



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**

Executive Summary

March 2018



EGAS
Egyptian Natural Gas Holding Company

Developed by



EcoConServ Environmental Solutions



Petrosafe
Petroleum Safety & Environmental Services Company

1 Introduction

The proposed project represents an integral component of the national energy strategy which aims for greater use of natural gas for domestic users at Qantara Sharq and Qantara Gharb cities in Ismailia governorate.

The Environmental and Social Management Plan (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 areas and the total number of household which will be covered in this ESMP are illustrated in table 1-1:

Table 1-1 Number of Areas and Households

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

The local distribution company responsible for project implementation is Sinai Gas or شركة سيناء للغاز

Qantara Shark and Qantara Gharb will each be connected to a new PRS which will have a separate ESIA study..



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.

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.

2.2 Project Work Packages

2.2.1 Qantara Sharq

1.1.1.1 Off take and 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 / Oyoum Moses road)

In Qantra Sharq , 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/ Oyoum Mousa) to the PRS pressure reduction station.

1.1.1.2 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 Sharq 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



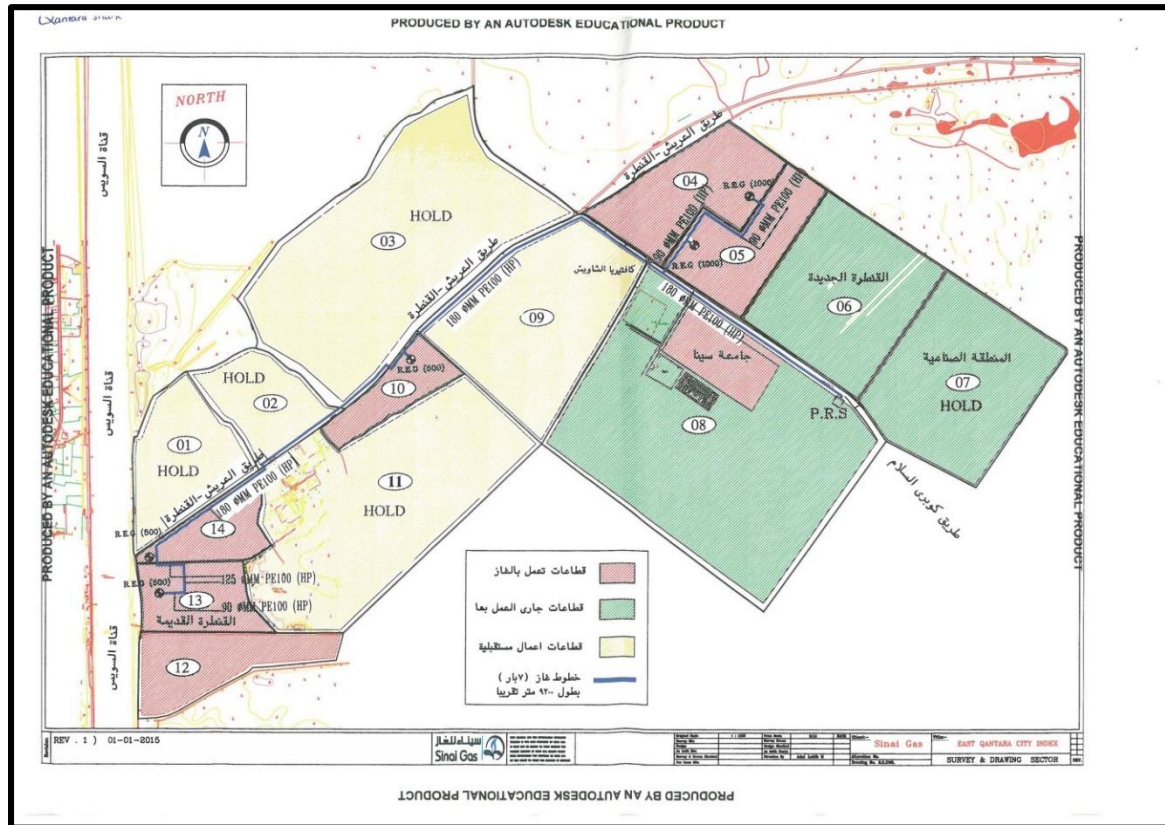


Figure 2-1 Intermediate Pipelines of diameters 90, 125 and 180 mm PE100



Figure 2-2 Intermediate Pressure Network's routing within the borders of QS

2.2.1.1.1 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 Sharq to supply 6 domestic sectors with the following specifications:

- Input pressure: 4:7 bars
- Output pressure: 100 mbar
- Flow rate: 1000 m³/hr
- Inlet diameter: 3 inches
- Outlet diameter: 6 inches

2.2.1.1.2 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 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 Sharq 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

2.2.2 Qantra Gharb

1.1.1.3 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)

1.1.1.4 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



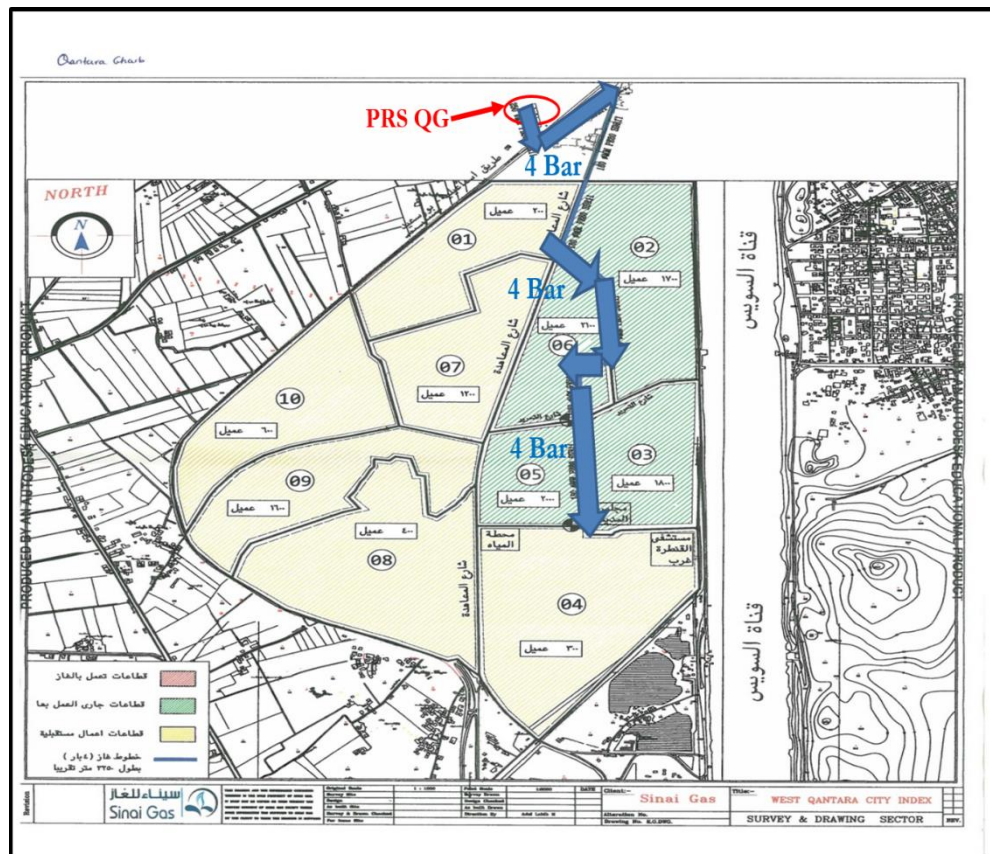


Figure 2-3 Qantra Gharb's Intermediate pressure pipelines route with diameters 90,125,180 and 250mm

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 m³/hr

1.1.1.5 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 9

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.

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 Information¹ 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 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

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



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.

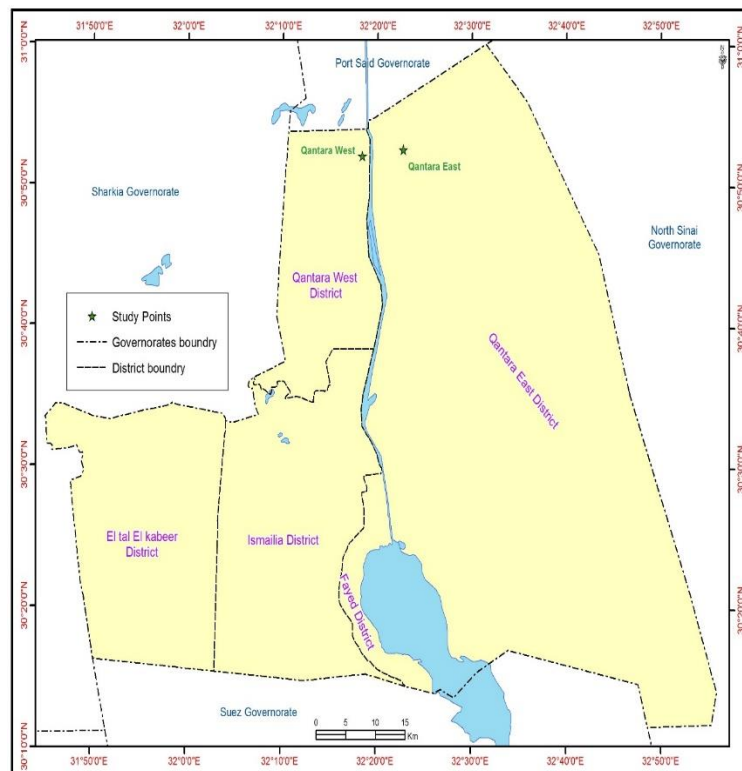


Figure 4-1: Map of Ismailia Governorate



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.

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 (NO₂), sulfur dioxide (SO₂), Total Suspended Particulates (T.S.P) and particulate matter (PM₁₀).

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, NO_x, SO_x 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

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.



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

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 Shahr

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

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 4-2 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**

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.

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

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.

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.



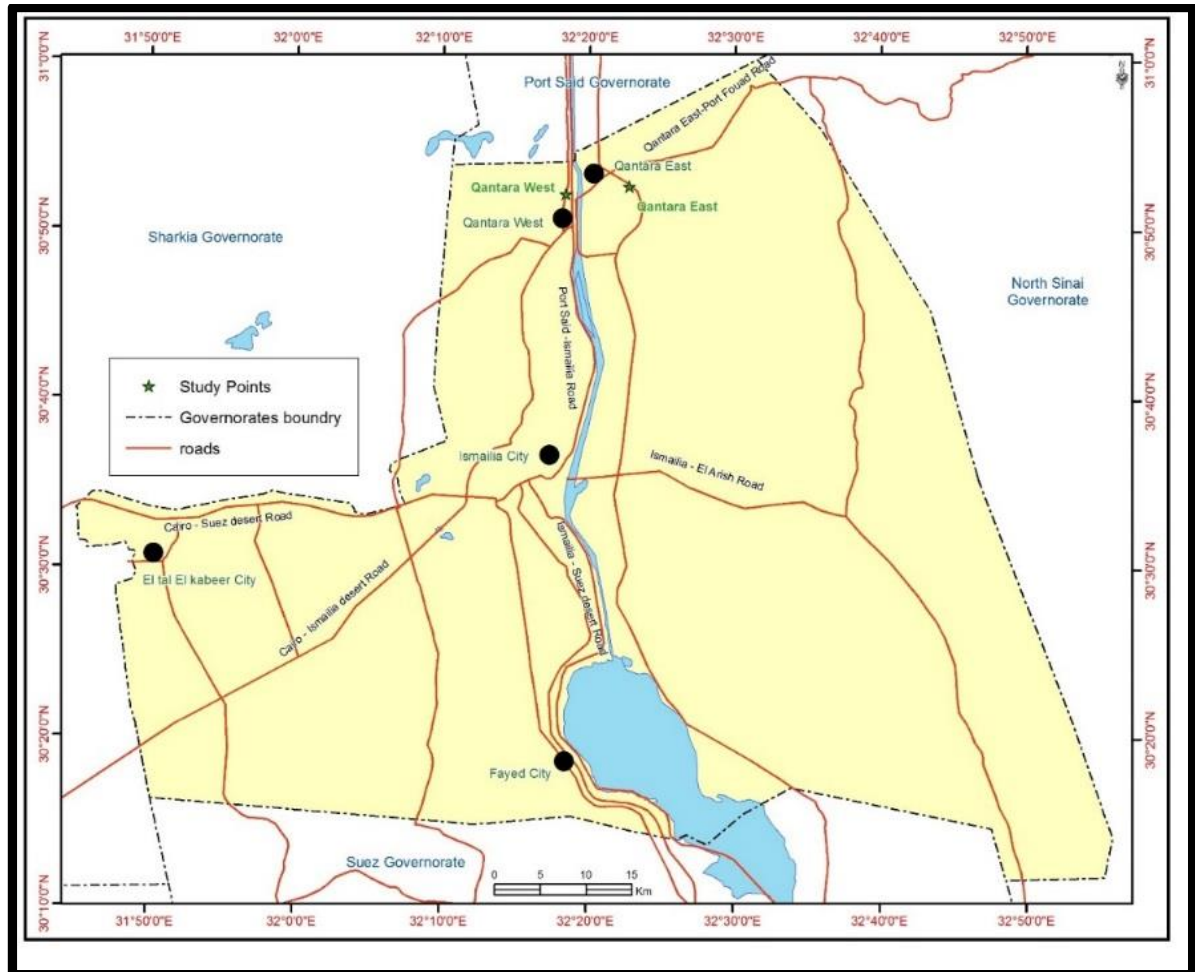


Figure 4-3: Road Network in Ismailia Governorate

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 three cities: the old city, the middle region and the new city. The total area of Qantra Shark city is 197.75 km², 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 km², according to Ismailia Governorate's official website.



4.2.2 Demographic characteristics

4.2.2.1 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

Table 4-2: Total Population in project areas

	Qantra Shark	Qantra Gharb
Population 2013	24193	34484
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

4.2.2.2 Rate of Natural Increase

According to 'Governorates' Description by Information 2010,' the birth rate in Ismailia is 32 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.

4.2.3 Living Conditions

4.2.3.1 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 Access to Basic Services

4.2.4.1 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.

4.2.4.2 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.

4.2.5 Human development profile

4.2.5.1 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 %.

4.2.5.2 Unemployment and Work Status

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

4.2.6 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.

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.

4.2.7 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%. In Qantra Shark city is 6677.26 EGP. Focus group discussions revealed that the average family expenditures range between 2000 to 3000 pounds.

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 distributors 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

The assessment of potential negative impacts reflected that the impacts pertaining to air emissions, vulnerable structures, ecology system, visual intrusion, labor influx and lands tend to be irrelevant. Following is a summary of relevant impacts



Table 5-1: Summary of Potential Project Negative Impacts

Receptor	Description of impact	Type of Impact	Significance
Impacts During Construction			
Air Emissions	<p>Air emissions (gases and particulates) during construction can exceed permissible limits and shall arise from:</p> <ul style="list-style-type: none"> - 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. <p>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.</p> <p>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.</p>	Negative impact	Medium
	<p>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.</p> <p>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.</p>	Negative impact	Medium
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	<p>Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination.</p> <p>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.</p> <p>Poor handling of Hazardous and non-hazardous materials may result in poor containment of induced leaks</p> <p>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.</p> <p>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</p>	Negative impact	Medium



Receptor	Description of impact	Type of Impact	Significance
	<p>collected for certified treatment/disposal according to WB/IFC guidelines and National Laws 93/1962 and 48/1982, respectively.</p> <p>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</p>		
Reduction of Traffic Flow	<ul style="list-style-type: none"> 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. <p>Coordinating with and obtaining approvals from local government and traffic police is vital to avoid delays, objections, and public inconvenience to the work program.</p> <ul style="list-style-type: none"> 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
Risk on Infrastructure and underground utilities	<p>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.</p> <p>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.</p>	Negative impact	Minor
Street condition deterioration	<p>Streets rehabilitation or restoration following pipeline network installation: is referred to by an Egyptian legal/institutional expression (رد الشيء 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".</p>	Negative impact	Minor
	<p>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.</p>	Negative impact	Minor
Community health and safety	<p>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.</p>	Negative impact	Medium
Labor conditions and occupational	<p>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</p>	Negative impact	Medium



Receptor	Description of impact	Type of Impact	Significance
health and safety	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.		
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
Impacts During Operation			
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
Risk of Economic disturbance	For those who will pay in installments, this may be an added financial burden on the poor families (a grant for poor through AFD is already in place for poor families based on an eligibility criteria (section 6.3)). 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.		Minor

6 Analysis of Alternatives

6.1 Pipeline Installation Technology Alternatives

To install a natural gas pipeline beneath the ground level, this can either be done by digging 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.

On the other hand, HDD might result in 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 recommended solution in the 4 studied areas since the pipeline route passes through urban and local roads and does not cross any main road or railway, and this will not negatively affect the environment, and it will be a cheap and safe option

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.

1.2 Working time

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. As a wrap up, the two alternatives related to working time are:

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



6.3 Installation Costs

The average natural gas connection installation cost is about 7000 EGP. Consumers contribute a part of this cost as 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. The customer can select between various payment schemes. Paying in installment is one of the proposed alternatives that might facilitate installation of the NG, especially, for poor and disadvantaged groups. 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. 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.

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**



Table 0-1: 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	Negligible	Excavation contractors	– LDC + Traffic department	Contractor has valid conditional permit + Field supervision	Contractor costs
		Time limited excavation permits granted by local unit & traffic department					
		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	LDC management costs
		Apply Horizontal Directional Drilling under critical intersections whenever possible to avoid heavy traffic delays	Negligible	Contractor	LDC HSE	Field supervision	
		<ul style="list-style-type: none"> 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
		1. Excavated soil stockpiles and stored sand should be located in sheltered areas. Stored fine sand should be	Minor			Contractual clauses + Field supervision	– LDC manage



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		covered with appropriate covering material ² , 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.					ment costs
		Compliance to legal limits of air emissions from all relevant equipment	Minor			Measure and document emissions of machinery by regular audits request emission measurements	
		<ul style="list-style-type: none"> 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 	Minor	LDC	LDC HSE	Field Supervision	

² 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		
		of failed component					
Ambient noise levels Local community Workers	Increased noise levels beyond WB/National permissible levels	<ul style="list-style-type: none"> • 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. • 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. 	Negligible	<ul style="list-style-type: none"> – LDC – Excavation Contractor 	LDC HSE	Contractual clauses + Field supervision (audits)	<ul style="list-style-type: none"> – Contractor costs – LDC management costs
		<ul style="list-style-type: none"> • Avoid noisy works at night 	Negligible			Field supervision	



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		whenever possible <ul style="list-style-type: none"> Avoid construction activities during peak hours of heavy traffic whenever possible; especially when the project site is in proximity of a sensitive receptor. 				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: <ol style="list-style-type: none"> 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. Boreholes to locate underground utilities before using mechanical excavation. Once underground utilities are mapped or uncovered, 	Negligible	Excavation Contractor	LDC HSE	Official coordination proceedings signed by representatives of utility authorities <ul style="list-style-type: none"> Examination of site-specific reports and records Field supervision 	<ul style="list-style-type: none"> Contractor management costs LDC management costs



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<p>horizontal and vertical clearances between natural gas lines and electricity lines must be respected for safety considerations.</p> <p>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:</p> <ol style="list-style-type: none"> Time and place of accident; Name of contractor; Type of underground utilities and infrastructure line; Description of accident circumstances and causes; Actions taken and responses of different parties, such as infrastructure company; Duration of fixing the damage; and Damage caused (description shall be 					



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		according to observation, expertise judgment, reports of infrastructure company).					
		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.	Negligible		LDC HSE	– Review periodic HSE reports	
		Preparation and analysis of accidental damage reports					
		Repair and rehabilitation of damaged components	Negligible		LDC HSE Local Government Unit Local Police	– Contractual clauses + Field supervision	



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Streets (physical status) local community and workers (health and safety)	Hazardous waste accumulation	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Minor 	<ul style="list-style-type: none"> 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 Nassreya Approximate cost of the above (to be revised upon project execution): 8,000-10,000 LE per ton
		<ul style="list-style-type: none"> In case of damaging of asbestos pipes during excavation, the Water Authority, which will carry out the repairs, will be responsible for 	Negligible	Water Authority + contractor		Field supervision + review of Water Authority manifests	<ul style="list-style-type: none"> Contractor costs



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		handling the waste asbestos according to their procedures. – Adequate management of asbestos and any possible hazardous waste					– 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	Minor	– LDC – Excavation Contractor		Field supervision	



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<p>sample before selecting the appropriate disposal option</p> <ul style="list-style-type: none"> – 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. – 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: <ul style="list-style-type: none"> ○ avoid inhalation and sources of ignition ○ cover and mix with sufficient amounts of sand using PPE ○ collect contaminated sand in clearly marked secure 					



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		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	–	– LDC – Excavation Contractor	LDC HSE	– Contractual clauses – Monitoring of waste management plan – Field supervision	– Contractor costs – LDC management costs



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<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>					
Social receptor	Grievance and redress mechanism	<p>The detailed grievance mechanism (GRM) is presented in Annex (9). It will to be shared with the community beneficiaries.</p> <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Arrange Restoration and re-pavement (رد الشئ لأصله) with local unit Communication with local community on excavation and restoration schedules. <p>Standard protocols adhering to national/local administrative requirements are to be followed:</p> <ul style="list-style-type: none"> Close and early coordination 	– Negligible	– LDC in coordination with LGU	EGAS	<ul style="list-style-type: none"> 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		
		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 - 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	Minor	Excavation Contractor	LDC HSE and EGAS SDO	Field supervision	– Contractor costs – LDC management costs



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<p>provide the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction.</p> <ol style="list-style-type: none"> Standard protection by placing clear project signs. Time management for vehicles movement; especially avoiding the peak hours Standard protection for the workers especially working at elevated heights or trench. Regular inspection to compelling worker to used their PPE Training and licensing industrial vehicle operators of specialized vehicles. The contractor also should keep attendance worksheet and laborers ID in order to verify the age of workers Health insurance should be applicable to the contractor workers and workers contracted by a sub-contractor Full compliance to EGAS and LDC HSE requirements, manuals, and actions as per 					



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		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					
	Child labor	<ul style="list-style-type: none"> 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 	Minor	<ul style="list-style-type: none"> LDC Excavation Contractor/subcontractor 	LDC–HSE department	– Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> Contract or costs LDC management costs



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		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					
Local communities and businesses	Lack of accessibility to businesses due to delay in street rehabilitation	<p>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 of excavation main streets in the commercial areas, this can be only done during night after business closing</p> <p>Compliance with the Environmental management plan concerning timely implementation of the construction schedule to minimize impact on local business</p> <ul style="list-style-type: none"> - Follow up the procedure of Grievance Redress Mechanism (see Annex 9) - Ensure transparent information sharing 	Negligible	LDC The sub-contractors	LDC and EGAS SDO	<ul style="list-style-type: none"> - Ensure the implementation of GRM - Supervision on Contractors performance 	No cost



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> The telephone numbers of the social development officer responsible for grievances should be shared with the community people 					
Local community Health and safety	Threat to Safety of users and houses (due to limited level of awareness and misconceptions)	<p>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</p> <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> List of awareness activities applied Lists of participants Documentation with photos Awareness reports 	<ul style="list-style-type: none"> 2250 \$ per awareness raising campaign 2250 \$ for brochure and leaflets to be distributed (material available by EGAS- \$ spent)

7.2 Environmental and Social Monitoring Matrix during CONSTRUCTION



Table 0-3 Environmental 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 emissions	air 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
		Observation of water accumulations resulting from dewatering (if	LDC HSE	During construction. Monthly	Around 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
		encountered)		reports			
		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	LDC HSE	Biannual	Construction site	Documentation in H&S monthly reports Complaints log	No cost



Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
inspection report							
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

7.3 Environmental and Social Management Matrix during OPERATION

Table 0-4: 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	<ul style="list-style-type: none"> 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 	Negligible	LDC	LDC HSE.	<ul style="list-style-type: none"> Map and local geotechnical report review Site inspections Awareness actions Periodical trainings and drills 	LDC management costs



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost
		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					
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	Negligible	LDC	LDC	Complaints raised due to Gas leakage	No cost



Receptor	Impact	Mitigation measures	Residual Impact	Responsibility		Means of supervision	Estimated Cost
		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					
Labor conditions	Occupational Health and Safety	<ul style="list-style-type: none"> – Total number of complaints raised by workers – Periodic Health report - Periodic safety inspection report 	Irrelevant	LDC HSE	LDC	<ul style="list-style-type: none"> - 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

7.4 Environmental and Social Monitoring Matrix during OPERATION

Table 0-5: 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Grievance received from the informal LPG distributors - Information shared with them 	EGAS, LDC	Quarterly	Desk work	- Complaints log	No cost



Possibility of Gas leakage	<ul style="list-style-type: none"> - 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
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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 Qanra Gharb City and Qanra 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,
 - o Directive and Procedure on Access to Information
 - o World Bank Operational Policy (OP 4.01)
- Egyptian regulations related to public consultation,
 - o 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



Figure 8-1: Meeting with the head of municipality and the deputy general secretary



December 2017

- 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 Sharq City)		Male	Female		
During data collection and scoping meetings					
Potential beneficiaries	Qantra Gharb	5	6	FGD	February and March 2017
	Qantra Sharq	6	6		
Government/public officials	Qantra Gharb	6	0	In-depth interview	
	Qantra Sharq	4	1		
NGOs/CDAs representatives	Qantra Gharb	1	0	In-depth interviews	
	Qantra Sharq	0	1		
Head of municipalities and the deputy general secretary	Ismailia Governorate	11	1	Meeting	12 th of February 2017
Total		33	15		
During final public consultation					
Various stakeholders		39	18	Public consultation	10 th of April 2017



Figure 8-2: The panel of the final public event

- 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 8-3: Community people



Figure 8-4: 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:

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.

8.1 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.

