How can the stakeholders be sure that all these actions will be undertaken in the future as promised in the ESIA and the ESMP?

The Project activities will be monitored and checked frequently by numerous parties, eg.

- The Egyptian regulatory inspectors and regional/local officials will conduct their obligatory, statutory inspections per Egyptian permits and regulations applicable to the Project;
- Systra will monitor its own activities during construction – and those of its subcontractors – per the obligations and commitments in the ESIA/ESMP, and they must submit periodic reports to NAT;
- NAT/Systra will need to report periodically to the Project Lenders on progress in implementation of commitments to ensure they are abiding by their contractual obligations, including conformance with permits and ESIA/ESMP commitments;
- Finally, the international Project Lenders for the HSR Project will conduct periodic monitoring visits of the Project to ensure that NAT, Systra, the construction contractors, Siemens-Consortium and all other parties are in compliance with their obligations under the loan agreement. Typically, the Lenders conduct visits on a quarterly or semi-annual basis during construction, and then annually during operations.

As such, for the HSR Project there are multiple-layers of monitoring and reporting obligations to help ensure that the ESIA/ESMP obligations are ultimately implemented for the Project in a satisfactory manner.

8. GRIEVANCE MECHANISM (GM)

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

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

The grievance mechanism will deal with suggestions, concerns, and grievances related to any issues arising from Project specific activities. The grievance mechanism is not designed to obstruct access to other judicial or administrative processes that are available under Egyptian law.

NAT CURRENT GRIEVANCE MECHANISM

The Current grievance mechanism is a participatory tool for the internal and external stakeholders, while it is a mandatory process for NAT. The procedure described in this document is extended to communities, all workers onsite, including permanent workers, casual workers, service providers, consultants, suppliers, subcontractors and external stakeholders, accessible to all workers, and at no cost and without retribution.

Although there are grievance mechanism for workers at the construction site (Relating to the contractor and supervised and monitored by SYSTRA, the consultant assigned by the NAT to monitor and follow up the work of the contractors working on the project), NAT's complaints channels are available to all parties concerned with the project.

GRIEVANCE TIERS

The proposed mechanism is built on two tiers of grievances:

- First tier of Grievances: project level (on Site)
- Second tier of Grievances: On the level of NAT headquarter

If the aggrieved person is not satisfied with the decision of the first tier, he can raise the complaint to the NAT headquarter.

GRIEVANCE CHANNELS

The following are the main channels through which grievances will be received:

- Engineering representative on-site: It varies from one site to another (data of the engineer in charge is available at each construction site)
- NAT Website: [Contact Us](#)
- Direct mail to the Chairman of NAT: chairman@nat.org.eg
- Planning Department: pld@nat.org.eg
- Telephone calls (Landline): +20225743070
- Hotline: (16528) There is no hotline except general for Government Complaints
- Address: Cairo, Ramses Square – NAT building - ZIP: 11794 p. B 466
- The Government Complaints/ Portal: www.shakwa.eg one of the new channels for complaints in all sectors of the state.

All grievances will be addressed to the focal point whose contact details are as follows:

- Eng. :Magdy Madany
- Address: Cairo, Ramses Square – NAT building - ZIP: 11794 p. B 466
- Telephone: +20225742968
- Email: magdymadany@hotmail.com

APPENDIX A GRIEVANCE FORM

GRIEVANCE FORM

Reference No. (To be assigned by Project office personnel):

Preferred language for communication	<input type="checkbox"/> Arabic <input type="checkbox"/> English <input type="checkbox"/> Other, please specify: _____
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Please enter your contact information and grievance. This information will be dealt with confidentially.

Please note: If you wish to remain anonymous, please enter your comment/grievance in the box below without indicating any contact information – your comments will still be considered by

Full Name	
Anonymous submission	<input type="checkbox"/> I wish to raise my grievance anonymously <input type="checkbox"/> I request not to disclose my identity without my consent
Please mark how you wish to be contacted (mail, telephone, e-mail).	<input type="checkbox"/> By telephone (please provide telephone number): _____ <input type="checkbox"/> By e-mail (please provide e-mail address): _____

Description of incident or grievance:

What happened? Where did it happen? Who did it happen to? What is the result of the problem?

Date of incident/grievance: _____	<input type="checkbox"/> One time incident/grievance (date _____) <input type="checkbox"/> Happened more than once (how many times? _____) <input type="checkbox"/> On-going (currently experiencing problem)
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What would you like to see happen to resolve the problem?

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