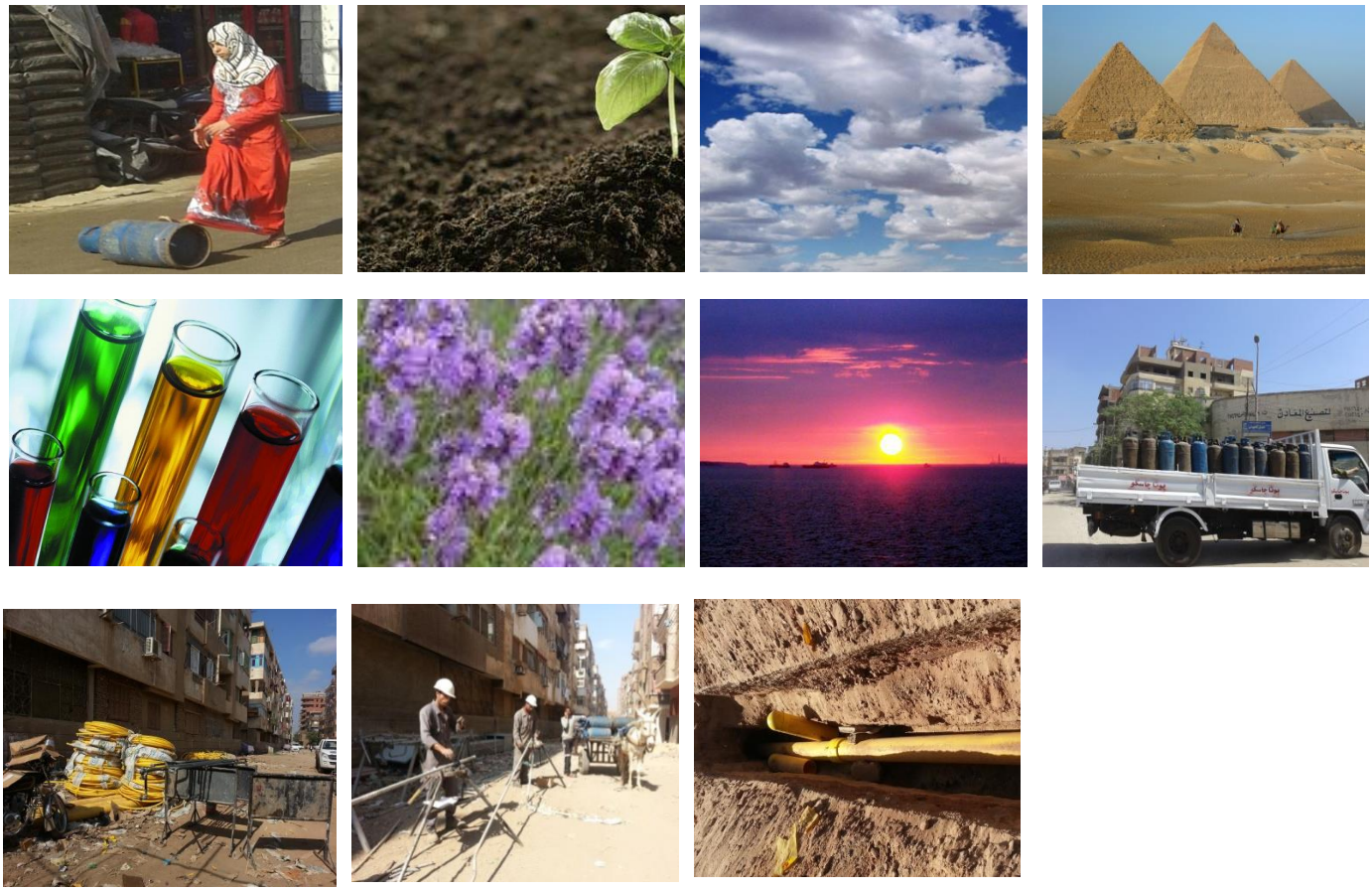

1.5 Million Natural Gas Connections Project in 11 Governorates

Low Pressure Natural Gas Network Environmental and Social Management Plan

Qantra Shark and Qantra Gharb Ismailia Governorate

Final Report

March 2018

EGAS
Egyptian Natural Gas Holding Company

Developed by

EcoConServ Environmental Solutions

Petrosafe
Petroleum Safety & Environmental Services Company

List of acronyms and abbreviations

QS & QG	Qantra Shark and Qantra Gharb
AFD	Agence Française de Développement (French Agency for Development)
BUTAGASCO	The Egyptian Company for LPG distribution
CAPMAS	Central Agency for Public Mobilization and Statistics
CDA	Community Development Association
CO	Carbon monoxide
CRN	Customer Reference Number
CULTNAT	Center for Documentation Of Cultural and Natural Heritage
EEAA	Egyptian Environmental Affairs Agency
EGAS	Egyptian Natural Gas Holding Company
EGP	Egyptian Pound
EHDR	Egyptian Human Development Report 2010
EIA	Environmental Impact Assessment
ER	Executive Regulation
E&S	Environmental and Social
ESIA	Environmental and Social Impact Assessment
ESIAF	Environmental and Social Impact Assessment Framework
ESM	Environmental and Social Management
ESMF	Environmental and Social Management framework
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
GAC	governance and anticorruption
GDP	Gross Domestic Product
GIS	Global Information Systems
GoE	Government of Egypt
GPS	Global Positioning System
GRM	Grievance redress mechanisms
HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene pipes
HH	Households
HHH	Head of the Household
hr	hour
HSE	Health Safety and Environment
IBA	Important Bird Areas
IDSC	Information and Decision Support Center
IFC	International Finance Corporation
IGE/SR	Institute of Gas Engineers/Safety Recommendations
LDCs	Local Distribution Companies
LGU	Local Governmental Unit
LPG	Liquefied Petroleum Gas
mBar	milliBar
MDG	Millennium Development Goal
MOP	Maximum operating pressure
MP	Management Plan
MTO	Material take-off
NG	Natural Gas
NGO	Non-Governmental Organizations

NO_2	Nitrogen dioxide
OSH	Occupational Safety and Health
P&A	Property and Appliance Survey
PAP	Project Affected Persons
PE	Poly Ethylene
PM_{10}	Particulate matter
PPM	Parts Per Million
PRS	Pressure Reduction Station
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SDO	Social Development Officer
SIA	Social Impact Assessment
SO_2	Sulphur dioxide
SSIAF	Supplementary Social Impact Assessment Framework
SYB	Statistical Year Book
T.S.P	Total Suspended Particulates
Town Gas	The Egyptian Company for Natural Gas Distribution for Cities
WB	The World Bank
WHO	World Health Organization
$	United States Dollars
€	Euros

Exchange Rate: US$ = 17.5 EGP. as of January 2018

Exchange Rate: € = 19.26 EGP as of January 2018

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1 Introduction

1.1 Project Objectives

The proposed project represents an integral component of the national energy strategy which aims for greater use of natural gas for domestic users at Qantra Shark and Qantra Gharb cities in Ismailia governorate. This report is the Environmental and Social Management Plan for the connections network planned for Qantra Shark (QS) and Qantra Gharb (QG) in Ismailia Governorate.

1.2 Environmental and Social Management Plan (ESMP)

This ESMP has been prepared based on the Terms of Reference prepared by EGAS and cleared by the World Bank, additionally the ESMP follows national and IFC requirements regarding scope and detail of assessment and procedure, and gives particular emphasis to public information and stakeholder participation.

Objectives of the ESMP include:

- Describing project components and activities of relevance to the environmental and social impacts assessments
- Identifying and addressing relevant national and international legal requirements and guidelines
- Describing relevant environmental and social conditions
- Assessing project alternatives
- Assessing potential site-specific environmental and social impacts of the project
- Developing environmental & social management and monitoring plans in compliance with the relevant environmental laws
- Documenting and addressing environmental and social concerns raised by stakeholders and the Public in consultation events and activities

The local distribution company responsible for project implementation in QS & QG is Sinai Gas or (شركة سيناء للغاز).

Project areas and the total number of household which will be covered in this ESMP are illustrated in the table below:

Table 1-1 Number of Areas and Households' Connections

Governorate	Local Distribution Companies	Areas	Number of Households
	Sinai Gas	Qantara Shark	3630
		Qantara Gharb	3500
Total		2 Areas	7130

This ESMP follows national and IFC requirements regarding scope and detail of assessment and procedure, and gives particular emphasis to public information and stakeholder participation. It will identify and assess significant impacts the proposed project is likely to have on the local population and on human health; on land, soil, water, air and climate; on landscape; on biodiversity; and on cultural heritage. It will identify risks and will suggest mitigation measures where appropriate.

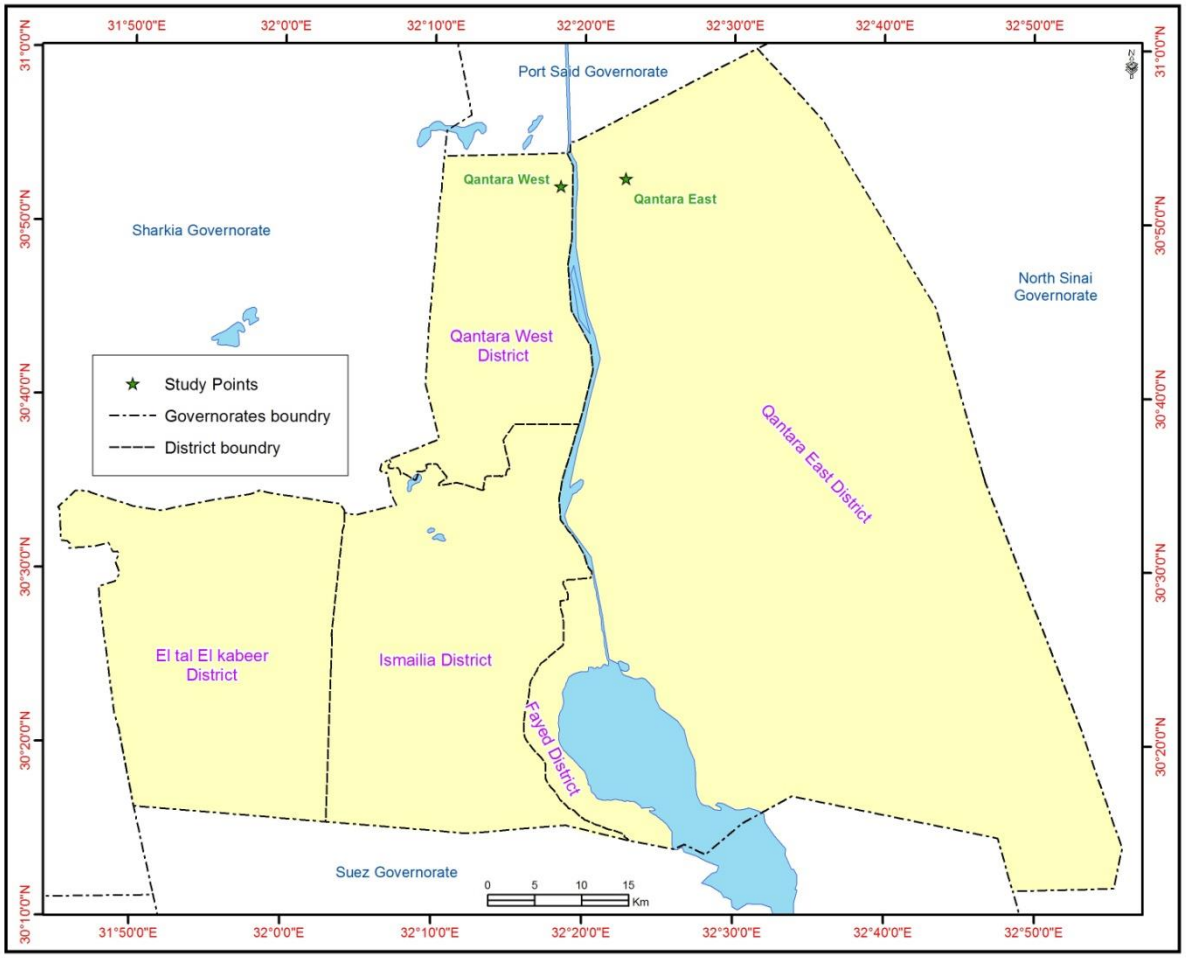


Figure 1-1The proposed project areas

Source: Study team's GIS expert

1.3 Contributors

The ESMP has been prepared by Petrosafe (Petroleum Safety & Environmental Services Company and EcoConServ Environmental Solutions (Cairo, Egypt) with collaboration and facilitation from EGAS, Sinai Gas HSE and Engineering Departments. The names of the Petrosafe and EcoConServ experts who have participated in the preparation of the ESMP study are listed in Annex 1 of this report.

2 Project Description

2.1 Background

Excavation and pipe laying of the distribution network, key activities of the construction phase also include installation of pipes on buildings, internal connections in households, and conversion of appliance nozzles to accommodate the switch from LPG to NG.

The red box below denotes project activities covered by this ESMP:

No land acquisition or resettlement activities are anticipated as the network will pass through the main urban roads/streets and side roads without causing any damage to private assets or lands.

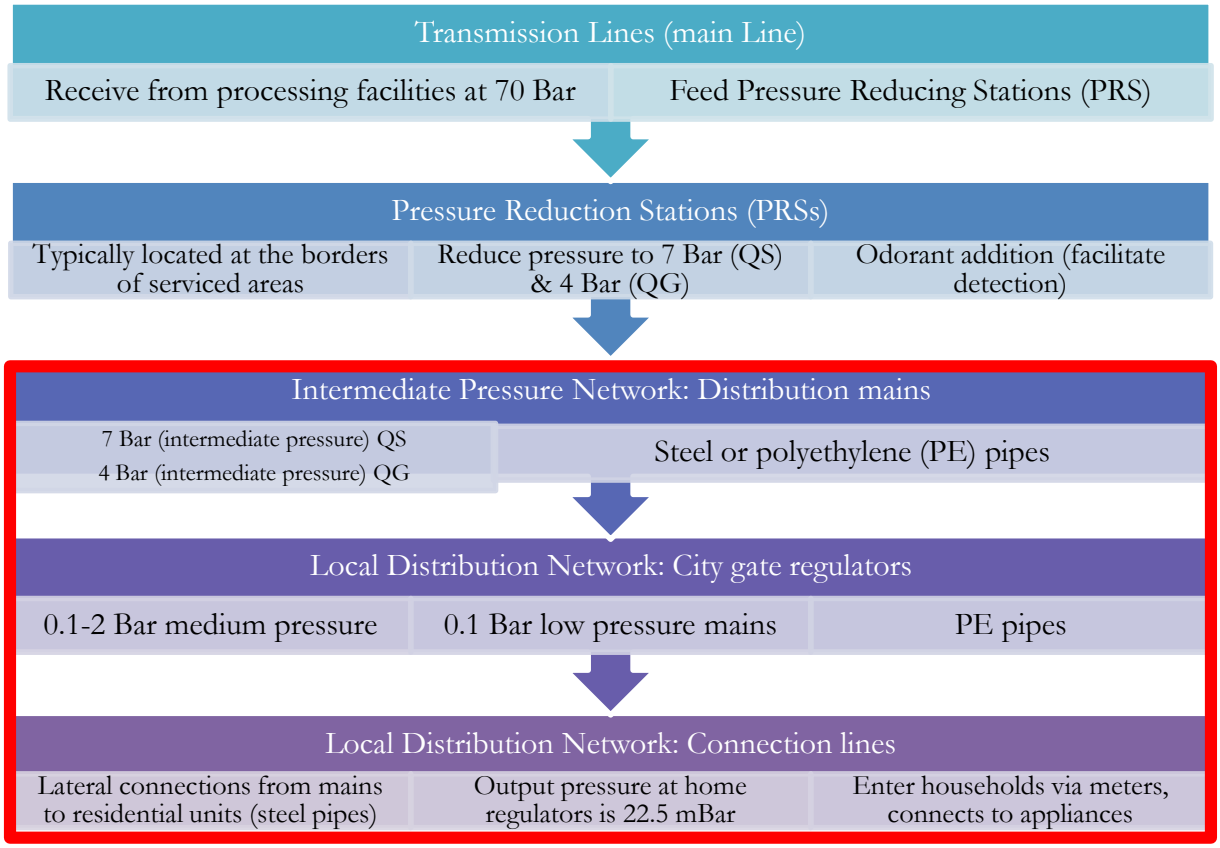


Figure 2-1 General components of the QS & QG'S distribution networks

2.2 Project Work Packages

2.2.1 Qantra Shark

2.2.1.1 Off-take & Inlet connection/Pipeline "70 bar system"

The Off take is the point on the HP national grid pipeline where a branch of the pipeline is constructed to connect the existing PRS to the national grid. The off take will be 15 meters from the outlet point (on the line of GASCO Company Al tenah / Oyoun Moses road)

In Qantra Shark , a 15-m carbon steel pipeline of 6-inch diameter and pressure 70: 25 bar is to be installed as an off-take connecting the high-pressure pipeline of the national grid on the line of GASCO (Al Tenah/ Oyoun Mousa) to the PRS pressure reduction station.

2.2.1.2 Pressure Reduction Station (PRS)

PRS consists of equipment installed for automatically reducing and regulating the pressure in the downstream pipeline or main to which it is connected. Included are piping and auxiliary devices such as valves, control instruments, control lines, the enclosure, and ventilation equipment.

A temporary rented pressure reduction station (including odorant addition) with a capacity of 5000 to 10000 m^3/hr is to be provided along with the necessary metering system.

This unit will be temporary pending the arrival and installation of the permanent PRS with a capacity of 5000 m^3/hr.

Impacts of the off-take and PRS will be addressed in a separate ESIA.

2.2.1.3 Polyethylene network

All main and service lines are made of polyethylene except the valves and the venting points. There are two type of polyethylene network; Intermediate pressure and low pressure

2.2.1.3.1 Intermediate Pressure Network - Main feeding line/network "7 bar system – PE 100"

The path of the intermediate pressure network starts from the outlet of the pressure reduction station till the pressure regulating kiosk of each sector

The pressure of this network is 4:7 bars and it is made from high density polyethylene PE 100 SDR 11.

The length and size of the pipes in this network are shown in the following table:

Table 2-1: Qantra Shark Length and size of pipes in the Intermediate Pressure Network

Pipe diameter	90 mm	125 mm	180 mm
Pipe length	1000 m	1510 m	7500 m
Laying depth	1.2m : 2 m	1.2m : 2 m	1.2 m :2 m

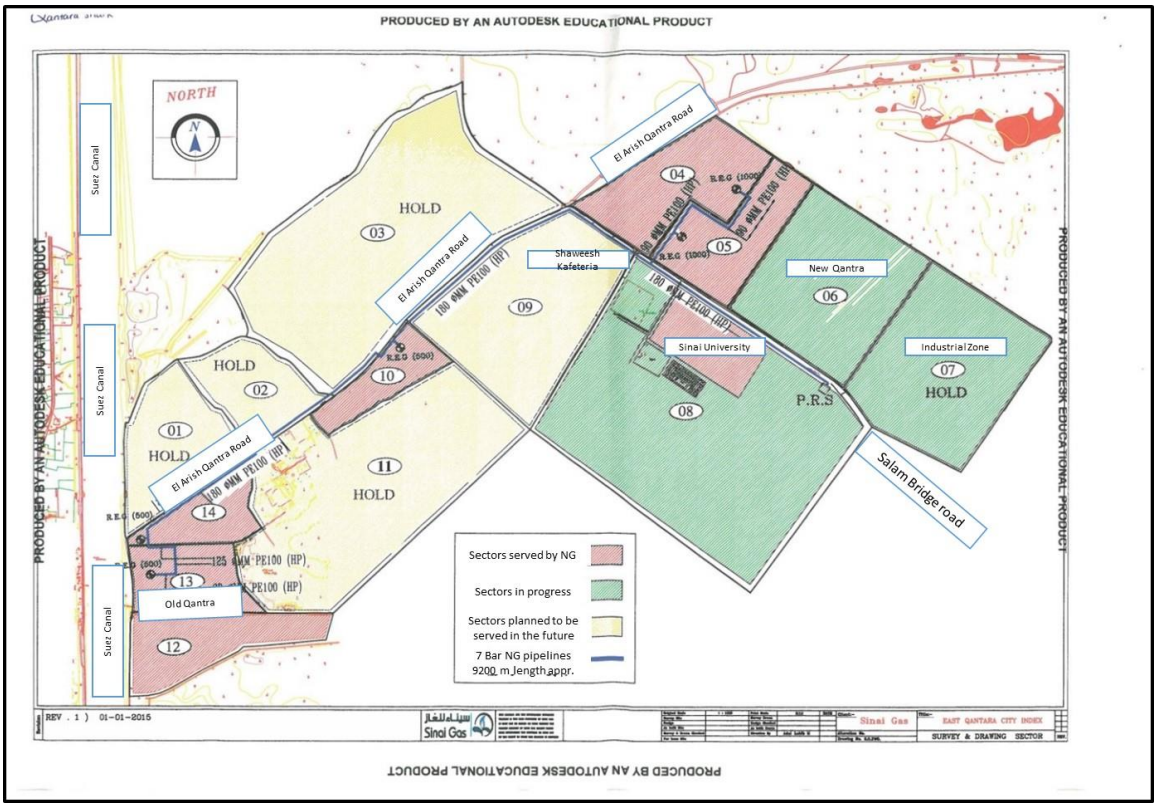


Figure 2-2 Intermediate Pipelines of diameters 90, 125 and 180 mm PE100
Source: Sinai Gas

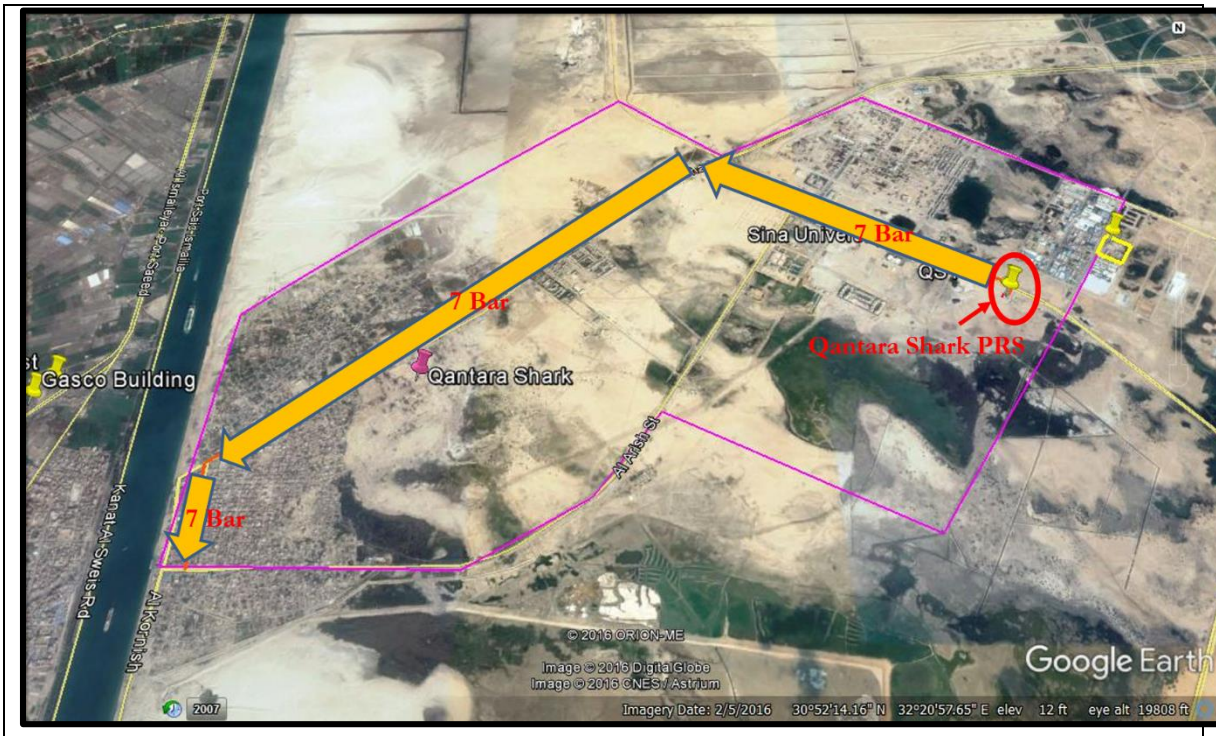


Figure 2-3 Intermediate Pressure Network's routing within the borders of QS
Source: Study team

2.2.1.3.2 Regulators

Regulators are subunits for gas pressure reduction from 7 bar intermediate pressure lines to 100 mbar low-pressure network. It is placed to serve one or two adjacent sectors in a kiosk provided with a safety device according to international standards surrounded by guard rail fence.

There are 5 Pressure Reduction Regulators in Qantra Shark to supply 6 domestic sectors with the following specifications:

- Input pressure: 4:7 bars
- Output pressure: 100 mbar
- Flow rate: 1000 m^3/hr
- Inlet diameter: 3 inches
- Outlet diameter: 6 inches

2.2.1.3.3 Low Pressure Network - Distributions network "Regulators, PE80 Networks"

The path of the low pressure network starts from the outlet of the pressure regulating kiosk of each sector till the service line of each property.

The pressure of this network is 100 mbar and piping is made from low density polyethylene PE 80 SDR 17.6

The length and size of the pipes in this network are shown in the following table:

Table 2-2: Qantra Shark Length and size of pipes in the Low Pressure Network

Pipe diameter	32 mm	63 mm	90 mm	125 mm	180 mm
Pipe length	16000 m	32000 m	2700 m	3100 m	2000 m
Laying depth	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m

A drawing with scale 1:1000 for the low pressure network is shown in annex 2

Installations (Steel Pipes)

Installations are steel pipe gas distribution piping systems which are connected from service lines to vertical service pipe in a multistory dwelling. Installations typically have laterals connected at appropriate floor levels. Service pipes, connected to a riser, supply gas to a meter and gas appliances inside the household. Internal Installation consists of pipe connecting the pressure reducing regulator and meter Outlet (MOP 25 millibar) to appliances inside the customer's premises.

Conversions

Conversions involve increasing the diameter of the nozzle of the burner of appliances (stove and bathroom water heater) to work with natural gas as a fuel gas rather LPG and others.

2.2.2 Qantra Gharb

Off-take & Inlet connection/Pipeline "70 bar system"

In Qantra Gharb, a 30-m carbon steel pipeline of 6-inch diameter and pressure (70: 25 bar) is to be installed as an take-off connecting the nearest high-pressure pipeline of the national high pressure grid (GASCO Port Said/Ismailia) to the new pressure reduction station (PRS)

Pressure Reduction Station (PRS)

PRS consists of equipment installed for automatically reducing and regulating the pressure in the downstream pipeline or main to which it is connected. Included are piping and auxiliary devices such as valves, control instruments, control lines, the enclosure, and ventilation equipment.

A New Permanent pressure reduction station with a capacity of 10,000 m^3/hr will be provided with the necessary metering system.

The off take and PRS are covered in a separate ESIA.

Polyethylene network

All main and services lines are made of polyethylene except the valves and the venting points. There are two type of polyethylene network; Intermediate pressure and low pressure

2.2.2.1.1 Intermediate Pressure Network - Main feeding line/network "2:4 bar system – PE 80"

The path of the intermediate pressure network starts from the outlet of the pressure reduction station till the pressure regulating kiosk of each sector

The pressure of this network is 2:4 bar and it is made from high density polyethylene PE 80 SDR 11.

The length and size of the pipes in this network is shown in the following table:

Table 2-3: Qantra Gharb Length and size of pipes in the Intermediate Pressure Network

Pipe diameter	90 mm	125 mm	180 mm	250 mm
Pipe length	1000 m	3500 m	3600 m	100 m
Laying depth	1.2m : 2 m	1.2m : 2 m	1.2m : 2 m	1.2 m :2 m

Regulators

Regulators are subunits for gas pressure reduction from 7 bar intermediate pressure lines to 100 mbar low-pressure network. It is placed to serve one or two adjacent sectors in a kiosk provided with a safety device according to international standards surrounded by guard rail fence.

There are 3 Pressure Reduction Regulators in Qantra Gharb to supply 6 domestic sectors with the following specifications:

- Input pressure: 2:4 bars ; Output pressure: 100 mbar
- Inlet diameter: 4 inches ; Outlet diameter: 6 inches
- Flow rate: 1000 m^3/hr

2.2.2.1.2 Low Pressure Network - Distributions network "Regulators, PE80 Networks"

The path of the low pressure network starts from the outlet of the pressure regulating kiosk of each sector till the service line of each property.

The pressure of this network is 100 mbar and it is made from low density polyethylene PE 80 SDR 17.6

The length and size of the pipes in this network is shown in the following table:

Table 2-4: Length and size of pipes in the Low Pressure Network

Pipe diameter	32 mm	63 mm	90 mm	125 mm	180 mm
Pipe length	16000 m	32000 m	2700 m	3100 m	2000 m
Laying depth	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m

A drawing with scale 1:1000 for the low pressure network is shown in annex 2

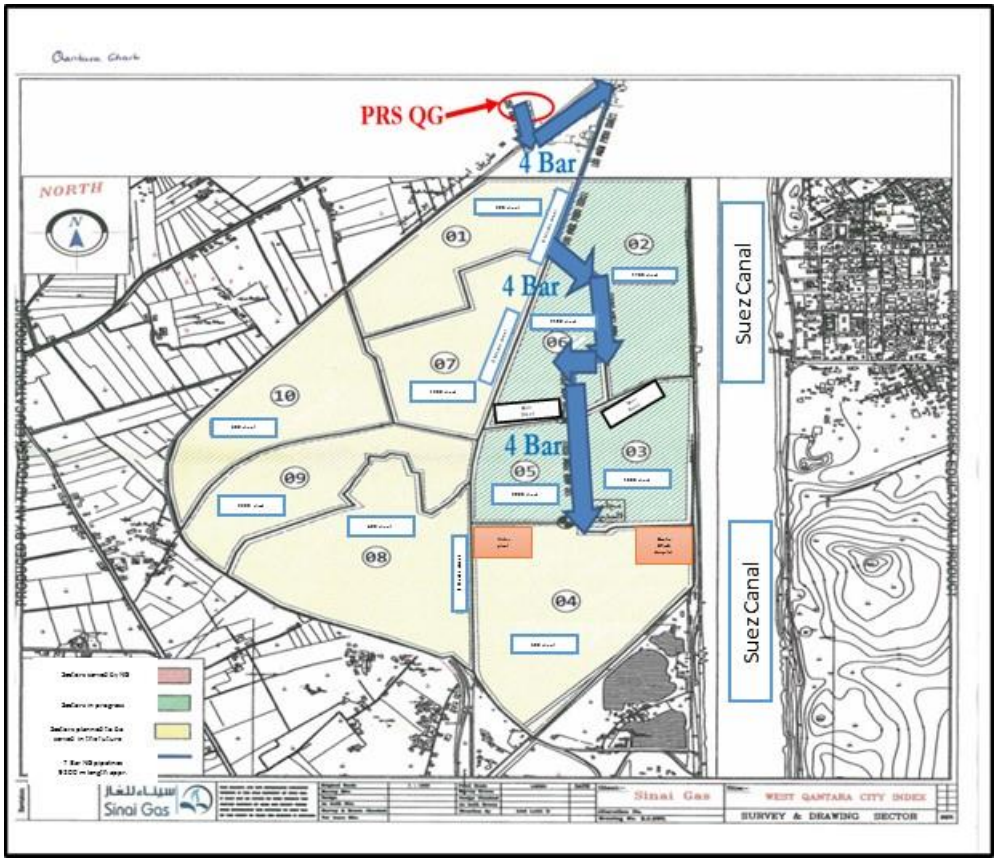


Figure 2-4 Qantra Gharb's Intermediate pressure pipelines route with diameters 90,125,180 and 250mm

Source: Sinai Gas

Installations (Steel Pipes)

A gas distribution piping system consist of steel pipes which are connected from individual service line to vertical service pipe in a multistory dwelling which may have laterals connected at appropriate floor levels; in addition to service pipe connected to a riser and supplying gas to a meter and gas appliances on one floor of a building. Internal Installation consists of pipe

connecting the pressure reducing regulator/district Governor and meter Outlet (MOP 25 millibar) to appliances inside the customer's premises.

Conversions

Conversions involve increasing the diameter of the nozzle of the burner of appliances (stove and bathroom water heater) to work with natural gas as a fuel gas rather LPG and others.

2.3 Project Execution Methodology

2.3.1 Project area selection criteria (QS & QG)

Preliminary project planning has applied social, economic, safety, and technical criteria to identify sub-areas eligible for connecting customers (households). The project shall introduce the service in new areas and shall further extend the network in areas which are partially covered.

A preliminary estimate was generated through a general survey, followed by a Property & Appliance (P&A) survey.

Based on the surveys described above, potential connections in Qantra Shark and Qantra Gharb are presented below:

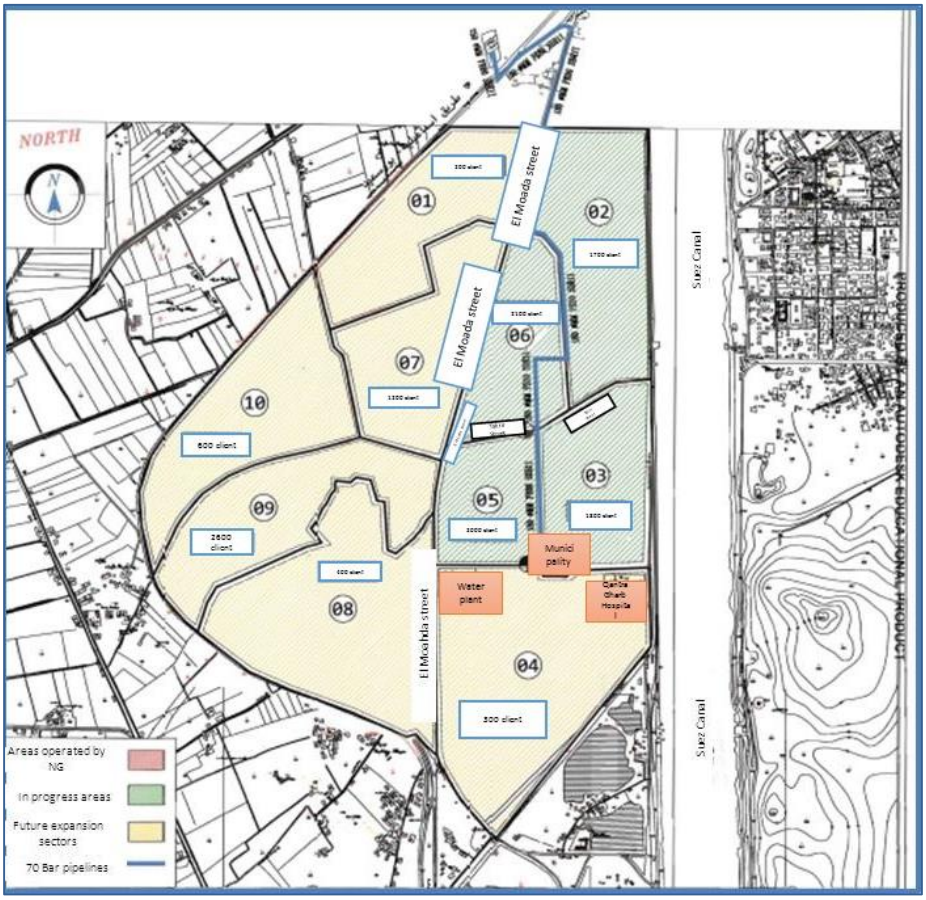


Figure 2-5: Project Sectors in Qantra Gharb

The technical criteria can be summarized as follow:

EGAS prepared a list of technical specification required to have the NG installed in the area:

1. Areas that have access to all necessary public utilities especially land networks (electricity, water, sewage, telephone lines)
2. Adobe and wooden houses are not eligible for NG connections
3. Areas that comply with the British standards and/or the applied standards for NG connections that can be used for determining areas eligibility for NG connections.
4. Areas adjacent to NG National Grid

Criteria for connecting to buildings, and selection of the path of external pipeline:

1. Buildings are to be located close to the local distribution network
2. Buildings are to be built with concrete and red bricks not adobe or wood
3. Buildings are to be legally permitted and has access to electricity
4. The possibility of installing the riser pipes along the length of the building depending on the following priority (service stairwell, stairwell, façade)
5. Availability of enough space for the erection of the scaffold and the existence of access door to the stairwells
6. Easy access to the entrance point of vertical line in case of emergency
7. Approval of the building administration to grant access to workers

2.3.2 Design and material take-off (MTO) including procurement

Design of the transmission and distribution pipelines is utilized to estimate the materials needed. Procurement of the materials includes local and international components. Local purchases typically include PE piping for the distribution networks. International purchases include critical components and PRSs, regulators, and metering stations.

2.3.3 Construction works of Main feeding line/network "4:7bar system – PE100"- Intermediate Pressure Network (QS) and "2:4 bar system – PE80"- Intermediate Pressure Network (QG)

For Qantra Shark , The distribution system shall consist of 7-Bar mains extending from the PRSs through city gate regulators, which feeds low pressure networks via district regulators.

Distribution mains are typically Polyethylene (PE) pipes connected to regulators. Regulators are fed by 7-Bar piping which is orange in color (referred to as PE100) with diameters between 90mm to 180mm according to GIS PL2 and the information provided by Sinai Gas

For Qantra Gharb, The distribution system shall consist of 2:4-Bars mains extending from the PRSs through city gate regulators, which feeds low pressure networks via district regulators.

Distribution mains are typically Polyethylene (PE) pipes connected to regulators. Regulators are fed by 2:4-Bar piping which is orange in color (referred to as PE80) with diameters between 90mm to 250 mm according to the information given from Sinai Gas.

The construction activities of both network lines (QS & QG) will involve drilling, pipeline placement, pipeline connection welding, and then surfacing. The following activities will take place during the construction of network:

- Clearing and grading activities and Pipe transportation and storage

- Excavation and pipe laying
- Site preparation and excavation
- Pipe laying
- Backfill and road repair
- Leakage testing
- Commissioning

2.3.3.1 Clearing and grading activities and Pipe transportation and storage (QS and QG)

The first step of construction includes flagging the locations of approved access route of pipeline, temporary workshop for the crew, install fences surrounding the area of working, clean the land from any rubbish and /or remove weeds. Grading is conducted where necessary to provide a reasonably level work surface. Additionally, equipment and piping will be transported to the site (temporary storage area). Quality control procedures during the transportation and handling of pipes should take place to ensure protection from any effects that may damage the pipes, and prevent any traffic accidents.

2.3.3.2 Site preparation (QS and QG)

Before any excavation activities, Sinai Gas shall coordinate with the different authorities to determine the existing infrastructure in the project's area (e.g. water lines, sewage lines, electrical cables and telecommunication lines) so as to avoid any undue damage. In case of lacking sufficient information on the available infrastructure, they will carefully excavate a trial pit.

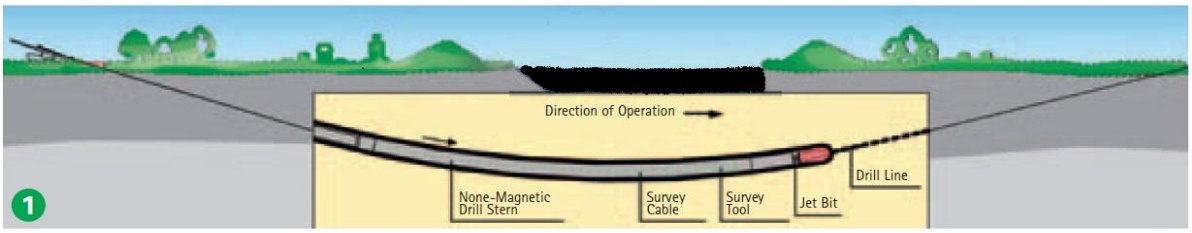
2.3.3.3 Excavation and pipe laying (QS and QG)

In general, the least expensive and most commonly used excavation technique is the Open cut technique. Open trench with width of 40 to 60 cm and depth of 1.2 – 2 m depending on the pipe size. The open cut method is usually used in small internal roads, where normal excavation takes place. This is a simple technique which usually takes between 1 and 2 days, and require road narrowing or diverting.

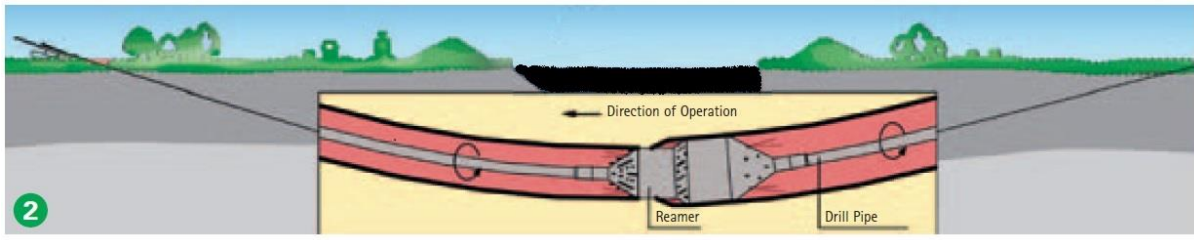
A Horizontal Direct Drilling (HDD) method is used for laying the underground pipe in crossing roads. HDD is a trenchless methodology that use high excavation depths (about 30-40 meters) and can be used for high pipeline length. HDD causes very little disruption to traffic as road narrowing or diverting are not required, in addition to the smaller work area requirements and it takes 2 working days.

Horizontal Directional Drilling (HDD) Technique

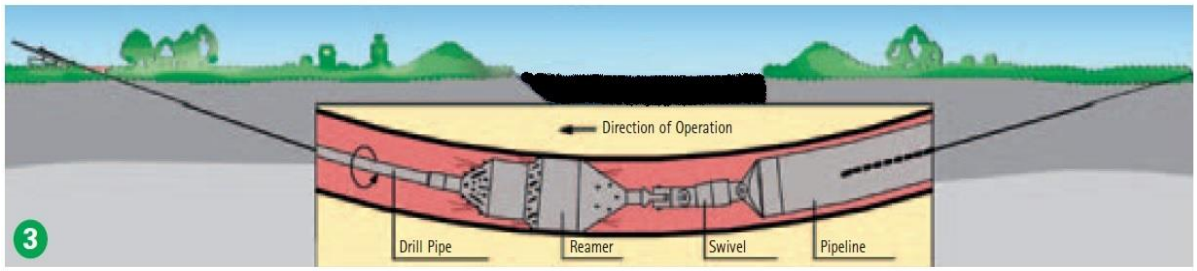
As simple as it is convincing. In the HDD method, pipelines are laid in three stages.



First, a pilot drill is carried out from the entry point. In this process step, a computer-controlled surveying system located behind the drilling bit steers the drill string along the planned route to the exit point on the other side of the obstacle to be crossed. The surveying system, the steering and the drilling tools can be adapted to any soil conditions, thus ensures the success of a project.



In the second stage, reaming the pilot drill, the drilling diameter is successively enlarged. To achieve this, the drill bit is replaced by a reamer. The reamer is equipped with jets and cutting tools, enabling it to remove the soil both hydraulically and mechanically. Depending on the soil conditions, a mixture of water and bentonite or other additives can be used for hydraulic excavation. This both supports the bore hole and reduces frictional forces, while allowing the excavated material to be transported to a separation plant on the surface.



Finally, the prefabricated pipeline or pipe bundle is **pulled-back** from the exit point into the enlarged and cleaned bore hole. To do this, the pipeline is connected to the pipe string and pulled back to the entry point. When the pipeline appears at the entry point, it has reached its final and safe position and the pipeline installation is complete.

Figure 2-6:Horizontal Directional Drilling (HDD) Technique

Source: http://www.seattledrainservice.com

Auger Boring drilling is used in an urban road crossing. The horizontal auger boring trenchless technique involves equipment like auger boring machine, auger, and cutting head. This technique also requires the excavation of a drilling pit and a receiving pit. The process starts by lowering the auger boring machine into the drilling pit, and then the augers installed inside the casing pipe are lowered into the pit and connected to the auger boring machine. The boring operation then starts by rotating the augers and the cutting head, and pushing the casing pipe gradually forward. This process continues till the casing pipe emerges from the receiving pit side. The boring process results in cuttings (spoil) which is carried through the augers and extracted from the entry side of the boring machine.

Figure 2-7. Auger Drilling

It should be noted that there are no intersections with waterways in project areas.

<u>Qantra Shark</u>

There are two crossings in QS

Crossing 1 on an urban road using Auger Boring drilling and takes between 3 to 6 working days

- Crossing an asphalt road with approximate length of 35 m and diameter of 180 mm to avoid the entrance of the armed forces camp

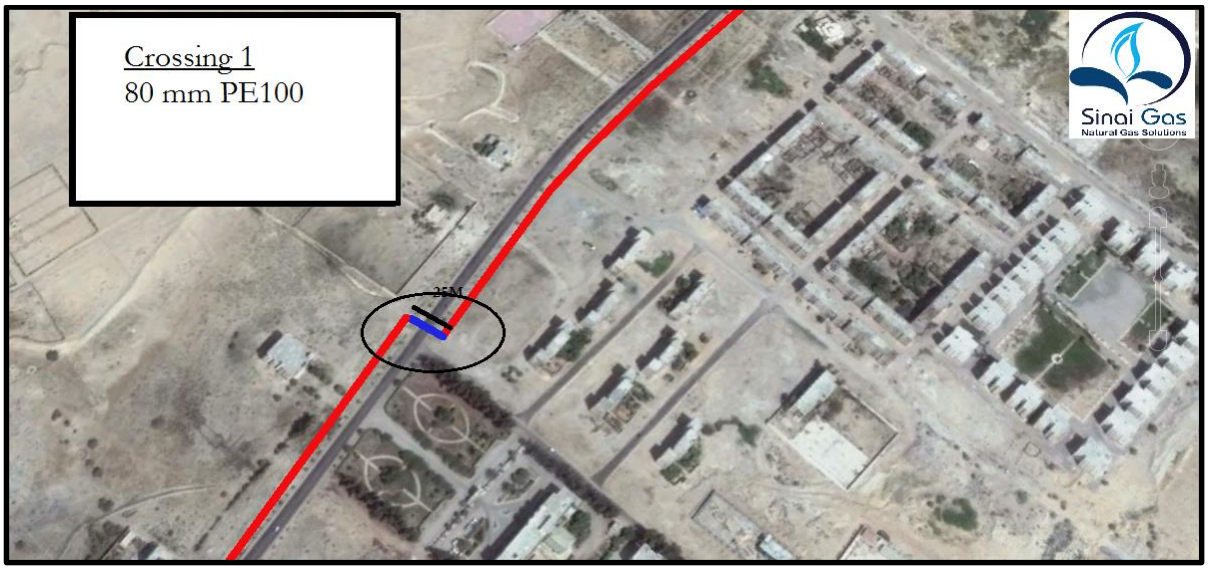


Figure 2-8 Crossing 1 of 25 m

- Second crossing on a highway using HDD drilling technique

Crossing asphalt road (Qantra Shark –RasSedr Road) with approximate length of 30 m and diameter of 90 mm to feed sector 5 shown in Figure 2-9

-

Figure 2-9 Crossing 2

Qantra Gharb

There is one crossing in QG

- Crossing asphalt road (Port Said – Ismailia) with approximate length of 50 m and diameter of 250 mm. → using HDD in a highway

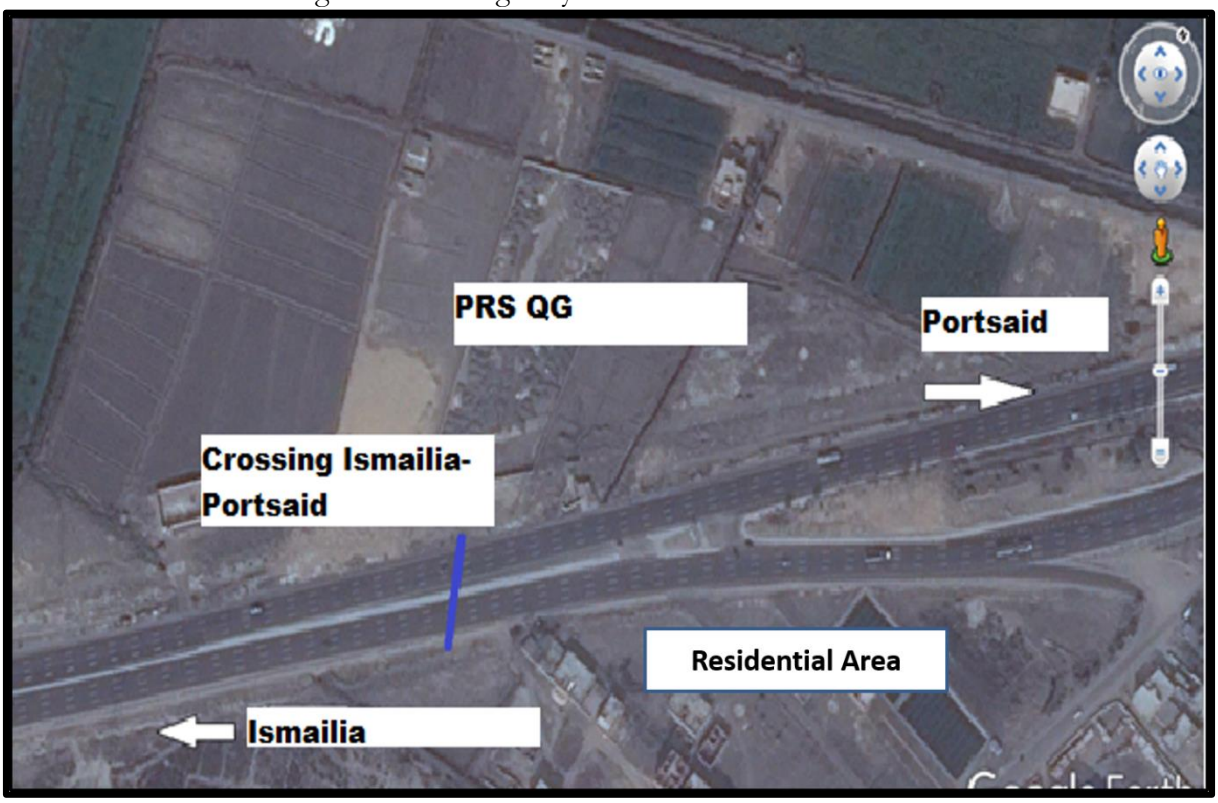


Figure 2-10 Crossing Port Said- Ismailia Road

2.3.3.4 Pipe laying:

Before pipe laying, the bottom of the trench is cleaned of any rocks or solid objects which may damage the pipes. In cases, where groundwater table is shallow, the trench should be dewatered (Portable trash pumps are commonly used in construction projects) and discharge the water into a drain or sewer manhole, according to the arrangements with local authorities. In case that the dewatered groundwater is free of perceivable pollution, it will be (if possible) used on or around the work site or discharged into the nearest canal to be used for irrigation. Once the trench is excavated, the pipe stretch shall be laid down.

2.3.3.5 Welding:

Two types of welding are used, butt fusion welding technique will be used for pipe welding (hot plate softening the tips of the PE pipes before joining) and electro fusion welding (fittings with heating coils installed inside) will be used to weld fittings. In both cases, diesel generators and relevant cabling would be needed.

2.3.3.6 Backfill and road repair:

The trench will be backfilled immediately after the pipeline has been laid considering that the finished backfilling level will be the same as the road level. The initial backfill will be to a minimum

height 20 cm of fine sieved sand either by a front loader or manually to protect the pipeline. The backfill will be then compacted by wet sand layers of 15 cm thickness in order to avoid road settlements and subsequent cracks In some cases, an inverted U-shaped reinforced concrete slab is constructed around the pipeline after laying in order to improve shock resistance.

Cathodic protection is mandatory for underground gas distribution lines. Packed magnesium anod cathodic protection system will be applied to the pipeline in all cases

After that, the contractor will work on restoring the road surface to its original status. A yellow warning tape marked "Natural Gas" is placed on top of the sand layer. Appropriate signage and community safety measures will be in place in addition to covering or safeguarding any open trenches that are not promptly filled.

2.3.3.7 Leakage testing:

Following construction activities, the piping should be tested to locate possible leaks. As long as the operating pressure in the studied areas is low so pneumatic testing will be required.

2.3.3.8 Pneumatic testing

A pressure test is always required for a new pressure system before the flow of natural gas starts to ensure the following:

- Safety
- Reliability of operation
- and leak tightness of pressure systems

The testing pressure is 1.5% higher than the design pressure. It is recommended only for low pressure applications. The testing media used is compressed air .Pressure relief devices are must during the test to ensure no over pressurization

Before testing, checking of weld joints is needed to be very careful thoroughly. It is needed the involvement of senior experienced staff to monitor the test. Testing media is air. Test pressure is normally 1.5 higher than the design pressure. Pressure drop indicates leakage.

In order to prevent deformation, dislocation, and rupture of the pipes, leakage testing through pressurization must be performed AFTER backfilling the excavation under (10 cm), around (10 cm), and above the pipes (20 cm, at least).

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2.3.4 Construction works of distribution network "regulators, PE80 networks"- Low Pressure Network (QS and QG)

The distribution system shall consist of 100 mbar mains extending from the city gate regulators through, Distribution networks are typically Polyethylene (MDPE) pipes connected to regulators. Regulators are fed by 100 mbar piping which is yellow in color (referred to as PE80) with diameters between 32mm to 180mm according to the information given from Sinai Gas

Open trench excavation with width of 40 – 75 cm and 1 meter maximum depth will be used.

2.3.5 Construction works of household installation

Connections work will connect the distribution network to the households. The connection starts from the main line (PE) and crosses the road to the buildings on both sides. Connection work will include the following activities:

- Gas will be feed into the property at 100 mbar maximum, through risers and laterals for flats and an external meter box service termination for singly occupied premises.
- Sizes of risers depend on the number of dwellings in the block of flats but laterals will be normally 1 inch or 3/4 inch.
- Gas meters will be installed with a suitable regulator (governor) at internal pressures of 20 mbar.
- Internal piping inside the household will be steel pipes of 1 inch, 3/4 inch and 1/2 inch diameter and will generally supply a cooker and a water heater. Connections from steel pipes to appliances are typically flexible rubber tubing in the case of stoves and copper tubing for water heaters

Traffic may be affected by the connection works. The traffic impact and mitigation will be presented in section environmental and impact assessment

The underground portion of the riser is sleeve-protected, while above-ground pipes are painted. Risers and laterals are fixed on walls by steel clips. This will involve drilling the walls to attach the necessary bolts and rivets. The laterals enter the household through the wall. Connections are tested for leakage by increasing pressure to 2 bar and monitoring pressure drop.

2.3.6 Conversion of home appliances

The installation contract between the household owner and the local distribution company includes the cost of converting 2 appliances (stove and water heater). Conversion involves drilling injector nozzles to become 1.25 to 1.5 times larger in diameter. Conversion works are practiced at the client's household. Typical drill bit sizes used for conversions are either 35 or 70mm.

Conversion works also involve flue gas outlet/stack installation for bathroom heaters. The stack must lead to external/ambient atmosphere outside the HH. In order to allow the installation of the conversion of the heater and installation of the stack, the bathroom volume must exceed 5.6 cubic meters. Installation of the stack may require scaffolding and breaking of the wall or ceiling.

2.3.7 Commissioning

Before starting the flow of Natural gas, the pipeline will be purged by flushing with dry nitrogen at ambient temperature to ensure that no operational problems arise from air or water left in the pipeline. The pressure of Nitrogen is gradually increased till it reaches the operating pressure, and then the operation starts by replacing the Nitrogen with Natural gas.

2.3.8 Machines used

- Air compressor with jack hammed
- Portable generators
- Directional boring machine
- Trench drilling machine
- Control box welding machine

- Butt fusion welding machine
- Manual excavation tools

2.4 Activities of the operation phase

2.4.1 Operation of the network (Qantra Shark and Qantra Gharb)

The operation of the system is undertaken by LDCs. Normal operation will include routine audits on pressures and condition of the network. Normal maintenance and monitoring works for the network include:

- Monitoring valves at selected points on the pipeline. Gas leaks are routinely monitored using gas detection sensors;
- Checking catholic protection on "Flange Adaptors" by taking voltage readings and changing anodes whenever needed.

In case of a leak detection, or damage to part of the network, the damaged pipe is replaced. The following procedures are usually followed:

- Stopping leaking line by valves when available or by squeezing the lines before and after the damaged part.
- Excavating above the effected part (in case of distribution main or underground line)
- Venting the line
- Removing affected pipe, replacing and welding, backfilling and road repair

The natural gas composition of the national network is mainly Methane (80%) and traces of ethane, propane, Iso-butane , Nitrogen…etc. . The main activities are the monitoring of the pipeline and the routine checking for the occurrence of gas leaks

2.4.2 Repairs in households

Repairs include appliance adjustments or piping/metering replacement.

2.4.3 Hotline

A 24-7 Hotline (**129**) is available for customers and the public to report leaks, damage, emergencies, and/or incidents related to gas connections, components, infrastructure, and activities (inside or outside households) and to request repairs/emergency response/assistance.

2.5 Resources Consumption

2.5.1 During Construction

2.5.1.1 Water

Water is mainly used during the construction phase by the workers and engineers. There is a permanent source of water from Egyptian Holding Company for Drinking Water and Sanitation.

2.5.1.2 Fuel

Diesel fuel will be mainly used for diesel generators that supplies electricity to the difficult construction activities including welding. The fuel will come from the nearest petrol station. The fuel will be delivered to the construction site via trucks when needed.

2.5.2 During Operation

No resources will be consumed during the operation phase

2.6 Waste Generation

2.6.1 During construction

All solid wastes generating during the construction phase (excavated soils, broken asphalt and other waste materials during excavation) will be managed and disposed in accordance with applicable regulations and established best management practices. But common practice, the wastes are loaded onto trucks, which transfer it to the nearest disposal areas. Loading waste trucks shall be done upon excavation, whenever possible, in order to avoid stockpiling waste on site.

Solid waste during construction phase will comprise domestic waste, construction waste and some hazardous wastes from the activities. Waste is expected to include the following streams:

2.6.1.1 Wastewater

During the construction phase, liquid waste will comprise mainly of domestic wastewater and vehicle/equipment wash down water. Domestic water is the only continuous source during construction. Project activities in the studied areas will take place in the city, where project workers will have access to public sanitary facilities. Therefore, **no sanitary waste management actions are needed**

2.6.2 During operation

No solid waste is expected during the operation phase.

3 Legislative and Regulatory Framework

3.1 Applicable Environmental and Social Legislation in Egypt

- Law 217/1980 for Natural Gas
- Law 4 for Year 1994 for the environmental protection , amended by Law 9/2009 and law 105 for the year 2015

  Executive Regulation(ER) No 338 for Year 1995 and the amended regulation No 1741 for Year 2005, amended with ministerial decree No 1095/2011, ministerial decree No 710/2012, ministerial decree No 964/2015, and ministerial decree No 26/2016
- Law 38/1967 for General Cleanliness
- Law 93/1962 for Wastewater
- Law 117/1983 for Protection of Antiquities
- Traffic planning and diversions
  - Traffic Law 66/1973, amended by Law 121/2008 traffic planning during
  - Law 140/1956 on the utilization and blockage of public roads
  - Law 84/1968 concerning public roads
- Work environment and operational health and safety
  - Articles 43 – 45 of Law 4/1994, air quality, noise, heat stress, and worker protection
  - Law 12/2003 on Labor and Workforce Safety

3.2 World Bank Safeguard Policies

Three policies are triggered for the project as a whole: Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12). It is not envisaged that the project will result in any physical or economic dislocation of people in **Ismailia**.

OP/BP 4.12 will not be applicable to the low pressure pipelines of **Ismailia** governorate since no land acquisition or resettlement is anticipated. Particularly, as the network will pass through the main urban streets/roads and side roads without causing any damage to private assets or lands. In addition, it is not envisaged that the project will result in any physical or economic dislocation of people for the construction of low-pressure pipelines in the project areas. The pipelines network will not cross agricultural land in the project areas and accordingly no compensation will be applied.

In addition to the above mentioned safeguards policies, the Directive and Procedure on Access to Information[1] will be followed by the Project.

3.2.1 World Bank Group General Environmental, Health, and Safety Guidelines & WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems

Gaps between requirements outlined by WBG guidelines and actions detailed by the ESIA have the LDC's Guidelines been analyzed. There are no significant differences between the

[1] https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=3694

requirements outlined by the WBG EHS GUIDELINE on GAS DISTRIBUTION SYSTEMS and the management and monitoring actions outlined by the ESIA.

3.3 International Finance Corporation (IFC) EHS Guidelines

The IFC Environmental Health and Safety (EHS) Guidelines describes pollution prevention and abatement measures and emission levels that are normally acceptable to the Bank. However, it is taking into account borrower country legislation and local conditions.
In 2007, IFC Environmental, Health, and Safety (EHS) Guidelines were released which replace World Bank Guidelines previously published in Part III of the Pollution Prevention and Abatement Handbook.
The IFC EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. (**See Annex 3**)

3.4 List of Permits

- Environmental permit: according to Egyptian Law for the Environment, Law 4/1994 amended by Law 9/2009. EEAA approval on ESIA is considered the environmental permit.
- Road and Bridges Directorate permission for excavation of main roads in accordance to 84 of year 1968 pertaining to the public roads
- Excavation permission to be obtained from the Local Governmental Unit
- Permission from the High Council of Antiquities

4 Environmental and Social Baseline

4.1 Description of the Environment (QS &QG)

Ismailia Governorate is one of the 27 Egyptian governorates, situated in the north-eastern part of Egypt. The capital city of this governorate is Ismailia; but Fayed, Tel-el-Kabeer and El-Qantra Shark are the other major cities of this Egyptian province. This province is expanded over a small area of only 1442 Km2, with the population of over 1 million only.

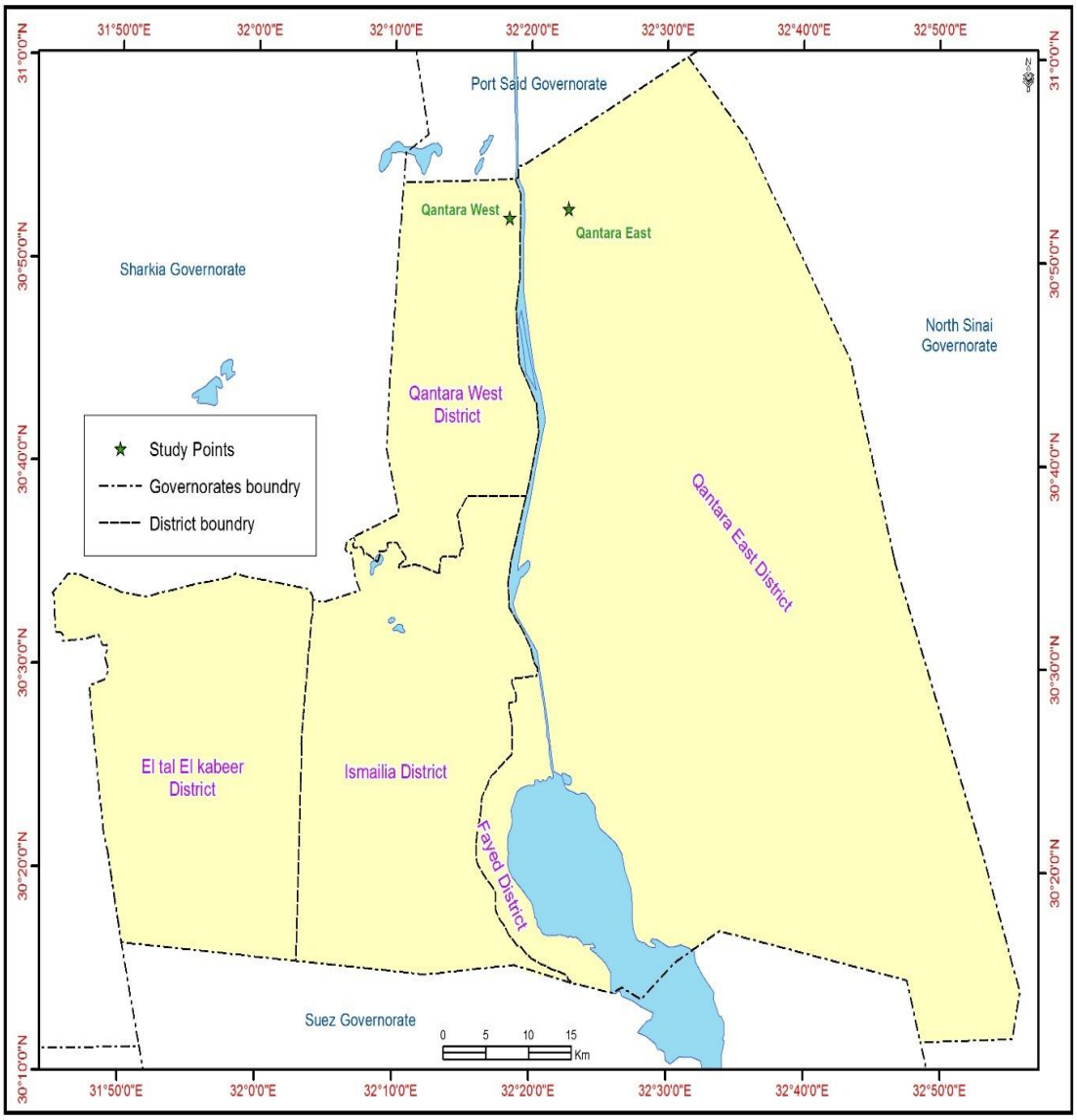

Figure 4-1: Map of Ismailia Governorate

4.1.1 Site Location (QS & QG)

Qantra Shark is located in Ismailia Governorate which is located at northeastern Ismailia city on the eastern side of the Suez Canal, 160 kilometers northeast of Cairo and 50 kilometers south of Port Said. Qantra Gharb lies under the jurisdiction of Ismailia Governorate which is located at northeastern Ismailia city on the Western side of the Suez Canal, 160 kilometers northeast of Cairo and 50 kilometers south of Port Said.

Figure 4-2: Location of QS & QG relative to Suez Canal

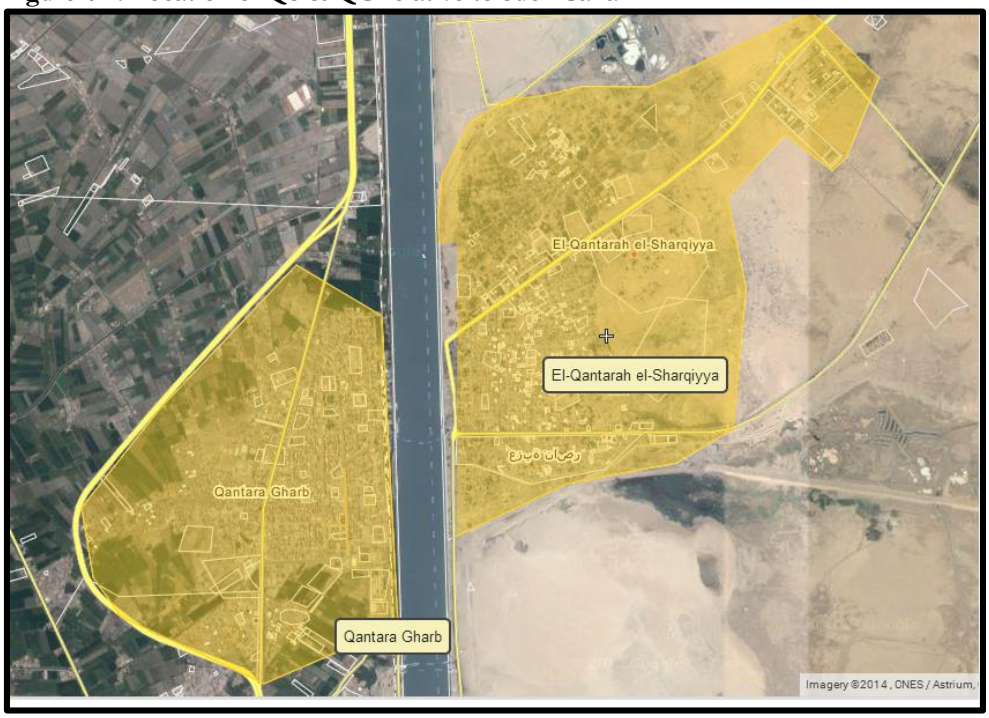

Figure 4-3: QS's and QG's Borders

Figure 4-4: QS's 7 Bar pipeline and Sinai University at a distance of 200 m from the pipeline

Figure 4-5: QG's 4 Bar pipeline and the nearest residential building at a distance of 30 m

4.1.2 Air and Noise Quality Measurement

4.1.2.1 Site Specific Ambient Air Quality

The selection of the active air measurement location is based on the nature of the surrounding activities, the location of the nearest sensitive receptors with respect to the project plots, prevailing wind direction, site topography and the future layout of the proposed project components. Moreover, the selection is based on the guidelines stated in the American Society for Testing Materials (ASTM) reference method.

8-hour average measurements were conducted for pollutants of primary concerns, namely, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), Total Suspended Particulates (T.S.P) and particulate matter (PM_{10}).

Table 4-1: Location of Air and Noise measurements

Location	Latitude	Longitude
QS's site	30°52'35.05"N	32°22'45.07"E
QG's Site	30°52'6.04"N	32°18'25.14"E

Methodology, instrumentation, and results of Air Quality measurements are detailed in Annex 4.

The concentrations of measured air pollutants are below national and WB guidelines. All the measurements for the gaseous pollutants were complying with the maximum allowable limits according to law 4/1994 for Environment protection and its amendments by law No.9/2009 and the executive regulation issued in 1995 and its amendments no. 710 in 2012 and 964 in April 2015".

Construction engines are certified, i.e., exhaust is below permissible levels. Ambient concentrations of gaseous pollutants, NOx, SOx and CO are unlikely to surpass permissible levels due to operation of construction equipment. Management and mitigation plans for ambient air pollution are further addressed in chapters 5 and 7.

4.1.2.2 Site specific noise measurements

Noise level measurements were conducted in the same location of the ambient air quality measurements. The duration of the measurements is 8 hours with one hour averaging intervals.

Methodology, instrumentation, and results of Noise measurements are detailed in Annex 4.

Results of Noise measurements

Typically due to noise from passing traffic on the road near the measurement locations, baseline ambient noise levels are marginally higher than the national, World Bank permissible limits and higher than national permissible limits.

Management and mitigation plans for noise levels beyond permissible levels are further addressed in chapters 5 and 7.

The locations of the air and noise measurements were taken at the borders of the PRSs in QS and QG (as shown in Annex 4) and they also lie within the gas line networks.

4.1.3 Waste Management in Ismailia

Solid waste management in Qantra Shark and Gharb is planned, operated and monitored by the local municipality. Primary waste collection is handled using old trucks and tools.

The local units in the governorate collect the solid waste in small containers in the streets and there are also manual tools and some modern equipment such as tractors and trailers. The collected solid waste is transferred into other trucks and transported to the public landfill in the desert near Ismailia city.

Sources of solid waste

The main sources of solid waste generation include:

Houses' waste- streets' waste- Clubs waste- Commercial and industrial waste- Tourist activities waste- buildings waste- nonhazardous medical waste

Volume of solid waste

The daily solid waste generated in the Ismailia governorate is 572 tones. The Local Units in cities Markazes manage the solid waste by collecting, transporting, dealing and finally disposing of waste in two recycling factories for compost. The daily solid waste in City and markaz of Qantra Gharb is 117 tons per day (Ismailia Environmental Profile 2007).

The local units in the governorate collect solid waste in small containers. There are also manual tools and some modern equipment such as tractors and trailers. The collected solid waste is transferred into other trucks and transported to the public dumpsite in the desert near Ismailia city.

Municipal solid waste collection points, used as open transfer systems, exist in residential areas in the capital cities of Ismailia Governorate.

No waste dumping was observed in the project area.

4.1.4 Geology and Soil

Soil types vary in Ismailia. At the eastern side of the Suez Canal there are 60,000 acres of clay soil and 340,000 acres of sandy soil, which are planted and watered either by a water drop or spray method according to the area. Ismailia is very specialized be the presence of Ismailia water Canal as a source for water.

The Northwest of Sinai is covered by Quaternary deposits which are composed of sand, gravel, clay and sand dunes. Either clay or sand is saturated with saline water which underlies the aquifer. The surface soil in the study area is nearly flat with ripple marks. It is covered by an extensive sedimentary clastics and nonclastic accumulation, alluvial deposits ranging from Oligocene to Quaternary age.

Qantra Shakr's area is characterized by desert and Sabkha (saltmarshes) areas

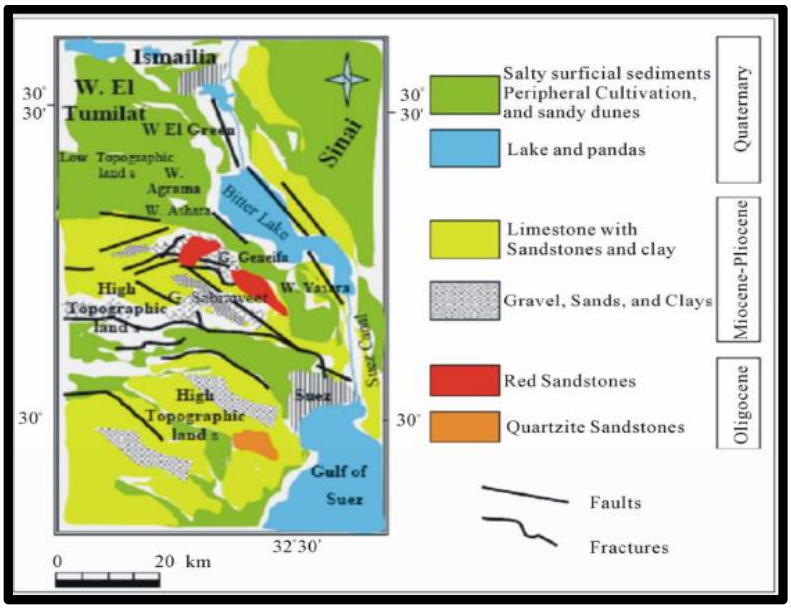

Figure 4-6: Type of Soil in Ismailia

Figure 4-7 : Geological Map of the area
Source: EEAA Environmental Profile 2007

4.1.5 Water Resources

4.1.5.1 Surface water

Ismailia governorate depends on Ismailia fresh water canal as a main water source for irrigation and drinking.

There are no canals or drainages in the surroundings of Qantra Shark

Figure 4-8 The closest intermediate pressure line (125mm PE 100) to the Suez Canal at a distance of 210 m

There is a drainage at 40 meters away from the PRS parallel to Ismailia – Port Said road

Figure 4-9 Drainage next to Port Said –Ismailia road and PRS Qantara Gharb

Figure 4-10 Drainage next to Qantara Gharb PRS

El-Salam canal is one of the five-mega irrigation projects in Egypt that located at the northern Sinai. The Egyptian Government envisage the reclamation of an estimated 620,000 feddans of desert situated along the Mediterranean coast of Sinai by diverting considerable amounts of agriculture drainage water to newly reclaimed areas after blending with Nile water in a ratio about 1:1

Figure 4-11 Small Channel Near Suez Canal

4.1.5.2 Groundwater

Groundwater is irrelevant. The excavation for the gas pipeline is shallow and will not reach the groundwater.

4.1.6 Terrestrial Environment

The projected work is planned along existing roads; no pipelines will be passing through any of the natural habitats.

- **Flora**

With respect to significance flora, none were encountered in the residential areas, where household connections are planned. Typical residential areas are free of significant vegetation. Planned off-take from national grid to the PRS shall not come into contact with palm trees alongside the road.

- **Fauna**

Very confined species have been recorded in the project site area in Qantra Shark . Bubulcus ibis (white erget bird) has been recorded in moderate populations in the project site area.

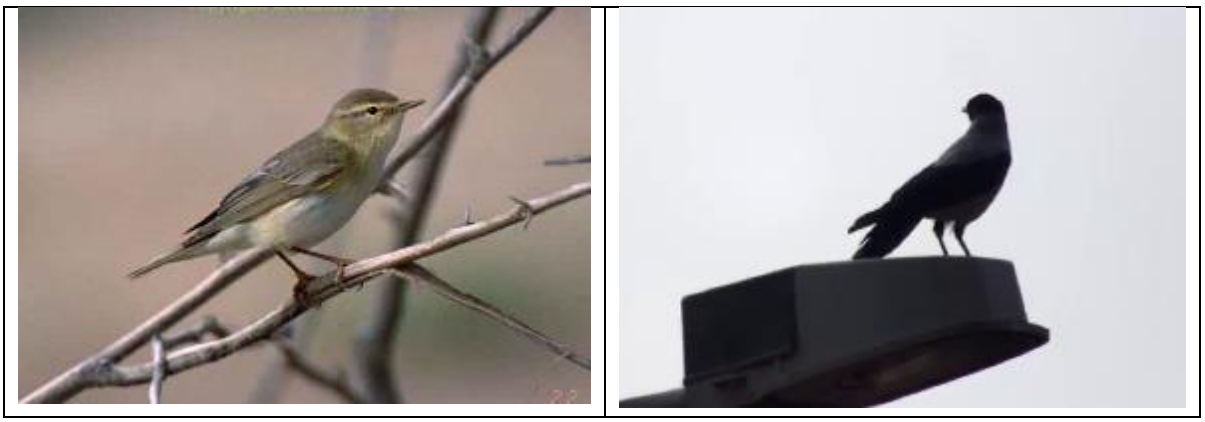

Figure 4-12: Avifauna Species Recorded in Qantra Shark

Cats (*Files domestica*) folks has been noted in the project site area, they live among garbage in the project area. Also, few dogs (*Canis sp*) cats (*Files domestica)*, Raven Black Desert: (*Corvus sp.*) and Hoopoes (Upupa epops) have been recorded.

In conclusion, the project area is eventually free from any endangered or vulnerable species.

- **Nearest Environmentally Sensitive Areas**

The nearest important birds' areas and protected areas to the Qantra Shark are Ashtum El-Gamil protected area which lies at 39 km North-West of Qantra Shark and is part of AlManazala Lake which is declared by the Bird Life international as an IBA and Zaranik protected area which lies at 93 km North-East of Qantra Shark ; Zaranik protected area is part of the Bardawil lake which is also declared as an IBA.

Figure 4-13: Nearest Protectorates in Ismailia

Ashtoom El-Gamil and Tenis Island Protected Area in Port Said Governorate

The protected Area includes the bays of El Gamil and Ashtoon El Gamil and Al Manzala lagoon. Tenis island is located in El Manzala lagoon which is the largest of the Delta lagoons. El Manzala lagoon Area was a rich agricultural land that fell down due to an earthquake that occurred in the late sixth century, the sea water overflowed the sand dunes which used to separate the sea from the agricultural land. The water gradually covered the land year after year except the renowned Tenis. It was a large city with great buildings and markets. It had palm trees, grapes and farms. It had high water channels pouring water in the sea currently known as Ashtoom. It was called Tenis after Tenis the son of Ham, the son of Noah.

Zaraniq Protected Area and El Bardwaeel Marsh in the North Sinai Governorate

Zaraniq protected Area and El Bardaweel Marsh are key points for bird migration in the world since they are the first stop for the birds to have comfort and food after the trouble of the migration trip from Europe and Asia during the fall heading from African. Some birds take this Area as a permanent habitat for living and reproduction. Over 270 species of birds have been

recorded in the area. They represent 14 classes. The most important birds recorded are: Pelicans, herons storks, crestet lark, quail, white stork, lark, avocet, Hem Harrier Rail and falcon.

4.1.7 Physical cultural resources

There are no significant physical cultural resources that exist in Qantra Shark& Qantra Gharb . However, mosques and churches exist in the project sites .

No archeological sites or sites that bear any significant historical or cultural value were identified in the project area of Qantra Shark City & Qantra Gharb .. However, in case of any unanticipated archeological discoveries; 'Chance Find Procedures,' outlines the set of measures and procedures to be followed in such case and are available in the ESIA Framework

Figure 4-14: Mosque and Church in QS

4.1.8 Physical structures

The majority of buildings are built with concrete and red bricks in relatively narrow streets. Building heights in Qantra Shark city range between one to three stories, with modest façade and finishes. The construction materials of the walls and ceilings comply with the main bases and conditions required to install the NG. It was reported that all of the samples surveyed live in apartment buildings that are constructed with concrete and red bricks. All streets are paved out; however, the condition of the asphalt is poor.

The figure below displays typical streets and buildings in Qantra Shark city:

Figure 4-15: Structures and Streets in Qantra Shark City

4.1.9 Road distribution network and traffic

As the project will be implemented in Qantra Shark and Qantra Dharb cities, the project will pass inside the local urban roads and local streets. It will not pass in the highways. It will only cut Ismailia –Port Said road using HDD. Unit reaching El Moa'hada road.

The local roads consist of two lanes, while the local streets encompass only one lane.

The following figure shows the main road distribution network in Ismailia.

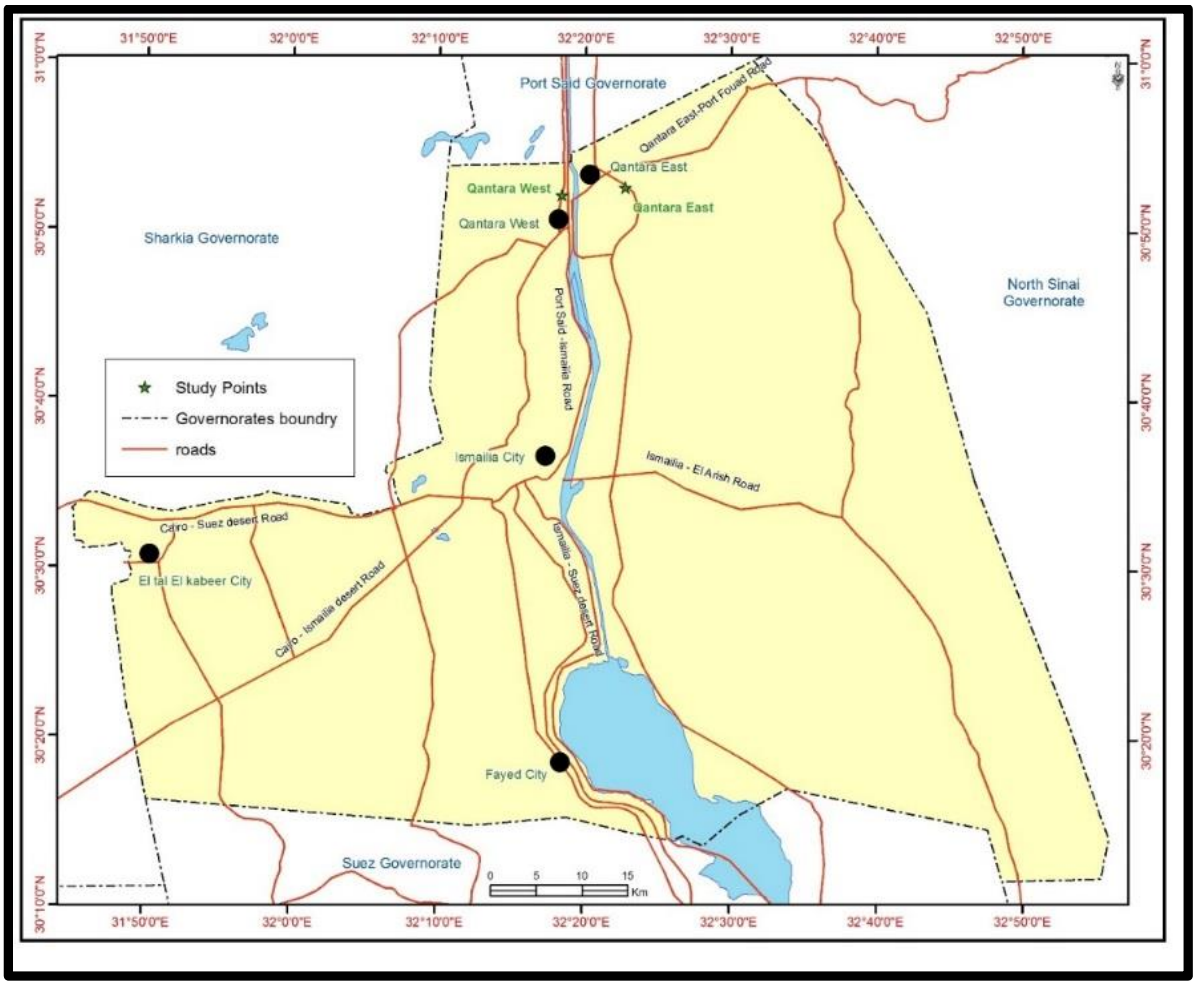

Figure 4-16: Road Network in Ismailia Governorate

Figure 4-17: Local Street in QS

Figure 4-18 Road Distribution Network in QS

The following figure shows the main roads in QG.

Figure 4-19: Main Roads in Qantra Gharb

Figure 4-20 Port Said – Ismailia Road

Figure 4-21 Types of streets in Qantra Gharb

4.2 Social Baseline

Qantra Shark City is located on the eastern bank of the Suez Canal. It is bordered by Port Saied to the north, Suez governorate to the south, and North Sinai governorate to the east. Qantra Shark city is connected with Qantra Gharb city by Al-Salam Bridge.

Qantra Gharb City lies within the jurisdiction of Ismailia Governorate. Qantra Gharb City is located on the west bank of the Suez Canal, near the northern borders of Ismailia Governorate. It is linked to East Qantra by Al-Salam Bridge.

4.2.1 Administrative affiliation

Qantra Shark City lies within the jurisdiction of Qantra Shark Markaz. It is subdivided into tree cities: the old city, the middle region and the new city. The total area of Qantra Shark city is 197.75 km^2, according to the Information Center in Qantra Shark Markaz.

Qantra Gharb City is administratively affiliated to Qantra Gharb Markaz. The total occupied area of Qantra Gharb City is 88.335 km^2, according to Ismailia Governorate's official website.

4.2.2 Urbanization trends

Qantra Shark city is considered as a semi-urbanized area. According to CAPMAS data from 2013, the percentage of individuals living in apartments is 95.3%, while individuals living in rural houses represent 0.43%. The remaining percentage 3.2 % reside in villas and luxurious buildings. 1.07% live in other types (i.e. huts) There are few villages surrounding the City, according to the findings of the field research team.

Qantra Gharb Markaz is of a mixed nature. It encompasses Qantra Gharb City which is the capital and the urban center, and six villages (Abou Khalifa, al-Reyah, al-Nasr, al-Bayadah, al-Roudah, and Abou Toufelah). According to figures from 2014, Qantra Gharb city encompasses 14.3% of the governorate's total population[2].

4.2.3 Demographic characteristics

4.2.3.1 Total Population

According to CAPMAS poverty mapping data 2013, the total population of Qantra Shark City is 24193 people. The total population of Qantra Garb City is estimated at 34,484 citizens; distributed among 7,806 households

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Table 4-2: Total Population in project areas

	Qantra Shark	Qantra Gharb
Population 2013	24193	34484

[2] <http://www.ismailia.gov.eg/w_qantara/Pages/display_wqantrata_cityinfo.aspx?ID=6>

Population 2006	20685	29355
Household 2006	4670	6565
households size 2013	4.43	4.47
households 2013	5462	7712
% of female headed household	12.9979	10.7219

Source: Poverty Mapping 2013

4.2.3.2 Rate of Natural Increase

According to 'Governorates' Description by Information 2010,' the birth rate in Ismailia is ٣٢ births per 1000 persons, while mortality rate stands at 6 per 1000 persons. That gives a natural growth rate which of 26 per thousand persons in Ismailia.

The 'Governorates' Description by Information 2010' reported figures from 2010 that the neonatal mortality rate 8.70 per 1000, while infant mortality is 16.2 per thousand live births. Infant mortality rate below five years old stood at 21.90 per 1000.

4.2.4 Living Conditions

4.2.4.1 Household Size and Density

A household is defined as "Family (and non-family) members who share residence and livelihood, and operate as one social and economic unit". The average family size in Ismailia Governorate is about 4.17 individuals, according to 'Governorates' Description by Information 2010.'According to CAPMAS figures, the average size of households in Qantra Shark city stands around 4.43 individuals.

The average family size in Ismailia Governorate is about 4.17 persons; while in Qantra Gharb City is 4.41 persons.

4.2.4.2 Dwelling characteristics

The predominant majority of the people of Qantra Shark live in urban houses (apartments). The conditions and characteristics of urban houses are in compliance with the bases and preconditions for connecting NG. Almost all of urban houses are built with concrete and red bricks. The tallest building in Qantra Shark city is five-story high.

With regard to the legal status of buildings; all buildings and neighborhoods are mostly legal, and no illegal or unplanned neighborhoods were documented by the research team.

Regarding the condition of the streets in Qantra Shark City, the average width of main streets range between (2 to 3) lanes wide, and side streets range between (1 to 2) lanes wide. Despite the modest conditions and maintenance of the asphalt, they are mostly paved out and convenient for NG installations. According to Ismailia governorate's website, since 2014, the governorate embarked on infrastructure upgrade, which included roads and streets, sanitary and sewage systems, and restoring main squares.

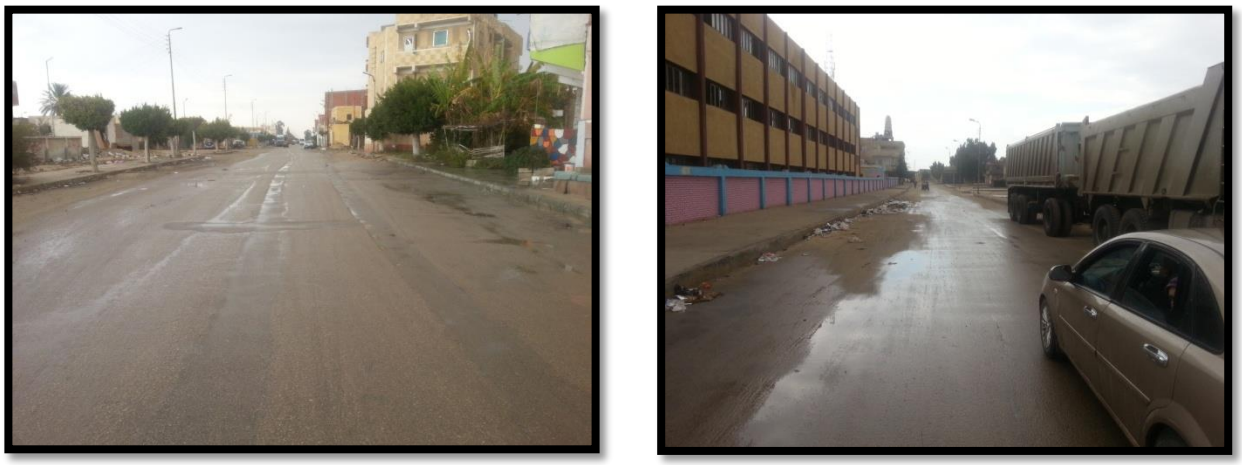

Figure 4-22 Two lanes street in Qantra Shark City

According to CAPMAS data, around 81.63 % of individuals in Qantra Gharb City live in urban houses, while only 8.16 % live in rural houses. The conditions and characteristics of urban houses are generally in compliance with the bases and preconditions for connecting NG. Almost of all of urban houses are built with concrete and red bricks. The maximum height of all buildings, documented by the research team, is five-story high.

Figure 4-23 Physical Structures in Qantra Gharb

With regard to the legal status of buildings; all buildings and neighborhoods are mostly legal. There are some illegal and unplanned buildings located in the outskirts of Qantra Gharb City that were documented by field research team.

With regard to the conditions of the streets, the average width ranges between 1 to 3 lanes wide. Despite the modest conditions and maintenance of the streets, they are mostly paved out and convenient for NG installations. According to Ismailia governorate's website; since 2014, the governorate has embarked on infrastructure upgrade, which included roads and streets, sanitary and sewage systems, and restoring main squares.


Figure 4-24 Street conditions in Qantra Gharb

4.2.5 Access to Basic Services

4.2.5.1 Access to Electricity

The number of subscribers in Ismailia Governorate is 381.83. The total consumption of electricity stood at 1091.10 k.w/h annually, which include lighting usage (954.10 k.w/h) and industrial usage (137.00 k.w./h).

According to CAPMAS poverty mapping data of 2013, 100% of Qantra Shark and Gharb Cities's residents have access to electricity.

4.2.5.2 Access to potable water and sanitary system

Accessibility to water network is widespread in Qantra Shark city, as 100% of individuals have access to the public water network, and have also tap water inside their houses, according to CAPMAS poverty mapping data of 2013. However, the coverage of the public sanitation network stands at 24.71 %, according to CAPMAS poverty mapping 2013.

There are complaints regarding the drainage system of the farms outside the city. Respondents of the focus group discussions reported that irrigation water pours into open space lands, which brings appalling smells and insects. According to the head of housing department, the newly developed areas still lacks public sanitation system.

Accessibility to water network is high in Qantra Gharb City. The percentage of individuals having access to the public water network is 99.98 %, and 98.15 % of individuals have tap water inside their houses.

The coverage of the public sanitation network is also very high in Qantra Gharb city, as 94.85 % of individuals have access to the public sanitation network, according to CAPMAS poverty mapping 2013.

4.2.6 Human development profile

4.2.6.1 Education

According to CAPMAS Poverty Mapping data of 2013, 16% of individuals have finalized their basic education, while only 12% have university degrees. Currently, there are 97.55% of individuals, between the age (6 to 18) years old, are enrolled at schools; while the percentage of drop-outs stands at 0.9%. Those who have not enrolled schools are estimated at 2.45%

In the same respect, the percentage of females with basic education stands at 14.12. The percentage of females having university degrees is 8.84%. The percentage of females between the age of 6 to 18 years old enrolled at schools is 98%.

The illiteracy rate in Qantra Shark city stands at 24.5%, while the illiteracy rate among females stands higher at 31.72%.

According to CAPMAS Poverty Mapping data 2013, 10.77 % of individuals have had basic education, while only 11.59% have university degrees. Currently, there are 95.10 % of individuals, between 6 to 18 years old, are enrolled at schools; while the percentage of drop-outs stands at 2.078 %.

In the same respect, the percentage of females with basic education stands at 17.15 %, while the percentage of females having university degrees is significantly low at 0.1 %. The percentage of females, between the age of 6 to 18 years old, enrolled at schools is 95.4 %. Those who have not enrolled schools are estimated at 4.6% And the percentage of female drop-outs stands at 0.8%.

The illiteracy rate in Qantra Gharb city stands at 29.52 %, while the illiteracy rate among females stands higher at 35.98 %.

4.2.6.2 Unemployment and Work Status

In Qantara Shark, the percentage of manpower who joined labor force at the age of 15 years old and above is 50.55% and the manpower at the age of 24 years old and above is 55%. The percentage of agriculture workers from total employed persons is 7.76%, in Qantara Shark. The unemployment rate in Qantra Shark city stands high at 18%. In Qantara Gharb, according to CAPMAS poverty mapping 2013, the percentage of manpower who joined labor force at the age of 15 years old and above is 45.43 % and the manpower, at the age of 24 years old and above, represents 52.45% of the total labor force. The percentage of agriculture workers from total employed persons is 8.71 %, in Qantra Gharb. The unemployment rate in Qantra Gharb city stands at 11%." The following table illustrates the distribution of manpower among different sectors.

Table 4-3: Employment in Qantra Shark and Qantra Gharb cities

Sector	Self-employed	Government/public sector	Private sector	Permanent jobs	Temporary jobs	Wage workers	Unpaid worker
Qantra Shark	5.34%	56.75%	22.5%	65.28%	35.44%	73.9%	0.11%
Qantra Gharb	9.43%	26.42%	53.47%	69.17%	32.30%	66.73%	0.40%

Source: CAPMAS poverty mapping, 2013

In the same respect, female employment figures show female unemployment rate at 31.5%. The percentage of female workers who joined labor force at the age of 15 years old and above is 25.19%. The following table display more figures related to type of work, taken up by females in Qantra Shark city:

Table 4-4: Female employment in Qantra Shark and Qantra Gharb Cities

Type of work	Self-employed females/total employed females	Female wage workers/ total employed females	Female agriculture workers/total employed females	Females working in temporary jobs
Qantra Shark	0.23%	67.77%	4.52%	4.52%
Qantra Gharb	0.37%	70.76%	0.65%	45.70%

Source: CAPMAS poverty mapping data

The formal Statistics obtained from the Poverty Mapping Data 2013 regarding manpower reflected that the age of starting work is 15 years old.[3] Both the Child Law and the Labor Law state that children shall not be employed before they complete 14 years old, nor shall they be provided with training before they reach 12 years old; however children between 12 and 14 years old are permitted to work as trainees. Furthermore, the governor concerned in each governorate, in agreement with the Minister of Education may permit the employment of minors aged 12-14 years in seasonal work which is not harmful to their health and growth, and which does not conflict with regular school attendance. Consequently, there is always a high probability to detect child labor in most of the projects implemented in Egypt. In the project areas where agriculture work and sales activities are in place, there is a big number of underage laborers were noticed. As a conclusion, there is a high risk that the contractors might employ young people below 18 years old. Therefore rigid restrictions to employ this category must be added to the contractor obligations.

According to focus group discussions, most of the people work as government employees, professionals, service workers, and laborers. There are a number of startups and new projects such as the 'Technology Valley,' which is part of the Suez Canal Axis Development Project.

4.2.7 Health Facilities

Qantra Shark markaz has one public and central hospital; in addition to one urban medical unit, 5 rural medical units, and 6 ambulance centers.

Qantra Gharb city has one general hospital; in addition to one urban medical unit, 8 rural medical units, and 3 ambulance centers.

[3] Based on Labor law number 12 of year 2003 and The Child Law (No. 12, 1996). There are certain critical obligations to recruit children below 15 years old. Article 98-103 of Labor law put limitations related to age, type of occupation, hazards work…etc

Many participants of the focus group discussions and a number of government officials reported that the level of medical services, provided in Qantra Gharb City, is poor in terms of quality and the availability of medication.

4.2.8 Poverty index

According to poverty mapping developed by CAPMAS in 2013, the number of poor people in Qantra Shark city is 3760 individuals, representing 15.54%. The Gini Coefficient, which indicates income inequality, stands at a critical 0.24. The percentage of female-headed households is 13%.

Male and female participants of the focus group discussions grumbled about the recent bulge in electricity bills which range between 100 to 300 pounds. More importantly, the cost of their consumption of LPG cylinders is very high, ranging from 35 to 70 pound per cylinder.

According to CAPMAS poverty mapping of 2013, the annual per capita consumption in Qantra Shark city is 6677.26 EGP. Focus group discussions revealed that the average family expenditures range between 2000 to 3000 pounds.

According to poverty mapping developed by CAPMAS in 2013, the number of poor people in Qantra Gharb city is 4579 representing 13.28%. The Gini Coefficient, which indicates income inequality, stands at a critical 0.21. The percentage of female-headed households is 10.7%.

Electricity bills, according to participants of the focus group discussions, are financially burdensome, compared to their level of income. Household expenditure, according to focus group discussions, range between 1500 LE and 4000 LE. On the other hand, CAPMAS poverty mapping data shows that per capita consumption stands at 6413.62 pounds.

4.2.9 Human activities in the project areas

As noted above, the size of agriculture activities are very slim; as it encompasses only 7.76% of total employed individuals living inside Qantra Shark city. There are a number of maintenance workshops and small businesses in the city. Focus group discussions revealed that the majority of the people work as employees; and the remainder work as drivers, or work involved in small commercial activities. The majority of employees work for the government/public sector at 56.75%, while 22.5% work for the private sector. The work force in Qantra Shark city is divided into government employees, professionals, service workers, and laborers. The city is considered as underdeveloped; however, it lies within the government vision of Suez Canal Axis Development plan.

According to focus group discussions, the main economic activities in Qantra Gharb city are trade and commercial activities. The majority of respondents stated that most people work in commercial activities, and the remainder work as employees. Agriculture activities are very low in Qantra Gharb City as it absorbs a small percentage of the labor force (8.7%), according to CAPMAS poverty mapping 2013.

4.2.10 Fuel currently used in households and its problems

The predominant majority of individuals surveyed in Qantra Shark and Gharb cities use LPG cylinders for cooking. The main source of LPG cylinders is LPG outlets which are located outside Qantra Shark city. Participants of the focus group discussions reported that the price of LPG cylinder range between 35 to 70 Egyptian pounds. And, mostly each household consumes between (1 - 3) cylinders per month.

Focus group discussions indicated a set of problems relating to the market of LPG cylinders. Firstly, participants of the focus groups reported that the LPG market is controlled by informal distributers. Secondly, there is absolutely no government supervision over the LPG market in Qantra Shark and Gharb Many of the participants were victims of cheating, as they discovered LPG cylinders not completely filled up, or filled up with water instead of LPG. However, the main problem that faces families in Qantra Shark and Gharb cities is shortages of supply, especially during the winter season. This problem leads to price irregularities; as traders in LPG cylinders use the situation to their advantage, and call their own prices. It is noteworthy to mention that these problems are common, and are not limited to Qantra Shark city.

As for water heating fuel, most of individuals surveyed stated that they use electric water heaters in their houses. Using electric water heaters add more financial burdens, given the recent bulge in electricity bills nationwide. As mentioned above, participants of the focus group discussions stated that electricity bills range between 100 to 300 pounds which from their point of view is a burden.

4.2.11 Perception towards the project

Throughout the various consultations and focus group activities conducted by the research team; participants displayed remarkable and overwhelming public acceptance and support towards the proposed project. The hardship and financial burdens that the people of Qantra Shark city have to go through in order to obtain LPG cylinders created a dire need for NG connections.

Beside some concerns regarding street rehabilitation after construction works and options of installation fee payment; the glaring message from governmental and community consultations was to commence and expedite the implementation of the project. Some respondents considered the project, as 'restoration of their dignity as Egyptian citizens.'

It is very obvious that almost all of the surveyed samples have positive perception about NG connections project. The majority of the samples reported that NG has many outstanding benefits:

- Saves time and effort
- Available and reliable
- Safer than LPG
- Reduces LPG and electricity shortages
- Ends the indignity and hardships of acquiring the LPG cylinder

4.2.12 Gender dimension of the current type of fuel

As the case all over Egypt, women play a key role in running households. Women's role includes buying the LPG cylinders and installing them to their stoves or water heaters. As mentioned above; LPG outlets are located outside the city which adds more pressure on women in terms of time, effort and money.

Women do not take up jobs as LPG vendors or suppliers considering first; the conservative nature of the community, and second; the grueling physical requirements.

4.2.13 Willingness and affordability to pay

As noted above, the majority of respondents stated their complete support of NG connection project. Such attitude is attributed to the high and fluctuating LPG prices (reaching in some cases over 70 EGP, especially during winter).

Based on focus group discussions, each household consumes between (1 – 3) LPG cylinders monthly, indicating that each household will pay up to 200 EGP per month, in the worst cases.

Participants of the focus groups were asked about their opinion of the NG Installation fee. They stated that the installation fee which goes around (2300 to 3000 EGP) is too high to be paid in one installment, given the level of income of all participants. All participants demanded a system of monthly installments to settle the Installation fee within a period between one to two years. Participants of focus group discussions stated that they can pay around (100 to 200 EGP) per month to settle the Installation fee.

The community socioeconomic characteristics and the willingness of people to convert from LPG cylinders to household NG are remarkable. Community members are much in favor of the project. However, there is a need to provide clear information about the project in order to guarantee full support to the project. The majority of the samples cannot pay NG installation costs in one installment, they strongly recommended to have payment plan and All NGOs interviewed expressed their willingness to act as communication channels with poor but no one of them will provide financial aid to the poor. However, the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG. Eligible households are those households with average monthly electricity consumption, calculated over a period of 12 months, is in the range of 50kWh and 130 kWh/month. This initiative has been approved and is currently being applied to all project areas. The grant covers 50% of the installation costs.

5 Environmental and Social Impacts

The environmental and social impact assessment (ESIA) is a process used to identify and evaluate the significance of potential impacts on various environmental and social receptors as a result of planned activities during (construction and operation) phases of the Project. Furthermore, the analysis of environmental and social impacts is important to detail an effective management and monitoring plan which will minimize negative impacts and maximize positives. The evaluation of the potential impacts on various receptors is based on a significance ranking process described in the following subsection.

5.1 Impact Assessment Methodology

The impact assessment methodology adopted for this ESIA is a semi-quantitative "cause-effect" matrix modified from Leopold and Buroz´s Relevant Integrated Criteria. The Leopold matrix is two-dimensional, where the stages of the project (activities) are assessed in relation to the existing environmental characteristics and conditions that may be affected during the execution of those actions. The impact of each activity on each receptor was assessed according to magnitude on a scale of -10 to 10, where negative values indicate a negative influence on the receptor, and importance on a scale of 0 to 10, which encompasses the probability of occurrence, frequency of the impact etc. The numbering system is used as a relative measure, where more negative numbers correspond to impacts having a higher negative magnitude. Susceptible receptors and corresponding activity are deduced if magnitude and importance are of minor severity. Then the importance of each impact by activity is determined based on the Buroz relevant integrated criteria. The importance of each impact by activity is assessed by assigning a score for intensity (IN), extension (EX), momentum (MO), persistence (PE), reversibility (RV), recoverability (MC), synergy(SI), accumulation (AC), effect (EF) and frequency (PR) of the impact. The importance, I, is determined according to **$I = \pm (3IN + 2EX + MO + PE + RV + SI + AC + EF + PR + MC)$.**

For both methods, the severity of the impact is defined as either irrelevant, minor, medium, or major. Results from both methods are summarized and presented according to the following scheme:

Impact rating	Color
None or irrelevant (no impact);	
Minor severity (minimal impact; restricted to the work site and immediate surroundings)	
Medium severity (larger scale impacts: local or regional; appropriate mitigation measures readily available);	
Major severity (Severe/long-term local/regional/global impacts; for negative impacts mitigation significant).	

Details including impact assessment results for both methods and definitions of each assessment criterion and corresponding score scale for the Buroz Relevant Integrated Criteria are presented in Annex 5.

5.2 Potential Positive Impacts

5.2.1 Positive impacts during construction

5.2.1.1 Provide direct job opportunities to skilled and semi-skilled laborers

Many variables affect the number and type of workers needed in specific time during construction. This includes but not limited to ; the number of connections, nature of work required, and time plan.

- According to information gained from Sinai Gas, the daily average number of workers during the peak time will be about 50-55 excavation worker, two engineers and eighteen technicians.
- In order to maximize employment opportunities in the local communities it is anticipated that on the job capacity building activities will be required for currently unskilled workers. On-the-job training will also supplement opportunities for the local workforce for both temporary construction roles and for long-term operation phase positions, where these are available.

5.2.1.2 Create indirect opportunities

As part of the construction stage, a lot of indirect benefits are expected to be sensed in the targeted areas due to the need for more supporting services to the workers and contractors who will be working in the various locations. This could include, but will not be limited to accommodation, food supply, transport, trade, security, manufacturing… etc.

5.2.2 Positive impacts during operation phase

- On a national level, reduced expenditure on imported LPG cylinders and subsidies
- As indicated in Baseline Chapter, women are key players in the current domestic activities related to handling LPG and managing its shortage. Being the party affected most from the shortfalls of the use of LPG, the NG project is expected to be of special and major benefits to women. This includes but is not limited to; clean and continuous sources of fuel that is safe and does not require any physical effort and is very reasonable in terms of consumption cost. Time saving is among the benefits to women. The use of a reliable source of energy will allow women to accomplish the domestic activities in less time and this will potentially open a space for better utilization for the saved time.
- The NG connection will help the household achieve a higher level of privacy by eliminating the need for informal LPG distributers from entering private homes.
- Constantly available and reliable fuel for home use.
- Significantly lower gas leakage and fire risk compared to LPG.
- Improved safety due to low pressure (20 mBar) compared to cylinders.
- Beneficiaries to benefit from good customer service and emergency response by qualified personnel/technicians.
- Eliminate the hardships that special groups like the physically challenged, women, and the elderly had to face in handling LPG.
- Limiting possible child labor in LPG cylinder distribution

5.3 Potential Negative Impacts

5.3.1 Negative impacts during construction

5.3.1.1 Reduction of Traffic Flow (disruption of local and regional traffic)

Environmental impacts

During the mobilization, preparation phases and construction phases: Mobilization of heavy machinery, asphalt breaking, excavation, placement of piping, and backfill activities are bound to limit traffic and accessibility. The impact of works on traffic flow and local access will be dependent on the type of road accessed during project activity.

Main roads (highways)

HDD works are planned on main roads; it is temporary and will last for a maximum of 2 working days therefore, the project will not directly impact circulation on main roads.

On main roads, traffic and access limitation impacts are of minor severity

Urban roads

On urban roads, mobilization, preparation and construction phases will entail narrowing roads by longitudinal and/or lateral excavation or totally blocking narrow or side roads as well as limiting or prohibiting parking along the length of the works. Access to buildings and shop entrances may be limited or constricted in cases where excavations form obstacles for pedestrians and cargo.

Coordinating with and obtaining approvals from local government and traffic police is vital to avoid delays, objections, and public inconvenience to the work program.

On urban roads, the impact on traffic flow and local accessibility are of **medium severity.**

Local roads

As pipeline installation will be taking place on roads, local access on select parts of the road will be ceased and will likely restrict local access to residents into and out of their households. As regular sized vehicles are not the principal mode of transport on local roads, congestion of cars is not anticipated. The inconvenience is expected to affect the flow of Tuk Tuks by slowing them down. However, considering their small size, congestion is not likely to be significant.

Inconvenience to the residents will last for the duration of the construction phase activities, namely, excavation and rehabilitation of the road, which will be done on the same day with no pits being left open overnight. Therefore, the duration of inconvenience and slowed traffic of Tuk Tuks etc. in affected areas will last for the duration of the work day i.e., 8-10 hours.

On local roads traffic congestion of regular sized vehicles will be insignificant. The main impact will be inconvenience to residents in accessing residential buildings and will likely be of minor severity.

On local roads, traffic and access limitation impacts are of minor severity

Socioeconomic impacts

The project will result in inconvenience and disturbance to local communities and business and delay in the various daily activities due to the following:

Traffic congestion will result in various unfavorable socioeconomic impacts. i.e.:

1- Microbuses and tuk tuks may find difficulty in maneuvering the streets that will be dug during the project construction. This will increase their oil consumption and reduce their ability to move quickly and transport less clients as each errand will take more time.
2- There might be a disturbance to community people due to the traffic congestion

5.3.1.2 Air Emissions

Environmental impacts

Construction of the network pipeline will include several activities such as excavation, land clearing, concrete foundations, transportation of construction material and equipment, burial of cables and pipes, etc. Those activities in consequence are expected to emit air pollutants to the ambient air, however it will be conducted for a short periods. The following air pollutants are foreseeable for most of the construction activities:

- Particulate matter and suspended solids from excavation/backfilling operations
- Possible dispersion from stockpiles of waste or sand used for filling trenches.
- Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO_x, NO_x, CO, VOCs, etc.
- Fugitive dust emissions (PM10, PM2.5)
- Traffic congestions resulting from road closure or slowing down of traffic due to excavation works.
- .

Dust

The impact of dust generation (particulate matter) will be limited to the working hours as excavation and backfilling are carried out within the same day.

Excavation on dusty or rocky roads such as local roads and some urban roads are likely to generate more dust compared to asphalted streets due to the dusty status of those roads.

Gaseous pollutants emissions

Machineries used during construction such as excavator, loader, bulldozer, trailer, etc are certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and WB permissible levels.

On urban roads, traffic congestion may lead to increased exhaust emissions. Traffic management with local authority will reduce the impact of works on road congestion and associated emissions.

Socioeconomic impacts

Air emission might result in health problems to allergic community members, especially in the vicinity of excavation areas.

Air emissions impacts are expected to be of medium severity.

5.3.1.3 Noise

Environmental impacts

Construction activities of the gas distribution network will likely increase noise levels due to excavation and heavy machinery. The ambient noise measurements are exceeding the WB/IFC guidelines and Law 4/1994-9/2009-105/2015 standards for noise intensity as shown in annex 4. However, the construction activities will be temporary and for short time.

Traffic interruption due to excavation can cause congestions, which can result in increased ambient average noise intensity levels.

Noise impacts on construction workers, technicians and engineers in direct vicinity of the excavation works and heavy machinery are considered more significant than those on residents. Traffic congestions, which could be caused by excavation works, may increase ambient average noise intensity levels.

Socioeconomic impacts

Noise might result in health problems to the workers, engineers and technicians.

Noise impacts are expected to be of minor severity.

5.3.1.4 Soil

Environmental impacts

The excavation activities will result in disturbance of the soil and geological characteristics. This will be more pronounced in the trench's area (around 1 meter depth) where excavation, pipeline laying, and soil compaction as a result of heavy equipment take place. Soil disturbance at higher depths will also take place in case of applying HDD technologies in main crossings (Roads). In addition, potential soil contamination may take place as a result of spillage or leaks

Soil impacts are expected to be of medium severity.

5.3.1.5 Risk on Infrastructure and underground utilities

Environmental impacts

Underground utilities and infrastructure pipelines (such as water, sewerage and telecommunication) have been installed years ago without accurate documentation and maps for its routes and depths. Therefore, the risk of damage to such utilities during excavations for natural gas pipeline installation is possible.

The most significant potential environmental impact will arise in case a sewerage pipe is broken and wastewater potentially accumulating in the trench. There is also the possibility of overflowing to the streets causing nuisance to the surrounding environment.

Socioeconomic impacts

Breaking a water supply pipe may result in cutting the supply to a number of residential units, which may lead residents to use other sources of water which may be either expensive or unsafe.

Damaging sanitary pipes, electricity underground cables and water pipelines result in severe disturbance to community people. The time needed to resolve problems with damaged utilities is relatively short (no more than 4-8 days). Additionally, the contractor will be responsible of compensating for damaged pipes.

Impacts on underground utilities are expected to be of minor severity

5.3.1.6 Impacts related to land

Socioeconomic impact

The project will not entail any land acquisition in both project areas rather than storage areas and workshops in the vicinity of the project sites. Sinai Gas managed to lease a plot of land inside the industrial zone to store their construction materials in (see lease contract in Annex 6). With regards to the workshops' site, they are allocated by the local governmental units in the side roads.

Land acquisition impacts are of irrelevant severity

5.3.1.7 Possible effects on vulnerable structures[4]

Environmental impacts

Works involving drilling will generate vibrations, which could threaten weak structures. Construction workers are accustomed to manually drill to prevent vibrations near sensitive structures.

Another possible impact on structurally-vulnerable buildings is weakening the structural system during drilling holes in the walls for riser connections on the side of the building or for internal connections to the household. The hole for the pipe usually is small compared to the wall section. Moreover, beams can easily be avoided by carefully selecting the distance of the drilling from the ceiling. For skeleton type buildings, drilling in columns or beams could have a significant effect on the structure, but this risk is well understood among connection workers and could be avoided.

Structural impacts on vulnerable buildings are of irrelevant severity

5.3.1.8 Effect on Culturally Valuable Sites [5]

Effects on culturally valuable sites (monuments, archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance) may involve:

- Structural damage to a monument due to dewatering during excavation.

[4] If encountered within project areas.

[5] If encountered within project areas.

- Damages to monuments' foundations due to excavation works.
- Damage to the monument body by vibration of machinery.
- Reducing the aesthetic appeal of the site or building.
- Improper management of discovered antiquities during excavation (chance finds).

If dewatering is needed, may lead to differential settlement of the soil surrounding the monument foundations could result. Shallow foundations may be affected by excavation works. This may cause differential settlement and may cause cracks and stability risks to the monument body.

Vibrations caused by machinery such as a trencher and jack hammer may cause cracks and surface damage to the stones of the monument, and risks to its stability.

According to the CULTNAT classification, a site may be classified as architecturally-valuable for its artistic design, its elevation view, artistic balcony, windows, domes or other components. Fixing gas risers and connections next to such components may reduce their artistic value.

Chance finds during excavation are highly unlikely within the project area as the streets have been previously excavated for installing underground utilities. However, Antiquities Law provides clear guidelines for action in the case of chance finds. It also states that a representative of the antiquities department must be present during excavations in areas adjacent to antiquities sites. Please see Annex 7 that outlines procedures in case of chance finds.

The works for the gas distribution network are not planned nearby physical cultural resources as described in the baseline of the project area in chapter 4.

Impacts on culturally valuable sites and buildings are of irrelevant severity

Effect on ecological systems

Environmental impacts

During construction of the gas distribution network, excavations and pipe laying will mostly be aligned along routes previously excavated or paved.

No protected areas will be encountered in the alignment of the lines.

Impacts on ecological systems are expected to be irrelevant.

Water

Groundwater

Information on groundwater in the 2 studied areas where distribution networks are planned is unavailable. Considering that the project areas are residential and that excavation will be carried out in lands that have previously been excavated for other underground utilities installation, groundwater is not anticipated**.**

Impact assessment on groundwater is irrelevant

Surface water

Surface waters consisting of canal branches may be susceptible to pollution resulting from uncontrolled dumping of wastes generated during construction.

The impact on surface water pollution is of minor severity

Solid and Liquid Waste Management

Environmental impacts

Wastes that are generated during the construction phase include:

- Excavated soil and excess sand; concrete and bricks waste;
- Broken asphalt in the case of paved roads;
- Cans containing paint used on steel pipes in household connections
- Containers of chemicals and lubricant oils used for construction machinery;
- Possibly damaged asbestos water pipes during excavation; and
- Dewatered product from trenches.
- Construction waste estimates are in the range of 100-120 m^3/km.

Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. The legal standards of Law 4/1994-9/2009-105/2015 for the Environment and Law 38/1967 stipulate that these wastes should be disposed of in licensed sites by the local authority, which minimizes any aesthetic effects of such waste.

Asphalt waste may contain hazardous components, such as tar, lubricating oils, some heavy metals, etc. However, its solid nature minimizes the transport risk of such components to the environment. Disposal of asphalt waste to a construction waste disposal site is common practice in Egypt, and is not normally associated with environmental risks because of dry weather.

Empty containers of chemicals, lubricating oils, and paint are considered hazardous waste. They should be disposed of in an approved hazardous waste handling facility. This is not a direct result of construction activities, but rather relates to maintenance of equipment. By preventing fueling/lubricating activities on construction sites no empty containers will need disposal.

Asbestos waste could result if an underground water pipe is broken during excavation. If encountered, wasted parts of the pipe must be sprayed with water, to prevent emissions of asbestos-containing dust, and transported to an approved hazardous waste landfill. Asbestos waste may pose significant health risks to workers, pedestrians and residents of neighboring areas. Therefore, efficient management of such waste, if generated, will be very important. The probability of generating asbestos waste is relatively low as the damage is usually repaired locally without the need for pipe replacement. Management and disposal of the generated waste is the responsibility of the Water Authority performing the repairs.

Socioeconomic impacts

Waste contractors and recycling/disposal sites will benefit from waste disposal contracts.

If waste is not managed properly, it will result in health problems to the surrounding communities.

Overall, waste generation impacts are of medium severity

Street condition deterioration

Environmental impacts

Streets rehabilitation or restoration following pipeline network installation :is referred to by an Egyptian legal/institutional expression (رد الشئ لإصله) that signifies the responsibility to "restore to original condition". In the context of the project, it applies to the responsibility of the implementing company to provide the necessary resources to re-pave roads and streets to the original state after natural gas excavation and installation works. The current arrangement is that the implementing entity performs the backfilling of the excavated trenches and agrees a restoration fee with the local government unit (district) to cover the balance of the restoration and pavement cost. The local unit uses the fee to include the restoration and re-pavement of the streets in its "pavements plan".

Socioeconomic impacts

Delays in street restoration may lead to varying degrees of damage to vehicles, loss of access and business, traffic congestions with associated delays and emissions, and a potentially significant public discontentment.

Although the restoration impact may be temporary, localized, and of minor severity, it is perceived by the public as major inconvenience.

Community health and safety

Impacts on community health and safety are expected to result from emissions of gaseous pollutants and dust, increased background noise levels, uncontrolled dumping of construction waste, accidental falls in temporary excavated trenches, accidental contact with equipment, accidental dropping of equipment due to works at height etc.

Emissions of gaseous pollutants and dust

Increased emissions of dust can result in health problems to community members. Excavation work will be intermittent over a duration of 8 hours a day.

Background noise levels

The noise intensity levels resulting from the operation of jackhammers surpasses WB/IFC guidelines and Law 4/1994-9/2009-105/2015 standard of 65 dBa for residential areas in the vicinity of commercial areas during the day. Increased noise intensity will be intermittent over the duration of one work day between 9 am and 5 pm.

Waste accumulation

Illegal dumping and potential burning of construction waste, which will consist mainly of excavated soil and leftover PE and carbon steel pipes can pose health and safety threats to local community.

Construction Activities

Excavation works will result in the presence of open trenches in areas accessible to local community (e.g., in front of building and shops.) The presence of open trenches can pose risks of accidental falls and injuries. Trenches are expected to be open during the work day, with no trenches being left open after working hours.

Installation of household connections may involve working at height, which can result in falling objects causing health and safety hazards to local community.

Construction works will involve the use of equipment such as jackhammers and welding machines, which can cause injuries to local community as a consequence of contact.

Excavation works may cause rupture of underground utilities such as water supply pipes. Breaking a water supply pipe may result in cutting the supply to a number of residential units, which may lead residents to use other sources of water which may be either expensive or unsafe.

Damaging sanitary pipes, electricity underground cables and water pipelines result in severe disturbance to community people. The time needed to resolve problems with damaged utilities is relatively short (no more than 4-8 days). Additionally, the contractor will be responsible of compensating for damaged pipes.

Impacts due to construction activities on community health and safety are of medium severity.

Visual intrusion

Project activities will entail piling of sands and moving of vehicles in various construction sites. Moreover, the temporary storage areas will be used to store pipes, painting materials and safety equipment. That will result in significant visual intrusion impact.

Impact related to the visual intrusion during the construction phase is **irrelevant**

Labor conditions and occupational health and safety

General risks associated with construction sites and anticipated include slips and falls; moving lorries and machinery; exposure to chemicals and other hazardous materials; exposure to electric shock and burns; weather related impacts (dehydration; heat stroke), exposure to high noise intensity levels. Because of the large number of unskilled workers who are reluctant to use Personal Protective Equipment (such as helmets, ear muffs, and masks), risks can be higher.

Noise

The noise intensity level resulting from jackhammers surpasses permissible level of 90 dB (A) for work place with up to 8 hour shifts (as per Egyptian Law 1994.) Therefore, the use of construction equipment constitutes an occupational and safety health risk on workers operating and in the vicinity of the equipment.

Vibrations

The use of jackhammers will results in the generation of hand-arm vibrations; the typical vibration value is of 9 m/s^2, which exceeds the ACGIH Threshold limit value of 5 m/s^2 (8 hour equivalent total value), but is below the exposure limit of 12 m/ s^2 for a total daily duration of less than an hour.

Electrical

Faulty equipment or exposed cables can cause risks of electrocution.

Working at heights

Household installations will require working at heights, which can result in falls and pose a safety hazard.

Chemical hazards

Chemical hazards are associated with the construction and connection of the odorizing unit. Inadequate handling or compromised integrity of the connections can result in leaks/released hazardous material (tertiobutylmercaptin and methylsulphide), to which workers will get exposed resulting in a health hazard.

Impact related to Occupational health and safety during the construction phase is **of medium severity**

5.3.1.9 Risk pertaining to child labor

As mentioned in the baseline, child labor is a common practice in Egypt at large. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and restrict obligations and monitoring should be applied in the contractor obligations.

The impact of construction activities pertaining to child labor is of **low-medium** severity.

5.3.1.10 Labor influx

Socioeconomic impacts

Generally speaking having workers in small cities might result in unfavorable impacts on the available resources (e.g. pressure on accommodation, food, health care and medication and potable source of water). It may also result in inconvenience to the local communities, particularly in the areas where communities are conservative or not accustomed to having outsiders. Given the fact that only limited number of workers exist in each of the locations during working hours, portion of those workers are local workers and that the LDCs are imposing roles and code of conduct on the contractors to ensure good behaviors and limit any potential conflict with the communities, it is very unlikely that impacts related to labor influx will be relevant in the project areas.

Impact related to the labor influx during the construction phase is **irrelevant**

5.3.2 Negative Impacts during Operation

5.3.2.1 Impact on worker health and safety

Possible impacts to health and safety during operations include exposures to odorant, noise, accidental injury to workers. In addition; health and safety issues include working around energized equipment, and possible contact with natural hazards. However, during the operation and maintenance phase, the impacts on workers tend to be low

Therefore the impact related to health and safety of workers is assessed as low

5.3.2.2 Risk pertaining to child labor

The LDC has never employed any children during the operation of the networks as they adhere to labor law. Additionally, maintenance and operation activities need highly professional technicians who graduated from secondary schools. They all are above 18 years old.

Child labor risk is assessed as irrelevant

5.3.2.3 Waste management

No wastes are expected during the operation phase

Therefor impact considered to be irrelevant

5.3.2.4 Noise impact

No noise impact is expected during the operation phase of the gas network

Therefor impact considered to be irrelevant

5.3.2.5 Air emission

No gaseous emissions are expected to occur during the operation phase except for the potential natural gas leak or in case of accidents (odorant handling or storage) and during maintenance activities.

Therefor impact considered to be irrelevant

5.3.2.6 Soil impact

The normal operation of the networks doesn't have any impact on soil; however risk of soil contamination is only associated with the possible spillage or leakage.

Therefor impact considered to be irrelevant

5.3.2.7 Ecological impact

The normal operation will not have any impact on flora and fauna.

Therefor impact considered to be irrelevant

5.3.2.8 Community health and safety

In addition to a full array of safety and emergency precautions taken by EGAS and the implementing entities (**local Distribution companies: Sinai Gas for Ismailia**), user safety is prioritized by stating emergency precautions on the household gas meter and by setting up emergency response centers. Impacts on user health and safety may occur through improper handling of piping and valves by the user. This may be due to a lack of awareness, illiteracy, or failures in piping or sealants.

Considering the low probability of occurrence and the lower density of natural gas (compared with current practice of LPG), impacts on community health and safety due to gas leaks is of minor severity.

5.3.2.9 Integrity of natural gas piping

Environmental impacts

Low-probability events may impact the integrity and safety of the NG network and components during the years of the operation phase.

- Geological and geotechnical events: earthquakes may result in geotechnical instabilities that lead to network breakage or leakage in multiple locations simultaneously. The geological and geotechnical history of the area may also lead to possible events.
- Sabotage: pipelines and other components may be targeted for sabotage.
-

Socioeconomic impacts

Adverse impact is expected due to the possibility of disrupting the Gas supply to households.

Leak impacts may be permanent and highly severe, however, considering the extremely low probability of occurrence, the impact is of minor severity.

5.3.2.10 Visual intrusion impacts

The installation of house connection and the chimney will affect buildings. There is a probability to affect the building, particularly, unique old buildings. Under certain technical and safety conditions it is not possible to avoid visually impacting the entrance of the apartment and dwellings with installed pipes.

Visual intrusion Impacts will be of irrelevant severity

5.3.2.11 Economic disturbance

For those who will pay in installments, this may be an added financial burden on the poor families. However, the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG based on an eligibility criteria (section 4.2.13). This initiative has been approved and is currently being applied to all project areas.

- There could be a Minor negative economic impact on LPG cylinders distributors. (Governmental sector- private sector who have license to distribute LPG cylinders- non official distributors). The LPG distributors will lose their income. However, their ability

to move to other areas or change their business is high. Various previous NG projects have not influenced the informal LPG vendors. Based on the meetings conducted with the LPG cylinder distributors, they reported that the NG will not cover all areas. Inside the same areas covered by the NG not all of the units are technically eligible to be connected to the NG. Therefore, they will continue working in the same areas and in the uncovered areas.

- The surveyed LPG distributors have their vehicle in transporting the LPG cylinders. They reported that this vehicle might be used in transporting other goods. Such activity is also lucrative for them in case of not being able to distribute the LPG cylinders and such approach was adopted during the shortage of LPG cylinders occurred two years ago..

The probability of such impact is **minor** as LPG distributors manage to perform alternative job.

5.4 Summary of Impacts

Table 5-1: Summary of Potential Project Negative Impacts

Impacts During Construction			
Receptor	**Description of impact**	**Type of Impact**	**Significance**
Air Emissions	Air emissions (gases and particulates) during construction can exceed permissible limits and shall arise from: - Particulate matter and suspended solids from excavation/backfilling operations - Possible dispersion from stockpiles of waste or sand used for filling trenches. - Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO_x, NO_x, CO, VOCs, etc. - Traffic congestions resulting from road closure or slowing down of traffic due to excavation works. **Dust** The impact of dust generation (particulate matter) will be limited to the working hours as excavation and backfilling are carried out within the same day. Excavation on dusty or rocky roads such as local roads and some urban roads are likely to generate more dust compared to asphalted streets due to the dusty status of those roads.	Negative impact	Medium
	Gaseous pollutants emissions Provided machinery used during construction is certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and WB permissible levels. On urban roads, traffic congestion may lead to increased exhaust emissions. Traffic management with local authority will reduce the impact of works on road congestion and associated emissions.	Negative impact	Medium

Impacts During Construction			
Receptor	**Description of impact**	**Type of Impact**	**Significance**
Noise	Construction activities of the gas distribution network will likely increase noise levels beyond permissible limits due to excavation and heavy machinery. Typical construction noise includes noise intensity due to engine operation, and intermittent impacts which may take place during demolition of asphalt by jack hammers	Negative impact	Minor
Surface Water	Uncontrolled dumping of waste in canals can result in water pollution	Negative impact	Minor
Solid, Hazardous Wastes and Liquid Waste	Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination. Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. These wastes should be disposed in licensed sites by the local authority, which minimizes any aesthetic effects of such waste. Poor handling of Hazardous and non-hazardous materials may result in poor containment of induced leaks Empty containers of chemicals, lubricating oils, and paint are considered hazardous waste. They should be disposed of in an approved hazardous waste handling facility. This is not a direct result of construction activities, but rather relates to maintenance of equipment. By preventing fueling/lubricating activities on construction sites no empty containers will need disposal. It is highly unlikely that groundwater may be encountered at the routes of the pressure distribution networks as these have been previously excavated with no record of groundwater. In the unlikely case that groundwater is encountered during excavation, improper drainage of dewatering water may result in forming stagnant water ponds around the construction site, which can develop, if not drained, infiltrated or evaporated, to form nuisance and an environment for breeding of insects. Normally dewatered product is relatively clean water, which should be drained to the sewer system. To conserve water, if dewatered groundwater is free of perceivable pollution, it will be to the extent possible- used on- or around the work site or discharged into the nearest canal to be used for irrigation When dewatering is performed from a contaminated trench or near a source of pollution seepage to groundwater, contaminated water is collected for certified treatment/disposal according to WB/IFC guidelines and National Laws 93/1962 and 48/1982, respectively.	Negative impact	Medium

Impacts During Construction			
Receptor	**Description of impact**	**Type of Impact**	**Significance**
	As mentioned previously, site offices will be located in residential areas during excavation of the pressure distribution network. Workers and employees typically utilize the bathrooms of surrounding facilities		
Reduction of Traffic Flow	• During the mobilization, preparation phases and construction phases: Mobilization of heavy machinery, asphalt breaking, excavation, placement of piping, and backfill activities are bound to limit traffic and accessibility. The impact of works on traffic flow and local access will be dependent on the type of road accessed during project activity. Coordinating with and obtaining approvals from local government and traffic police is vital to avoid delays, objections, and public inconvenience to the work program. • HDD works are planned on main roads; it is temporary and will last for a maximum of 2 working days therefore, the project will not directly impact circulation on main roads. • On urban roads, mobilization, preparation and construction phases will entail narrowing roads by longitudinal and/or lateral excavation or totally blocking narrow or side roads as well as limiting or prohibiting parking along the length of the works. Access to buildings and shop entrances may be limited or constricted in cases where excavations form obstacles for pedestrians and cargo. • As pipeline installation will be taking place on roads, local access on selected parts of the road will be ceased and will likely restrict local access to residents into and out of their households. As regular sized vehicles are not the principal mode of transport on local roads, congestion of cars is not anticipated. The inconvenience is expected to affect the flow of Tuk Tuks by slowing them down. However, considering their small size, congestion is not likely to be significant. • Inconvenience to the residents will last for the duration of the construction phase activities, namely, excavation and rehabilitation of the road, which will be done on the same day with no pits being left open overnight. Therefore, the duration of inconvenience and slowed traffic of Tuk Tuks etc. in affected areas will last for the duration of the work day i.e., 8-10 hours. .	Negative impact	Medium

Impacts During Construction			
Receptor	**Description of impact**	**Type of Impact**	**Significance**
Risk on Infrastructure and underground utilities			
	Breaking a water supply pipe may result in cutting the supply to a number of residential units, which may lead residents to use other sources of water which may be either expensive or unsafe. Damaging sanitary pipelines, electricity and water supply result in severe disturbance to community people. Yet such problem takes short time (no more than 4-8 days). Additionally, the contractor will be responsible of compensating for damaged pipes.	Negative impact	Minor
Street condition deterioration	Streets rehabilitation or restoration following pipeline network installation: is referred to by an Egyptian legal/institutional expression (رد الشئ لإصله) that signifies the responsibility to "restore to original condition". In the context of the project, it applies to the responsibility of the implementing company to provide the necessary resources to re-pave roads and streets to the original state after natural gas excavation and installation works. The current arrangement is that the implementing entity performs the backfilling of the excavated trenches and agrees a restoration fee with the local government unit (district) to cover the balance of the restoration and pavement cost. The local unit uses the fee to include the restoration and re-pavement of the streets in its "pavements plan".	Negative impact	Minor
	Delays in street restoration may lead to varying degrees of damage to vehicles, loss of access and business, traffic congestions with associated delays and emissions, and a potentially significant public discontentment.	Negative impact	Minor
Community health and safety	Negligent workers may cause accidents harmful to the community members, particularly children and old people, especially close to the excavation sites. The workers should support children and old people in case of crossing excavation areas. There should also be caution tapes to stop community people from accessing construction sites. In case of the workers and contractor adhere to such procedures the community health and safety impact will be limited.	Negative impact	Medium

Impacts During Construction			
Receptor	**Description of impact**	**Type of Impact**	**Significance**
Labor conditions and occupational health and safety	Throughout this phase there will be many occupational health and safety risks to workers on the sites. These are generic risks associated with construction sites and include slips and falls; moving lorries and machinery; exposure to chemicals and other hazardous materials; exposure to electric shock and burns; weather related impacts (dehydration; heat stroke). This is short term (6-12 months) but because of the large number of unskilled workers who are reluctant to use Personal Protective Equipment, there might be some level of risk.	Negative impact	Medium
Child labor	As mentioned in the baseline, child labor is a common practice in Egypt at large. This could be also an applicable risk in the project areas in QS and QG. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and restrict obligations and monitoring should be applied in the contractor obligations	Negative	Low-Medium
Labor influx	Generally speaking having workers in small cities might result in unfavorable impact on the available resources, e.g. pressure on accommodation, food, health care and medication and potable source of water. Given the size of population in project sites and the availability of most of services; the limited number of workers will not result in any significant impact on the community resources.	Negative Impact	Negligible

Impacts During Operation			
Impact	**Description of impact**	**Type and Magnitude**	**Significance**
Community health and safety	In addition to a full array of safety and emergency precautions taken by EGAS and Sinai Gas, user safety is prioritized by stating emergency precautions on the household gas meter and by setting up emergency response centers. Impacts on user health and safety may occur through improper handling of piping and valves by the user, which can result from lack of awareness, illiteracy, or failures in piping or sealants.	Negative impact.	Minor
Integrity of natural gas piping	Low-probability events may impact the integrity and safety of the NG network and components during the years of the operation phase. Geological and geotechnical events: earthquakes may result in geotechnical instabilities that lead to network breakage or leakage in multiple locations simultaneously. The geological and geotechnical history of the area may also lead to possible events. Sabotage: pipelines and other components may be targeted for sabotage.	Negative impact.	Minor
Economic disturbance to the LPG distributors	There could be a Minor negative economic impact on LPG cylinders distributors. (Governmental sector-private sector licensed to distribute LPG cylinders- non official distributors). The LPG distributors will lose their income. However, their ability to move to other areas or change their business is high. Various previous NG projects have not influenced the informal LPG vendors.		Minor

6 Analysis of Alternatives

The No-Project alternative is not favored as it simply deprives the Egyptian Public and Government of the social, economic, and environmental advantages.

6.1 Pipeline Installation Technology Alternatives

To install a natural gas pipeline beneath the ground level, this can either be done by excavation a trench or using trenchless technologies. Trenchless technologies can be further classified as guided methods and non-guided methods. In this analysis, the most famous technology in each category will be considered; namely, horizontal directional drilling representing the guided trenchless technology, auger boring representing the non-guided trenchless technology, and the open-cut representing the trench technology.

6.1.1 Trenchless Technologies

HDD has some advantages compared to auger boring and open-cut technique as follows:

- Compared to the open-cut technology, it doesn't cause interruption to traffic flow.
- Compared to the open-cut technology, it causes fewer disturbances to the surface and sub-surface soil layers.
- Compared to the auger boring technology, it can be used for larger distances and wider range of pipeline diameters.
- Compared to the auger boring technology, it is a surface-launched process which doesn't require drive pits.
- Compared to the auger boring technology, it is a guided method, and accordingly can achieve high accuracy for the pipeline path.
- Can be employed for high depths, and accordingly can avoid any breakage accidents to the existing infrastructure lines/cables.

Figure 6-1 Horizontal Directional Drilling

On the other hand, HDD suffers from some disadvantages including:

- Like any other trenchless technology, and according to the geologic condition, soil collapse may take place during the installation.
- In case of having existing infrastructure lines/cables, there will be less flexibility in choosing the pipeline depth, the fact which may necessitate drilling through soil layers which may be of insufficient strength to withstand the slurry's pressure.
- Not favorable with soils containing gravels and cobbles.

6.1.2 Open-Cut Method

This is the traditional method for pipeline installation. It is very simple technology which just depends on excavating the soil, laying the pipeline, and backfilling. However, it is technically not possible to be used in crossings with major waterways. It can be used in crossings with major roads and railways; however, this will cause huge interruption to traffic as this will necessitate either re-routing or reducing the number of lanes. This will lead to reduction in the average speed of the vehicles on the road, and may affect the areas devoted for parking. This may also increase the probability of having car accidents, in addition to negative socio-economic impacts as a result of interrupting the flow of people and goods. Open-cut method may be the only possible solution in case of having long pipeline distances such as in agricultural lands or desert areas.

In conclusion, since the pipeline route passes through desert area, open cut is recommended since this will not negatively affect the environment, and it will be a cheap and safe option. However, for the crossings, HDD is needed for the roads specified in section 2.3.

6.2 Routing

The preferred route was selected on parameters like:

- Study Area Identification: Identifying major features in the study area like main roadways, residential and commercial areas to help identify constraints during the selection of the routes
- Mapping the resources: Existing linear corridors include major streets, waterways, railroads, and utility lines. Existing linear corridors are considered opportunity areas for pipeline routing because they have already been developed and therefore are generally considered a compatible land use. In addition, these linear corridors generally provide existing access for construction and maintenance requirements.

6.3 Regulators

Two type of 100 mbar regulators outlet pressure were considered

1- Kiosk regulators

2- Wall mounted regulators

Kiosk regulators were preferred because:

- Easier maintenance
- Less expensive
- More safe

6.4 Working Hours

Some areas are overcrowded from 7 a.m. to 2 p.m. Therefore, it will be useful to apply flexible working time that can avoid working during rush hours.
Additionally, in some residential areas, it will be extremely difficult to work during night.
Working during morning can be applied in such areas. The two options are:

- Working during the day in most of the project areas
- Working during the night in overcrowded areas

6.5 Installation Costs

The average natural gas connection installation cost is about 7000 EGP (equivalent to about 400 $)and consumers contribute a part of it because the balance is subsidized by the Government. The government of Egypt is negotiating with the project's financing organizations in order to secure additional subsidy to poor and marginalized groups. Currently, they offer flexible payment schemes for the installation cost. No financial assistance will be provided by the NGOs for the poor to install the NG. All NGOs interviewed expressed their willingness to act as communication channels with poor but no one of them will provide financial aid to the poor. However, the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG based on an eligibility criteria (section 4.2.13). This initiative has been approved and is currently being applied to all project areas. The grant covers 50% of the installation costs.

7 Environmental and Social Management & Monitoring Plan

7.1 Objectives of the ESM&MP

The objective of the Environmental and Social Management and Monitoring Plan (ESMMP), is to outline actions for minimizing or eliminating potential negative impacts and for monitoring the application and performance of mitigation measures. The ESMMP identifies roles and responsibilities for different stakeholders for implementation and monitoring of mitigations. This section also presents an assessment of the institutional capacity and institutional responsibilities for implementing the ESMMP.

Wherever applicable, the ESMMP is designed to accommodate alternative context-specific mitigations and monitoring measures.

Overall, the following Environmental and Social measures are complementary to and do not substitute compliance to the detailed HSE guidelines, procedures, and actions adopted by EGAS and its subsidiary LDCs.

In the following Management and Monitoring measures the term Local Distribution Company (**LDC**) refers to the gas company in charge of project implementation: **Sinai Gas**

7.2 Management of Mitigation and Monitoring activities During Construction Phase

7.2.1 Hotline

During construction activities, a 24-7 Hotline (**129**) is available for customers and the public to report leaks, damage, emergencies, and/or incidents related to gas connections, components, infrastructure, and activities (inside or outside households) and to request repairs/emergency response/assistance.

This includes possible damage to other underground utility lines (water, wastewater, electricity, phone, Internet) and to buildings and physical structures or cultural sites during excavation/construction activities. It also includes reporting issues resulting from construction activities such as excessive/prolonged noise, vibration, waste, traffic, accessibility, visual, and other community health and safety impacts.

7.2.2 Air Emissions

Air emissions of excavation machinery and diesel-powered electrical units should be within allowable legal limits. Because dust emissions from construction works include non-point sources such as excavation, direct emission levels cannot be measured. On the other hand, monitoring ambient total suspended particles or PM_{10} could be misleading because of the interference of other sources. Therefore, monitoring activities should ensure point sources, i.e., exhaust of excavation machinery, are within the standards stipulated by the Law. Mitigation measures must be documented. Documentation should consist of standard operating procedures and monitoring reports for emission tests and complaints.

Leaks of natural gas

A natural gas leak can result if integrity of pipes is jeopardized. The Local Distribution Company must coordinate with the local municipality to safely evacuate the area and deploy trained personnel to repair broken pipe based on an Emergency Response Plan.

Mitigation measures proposed to minimize Air Emissions are detailed in the ESMP matrix below.

7.2.3 Traffic Impacts

Mitigation measures proposed to minimize traffic disruptions are detailed in the ESMP matrix below.

Coordination between Sinai Gas/EGAS and the local traffic authority is imperative as the above mentioned mitigation measures will be implemented by, or in coordination with, the local Traffic Department. Monitoring will be carried out by the local Traffic Department to make sure that flow reduction is within acceptable levels. Coordination should be established between the Traffic Department and the HSE Departments of the implementing gas companies (Local Distribution Companies- LDCs) to ensure compliance and adequate implementation of the identified mitigation measures. LDC HSE should record any comments by the Traffic Department regarding violation of excavation permits by the contractor.

7.2.4 Noise

Mitigation measures proposed to minimize Noise Emissions are detailed in the ESMP matrix below.
Documentation should consist of standard operating procedures and monitoring reports for noise measurement tests and complaints. Mitigation of noise impacts during construction of the PRSs should follow the same measures outlined in this section.

7.2.5 Excavation Activities Posing Risk on Utilities

Mitigation measures proposed to impact on underground utility lines and infrastructure are detailed in the ESMP matrix below.

Monitoring activities for such risks, are basically documenting, analyzing reasons that led to the accident and updating procedures to avoid future accidents. Monitoring environmental consequences of such accidents, such as depth of effected soils, volumes of effected groundwater, and other social effects are believed to be unnecessary actions by the implementing company, though it might be recommended for the authority owning the infrastructure line (Water and Wastewater Company or Telecommunication Authority) for their research activities.

7.2.6 Waste Management

In Ismailia, the local unit is responsible for the pick-up and disposal of solid waste. Construction waste such as soil waste is disposed of. Domestic waste is collected from domiciles and collection sites and disposed.

As summarized below, solid wastes generated during the construction phase are classified as either non-hazardous (which includes inert wastes) and hazardous wastes. It is worth mentioning Construction wastes will be generated only during a relatively short period.

Table 7-1 Handling of Solid Wastes during Construction of gas pipelines

Waste Type	Description	Classification	Treatment and Disposal
Possibly damaged asbestos water pipes during excavation	Any waste material containing more than 1 wt% asbestos including piping/equipment/vehicle gaskets, pump packing brake pads, etc.	Hazardous	Dispose to an approved hazardous waste disposal facility: Nasreya Hazardous Waste Treatment Centre

Waste Type	Description	Classification	Treatment and Disposal
Batteries	Scrap wet and dry cell batteries from vehicles and equipment.	Hazardous	- Preferred: Recycle - Alternative: Dispose to an approved hazardous waste disposal facility, Nasreya Hazardous Waste Treatment Centre.
Contaminated Soil – Refined Fuel and Oil	Contaminated soil from routine activities and minor accidental releases spills or leaks.	Hazardous	Dispose to an approved hazardous waste disposal facility Nasreya Hazardous Waste Treatment Centre.
Domestic Waste	Food waste, paper and packaging discarded from kitchens, living quarters, bathrooms, laundries, warehouses and offices.	Non-Hazardous	Dispose to an approved non-hazardous waste disposal facility.)
Filters – Lube Oil (Drained)	Lube oil filters used to remove solids and impurities originating from vehicles, machinery and equipment maintenance and repair.	Hazardous	Disposal: - Filters - Dispose to an approved hazardous waste disposal facility Nasreya Hazardous Waste Treatment Centre. - Drained liquids - Manage same as Lubricating Oil
Oil Containers – (Including Drums and Barrels)	Drums and barrels used for bulk oils and lubricants.	Hazardous	Dispose to an approved hazardous waste disposal facility, Nasreya Hazardous Waste Treatment Centre.
Shop Towels (Not Laundered - Contaminated)	Shop towels, rags, Nomex, and other cloth wipers that are contaminated with a hazardous waste or that exhibit a hazardous characteristic and are not commercially dry cleaned or laundered	Hazardous	Dispose to an approved hazardous waste disposal facility, Nasreya Hazardous Waste Treatment Centre.

Monitoring activities shall depend mainly upon observation of waste stockpiles of soil and construction waste to ensure the frequency of removal from site, and whether they contain hazardous components.

7.2.6.1 Solid Waste

Mitigation measures proposed to minimize impact of non-hazardous waste are detailed in the ESMP matrix below.

7.2.6.2 Liquid and hazardous waste

Mitigation measures proposed to minimize impact of liquid and hazardous waste are detailed in the ESMP matrix below.

Medical or healthcare wastes containing pathologic, contagious, or radioactive constituents as per the definitions of Ministry of Health decree 192 for the year 2001 should be collected, stored and transported separately from any other wastes. Several certified incinerators are available across

Egyptian governorates in designated healthcare facilities. In the unlikely case of medical waste, arrangements should be made immediately with the local office of the ministry of health for safe handling and disposal.

7.2.7 Street Restoration after asphalt breaking

As mentioned in the impacts section of the study, restoration and re-pavement of streets post-construction and excavation is one of the impacts which are highly perceived by the public. The implementing entity agrees a restoration fee with the local administration unit in charge of the area. The fee is used by the local unit to include the restoration in their re-pavement plans. In some cases, the restoration and re-pavement job is carried out by the Roads and bridges directorate who, in turn, schedule the re-pavements in their own plans. A key to minimize public discontentment and socioeconomic impacts of excavated streets is quick restoration and effective communication with regarding work and restoration schedules.

Mitigation measures proposed for restoration of excavated streets are detailed in the ESMP matrix below.

7.2.8 Community health and safety

In addition to all the environmental and social management and monitoring measures in this section which aim for health and safety, awareness-raising actions and signs should be provided to workers and community members to promote safety and health, safety supervisors should be hired by the LDCs to oversee work sites and they will be largely responsible for children and their safety around the construction site.

Mitigation measures proposed for minimizing community H&S impacts detailed in the ESMP matrix below.

7.2.9 Occupational health and safety (OH&S)

A comprehensive and practical occupational health and safety management system must be enforced. The OH&S measures are to comply with all relevant national legal requirements well as international Best Practice such as the IFC EHS General Guidelines. Practical and administrative measures should be taken by EGAS and the LDC to ensure adherence of site crews to OH&S procedures and measures reported in **Annex** 8(EGAS H&S guidelines)

Mitigation measures proposed for minimizing occupational H&S impacts detailed in the ESMP matrix below.

7.2.10 Management of grievances (E&S Grievance Redress Mechanism)

The grievance mechanism (GRM) is to be shared with the community beneficiaries. Posters will be prepared and made available to the beneficiaries in the contracting office[6] and the construction sites. Additionally, they will be available in the customer services office. Thus, sufficient and appropriate information about the GRM will be disseminated to the communities prior and during the construction phase. Information dissemination about the GRM should be shared with the beneficiaries during the process of contracting and disclosed in the contracting office and other publically accessible venues.

Due to the diversity of the context in different Governorates and the socioeconomic characteristics of the beneficiaries, the communication channels to receive grievances were locally tailored to

[6] Falls under the budget of the LDCs

address all petitioners concerns and complaints. The following are the main channels through which grievances will be received:

1. Foremen act as the main channel for complaints. They are always available on the construction sites. However, complaints raised to him/her are mostly verbal. Thus, s/he should document all received grievances in writing form using a fixed serial number that the complainant should be informed about to be able to follow up on the complaint
2. Hotline: 129 is the hotline in Sinai Gas.
3. The SDO within the LDC and EGAS
4. Email. info@***Sinai Gas***.com.eg

Trustworthy people, community leaders and NGOs/CDAs will be an appropriate channel to guide petitioner about the various tiers of grievances, particularly, in rural areas. Response to grievances

Response to grievance will be through the following channels

1. The response to grievances should be through an official recognized form to ensure proper delivery to the complainant. It is the responsibility of the SDOs to ensure that complainants were informed about the results of handling their complaints.
2. Response to grievances should be handled in timely manner as mentioned above, thereby conveying a genuine interest in and understanding of the worries put forward by the community.
3. EGAS and Sinai Gas should maintain record of complaints and results.

Details on the GRM and the institutional arrangements required to implement it are presented in Annex 9.

7.2.11 Activities Posing Risk on Structures Stability[7]

1. Screening by a technical committee from the Design, Projects and Operations Departments of LDCs to identify areas/sectors including buildings with potential structural problems. Areas with potential problems should be excluded from the project.
2. In areas of high groundwater level, dewatering activities would be needed. Dewatering activities should follow a tight excavation/dewatering schedule through preplanning and supervision of implementation to avoid lengthy dewatering activities. If water resulting from dewatering is contaminated, it should be transferred to an adequate facility.

3. Minimize excavation intensity and vibrations from heavy equipment in the vicinity of vulnerable structures, if any. In case vulnerable structures are identified, excavation should be done manually.

   Monitoring activities will be mainly performed through supervision of the work of LDCs, and reviewing site reports by the HSE supervisor.

[7] If encountered within project areas.

7.3 Environmental and Social Management Matrix during CONSTRUCTION

Table 7-2: **Environmental and Social Management Matrix during CONSTRUCTION**

Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Local traffic and accessibility	**Traffic congestion (and associated noise/air emissions)**	Excavation during off-peak periods Time limited excavation permits granted by local unit & traffic department	Negligible	Excavation contractors	– LDC + – Traffic department	Contractor has valid conditional permit + Field supervision	Contractor costs LDC management costs
		Announcements + Signage indicating location/duration of works prior to commencement of work	Negligible	– LDC – Excavation contractors	– LDC HSE – Local Unit – Traffic department	Ensure inclusion in contract + Field supervision	
		Apply Horizontal Directional Drilling under critical intersections whenever possible to avoid heavy traffic delays	Negligible	Contractor	LDC HSE	Field supervision	
		• Traffic detours and diversion • Pedestrian crossings can be provided if necessary.	Negligible	Traffic Department	Traffic Department	Field supervision for detouring efficiency Complaints received from traffic department	Additional budget not required
		Road restructuring and closing of lanes	Negligible			Fluidity of traffic flow	
Ambient air quality	**Increased emissions of dust and gaseous pollutants**	Controlled wetting and compaction of excavation/backfilling surrounding area	Negligible	Excavation Contractor	LDC HSE	Contractual clauses + Field supervision	– Contractor costs – LDC management costs
		1. Excavated soil stockpiles and stored sand should be located in sheltered areas. Stored fine sand should be covered with appropriate covering material[8], such as polyethylene or textile sheets to avoid soil dispersion. 2. Transportation of excavation/construction waste should be through licensed and sufficiently equipped vehicles with a suitable special box or provided with a cover to prevent loose particles of waste and debris from escaping into the air or dropping on the road. 3. Disposal of excavation/construction waste should be in locations licensed by the local authority.	Minor			Contractual clauses + Field supervision	
		Compliance to legal limits of air emissions from all relevant equipment	Minor			Measure and document emissions of machinery by regular audits request emission measurements	
		• Availability of 24-7 hotline service (129) to all beneficiaries and the public for reporting possible leaks, damages or emergencies • Quick response to gas leaks by evacuation of the affected area • Repair or replacement of failed component	Minor	LDC	LDC HSE	Field Supervision	
– **Ambient noise levels** – **Local community** – **Workers**	**Increased noise levels beyond WB/National permissible levels**	• Ear muffs, ear plugs, certified noise PPE for workers • Noise exposure periods should be minimized for workers so as not to exceed the safe limits mentioned in the environmental laws in addition to the occupational health and safety standards. . • Workers operating in areas or activities of high noise level intensities should be supplied with earmuffs • Contractors should train all the workers before the commencement of construction activities about this hazard and how to avoid it.	Negligible	– LDC – Excavation Contractor	LDC HSE	Contractual clauses + Field supervision (audits)	– Contractor costs – LDC management costs

[8] Sufficient sheets should accompany work groups during the construction phase.

Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		• Restrictions on lorry movements to prevent noise nuisance in the early morning/late evening • All machine and vehicles should be shut-off when not used.					
		• Avoid noisy works at night whenever possible • Avoid construction activities during peak hours of heavy traffic whenever possible; especially when the project site is in proximity of a sensitive receptor.	Negligible			Field supervision Complaints receipt from local administration	
_ **Ground utilities' integrity** _ **Local community**	**Damage to underground utilities resulting in water/wastewater leaks, telecommunication and electricity interruptions**	Coordination with departments of potable water, wastewater, electricity, and telecom authorities to obtain maps/ data on underground utilities, whenever available Mitigation measures for avoiding breaking underground utilities and infrastructure pipes: 1. Collecting most accurate maps for underground utilities and infrastructure routes from Information Centers in the various Governorates and asking them for site markings, whenever available, and making such data available to the contractor prior to commencing the works. 2. Boreholes to locate underground utilities before using mechanical excavation. 3. Once underground utilities are mapped or uncovered, horizontal and vertical clearances between natural gas lines and electricity lines must be respected for safety considerations. 4. In case an underground utility and infrastructure pipe has been damaged, standard procedures should be followed, as described before, in addition to preparing a documentation report for the accident. The documentation report should include: a. Time and place of accident; b. Name of contractor; c. Type of underground utilities and infrastructure line; d. Description of accident circumstances and causes; e. Actions taken and responses of different parties, such as infrastructure company; f. Duration of fixing the damage; and g. Damage caused (description shall be according to observation, expertise judgment, reports of infrastructure company).	Negligible	Excavation Contractor	LDC HSE	Official coordination proceedings signed by representatives of utility authorities _ Examination of site-specific reports and records _ Field supervision	_ Contractor management costs _ LDC management costs
		If maps/data are unavailable: Perform limited trial pits or boreholes to explore and identify underground utility lines using non-intrusive equipment	Negligible		LDC HSE Supervisor	_ Contractual clauses + Field supervision	
		LDCs follow established procedures to deal with emergency situations related to breaking underground utility and infrastructure lines. The company supervisor stops work in the affected area, calls the Police Department and emergency department in the relevant utilities company for immediate repair of the damage, which the contractor is invoiced for. The mitigation measures below focus on preventive measures and documentation. Preparation and analysis of accidental damage reports	Negligible		LDC HSE	_ Review periodic HSE reports	
		Repair and rehabilitation of damaged components	Negligible		LDC HSE	_ Contractual clauses + Field supervision	

Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
					Local Government Unit Local Police		
_ **Streets (physical status)** _ **local community and workers (health and safety)**	**Hazardous waste accumulation**	_ Temporary storage in areas with impervious floor _ Safe handling using PPE and safety precautions _ Empty cans of oil-based paint resulting from painting the steel connection pipes to households are to be collected and sent back to nearest LDC depots for temporary storage until disposal at a hazardous waste facility (Nassreya). _ Transfer to LDC depots for temporary storage _ Disposal at licensed Alexandria hazardous waste facilities (Nassreya) _ If hazardous waste quantities generated are too small for isolated transport to the Nassreya landfill, a temporary storage site can be created. Coordination with waste authority will be imperative to secure a location and implement adequate procedures for storage depending on quantities and type of wastes until collection and shipping to Nassreya landfill. _ Hand-over selected oils and lubricants and their containers to Petrotrade for recycling	_ Minor	_ LDC _ Excavation Contractor	LDC HSE	Field supervision and review of certified waste handling, transportation, and disposal chain of custody	Indicative cost items included in contractor bid: Chemical analysis of hazardous waste Trucks from licensed handler Pre-treatment (if needed) Disposal cost at Nasreya Approximate cost of the above (to be revised upon project execution): 8,000-10,000 LE per ton
		_ In case of damaging of asbestos pipes during excavation, the Water Authority, which will carry out the repairs, will be responsible for handling the waste asbestos according to their procedures. _ Adequate management of asbestos and any possible hazardous waste	Negligible	Water Authority + contractor		Field supervision + review of Water Authority manifests	_ Contractor costs _ LDC management costs
		_ Minimize fueling, lubricating and any activity onsite that would entail production of hazardous materials empty containers _ Pre-Plan the anticipated amounts of hazardous liquid materials (such as paint, oils, lubricants, fuel) to be used in the various activities in order to minimize leftovers and residuals. _ In case of damaging of asbestos pipes during excavation, the Water Authority, which will carry out the repairs, will be responsible for handling the waste asbestos according to their procedures. _ Preplanning drainage of dewatering water (subsurface water) and taking necessary permits from the Water and Wastewater Company, or irrigation authority. No land disposal should be accepted for the water _ If dewatering is taking place from a contaminated trench, or contains hydrocarbons that could be observed or smelled, contaminated water should be collected in barrels and transported to a wastewater treatment facility. _ Testing the subsurface water sample before selecting the appropriate disposal option _ Asphalt waste may contain hazardous components, such as tar, lubricating oils, heavy metals, etc. However, its solid nature minimizes the transport risk of such components to the environment. Disposal of asphalt waste to the municipal waste disposal site is common practice in Egypt as this is normally not associated with significant environmental risks because of the dry weather nature of the country.	Minor	_ LDC _ Excavation Contractor		Field supervision	

Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		_ To the extent practical, seek to combine leftovers or residuals of the same liquid material/waste in order to minimize the number of containers containing hazardous residuals _ Ensure hazardous liquid material/waste containers are always sealed properly and secured from tipping/falling/damage/direct sunlight during transportation and storage _ In case of spillage: o avoid inhalation and sources of ignition o cover and mix with sufficient amounts of sand using PPE o collect contaminated sand in clearly marked secure containers/bags _ Add sand to inventory of hazardous waste					
_ **Local community**	**Non-hazardous waste accumulation**	1. Allocating certain areas, in each Sector, for stockpiling waste soil and construction waste, in coordination with the local authority. 2. No soil stockpiling is allowed on banks of waterways. 3. Segregate waste streams to the extent possible to facilitate re-use/recycling, if applicable 4. Maximize re-use of excavation waste as backfill for natural gas pipeline trenches. 5. Reuse non-hazardous waste to the extent possible 6. Estimate size of fleet required to transport wastes. 7. Transfer waste to Nassreya disposal facility 8. Normally asphalt waste could be disposed of with other excavation waste/aggregates in the local non-hazardous waste site. 9. Solid waste from unlikely scenarios such as domestic site activities (such as temporary offices or rest areas) should be addressed in specific waste management plans, as appropriate **<u>If septic tanks are used in case of temporary toilet facilities, make contractual arrangements with a wastewater removal contractor (in coordination with the local unit) to purge and dispose of possible septic tanks in the case they are utilized in work sites</u>**	_	_ LDC _ Excavation Contractor	LDC HSE	_ Contractual clauses _ Monitoring of waste management plan _ Field supervision	_ Contractor costs _ LDC management costs
Social receptor	Grievance and redress mechanism	The detailed grievance mechanism (GRM) is presented in Annex (9). It will to be shared with the community beneficiaries. _ The GRM presented various tiers of complaints, time to respond to the aggrieved person and reporting requirement for grievances. It is crucial to notify that time frame allocated for responding to a complaint will not exceed 15 business days.		_ Contractor	LDC –HSE department	- Contractual clauses + Field supervision	Contractor costs LDC management costs
Local community	**Destruction of streets and pavement**	_ Arrange Restoration and re-pavement (رد الشئ لأصله) with local unit _ Communication with local community on excavation and restoration schedules. Standard protocols adhering to national/local administrative requirements are to be followed: - Close and early coordination between the LDC (and the excavation contractor, if applicable), the local unit, and any other relevant authorities (in the case of public roads, the Roads and Bridges Directorate may become the counterpart to the LDC) - Agreement on the restoration arrangements, schedules, fees, and payment schedules	_ Negligible	_ LDC in coordination with LGU	EGAS	- Field supervision - Coordination with LGU as needed	Included in re-pavement budget agreed by LDC with local units or Roads and Bridges Directorate

Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		- Coordination with the General Utilities before starting work especially the Traffic Department, sewerage, water, telephones and electricity departments. - Payment of restoration fees by the LDC before works commencement - Documentation of the agreement and adoption by all involved parties - Communication with the Public and relevant authorities (such as the security and the traffic departments) regarding excavation and restoration plans					
Occupational health and safety	**Health and safety**	1. The project will hire a qualified contractor/sub-contractor with the high health and safety standards. In addition, the ToR for the contractor and the ESIA will provide the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction. 2. Standard protection by placing clear project signs. 3. Time management for vehicles movement; especially avoiding the peak hours 4. Standard protection for the workers especially working at elevated heights or trench. 5. Regular inspection to compelling worker to used their PPE 6. Training and licensing industrial vehicle operators of specialized vehicles. 7. The contractor also should keep attendance worksheet and laborers ID in order to verify the age of workers 8. Health insurance should be applicable to the contractor workers and workers contracted by a sub-contractor 9. Full compliance to EGAS and LDC HSE requirements, manuals, and actions as per detailed manuals adopted by EGAS 10. Ensure the provision of the appropriate personal protective Equipment and other equipment needed to ensure compliance to HSE manuals	Minor	Excavation Contractor	LDC HSE and EGAS SDO	Field supervision	– Contractor costs – LDC management costs
	Child labor	• The ToR to be prepared for both contractor and subcontractors will prohibit any kind of hiring child labor in the project • Rigid obligations and penalties will be added to the contractor/subcontractors' ToR in order to warrantee no child labor is occurred in the project • The ToR also will oblige the contractor/subcontractor to keep a copy of IDs of laborers in order to monitor the hired staff below 18 years old The contractor/subcontractor also will be obliged to maintain daily attendance sheets in order to verify the attendance of workers not include staff below 18 years old	Minor	• LDC Excavation Contractor/subcontractor	LDC–HSE department	– Field supervision and review of HSE report+ Field supervision (audits)	• Contractor costs LDC management costs
Local communities and businesses	**Lack of accessibility to businesses due to delay in street rehabilitation**	Access to business due to excavation out the streets will be mitigated through enabling alternative entrances to the business. Also special wooden bars will be used to enable the shoppers to get into the markets. Additionally, the duration of work will not exceed one working day. In case	Negligible	LDC The sub-contractors	LDC and EGAS SDO	– Ensure the implementation of GRM	No cost

Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		of excavation main streets in the commercial areas, this can be only done during night after business closing Compliance with the Environmental management plan concerning timely implementation of the construction schedule to minimize impact on local business - Follow up the procedure of Grievance Redress Mechanism (see Annex 9) - Ensure transparent information sharing - The telephone numbers of the social development officer responsible for grievances should be shared with the community people				_ Supervision on Contractors performance	
Local community Health and safety	**Threat to Safety of users and houses (due to limited level of awareness and misconceptions)**	Prepare Citizen engagement and stakeholder plan Awareness raising campaigns should be tailored in cooperation with the community-based organizations Following are some mitigation procedures to be adopted - Using caution tapes that help to keep people away of the site, - Informing residents and shopkeepers about the timeline of the project (street by street) in order for the residents to know when to avoid certain streets - A worker should support old people to cross the excavation areas, especially, on the wooden bars		During the construction LDC	LDC and EGAS SDO	_ List of awareness activities applied _ Lists of participants _ Documentation with photos _ Awareness reports	_ 2250 $ per awareness raising campaign _ 2250 $ for brochure and leaflets to be distributed (material available by EGAS-$ spent)

7.4 Environmental and Social Monitoring Matrix during CONSTRUCTION

Table 7-3Environmental and Social Monitoring Matrix during CONSTRUCTION

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Local traffic and accessibility	Reduction of traffic flow and accessibility to local community	Comments and notifications from Traffic Department	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports Complaints log	LDC management costs
Ambient air quality	Increased air emissions	HC, CO% and opacity	LDC HSE	Once before construction + once every six months for each vehicle	Vehicles licensing Department	Measurements and reporting of exhaust emissions of construction activities machinery Complaints log	LDC management costs
Ambient noise levels	Increased noise levels	Noise intensity, exposure durations and noise impacts	LDC HSE	Regularly during site inspections and once during the night in every residential area or near sensitive receptors such as hospitals	Construction site	Measurements of noise levels Complaints log	LDC management costs
		Complaints from residents	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs
Underground utilities	Damages to underground utilities and infrastructure	Official coordination reports with relevant authorities Accidents documentation	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs
Physical state of street	Waste generation	Observation of accumulated waste piles	LDC HSE	During construction. Monthly reports	Construction site	Observation and documentation	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
		Observation of water accumulations resulting from dewatering (if encountered)	LDC HSE	During construction. Monthly reports	Around construction site	Observation and documentation	LDC management costs
		Comparing the subsurface water quality with the permissible law's requirements	LDC HSE	During construction. Audit (Biannual, annual based on the construction time)	Around construction site	Sampling subsurface water	LDC management costs
		Chain-of-custody and implementation of waste management plans	LDC HSE	Zonal reports	Construction site and document examination	Site inspection and document inspection	LDC management costs
		Chain-of-custody and implementation of domestic wastewater (sewage) management	LDC HSE	During construction. Monthly reports	Construction site	Site inspection and document inspection	LDC management costs
Local community	Damage to the streets	_ Streets quality after finishing excavation _ Number of complaints due to street damage	LDC, EGAS	Four times per year, each three months	Site and Desk work	Checklists and complaints log	No cost
Local community	Threat to Safety of users and houses (due to limited level of awareness and misconceptions)	_ Number of awareness raising implemented _ Number of participants in information dissemination	LDC, EGAS	Quarterly monitoring	Office	Reports Photos Lists of participants	No cost
Labor conditions	Occupational Health and Safety	Total number of complaints raised by workers Periodic Health report _ Periodic safety inspection report	LDC HSE	Biannual	Construction site	Documentation in H&S monthly reports Complaints log	No cost
Labor conditions	Child labor	Attendees lists with workers IDs _ Complaints and accidents reports	LDC HSE	Biannual	Construction site	Documentation in H&S monthly reports Complaints log	No cost

7.5 Management of Mitigation and Monitoring activities During Operation Phase

7.5.1 Hotline

As mentioned previously, odorant is added to odorless natural gas to facilitate leakage detection by smell/odor.

A 24-7 Hotline (**129**) is available for customers and the public to report leaks, damage, emergencies, and/or incidents related to gas connections, components, infrastructure, and activities (inside or outside households) and to request repairs/emergency response/assistance.

7.5.2 Community health and safety

Several measures are suggested to overcome obstacles to full understanding and adoption of safety measures by the clients in the social management plan. Examples include using drawings instead of written instructions to improve communication with illiterate customers, coordinating with women of local NGOs who are interested in cooperating with the project to explain safety precautions to women in the households to be connected, and constantly monitoring the performance of emergency response units.

The LDC must communicate clear instructions to clients in order to ensure that NG piping and components (both inside the household and outside) are not be altered, violated, or intruded upon in any way without written approval from, or implementation of the alteration by, the LDC.

7.5.3 Management of Repairs and Maintenance

The same mitigation and monitoring measures discussed for the construction phase shall also apply to the repair and maintenance works that will require excavation.

7.5.4 Management of network integrity

Rare events may threaten the integrity of the network and cause multiple failures/leaks/fires/explosions simultaneously should be addressed, despite their low occurrence probability. Such events may include the unlikely impacts from earthquakes, unexpected geotechnical settlements, and pipeline sabotage. Mitigation should involve review of geological/geotechnical history and vulnerabilities. Other measures include an emergency action plan and training drills to deal with such events with minimal damage and risk to the public.

7.5.5 Emergency Response

In case of emergencies, the proper action will be taken according to Sinai Gas's Emergency Response Procedure. The procedure includes the key personnel responsibilities and communication methods, as well as the emergency classes. Reports will be prepared after the necessary actions are taken to document the cause of the emergency and the remedial actions taken.

7.5.6 Management of financial disturbance

Residential gas connection installation costs are around 7000 EGP. Customers pay 2160 EGP of that cost in cash. The balance is subsidized by the government of Egypt. The 2160 EGP can be made either upfront or in installments over a period of time. Typically, households opt for flexible monthly payment plans facilitated by the LDCs and local banks. All NGOs interviewed expressed their willingness to act as communication channels with poor but no one of them will provide financial aid to the poor. However, the AFD in cooperation with the European Union provide the

poor with a kind of grant to be able to install the NG based on an eligibility criteria (section 4.2.13). This initiative has been approved and is currently being applied to all project areas.

7.6 Environmental and Social Management Matrix during OPERATION

Table 7-4: Environmental and Social Management Matrix during OPERATION

Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost
				Mitigation	Supervision		
Integrity of Natural Gas piping	**Network integrity**	_ Detailed review of the geotechnical and geological history of the project area _ Development of a full emergency response plan _ Random inspections and awareness campaigns to ensure that NG piping and components (both inside the household and outside) are not be altered, violated, or intruded upon in any way without written approval from, or implementation of the alteration by, the LDC. _ Availability of 24-7 hotline service (129) to all beneficiaries and the public for reporting possible leaks, damages or emergencies _ Quick response to gas leaks by evacuation of the affected area _ Repair or replacement of failed component _ Scheduled inspection and preventive maintenance activities _ Inspection will include any activities that could potentially lead to damage in the pipeline _ In case of emergency, the source of the leak will be isolated until the maintenance team performs the required maintenance _ Signs will be posted over the pipeline path showing the numbers to be called in case of emergency	Negligible	LDC	LDC HSE.	- Map and local geotechnical report review - Site inspections - Awareness actions - Periodical trainings and drills	LDC management costs
Informal LPG distributors	**Loss of revenue for LPG distributors**	- LPG distributors should be informed about the NG potential areas in order to enable them to find alternative areas - They should be informed about the GRM in order to enable them to voice any hardship		Butagasco	EGAS	Information sharing activities with the LPG vendors Grievances received from them	No cost
Community health and safety	**Possibility of Gas leakage**	- Information should be provided to people in order to be fully aware about safety procedures - The hotline should be operating appropriately - People should be informed of the Emergency Numbers - The complete integrated, comprehensive and robust **Emergency Response Plan of the LDC** (in Arabic) is in Annex 10 A of the study and only a small part concerning the followed procedures during some emergency scenarios is translated in Annex 10 B	Negligible	LDC	LDC	Complaints raised due to Gas leakage	No cost
Labor conditions	Occupational Health and Safety	– Total number of complaints raised by workers – Periodic Health report - Periodic safety inspection report	Irrelevant	LDC HSE	LDC	- Safety supervisor should follow the commitment of workers to use the protective equipment - Inspection and recording of the performance -Reports about the workers and complaints	LDC management costs

7.7 Environmental and Social Monitoring Matrix during OPERATION

Table 7-5: Environmental and Social Monitoring Matrix during OPERATION

Impact	Monitoring indicators	Responsibility of monitoring	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
Network integrity	- Earthquakes or geotechnical settlements - Emergency response time and corrective actions during emergency drills - Reports of alteration or tampering with ANY gas components	LDC HSE	Bi-annual inspections and annual emergency response drills	Along the network and inside and outside households	- Inspection, leakage detection, running the drills	LDC management costs
Impact on the informal LPG distributors	- Grievance received from the informal LPG distributors - Information shared with them	EGAS, LDC	Quarterly	Desk work	- Complaints log	No cost
Possibility of Gas leakage	- **Complaints raised by the community people** - **Number of leakage accidents reported/raised**	LDC, EGAS	Four times per year, each three months	Site and Desk work	Complaints log LDC	No cost

7.8 Reporting of Mitigation and Monitoring Activities

EGAS HSE Departments are to prepare monthly and quarterly reports to be submitted to EGAS Environment Department during the construction phase.

During construction phase monthly reports should include as a minimum:

- Conditional permits and any comments or recommendations by Traffic Department and Supreme Council for Antiquities
- Number and date of paint cans shipped to company depot or returned to supplier
- Evaluation of LDC and contractor's performance on applying relevant mitigation measures
- Any accidents or breaking of utility pipes
- Monitoring results of excavation machinery exhaust emission, noise and vibrations
- The number of complaints received and how they were dealt with
- Communication and information sharing activities done by the LDC on the field

During Operation phase monthly reports should include as a minimum:

- Evaluation of the adherence of staff to safety measures
- Pipeline leakage or damage incidents
- The number of complaints received and how they were dealt with

7.9 Institutional Framework for ESM&MP Implementation

7.9.1 Environmental and Social Management Structures

EGAS is the supervisory body. Sinai Gas is the implementing body. Below is the management structure of Sinai Gas.

Being the implementing body of the natural gas network in project areas, Sinai Gas has a direct involvement with the environmental management and monitoring of the natural gas network. Sinai Gas has limited environmental and social background. They will be in need to upgrade their capacity regarding the environmental and social aspects. EGAS will provide Sinai Gas staff with the needed information.

One of the standard tasks of the HSE Departments of Sinai Gas, supervised by EGAS, is to ensure that the Environmental and Social Management Plan of the project is implemented in all the phases of the Project.

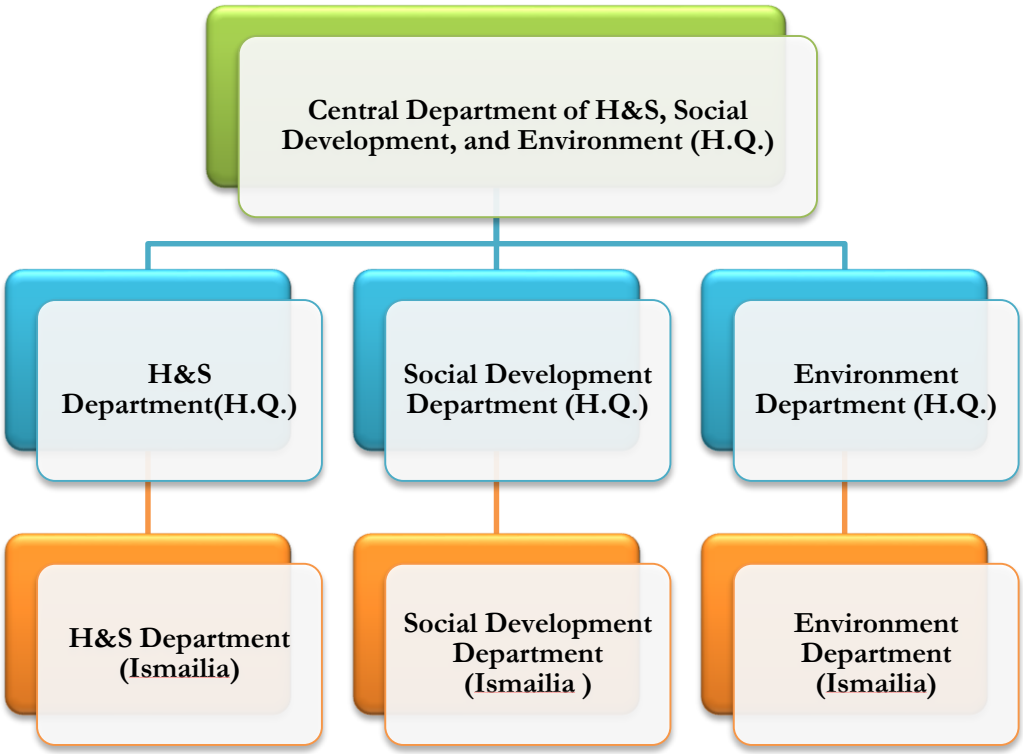

Figure 7-1: Sinai Gas ESMP organogram

7.9.2 Required Actions

1- Involvement of environmental and social officers during the design, costing, tendering, and construction phases would be advantageous.
2- Detailed HSE manuals covering each activity must be developed and institutionalized in Sinai Gas Several versions of such manuals have been developed by Sinai Gas and should be mainstreamed to other LDCs, accompanied by the appropriate capacity-building.
3- An updated and detailed assessment of Sinai Gas EHS institutional capacity and available resources for implementation of the ESMP
4- Specifically, Sinai Gas should take steps to develop capacity of site engineers and HSE officers with specific courses focused on implementation of the ESMP detailed in this ESIA.

8 Stakeholder Engagement and Public Consultation

The public consultation chapter aims to highlight the key consultation and community engagement activities that took place as part of the preparation of the ESMP, developed for Qantra Gharb City and Qantra Shark City. The two cities fall under the jurisdiction of Ismailia governorate.

8.1 Legal framework for consultation

The consultation activities were conducted in full compliance with the following legislations:

- WB policies and directives related to disclosure and public consultation, namely,
  - Directive and Procedure on Access to Information
  - World Bank Operational Policy (OP 4.01)
- Egyptian regulations related to public consultation,
  - Environmental law No 4/1994 modified by Law 9/2009 modified with ministerial decrees no. 1095/2011 and no. 710/2012

8.2 Objectives of consultations

Objectives of various consultation activities are summarized as follows:

1- Define potential project stakeholders and suggest their possible roles in the project.

2- Disseminate comprehensive information about the project to enable stakeholders to identify their concerns, needs, and recommendations.

3- Document stakeholder feedback on the defined impacts as well as the social and environmental management plan and enhance the ESIA accordingly

4- Identify the most effective outreach channels that support continuous dialogue with the community

5- Discuss potential resettlement plans and impacts of involuntary resettlement (in places where this is applicable).

For the purpose of the site specific ESMP; qualitative information and data were collected through identifying stakeholders, and recognize their views and concerns about the project. The aim of this endeavor is to ensure a well-integrated and all-inclusive public review of the project. The consultation activities used multiple tools and mechanisms including scoping, interviews, focus group discussions, public hearings/consultations

8.3 Defining the stakeholder

For the purpose of the site specific ESMP; qualitative information and data were collected through identifying stakeholders, and recognize their views and concerns about the project. The aim of this endeavor is to ensure a well-integrated and inclusive public review of the project.

Key groups of relevance include: ordinary citizens, community leaderships, officials and government representatives, potential Project Affected Peoples (PAPs), local Non-

Governmental Organizations (NGOs) and Community Development Associations (CDAs). In this regard, key groups of relevance –in Qantra Gharb City and Qantra Shark City- were approached and consulted using various tools (i.e. in-depth interviews, focus group, meetings, Panel meeting and public consultation sessions). Stakeholder engagement and public consultation activities encompassed a gender aspect that women's views and concerns were taken into account, and were well documented.

8.4 Consultation Methodology and Activities

The consultation process was a dynamic and evolving process which adapted with the nature and expectations of the host community. As stated in the previous section, stakeholders' engagement and public consultation activities involved a broad base of community members; in order to establish a more profound understanding of the local communities' perceptions and perspectives of the project.

The first step was to collect the responses and feedbacks of the local communities through conducting Focus Group Discussions (FGDs), structured questionnaires, panel meeting and public consultation sessions. The second step was to analyze these qualitative data in order to reach a conclusion regarding the general stance and attitudes of the local communities towards the project. Various NGOs participated actively in the preparation of the FGDs and providing data collectors to assist the team in collecting the data.

Figure 8-1: FGD with women in Qantra Shark City

Figure 8-2: A panel with government officials at Qantra Gharb's LGU headquarters

Figure 8-3: Meeting with the head of municipality and the deputy general secretary

The following table summarizes the main groups consulted during the ESMP and the engagement tools used.

Table 8-1: Summary of Consultation Activities in Ismailia Governorate

Participants:		**Number**		**Methods**	**Date**
During the framework		**Male**	**Female**		
Potential beneficiaries and governmental bodies		16	8	FGD	December 2013
Potential beneficiaries		53	71	Structured questionnaire	
Potential beneficiaries, government officials, NGO representatives,		31	48	Public consultation	
Total		100	127		
During Site-Specific ESIA (Qantra GharbCity and Qantra Shark City)		Male	Female		
During data collection and scoping meetings					
Potential beneficiaries	Qantra Gharb	5	6	FGD	February and March 2017
	Qantra Shark	6	6		
Government/public officials	Qantra Gharb	6	0	In-depth interview	
	Qantra Shark	4	1		
NGOs/CDAs representatives	Qantra Gharb	1	0	In-depth interviews	
	Qantra Shark	0	1		
Head of municipalities and the deputy general secretary	Ismailia Governorate	11	1	Meeting	12th of February 2017
Total		**33**	**15**		
During final public consultation					
Various stakeholders		39	18	Public consultation	10th of April 2017
		39	18		

8.4.1 Main results of consultation during the data collection phase

The predominant majority of participants expressed very strong approval of the project. It is noteworthy to mention that the different groups concurred on the point that NG is, by all means, a far better substitute for LPG cylinders. The general viewpoint of the local community is that the benefits of NG outweigh its downsides. The only downsides associated with NG are firstly, the impact on the streets during construction; secondly, the cost of NG installation to households. The following is a summary of the main issues raised during data collection and scoping phase is presented below:

8.4.2 Summary of previous consultation activities

Stakeholders' engagement and public consultation activities were conducted in order to ensure that the views and concerns of the local communities are integrated, and guarantee that they are taken into account by the different parties in charge of implementing the project. The views and concerns of local communities are an integral part of the project, and they are to be thoroughly taken into account throughout the different phases of the project.

The field research team commissioned by EcoConServ engaged in a number of social activities. These activities include focus group discussions with potential beneficiaries; in-depth discussions with government officials, representatives of civil society, and community leaders. A panel meeting was held at Qantra Gharb's LGU headquarters, where the public officials of Qantra Gharb's LGU stressed on expediting the implementation of the project in their city.

Throughout the discussions interviewees were asked about five main points:

- The type of fuels currently in use, and its associated problems
- The upsides and downsides of NG, compared to other types of fuels
- The effects of the project during constructions and operations
- The cost of NG installation to households
- The future positive/negative impact of NG connections project

It was notable that the reactions and attitudes of the local communities towards the project are in favor of the project. The field research team noted a strong public support and eagerness towards the project. Beside some legitimate concerns expressed by the public, the field research team recorded the general view that NG is a far better substitute for the type of fuel currently in use. The following table illustrates the different subjects, questions, comments and responses that were discussed throughout the different public consultation activities.

Table 8-2: Key comments and concerns raised during the different public consultation activities, and the way they were addressed during in the ESMP study

Subject	Questions and comments	Responses	Addressed in the ESMP Study
Street rehabilitation & land refill	-who should bear the cost for street rehabilitation and land refill after the end of construction works?	Sinai Gas responded to this question as they will be the implementing agency responsible for street rehabilitation in terms of budget. However, the local unit might participate in rehabilitating streets	Section 7.2.7 street restoration
The cost of NG installation	-how much is the cost for installing NG to households? -Is there an installment system to settle the installation fee?	The total cost of NG installation varies annually and influenced by any inflation occurred. Given the floating of Egyptian pound the prices increased during this period. The cost to date is about 5600 EGP. The stat pay about 3800 EGP as subsidy to households. However, the residents pay about 1800 EGP. There will be another increase in the prices due to inflation	The response of this comment in included in this table in Section 8 stakeholder engagement presents information about the prices. As well as detailed information is reported in section 6.5 of this report
Hotline & customer services	-Is there a hotline or a customer service office to receive customer complaints?	There is a hotline number which is 129 that workers 7 days a week for 24 hours.	Management section 7.5
Compatibility of home appliances	-Do people have to replace their old home appliances in order to get NG?	The home appliances should be suitable to install the NG. Old appliances might not be suitable to NG installation. Electricity water heater should be replaced by Gas water heater. Additionally, the baking oven will never be connected the NG as the valve is not compatible with the NG.	Section 8 stakeholder engagement presents information about the prices

Subject	Questions and comments	Responses	Addressed in the ESMP Study
Clear information	-The gas company needs to provide us with clear information about everything related to NG. -shouldn't the gas company distribute flyers or brochures with clear information about Gas	The LDC adopts multi-level of information sharing. The first level through the contracting office. Posters are installed there to share information about the NG and contracting procedures. The second level is during the P& A survey where technicians share information about contracting and NG Additionally, there is a hotline that can share information with any of the targeted beneficiary	The comment is addressed in the mitigation section
Time frame for construction works	-what is the duration of construction works?	It is relatively difficult to inform about a time plan during this stage as some factors might result in changing in the time frame: 1- obtaining the lands needed for the PRS was the first barrier 2- The funding agency (WB) required specific studies to be completed before starting the construction and installation activities	Justification for the lack of time frame is illustrated here in the stakeholder engagement section

Subject	Questions and comments	Responses	Addressed in the ESMP Study
Eligibility for connecting NG to an area	-an area in Qantra Shark City, located near al-Tabbah area is not included in the project. We need to know why? -what are the prerequisites for connecting NG to an area?	The area can be connected to NG if it is technically suitable: - First all infrastructure should be available in the area especially sewage system - The area should be crowded and suffer from LPG problems - The area should be near to the national NG network - Detailed technical specifications will be informed to all beneficiaries through the hotline	In the project description a detailed description is included

8.4.3 Final consultation event

The Final Consultation event was conducted in Ismailia governorate on the 10th of April 2017.

- Eng. Ahmed Farag the project manager from EGAS attended the meeting
- The General Secretary General Mohamed Abd el Salam El Seirah attended the discussion
- The two heads of Qantra Shark and Qantra Gharb attended the meeting (Mr. Abd Allah El Zogby and Mr. El Sayed Amer)
- Three consultants (Petrosafe/EcoConServ environmental and social) attended the public event
- Five representatives of EGAS and Sinai Gas
- Media related expert was recruited to invite media people

The list of invitees was developed by EEAA regional branches, environmental offices of the governorates, NGOs, governmental media centers, and various government employees, in cooperation with the Consultant. Invitees were informed of the date and location of the Public Consultation at least two weeks ahead. An executive summary was shared with them. Participants were invited through:

1- Invitations sent by EGAS via mails, Faxes and e-mails.
2- Invitations by Sinai Gas via telephone calls and meetings
3- Telephone communication by EGAS and the Consultant.

4- An advertisement was published in El Mesaa Newspaper in the first page on Friday 31st of March 2017.
5- A community mobilizer was recruited from Ismailia Governorate to distribute invitations in all project sites
6- Microbuses were provided to transport community people from the two areas in Ismailia.

Figure 8-4: Advertisement published in **El Messa** newspaper

Consultation was held in a hall affiliated to the governorate that can host more than 200 people. The invitees were fully acquainted of the venue. That means most of community people are aware about the venue and know precisely how to get there.

8.4.3.1 Participants profile

The event was conducted on the 10th of April 2017

- 57 persons attended the consultation event: 39 males and 18 females

Figure 8-5: Invitation sent to people

- 41% of the participants were from Qantra Shark, while 16.1% were from Qantra Gharb. 19.6% of the participants were from Ismailia Governorate

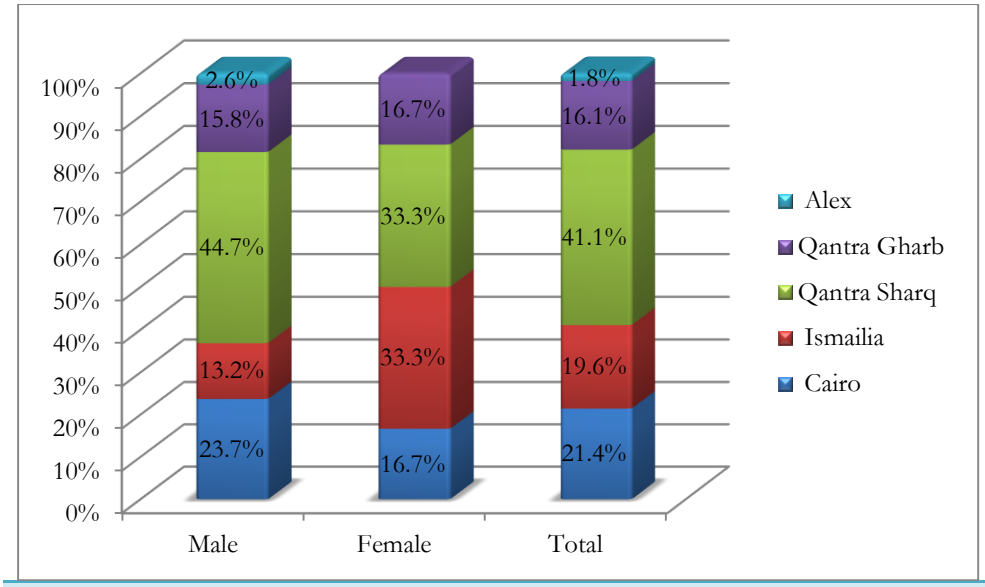

Figure 8-6: % Distribution of participants by area and sex

With regards to the occupational status:

Almost half of participants were specialists i.e. public managers, lawyers, accountants and physicians. The administrative represented about 29.8%. 12.3% represented skilled workers

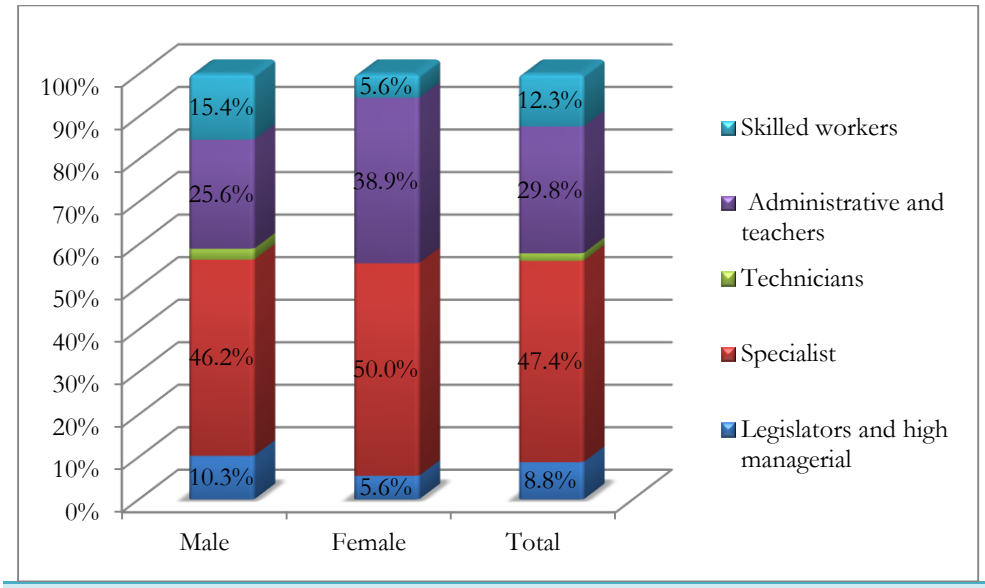

Figure 8-7: % Distribution of participants by occupation and sex

- 57.9% of the participant were from local governmental and community people residing in the two cities
- 5.6% of female participants were affiliated to media sector
- 11.1% of females were affiliated to environmental sector. 10.5% of the participants were traders

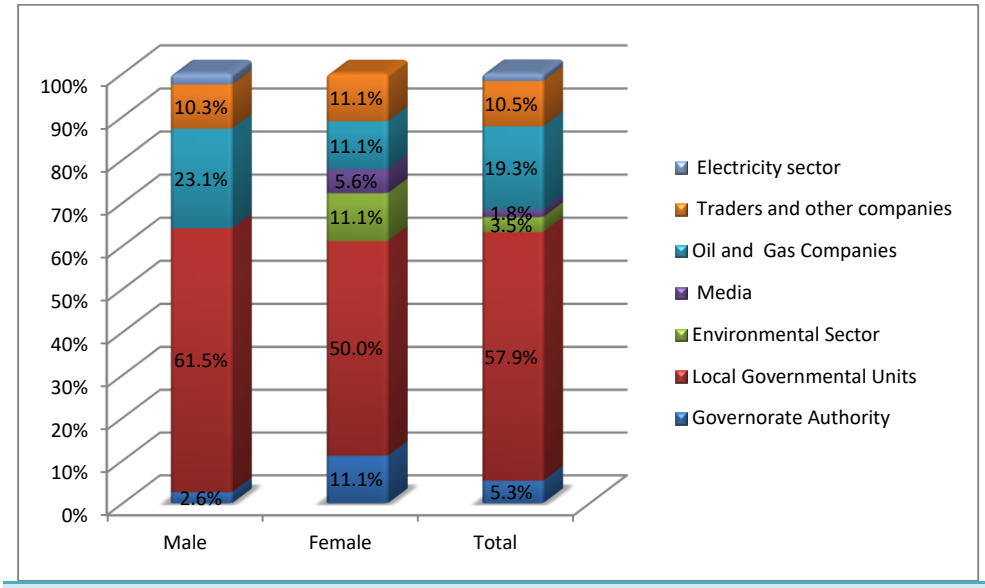

Figure 8-8: % Distribution of participants by sector and sex

8.4.3.2 Summary of discussions

- The General Secretary started this event with a welcoming statement. He shed lights on the importance of the NG and encouraged the participants to tell about their concerns and questions,
- The head of Qantra Shark delivered a speech about the importance of the project and the necessity to continue the installation phase. He also noted to the previous consultation activities conducted in Qantra Shark and in the Ismailia Governorate,
- Eng. Ahmed Farag from EGAS also delivered a speech about the project and it importance. He also presented detailed information about the NG and how it is used in Egypt. Safety measures and technical prerequisites to install the NG were presented
- Eng. Mohamed Mahmoud and Abd Allah El Adawy from Sinai Gas made a presentation about the project in Qantra Shark, Qntra Gharb and Fayed
- Ms. Zeinab Hafez ESIA consultant from EcoConServ delivered the results of the ESIA and ESMP studies in Qantra Shark and Qantra Gharb.

Figure 8-9: The panel

- Using PowerPoint and multimedia, EcoConServ experts presented the ESIA to the community people. Simple wording was used whenever possible by the environmental and social expert in order to be comprehended by the members of community. Thereafter, an open discussion took place for couples of hours. There was an active participation from the participants side and they were more than willing to play a role in informing people about the NG.

Figure 8-10: Community people

Figure 8-11: Participants

Thereafter, the participants were keen to ask more details and questions related to the project. Following is the main issues raised during the final consultation event:

Table 8-3: Key comments and concerns raised during the Final Public Consultations

Subject	Questions and comments	Responses	Response to comments in the reports
General comments			
Previous consultation events	A consultation event was conducted in Qantra Shark and Qantra Gharb. Information as shared about the project. Such approach is appreciated by people	This is in full compliance with EEAA requirements and WB safeguard polices. Various consultation activities took place in order to be sure that the target communities are fully informed about the project. Additionally, their worries and concerns were responded to.	A full section is presented about stakeholder engagement activities (section 8)
Job opportunities	The residents of Qantra Shark have benefited from job opportunities (temporary) it will be extremely useful to provide them with permanent job opportunities in the project	This request is difficult to adhere to as this will add burden to the companies. Additionally, drilling workers are not needed on the long term.	Job opportunities were presented in the social positive impacts 5.2.1 and 5.3.1

Subject	Questions and comments	Responses	Response to comments in the reports
Paying in installment	The cost of NG installation increased to be about 2300 (including administrative cost) This is relatively expensive. We need to be supported by the LDC or the bank to install the NG by paying in installment	There is already arrangements with the banks to install the NG in installment. There are various types of installment starting from one year period to 7 year period	To be added to alternative sections
Time plan	There is a huge time spam between the contracting to install the NG and the actual installation. It is relatively difficult to wait for such long time. All problems should be solved before contracting process.	Firstly Sinai Gas apologize for the prolonged delay. However, it worth noting that the NG installation requires obtaining approvals from local units and various governmental entities. Additionally, EEAA approval and the WB approval on environmental studies. The connection activities took place in the areas where all infrastructures are available. This is also might delay the installation activities. In Qantra Shark, various attempts to purchase lands for the PRS was failed due to asking for high prices. The LDC sought for the land for more than six months. This also delay connection activities .	Time plan to be added in the project description

Subject	Questions and comments	Responses	Response to comments in the reports
Technical prerequisite	The NG installation requires fulfilling certain prerequisites. The LDC contract with the beneficiaries, thereafter, they inform them that they are not illegible	Generally speaking the contracting is only available to those who are technically eligible. However, in some cases the beneficiary asks to install the NG from the kitchen window. This might not be technically acceptable. This might influence the process	Technical specifications was added in section 2.3.1
Odor	The odor is flammable and what are the mitigation measures utilized to properly handle odor	The NG does not have a smell. Therefore, odor substances should be added to it for safety. Odor adding process is automatized in order to avoid any impact on human. Rigid monitoring activities are applied to odor and the tanks are dealt with as hazardous waste that can be disposed to El Nasiriya landfill	Added in the mitigation section
The benefit of chimney	The NG requires the installation of chimney. Is this impotent?	The NG requires complete combustion for safety measures. This is the reason to add the chimney for oxidation. Just to be sure that the Carbon Gas result from the NG will not affect the human. Additionally, the bathroom should not be less than 5.6 m^2 width.	Reported in health and safety section

Subject	Questions and comments	Responses	Response to comments in the reports
Funding agencies	Is the WB provide a grant to install the NG?	The WB provide loan not grant to purchase the construction materials not to install the NG. Additionally, the AFD and Kuwaiti Bank provide additional funds to install the NG	Reported in the stakeholder section
Apartment eligible to install the NG	It was said that the apartment should be painted and plastered in order to install the NG	It was a problem raised several times before. The un-plastered apartment might cause a problem as some people cover the pipelines by cement during the plastering. This made it very difficult to maintenance staff. Therefore, it was strongly recommended to install the NG to apartments after being finished	Technical specifications was added in section 2.3.1
Qantra Shark			
Street rehabilitation in Qantra Shark	Luckily Qantra Shark managed to get a budget for street rehabilitation. We try to convince the NG company to continue working in the areas in order to benefit from street rehabilitation budget. This will save the LDC money	First of all such proposal is appreciated by the LDC as it will really work for their benefit. However, the installation can't be commenced unless approval from EEAA and the WB is obtained on the ESMP and ESIAs.	

Subject	Questions and comments	Responses	Response to comments in the reports
Installation problems in some of Qantra Shark areas	There was a tremendous delay in the installation of NG to two areas in Qantra Shark	Such problems were raised due to the absence of sanitary system in the two areas. Additionally, the majority of houses were constructed using mud and white bricks. Such construction materials are not suitable to install the NG to . Finally, the total eligible customers in the two areas is about 150-200 unit. This will not be acceptable from economic point of view	Technical specifications was added in section 2.3.1
Qantra Gharb			
Importance of installment	The number of beneficiaries is not big as the installation cost is high. It is strongly recommended to have an arrangement with the Banks to make various types of installments available to the community people	Negotiations with the banks took place during the previous year to enable the people to install the NG. They asked for big interest rate that can't be accepted by people We negotiated with them and managed to get their approval. Now various types of installments are in place.	Reported in the consultation section

Subject	Questions and comments	Responses	Response to comments in the reports
Abu Khaleifa in Qantra Gharb	Abu Khaleifa is one of the biggest mother villages in Qantra Gharb. We need to include it in this fiscal plan	Abu Khaleifa is now under planning and study preparation. The LDC aims at installing the NG o Abu Khaleifa and the industrial area there. Given the big number of population there, a new PRS will be needed to feed this mother village/ small town	Reported in the consultation section
Customer service office	The customer service office is in Qantra Shark. It is relatively far from Qantra Gharb	There is a contracting office in Qantra Gharb local Governmental unit. It is temporary office that will be permanent in later stage. Additionally, the contracting people visit the residential units to sign NG installation contract in their houses.	Reported in the consultation section

Detailed discussion was documented and presented in Annex 11 in Arabic.

8.5 Summary of consultation outcomes

Site-specific consultation activities in Qantra Gharb City and Qantra Shark City included wide range of concerned stakeholders. This included but not limited to individuals/households affected by the project activities, civil society organizations representing the interest of the community, and governmental bodies who will play a role in facilitating or regulating the implementation of site-specific project activities.

The general stance towards the project is very supportive; even after the disclosure of the negative impacts during construction. The residents of Qantra Shark have benefited from job opportunities (temporary). They expressed their willingness to have permanent job opportunities in the project.

The cost of NG installation was one of the concerns raised by the people as it was increased to be about 2300 (including administrative cost) They recommended to provide support by the LDC or the bank to install the NG through paying in installment.

There was a concern about the time plan allocated for the project and sharing no information about the execution plan. The safety of the pipelines was one of the concerns

raised by the community people. How to handle odor and flammable materials was a concern. Clarifications and information about the NG prerequisites were raised by the community people. Consequently, information sharing strategies and techniques should be adhered to

It was obvious that additional areas were willing to be included during this phase. The community raised their concerns about the time plan and required approvals that remain as main barriers to install the NG in such areas. All heads of municipalities attended various meetings. They expressed their support to install the NG to their areas. Such attitude is appreciated by Sinai Gas.

8.6 ESMP disclosure

As soon as the site-specific ESMPs gets approval from the World Bank and EEAA,

a final report will be published on the WB, EGAS and Sinai Gas websites. An executive summary in Arabic will be published on EGAS and Sinai Gas websites. A copy of the ESMP report in English and a Summary in Arabic will be made available in the customer service office. Additionally, an Arabic summary will be made available in the contracting offices. An A3 poster will be installed in the contracting office informing about the results of the ESIA and the website link for the full ESMP study.

Annex 1 Contributors to the ESIA

Annex 2: Network Plans Maps

Annex 3: IFC Environmental, Health, and Safety Guidelines

Annex 4: Site Air Quality & Noise

Annex 5: Impact Assessment

Annex 6: Permits and approval

Annex 7 Chance Find Procedures

Annex 8: EGAS H&S guidelines

Annex 9: GRM & Complaint Form

Annex 10 A The LDC's Emergency Plan

Annex 10 B English Emergency plan

Annex 10 C Classification of Emergency Levels

Annex 11: Public Consultation documents