











1.5 Million Natural Gas Connections Project in 11 Governorates

Low Pressure Natural Gas Network

Environmental and Social Management Plan

Marsa Matrouh City / Matrouh Governorate

March 2018

EGAS
Egyptian Natural Gas Holding Company

Developed by

EcoConServ Environmental Solutions

Petrosafe
Petroleum Safety & Environmental Services Company

List of Acronyms and Abbreviations

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$ = 18.15 EGP. as of April 2017

Exchange Rate: € = 19.26 EGP as of April 2017

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1 Introduction

1.1 Preamble

The Government of Egypt (GoE) recognizes the importance of the residential household natural gas connection program to improve the delivery of natural gas to households with affordable prices, high safety measures and the replacement of costly and troublesome LPG cylinders. The project will cover Marsa Matrouh City in the jurisdiction of Matrouh Governorate. The total anticipated household connections in the city will be about 17 thousand connections.

1.2 Objectives of the Environmental and Social Management Plan (ESMP)

World Bank Environmental and Social Safeguard policies require an Environmental and Social Management Plan **(ESMP)** of the proposed project.

The ESMP is undertaken to assess and propose mitigations for environmental and social impacts of the distribution networks serving the various project areas. Impacts of NG exploration, extraction, refining, and transmission are outside the scope of the ESMP.

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 baseline environmental and social conditions
- Assessing project alternatives if different from those presented in ESIA framework
- 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

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

The areas and the total number of households which will be covered in this ESMP is illustrated in the following table:

Table 1-1: Project area and estimated household connection

Governorate	Local Distribution Companies	Areas	Households connection		
Matrouh	ReGas		**First year(2017/2018)**	**Second year(2018/2019)**	**Total**
		Marsa Matrouh City	10,000	7,000	17,000

No major environmental or social risks could be foreseen to prevent reaching the targeted customers over the proposed 3-year timeframe. The extensive experience gained by EGAS and its affiliates through the implementation of previously funded WB and GoE Natural Gas Connection projects in Greater Cairo (and all over Egypt) plays a critical role in minimizing environmental and social risks and maximizing public ownership and acceptance.

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 EGASو ReGas' 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

Natural Gas is processed and injected into the high pressure lines of the national Grid (70 Bar) for transmission. Upon branching from the main lines to regional distribution networks, the pressure of the NG is lowered to 7 Bar at Pressure Reduction Stations (PRS). An odorant is added to the NG at PRSs feeding distribution networks to residential areas[1] in order to facilitate detection. Regulators are then used to further lower the pressure from 7-4 bar to 100 mbar in the local networks, before finally lowering the pressure to 20 mbar for domestic use within the households.

Main feeding lines and distribution networks are mainly constructed from polyethylene pipes with a maximum operating pressure (MOP) of 7 bar.

Neither a high pressure network nor a new pressure reduction unit (PRS) will be anticipated in the studied areas (Marsa Matrouh City). 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. The main feeding lines to these areas start from the outlet of the existing PRS with intermediate pressure (7 bar)

The diagram below presents the components of a city's distribution network. The components covered in this ESMP are lined in red.

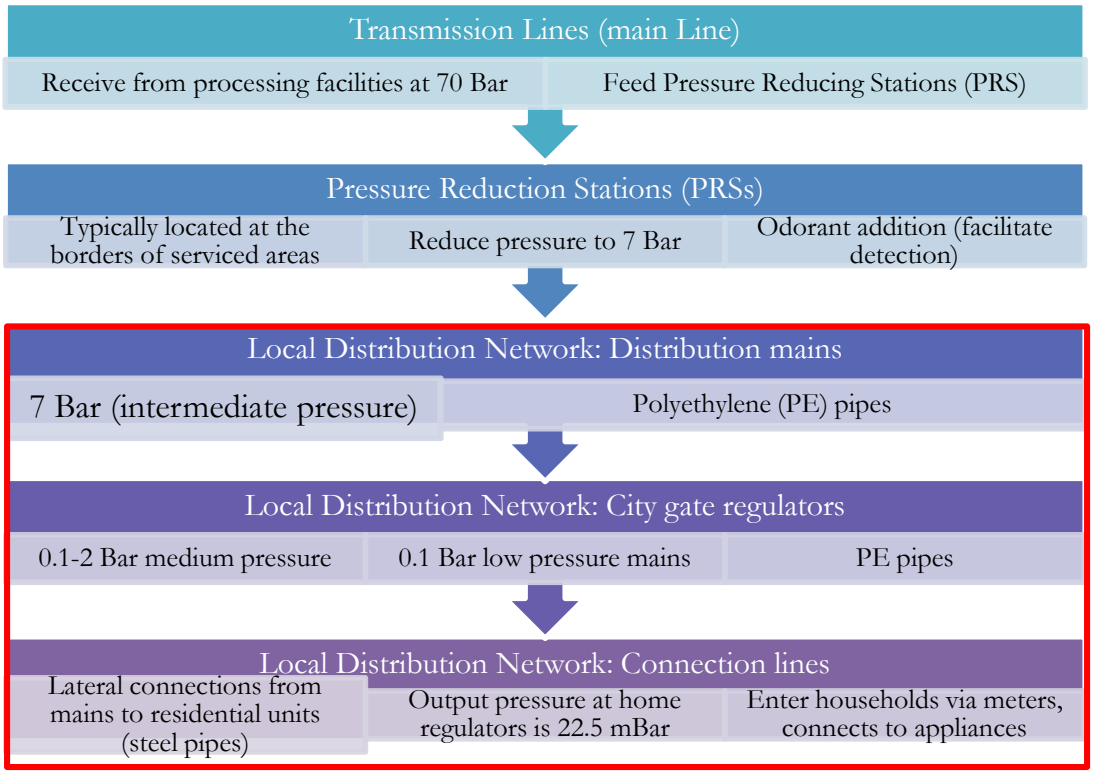

Figure 2-1 General components of the City's distribution network

[1] Because natural gas is odorless, odorants facilitate leak detection for inhabitants of residential areas.

2.2 Project Work Packages

2.2.1 Intermediate Pressure Network-Main feeding line (7 bar system) Marsa Matrouh City

Marsa Matrouh city is the capital of Matrouh Governorate and is located on Egypt's Mediterranean coast.

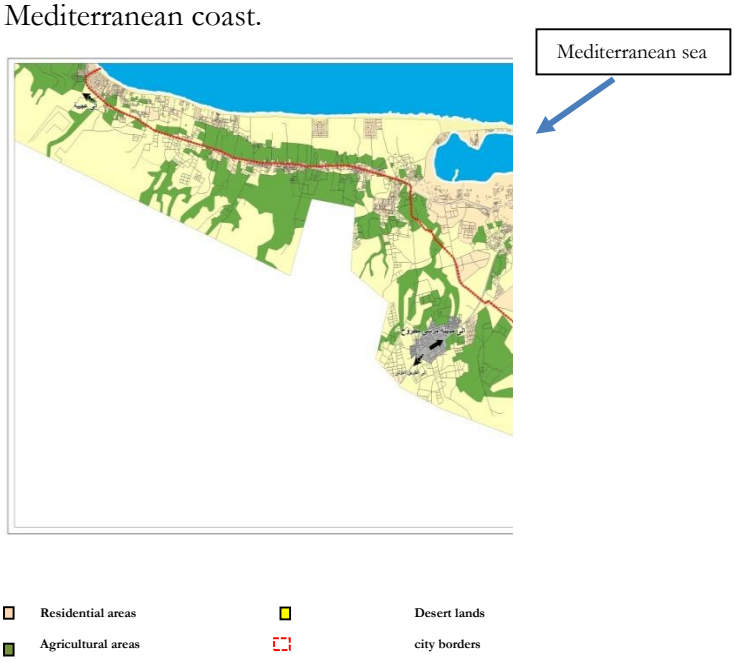

Figure2-2Marsa Matrouh city

2.2.1.1 Route

Marsa Matrouh city is supplied from the outlet of Matrouh's PRS. It is a rented station with a capacity of 3000 m^3/hr and outlet pressure of 7 bar, owned by Egypt Gas. However, there is an upgrading project at the PRS site to increase the capacity of the station to 10,000m^3/hr. A separate ESIA study has been prepared for the PRS.

The 7 bar pipeline will be installed parallel to EL Kasr –Agiba Road until it reaches EL Senosaya street. Thereafter, it will go through EL Senosaya Street until the intersection with EL Galaa road toward the center of the city.

Figure 2-3 shows the sectors that will be connected to the natural gas distribution network, and the route of the intermediate pressure network pipeline. Table 2-1 presents the length of the intermediate pressure pipeline at Marsa Matrouh city. The number of regulators converted from intermediate pressure (7 bar) to low pressure (0.1 bar) in the Matrouh area are 26 regulators.

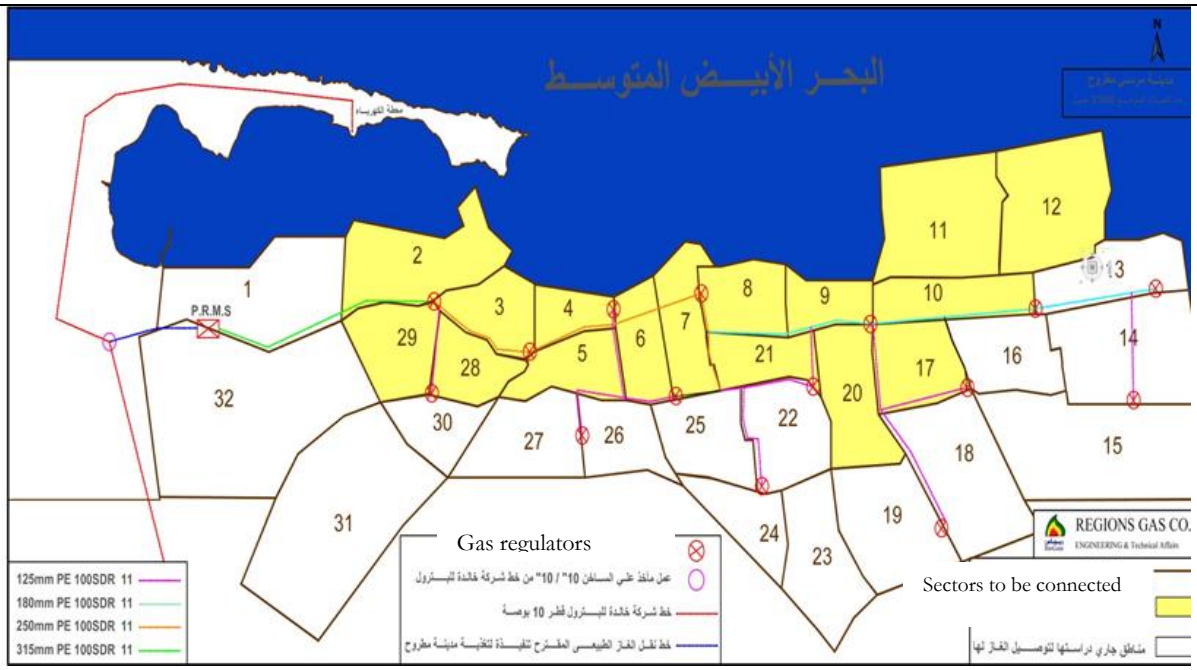

Figure 2-3 The 7 Bar network- (network sectors)

Table 2-1 Length and size of pipes in the intermediate Pressure Network for Marsa Matrouh city (7bar)

Pipe diameter	125 mm	180 mm	250 mm	315 mm
Pipe length	10797 m	5281 m	4101 m	2813 m
Laying depth	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m	1.2 m :2 m

The following figures present the intermediate (7 bar) route within Marsa Matrouh city.

Figure2-4 Intake point from Matrouh PRS to the distribution Sectors (EL Senosaya street)

Figure2-5 Location of starting point of the route and pressure regulator(EL Galaa Street)

2.2.1.2 Low pressure Network-Distribution Network (Regulators, Poly Ethylene 80 Networks)

Existing low pressure gas city regulators are distributed via a gas distribution piping system consisting of low pressure service lines. The pressure of the gas in service lines is 100 mbar. In such a system, a service regulator is not required on the individual service lines. Low pressure service lines are mainly constructed from medium density polyethylene pipes (MDPE) having a maximum operating pressure (MOP) below 100 mbar. The PE80 network will be installed horizontally underground. Piping characteristics are tabulated below.

Table 2-2 Length and size of pipes in the Low Pressure Network (100 mbar)

Pipe diameter	32 mm	63 mm	90 mm	125 mm	180 mm	250 mm
Pipe length(m.)	37,695	67,110	5,850	5,265	11,190	393
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	1.2 m :2 m

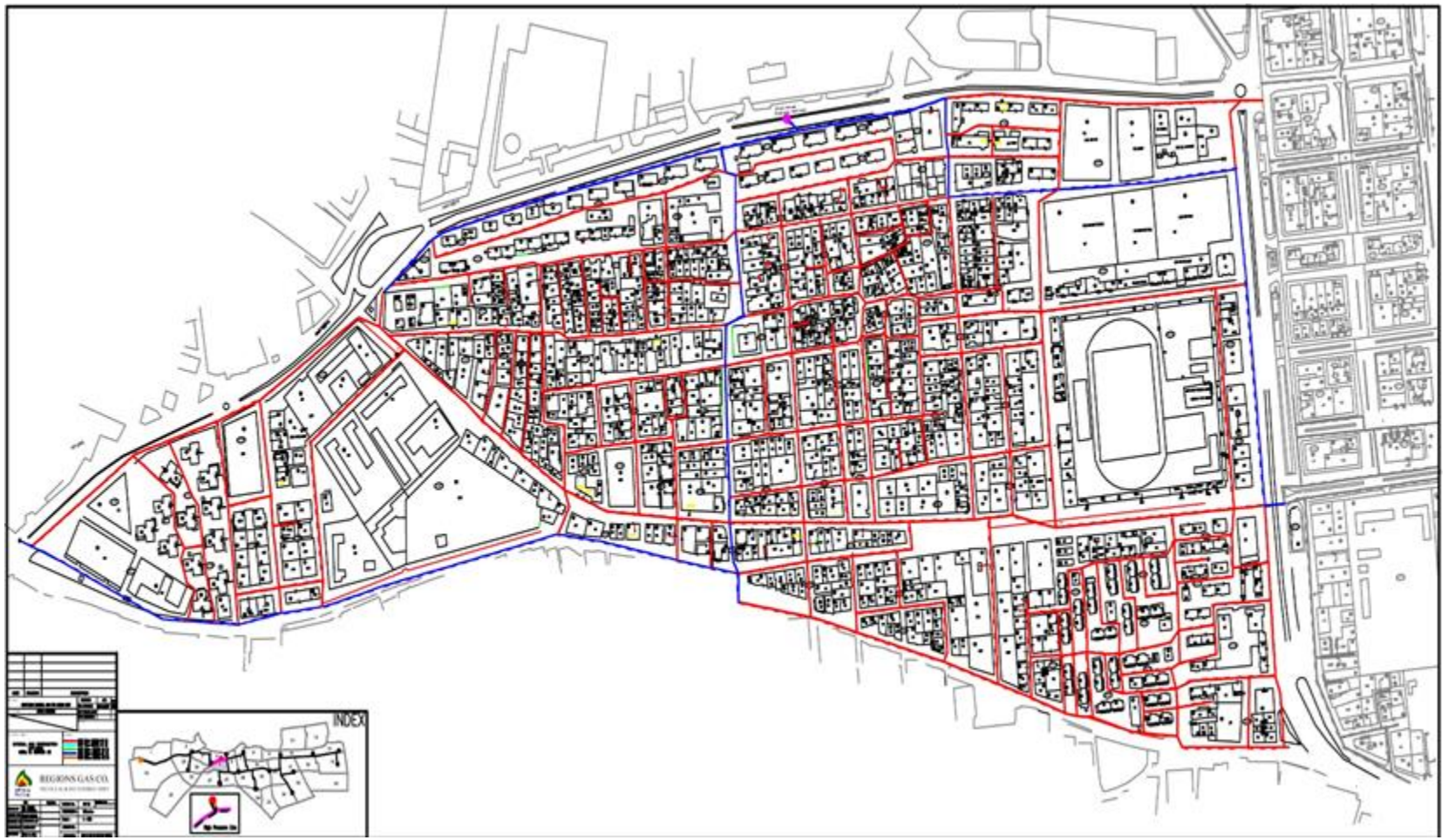

Figure 2-6 100 mbar distribution network execution map (Sector 5 Marsa Matrouh city)

2.3 Project Execution Methodology

2.3.1 Project area selection criteria

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.

The general survey covered the following:

- Identifying availability of utilities in the area and their conditions (electricity, water, telephone lines, and sanitary pipelines) through data and maps from the relevant authorities.
- Identifying the location of the nearest gas networks.

While the Property & Appliance (P&A) survey covered the following:

- Obtaining the latest aerial maps of the project areas from the Egyptian Survey Authority
- Identifying Global Positioning System (GPS) coordinates of the sites
- Entering data into a central database and G.I.S system for review by a design team
- Finalizing pipe sizing, capacity & locations and routing by the design team finalizes.

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

Approval of the building administration to grant access to workers

2.4 Construction works of Main feeding line/network "7bar system- low pressure Network 100 mbar"

The construction activities of the network lines will involve drilling, pipeline placement, pipeline connection welding, and then surfacing. The construction activities will be located within the allocated site. The following activities will take place during the construction of the 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
- Construction works of household installation
- Commissioning

The construction will be mainly in urban and local roads. No construction activities will take place in main roads.

2.4.1 Clearing and grading activities and pipe transportation and storage

The first step of construction includes flagging the locations of approved access routes for the pipeline, temporary workshop for the crew, installing fences surrounding the construction areas, clearing land from any rubbish and/or clearing weeds. Grading is conducted where necessary to provide a reasonably leveled work surface. Additionally, equipment and piping will be transported to the site and stored at a temporary storage area located at the Marsa Matrouh – Siwa road. Quality control procedures during the transportation and handling of pipes should take place to ensure protection from any possible damages to the pipes, and prevent any traffic accidents.

Figure 2-7 Temporary Storage areas and Workshop

2.4.1 Site preparation

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

2.4.2 Excavation

The most commonly used excavation technique is the open cut technique. Alternatively, borings may be excavated using hydraulic drive, and finally the horizontal directional drilling (HDD) technique.

HDD is only utilized in the case of railway crossings, waterways, and major streets where traffic cannot be interrupted. In the case of HDD under railway crossings steel, reinforced concrete sleeves will be installed to further protect the piping from fatigue**. It should be noted that there are no intersections with waterways and railway in the studied areas**.

Excavation works start by removing the asphalt layer and the base stone layer using either a mechanical excavator (used in urban roads) or an air compressor jack hammer for dusty roads (used in local roads). In case the jack hammer is used, road layers are removed by an excavator. The trench is excavated to a depth that provides sufficient cover over the pipeline after backfilling.

The road base soil, underneath asphalt and stones, is then excavated either by a backhoe excavator or by manual excavation. The advantage of manual excavation is that it reduces the risks of breaking water, sewerage, electric or telecommunication lines.

At locations with irregular ground elevations, additional excavation may be applied to avoid undue bending of the pipe. In addition, and in case of having crossings with other underground infrastructure lines/cables, the trench shall be deepened so that the pipeline be installed below or above the existing lines/cables.

Typically the trench (for PE100 7 bar network are orange pipes with a diameter of 0.125m to 0.315 m and for PE80 100 mmbar are yellow with diameter 0.032 to 0.25 m, and about 1.2-1.5 meter deep, depending on pipe diameter.

Figure 2-8 Typical trench for PE pipes

2.4.3 Pipe laying

Before pipe laying, the bottom of the trench is cleaned of any rocks or solid objects which may damage the pipes. Moreover, if the groundwater table is shallow, the trench should be dewatered (portable trash pumps are commonly used in construction projects) and discharge the water into a sewer manhole, according to the arrangements with local authorities. Once the trench is excavated, the pipe stretch shall be laid down.

2.4.4 Welding

During the excavation works, welding works may take place above-ground. Welding may involve built-in coil electrical fusion welding (fittings with heating coils installed inside) or butt fusion welding (hot plate softening the tips of the PE pipes before joining). In both cases, adequate electrical units are needed onsite (diesel generators, cables).

2.4.5 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 and 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.

2.4.6 Leakage testing:

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

- **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 used during the test to ensure no over pressurization

Before testing, the thorough checking of weld joints is needed to be carried out. Senior experienced staff is required to monitor the test. Testing media is air. Test pressure is normally 1.5 times higher than the design pressure. During the test, a drop in pressure 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).

2.4.7 Construction works of household installation

After testing the piping for leakage, 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 fed 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

Figure 2-9 House connection

Figure 2-10 Pipe welding

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.

2.4.8 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.

2.5 Machines used

- Air compressor with jack hammer
- Portable generators
- Directional boring machine
- Trench drilling machine
- Control box welding machine
- Butt fusion welding machine
- Manual excavation tools

2.6 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 carried out 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 household. 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.

2.7 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.

It also includes reporting any 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.

Moreover, reporting issues resulting from construction activities such as excessive/prolonged noise, vibration, waste, traffic, accessibility, visual, and other community health and safety impacts.

2.8 Activities of the operation phase

2.8.1 Operation of the network

The operation of the system is undertaken by local distribution companies (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 cathodic 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 repairing.

2.8.2 Repairs in households

Repairs include appliance adjustments or piping/metering replacement.

2.9 Resources Consumption

2.9.1 During Construction

- **Water**

Given the project's location within the city, there will be a permanent source of water from the Egyptian Holding Company for Drinking Water and Sanitation. However, no water is anticipated to be needed during the construction activities.

- **Fuel**

Diesel fuel will be mainly used for diesel generators that supply electricity to the different construction activities such as welding. In addition, diesel will be the fuel used by trucks and excavators. The fuel will be delivered to the construction site via trucks when needed.

2.9.2 During Operation

The operation of the intermediate 'main' feeding and low pressure network do not involve permanent workers. Therefore, consumption of water will be limited to the workforce carrying out maintenance and repairs. No consistent or significant consumption of water is anticipated.

2.10 Waste Generation

All solid waste generated throughout the project, and especially 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. In common practice, waste is loaded into trucks and transferred to licensed disposal areas. Due to the limited available space on most Egyptian streets, loading waste trucks shall be executed upon excavation, whenever possible, in order to avoid stockpiling waste on site.

2.10.1 During Construction

2.10.1.1 Solid Waste

Solid waste generated during construction phase will comprise of domestic waste, construction waste and some hazardous wastes . The following table presents the expected wastes generated during construction and means of disposal.

Table 2-3 Solid wastes during Construction

Waste type	Hazardous/Non-hazardous	Treatment and Disposition
Domestic Waste (food waste, packing)	Non Hazardous	Disposed to an approved solid waste facility(by contractor) in Marsa Matrouh City
Wood – Scrap	Non-hazardous	Stored at a land site (south of the PRS) rented by ReGas . Transported to ReGas storage area in Alexandria and sold to specialized companies in a public auction
Tyres		
Cardboards		
Containers		
Paints containers	Hazardous	Transported for final disposal is Nassreya - Alexandria
Batteries	Hazardous	Resold to the supplier
Used oil waste (vehicles	Hazardous	Transported for final disposal to UNICO

Waste type	Hazardous/Non-hazardous	Treatment and Disposition
and machines)		

2.10.1.2 Liquid Waste

No Liquid waste is expected to be generated during the construction phase. However, if the groundwater table is shallow, the trench should be dewatered (portable trash pumps are commonly used in construction projects) and water should be discharged into a drain or sewer manhole, according to arrangements with local authorities.

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 wastewater is anticipated to be generated during the construction phase.**

2.10.2 During Operation

The pipeline operation is not expected to generate waste.

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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).

OP/BP 4.12 will not be applicable to the low pressure pipelines of **Matrouh** 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[2] 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

As stated in IFC general EHS guidelines, when host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. .Gaps between requirements outlined by WBG guidelines and the Egyptian Law 4/1994 for Environment protection and the LDCs EHS guidelines has been analyzed. There are no significant differences between the requirements outlined by the WBG EHS GUIDELINE

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

on GAS DISTRIBUTION SYSTEMS and the management and monitoring actions outlined by the ESMP.

3.3 International Finance Corporation (IFC) Guideline/EGAS H and S 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.

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which provide guidance to users on EHS issues in specific industry sectors. Gas distribution system – HSE Guideline (provided in **Annex 2** from the report) are applicable to the project.

3.4 Permits Required

- Constructions permit to be obtained from the Local Governmental Unit.
- Road and Bridges Directorate permission for digging of main roads in accordance to 84 of year 1968 pertaining to the public roads
- 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.
- Permission from the High Council of Antiquities in accordance to Law No 117 of year 1983 and its amendment No 12 of year 1991

4 Environmental and Social Baseline

4.1 Environmental Baseline

Marsa Matrouh is the capital of the Matrouh Governorate which is a Mediterranean coastal city located in Egypt's western section (Mariut coast) which extends from Sallum to Abu Qir for approximately 550 km. It is the narrow, less arid belt of Egypt (Zahran et al., 1985a, 1990).
. Its average north-south width, from sea landward, is about 20 km and it is bordered by Lake Mariut on the east.[3]

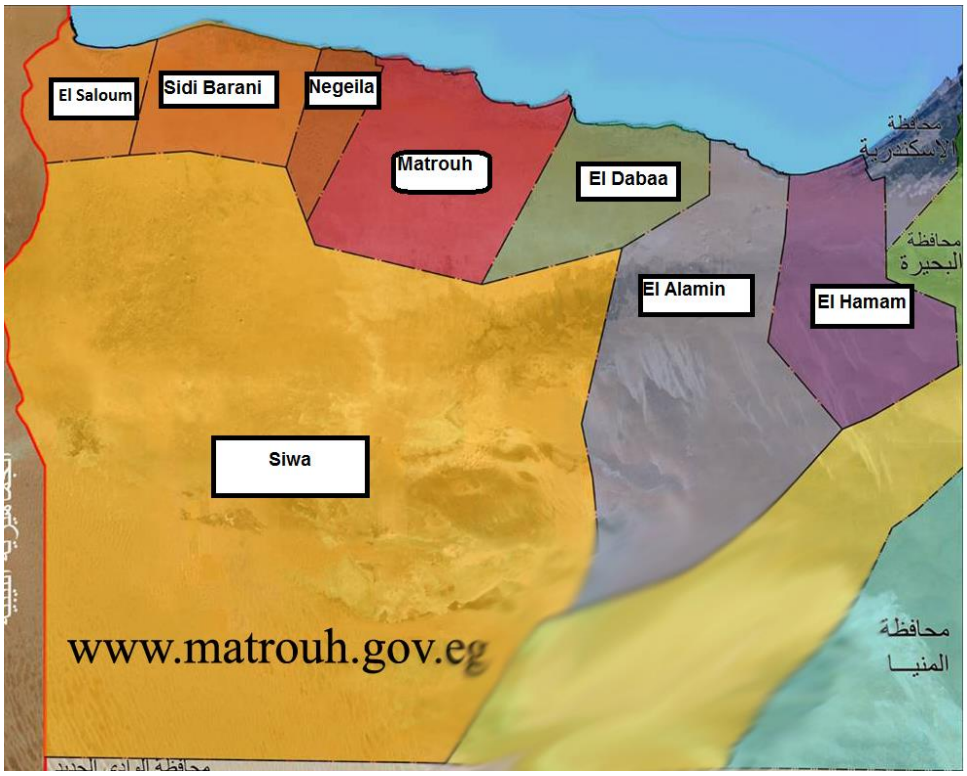

Figure 4-1: Matrouh Governorate

4.1.1 Climate

4.1.1.1 Temperature

The area is generally characterized by a mild semi-arid climate with relatively high temperatures in summer during the months of June, July and August, and relatively low temperatures during the months of December, January and February. Maximum temperatures in Matrouh city range

[3] M.A.Zahran,A.J.Willis,the vegetation of Egypt 2nd edition,Spring

between 18.5°C and 29.5°C. The average of minimum Temperatures range between 9.5°C and 22.5°C.

Table 4-1 Average high and low temperatures (°C)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Temp.	14.5	16.3	20.1	25.1	29	31.5	31.7	31.1	29.3	26	20.5	16.1
Av. High Temp.	12	13	15	17	19	22	24	25	24	22	18	15
Av. Low Temp.	17	18	20	22	23	26	27	28	28	26	23	20

4.1.1.2 Rainfall

Rainfall decreases rapidly south of the coast. Inland, there is a very sharp precipitation. The average annual precipitation in Marsa Matrouh was recorded to be 410 mm.

Table 4-2 Average Precipitation in Marsa Matrouh Area

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Prec. (mm.)	50	40	30	20	10	---	---	10	10	70	40	90

4.1.1.3 Relative Humidity

Relative humidity is high at the coast, with values highest early in the morning and lowest at noon.

Table 4-3 Average relative humidity

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average Relative Humidity %	69	67	67	66	68	72	79	77	74	71	72	70
Average Dew Point °C	8	8	10	11	13	17	20	21	19	17	14	10

4.1.2 Air Quality

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

The measurement location was chosen on the basis that it's beside a school and near a residential area beside a main road and close to the pipeline route. The GPS coordinates of the selected Ambient Air monitoring locations are included in (Annex 3).

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

Table 4-4 Average ambient air pollutants' concentrations (µg/m³)

Pollutants	NO_2 (µg/m3)	SO_2 (µg/m3)	CO (mg/m³)	PM_{10} (µg/m3)	T.S.P (µg/m³)
Average	9.465	15.275	2.031	131.4	152.6
National Limits	200*	350	30 **(mg/m³)**	150	230
International limits	200	125		150	

Methodology, instrumentation, and results of Air Quality measurements are detailed in Annex 3.

4.1.3 Noise

One-hour average results for 8 hours continuous measurements were conducted for noise level measurements in the same location of the ambient air quality measurements.

The noise measurements in the studied areas are below national and WB guidelines. They are 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

Table 4-5 Average Ambient noise level measurements

	LAeq (dBA)
Marsa Matroh	57.36
National Limits	70
International Limits	70

The excavation and construction activities may cause noise levels to further surpass permissible levels at the site. As the excavation and construction are done on the same work day, therefore, the duration of permissible levels being surpassed will be intermittent for the duration of the work day i.e., 8-10 hours Management and mitigation plans for noise levels beyond permissible levels are further addressed in chapter 7.

4.1.4 Water resources

4.1.4.1 Surface water

Freshwater bodies in the areas are limited to temporary rainwater collection ponds that accumulate in wadis and low elevation areas during the rainy season. The coastal zone in the north of the area receives most of the rainfall and also receives the runoff collected by wadis in the northern tableland and drainage wadis area. According to a detailed analysis of rainfall-runoff dynamics made in two drainage wadis in the area, the vast and un-dissected tableland areas contribute little if any overland flow to the wadi runoff during the observed flooding events, and that the extreme flooding events did not cause significant damage or erosion in the valleys but was on the margin of control.

Large amounts rainwater harvesting structures and systems in the coastal area bear witness to the profound hydrological experience of and successful management by the inhabitants (Local Communities). The terraced tableland fields (kurum) and lateral wadi terraces, including their supply infrastructure, are the most remarkable rainwater harvesting systems of the region. This is beside the construction of cisterns (underground water storage) to collect and save the surface run-off, but the team study did not observe these practices in the project area.

4.1.4.2 Groundwater

No site specific data is available on the groundwater in the studied areas. However, the excavation for the gas pipeline is shallow (1 meter depth) and will not reach the groundwater.

4.1.5 Terrestrial Biological Environment

- *Natural habitat*

  Given the fact that all pipelines will be in urban areas, the projected work is planned along existing roads in residential areas of the city of Marsa Matrouh.

  No natural habitats were observed in the project areas.

- *Flora*

Most of the urban areas in Marsa Matouh have rare vegetation cover, except for exotic vegetation for ornamental purposes. Apart from some public parks and trees planted on street sides and middle islands/medians, most areas are urbanized. However, agricultural areas are located in the entrance of Marsa Matrouh City and in the southern areas.

No flora of significance were observed in the project area.

- *Fauna*

Most of the fauna species in Marsa Matrouh are those species adapted to urban areas such as feral cats and dogs, rodents, lizards, bats and birds, which depend on waste for their nutrition. The deserts in the area are "species poor" affording little in the way of food or shelter for wildlife due to the lack of vegetation cover and complexity of the habitats. Bird migration is expected through the area in the spring and autumn as Marsa Matrouh is a well-known migration corridor.

No endangered species were observed in the project area.

Figure 4-2 Dog (Canis sp) has been recorded at the city

4.1.6 Protected Areas

The project area does not include protected areas under law 102/1983. The nearest protected areas to Marsa Matrouh city is the Siwa protectorate which is approximately 306 km south west of Marsa Matrouh. The nearest important bird area (IBA) is Lake Maryout, located approximately more than 291.6 km to the east and Al Qasr Desert located approximately 70 km to the south west. The figure below shows the nearest protected area and IBAs to the project area.

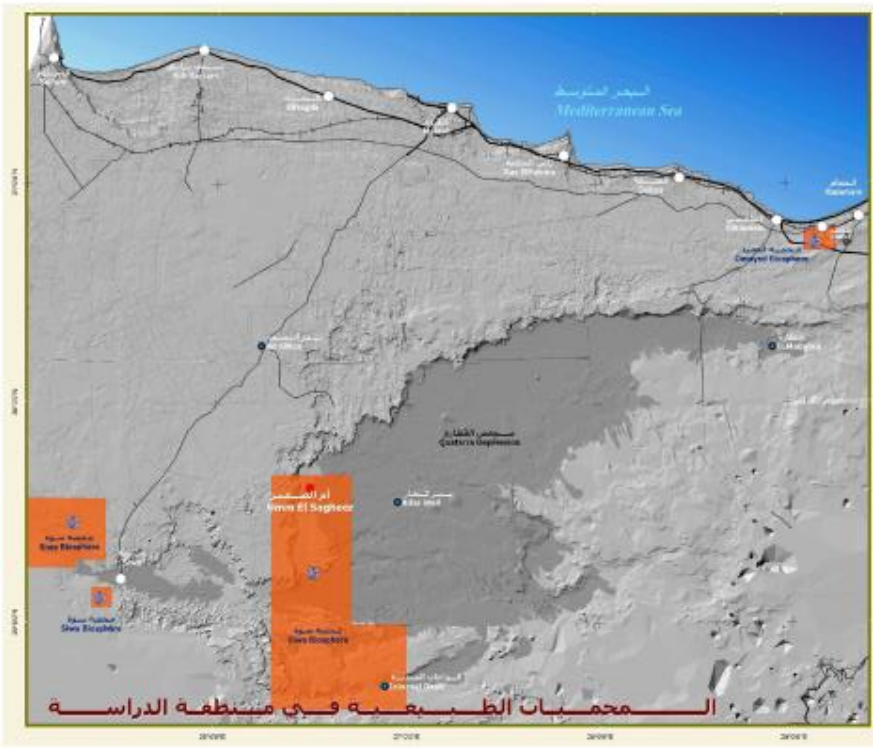

Figure 4-3 Nearest protectorate area to Marsa Matrouh
Source: General Authority for urban planning

4.1.7 Solid Waste Management

The municipality of Marsa Matrouh and the Local Governmental units are the responsible entities for transferring solid wastes. They use collection points where waste is accumulated and transferred to open transfer systems, existing in residential areas in the capital cities of Matrouh Governorate.

Marsa Matrouh has a controlled-landfill, located approximately 35 km from Marsa Matrouh city. The landfill contains a leachate collection system at those remote areas.

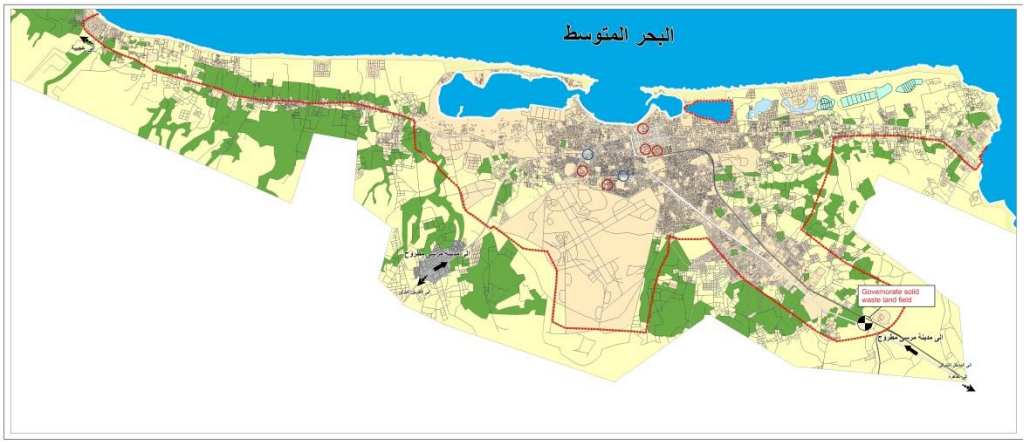

Figure 4-4 Governorate Solid waste landfilled
Source: Ministry Of Housing, Utilities & Urban Development

4.1.8 Physical cultural resources

Matrouh Governorate comprises of many archeological sites, as the area has been used by many old civilizations. Most of Matrouh's archeological sites are in Siwa, located approximately 300 km south west of Marsa Matrouh. Marsa Matrouh is home to some archeological sites that are already registered in the Supreme Council for Antiquities (SCA) and some are still under research and further excavations to extract potential antiquities.
In the case of any unanticipated archeological discoveries within the project area; a 'Chance Find Procedure,'(Annex 4) details the set of measures and procedures will be followed in such case.

4.1.9 Physical structures

The majority of buildings, to which the NG will be connected, are built with concrete and red bricks in relatively wide streets. Residential buildings in Marsa Matrouh range between 6-storey to 10-storey high. 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. As documented by the field research team, almost all streets, roads and alleyways are leveled out; and the condition of asphalted streets is good.

The figure below displays typical street and buildings in Marsa Matrouh:

Figure 4-5 Residential neighborhood in El Galaa street Marsa Matrouh

Figure 4-6 El Thanwya street

4.1.10 Traffic profile

Matrouh Governorate (a frontier governorate) occupies a wide sector in the northwest of

Egypt and is stretched from km 61 west of Alexandria up to the Egyptian- Libyan borders on the northern coast of Egypt where it extends for 450 km along the coast of the Mediterranean Sea. The governorate occupies the northern half of the Western Desert.

Marsa Matrouh City is a Mediterranean seaport and the capital of the Matrouh Governorate in Egypt. It is 240 km (150 miles) west of Alexandria and 222 km from Al Sallum, on the main highway from the Nile Delta to the Libyan border. The distance from Cairo to Marsa Matrouh is about 524 km. Another highway leads south from the town, toward the Western Desert and the oases of Siwa and Bahariya.

The streets are paved and most of the city's streets are asphalted. This enabled communities to move within the city. The majority of the main streets are two lanes.

There are three types of roads in Marsa Matrouh City:

- **The highways:** They are the roads connecting the city with Alexandria governorate and Siwa oasis. The roads available close to the project sites are Marsa Matrouh – Siwa road, Cairo- Matrouh road and Alexandria Matrouh road.

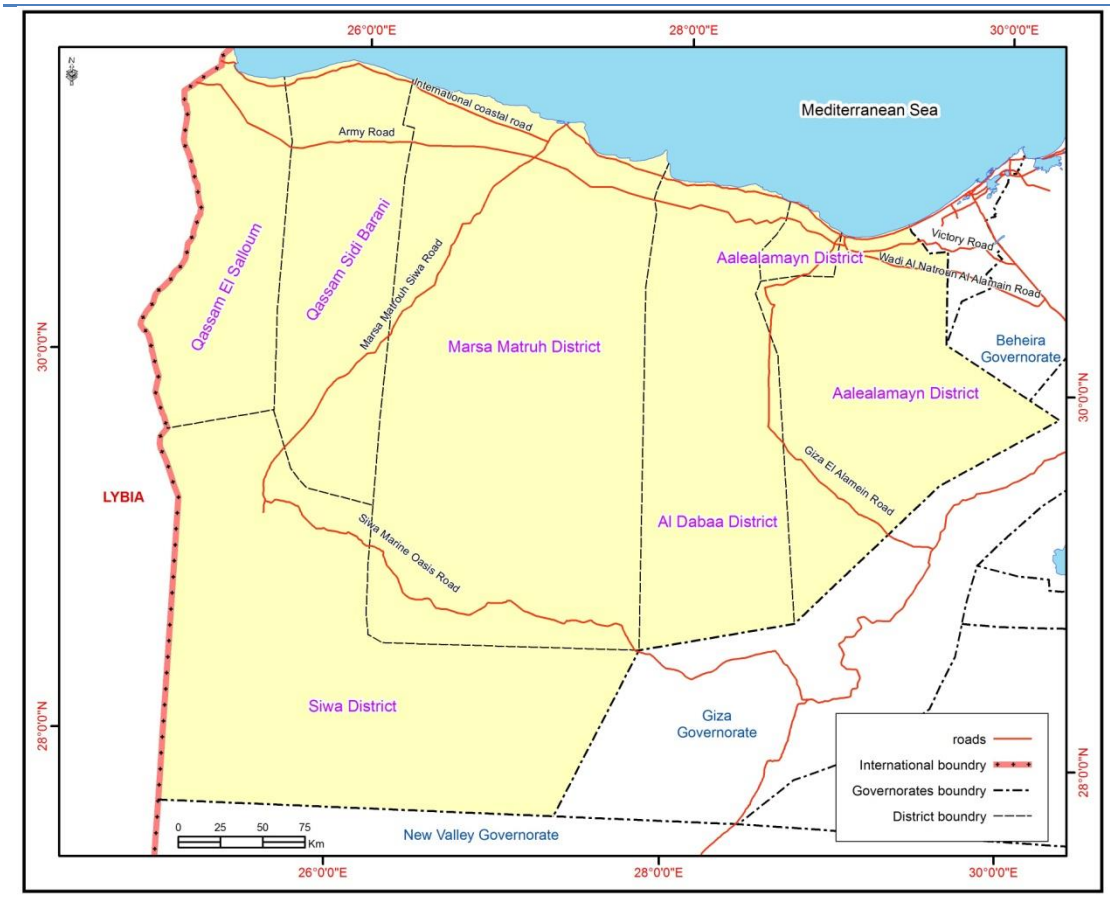

Figure 4-7: Roads in Marsa Matrouh

The urban roads: they are the main roads penetrating Marsa Matrouh i.e. Cornish street, Alam El Roum Street and Alexandria Street. The streets are relatively wide with three or four lane width.

Local streets: they are the streets passing through the city of Marsa Matrouh. They consist of two lanes or one lane streets

Figure 4-8 : Omar El Mokhtar urban road

Figure 4-9 : Local street from El Galaa road

4.2 Socio-Economic Baseline

Marsa Matruh is a major Egyptian tourist resort and serves as a getaway resort for Europeans as well as Alexandria and Cairo Governorates. Marsa Matrouh is the base of the Egyptian sponge fishing fleet. It is also a busy trading Centre for the Bedouins of the Western Desert, as it allows them to bring their sheep, wool and agriculture products (barely, dates, olives and melons) to the local market. (Source: www.our-Egypt.com).

Administratively, Matrouh Governorate is divided into 8 districts or Centres each of them is known as a "Markaz". These are from east to west: Al Hammam, Al Alamein, Al Dabaa, Matrouh, Siwa, Al Nogila, Barani, and Al Sallum and also it comprises 8 cities, 56 rural local, and 631 sub villages (kafr) (IDSC, 2011).

4.2.1 Administrative affiliation

Marsa Matrouh City lies under the jurisdiction of Matrouh governorate. It is located on the north cost of Egypt.

4.2.2 Urbanization trends

Marsa Matrouh is a large city having potential urbanization activities to both the east and the west. During the last five years, illegal expansion of residential areas was noted in all Egyptian communities. There has been huge illegal incursion into agricultural land in the form of unstructured urban expansion and construction activities. It was obvious that the houses are scattered in the vicinity of project areas. The residents construct houses with no legal license. Aiming at declaring their legal possession of the lands, separate houses are built and scattered in the western and eastern suburbs of Marsa Matrouh city. Additionally, there is a rapid expansion for newly constructed resorts in the North cost of Marsa Matrouh. This expansion is of legal and organized nature.

4.2.3 Demographic characteristics

- **Total Population**

According to the 2011 estimates of the Information Center at Marsa Matrouh city the total population of the city is 149,327 people. Those who reside the urban areas in Marsa Matrouh are 77.9% versus only 22.01% living in rural areas.

- **Rate of Natural Increase**

Crude birth rate (per 1000 people) in Egypt was last measured at 23.82 in 2011, according to the World Bank. Crude birth rate indicates the number of live births occurring during the year, per 1,000 people estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration.

In Matrouh the crude birth rate is doubled (46.47 per 1000 people). The population shows a natural increase of 4%. Indicating that there should be family planning interventions directed to remote areas in the country such as Matrouh.

4.2.4 Living Conditions

- **Household Size and Density**

The total households in Marsa Matrouh city are about 30,757. The 2006 census reported that the average family size in the Matrouh Governorate is about 5.33 people. While the average family size in Matrouh District is 5 persons. The density rate (total number of household/total number of rooms in the residential unit) in Matrouh Governorate is 2.2 person/room, whereas, it is only 1.23 person/room in Matrouh City.

- **Dwelling characteristics**

As mentioned above, the majority of the people living in Marsa Matrouh dwell in urban houses. The houses are of acceptable conditions required for the installation of the NG. The buildings are 6-10 storey high. The construction materials are mainly concrete and red bricks.

Figure 4-10 : residential units in Marsa Matrouh City

4.2.5 Access to Basic Services

- **Access to Electricity**

According to CAPMAS poverty mapping data of 2013, almost all individuals in Marsa Matrouh use electricity for lighting.

- **Access to potable water and sanitary system**

Accessibility to water network is high in Marsa Matrouh, as almost 94.8% of individuals have access to the public water network; and 35% of individuals have tap water inside their houses, according to CAPMAS poverty mapping data of 2013.

However, the public sanitation network covers almost all project areas. Access to sanitation systems is still limited in the suburbs of Marsa Matrouh city. The secondary data provided from the Matrouh information center revealed that only 19,329 from a total of 30,757 households residing in urban areas in Marsa Matrouh are connected to a public sewage grid. Most probably they will be covered by the NG.

4.2.6 Human development profile

- **Education**

The census data revealed that illiteracy rate in Matrouh Governorate is 35.1% of the population in Matrouh while it represents only 28.7% of Marsa Matrouh population. Female illiteracy is higher among Matrouh residents (48.9%).

Intermediate education is the prevailing type of education in Egypt with 25.8% completion percentage for the population. While, in Matrouh Governorate the basic education is more dominant at 24.4%. In Marsa Matrouh, the basic education is also more prevalent. The variation in the percentage for the two sexes reflects the gap between males and females particularly in Matrouh governorate.

The project will pass by some schools in Marsa Matrouh City. Specific procedures will be applied in order to minimize the adverse impacts on schools and their students. Detailed procedures will be presented in the management plan.

Figure 4-11 Zaher Galal primary school

Figure 4-12 Abd el Kareim Hagag secondary school

- **Unemployment and Work Status**

According to the Statistical Year Book of Matrouh Governorate, the total unemployment rate is 8.58% that increases among females to be 10.95%. The total workforce is estimated at 44.96%. 20.5% of Marsa Matrouh's population work as farmers with 15.8% of those employed work as skilled laborers. 11% of Marsa Matrouh's workers are specialis which stands as an indication of the availability to employ skilled workers from Marsa Matrouh city.

The formal Statistics obtained from the Poverty Mapping Data 2013 regarding manpower reflected that the age of starting work is 15 years old.[4] Both the Child Law and the Labor Law state that children shall not be employed before they complete 14 calendar years old, nor shall they be provided with training before they reach 12 calendar years old; however children between 12 and 14 years old are permitted to work as trainees. Furthermore, the governor

[4] 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

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.

4.2.7 Health Facilities

There are six hospitals serving Marsa Matrouh, according to the Information Center of Marsa Matrouh's LGU. Additionally, there are a number of private clinics offering their services to the public.

Participants of focus group discussions expressed their satisfaction with the services provided by the military hospital. They recommended to have a service contract for medical treatment signed with the military hospital.

4.2.8 Poverty index

According to poverty mapping developed by CAPMAS in 2013, the number of poor people in Marsa Matrouh in 2013 is 28,072 individuals, representing 18.43%. The Gini Coefficient, which indicates income inequality, stands at 0.23. The percentage of female-headed households is 6.89%.

According to CAPMAS poverty mapping of 2013, the per capita consumption in Marsa Matrouh is 5,992.0 EGP/annually.

4.2.9 Human activities in the project areas

Agriculture activities are substantial in Marsa Matrouh, as it absorbs 7.68% of total employed individuals. According to the Poverty mapping 2013, the governmental sector employs 41.17% of the labor force in Marsa Matrouh City. 66.9% of the total employed individuals have permanent works contracts.

With regards to tourism in Matrouh, there has been a significant increase in accommodation capacity with only a small increase in the number of hotels, which reflects the tendency for growth via building large hotels. There is a large number of small, "entry-level", 1, 2 and 3 star hotels (67%) which are overrepresented with respect to large, luxury, 4 and 5 star hotels (19%) and bottom-of-the-range hotels (14%). However, these 4 and 5 star hotels – while only 19% of the total number – account for 48% of rooms, which is a higher proportion of the total than either of the other categories. Thus, the top-of-the-range offer represents approximately half of Matrouh Governorate's hotel capacity.

Given the touristic nature of the city, there are lots of traders, retailers and small shops located in Libya Street, Alexandria Street and Alam El Roum. There are a small number of individuals (young people) who are reported to work in the tourism sector

The consultation activities conducted in Marsa Matrouh revealed that the average monthly salary is about 2,500 EGP. The majority of consulted groups are of Bedouin and non-Bedouin origin who work in the governmental sector.

4.2.10 Fuel currently used in households and its problems

The predominant majority of individuals surveyed in Marsa Matrouh use LPG cylinders for cooking. The main source of LPG cylinders is LPG outlets and LPG vendors. The average price of an LPG cylinder is 25 EGP. The average household consumption of LPG cylinders ranges between 2 to 4 cylinders per month.

As for water heating fuel, many of the individuals surveyed stated that they use electric water heaters in their houses. Using electric water heaters adds more financial burdens, given the recent increase in electricity bills nationwide. There is also a substantial proportion of focus groups' participants that use LPG cylinders for water heating.

4.2.11 Perception towards the project

Throughout the various consultations with civil servants 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 Marsa Matrouh have to go through in order to obtain LPG cylinders created a dire need for NG connections.

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

4.2.12 Gender dimension of the current type of fuel

Given the nature of project area (Bedouin), women play a limited role in buying the LPG cylinders and installing them to their stoves or water heaters. It is the man who takes up the heavy burden of fetching and carrying LPG cylinders from LPG outlets or vendors to their own houses. Norms and traditions prohibit woman fetching the LPG

4.2.13 Willingness and affordability to pay

As noted above, the majority of respondents stated their complete support of the NG connection project. Such attitude is attributed to the high and fluctuating LPG prices.

Based on consultation activities, each household consumes between 2 to 3 LPG cylinders monthly, indicating that each household pays up to 75 EGP per month. The average value of NG consumption fee per month is about 20 EGP.

Participants of the focus groups were asked about their opinion of the NG installation fee. They stated that the installation fee is too high to be paid in one installment, given their incomes. 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 500 EGP) per month to settle the installation fee. 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.

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.

5 Environmental and Social Impact Assessment

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

To determine and assess the impacts of the project phases on environmental and social receptors, a semi-quantitative approach based on Leopold was first adopted. 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 and addressed if both magnitude and importance are of minor severity.

The second approach is based on Buroz's Relevant Integrated Criteria and is used to determine the total importance, I, of the impact for each activity on all receptors and of the project overall. Detailed assessment matrices for both approaches are in Annex 5. Following are the impact assessment scoring classification and results.

On the basis of the value of the importance of impact, I, obtained, the severity of the impact of an activity is assessed. The table below presents the classification of impact ratings and respective importance of impact values.

Importance of Impact	**Impact rating**	
0-25	**None** or irrelevant (no impact);	
26-50	**Minor** severity (minimal impact; restricted to the work site and immediate surroundings)	
51-75	**Medium** severity (larger scale impacts: local or regional; appropriate mitigation measures readily available);	
76-300	**Major** severity (Severe/long-term local/regional/global impacts; for negative impacts mitigation significant).	

5.2 Anticipated 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 the information shared by ReGas, the daily average number of workers during the peak time will be about 15 workers for installation, two of them are foremen and 13 technicians in the project sites. Five workers are recruited for chimney and transformation of appliances. This number is flexible and might be changed in case of recruiting daily excavation workers. Additionally, there are some drivers, two customer services and one health and safety personnel. With regards to the permanent storage site, two people from Bedouin tribes provide security services in the site. Most of the abovementioned jobs allocated for semi-skilled and unskilled laborers are allocated for the community people.
- 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 trading 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 lease contracts, food supply, transport, trade, security, manufacturing… etc. Additionally, lease contract of permanent storage site.

5.2.2 Positive impacts during operation

- 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 persons with disabilities, 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)

No works are planned on main roads; therefore, the project will not directly impact circulation on main roads. An indirect impact can be increased flow of vehicles as urban roads are avoided.

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 small vehicles 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 small vehicles.. etc. in affected areas will last for the duration of the work day i.e., 8 hours in the alley way and local streets. With regards to urban roads, the work should be stopped between 7-2 p.m. This is classified as the rush hour period.

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.

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 unfavourable socioeconomic impacts. i.e.:
  - Microbuses and small vehicles may find difficulty in crossing 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.
  - There might be a disturbance to community people due to the traffic congestion

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

5.3.1.2 Air quality

Environmental impacts

WB requirements and Law 4/1994 (modified by laws 9/2009 & 105/2015) stipulates strict air quality standards. Air emissions (gases and particulates) during construction 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, 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.

Gaseous pollutants emissions

Machinery used during construction is certified, therefore, emissions stemming from the exhaust of machinery are unlikely to increase ambient levels beyond 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.

Air emissions impacts are expected to be temporary, local, and 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. Typical construction noise includes noise intensity due to engine operation and the use of jack hammers for excavation works. A typical team will operate 2-3 jack hammers, each generating a noise intensity of 107dBa intermittently throughout the day.

As discussed previously, the WB/IFC guidelines and Law 4/1994-9/2009-105/2015 have defined standards for noise intensity and exposure periods in the work place, in addition to certain limits for ambient noise levels for different types of urban and rural areas. The results showed compliance with all the national and international guidelines. (see Annex 3)

Traffic interruption due to excavation can cause congestions, which can result in increased 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 temporary, local, and of **minor** severity

5.3.1.4 Impacts related to soil

Environmental impacts

Soil may be susceptible to pollution resulting from uncontrolled dumping of wastes generated during construction.

The impact on soil pollution is of **minor** severity

5.3.1.5 Impacts on water

Groundwater

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 not applicable.**

Surface water

Subsurface water may be impacted in case of improper disposal of sanitary wastewater, construction wastes or debris (generated from activities like ditching, and excavation). Generated sanitary wastewater, as well as water resulting from the dewatering activities (if exist) during excavation, will be collected in tanks and transported via a certified contractor to the nearest wastewater treatment station.

The impact on surface water pollution is of **minor** severity

5.3.1.6 Impact 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.

Assessment of impact on ecological systems is not applicable.

Impacts on fauna

Fauna identified is unspecific to the project areas and consist of stray dogs and cats and pigeons.

Open trenches may pose risks to stray animals, which can become trapped. Considering that trenches are backfilled in the daylight and that no trenches are left open overnight, animals trapping is not anticipated.

Dumping sites attract animals as sources of food. Uncontrolled dumping of waste can pose threats to animals accessing the uncontrolled dumping sites. Considering the nature and small quantities of the waste generated mostly composed of broken asphalt and left over pipes, **impacts on dogs, cats, and pigeons are of irrelevant severity.**

Impacts on fauna are of **irrelevant** severity

No fauna of significance have been identified in the project areas.

Impact assessment on fauna of significance is not applicable.

Impacts on flora

As described in the baseline section, the proposed project site is not characterized by the presence of endangered species. The project site is characterized by desert area, and only some non-significant exotic floral species such as grasses were recorded in the project area.

Impacts on flora alongside roads are of **irrelevant** severity

No flora of significance have been identified in the project areas. **Impact assessment on flora of significance is not applicable.**

5.3.1.7 Waste generation related 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;
- Empty paint Cans that were 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, if encountered
- 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.

Impacts due to waste generation are of **minor** 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:

1. Structural damage to a monument due to dewatering during excavation.
2. Damages to monuments' foundations due to excavation works.
3. Damage to the monument body by vibration of machinery.
4. Reducing the aesthetic appeal of the site or building.
5. 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 jack hammers 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 4** 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 5.

Impacts on culturally valuable sites and buildings are of **irrelevant** severity

[5] If encountered within project areas.

5.3.1.9 Risk on Infrastructure and underground utilities

Environmental impacts

Prior to excavation the LDC (ReGas) performs exploratory drills to investigate the presence of underground utilities that may have been installed without accurate documentation and maps for its routes and depths. The risk of damage to such utilities during excavations for natural gas pipeline installation is possible, but minimal. In the event that an underground utility is damaged, 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 temporary, local, and of **minor** severity

5.3.1.10 Impacts related to land

Socioeconomic impact

The project will need plots of lands for workshops and temporary storage areas. It is envisaged that the network installation will not entail any land acquisition in the project areas rather than storage areas and workshops in the vicinity of the project sites in the side roads.

ReGas coordinates with the local governmental unit to enable them using the side streets for storing their materials and establish temporary workshops. The lands are classified as state owned lands that require a kind of arrangement with the Local Governmental Unit to use the lands for storage purpose and establish a temporary workshop. Using the side road will never entail any land acquisition.

The connection network will pass through main urban roads and streets. Installation activities will not cause any disturbance to the shop owner rather than digging streets for one day.

Figure 5-1: Sample of a workshop located in the street side

Figure 5-2: Sample of a temporary storage area

No socio-economic impacts on lands have been identified.

Land acquisition impacts are of **irrelevant** severity

5.3.1.11 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**

5.3.1.12 Possible effects on weak structures[6]

Environmental impact

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

[6] If encountered within project areas.

Another possible impact on structurally-weak 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

5.3.1.13 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.

5.3.1.14 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 permissible level 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 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 **minor** severity.

5.3.1.15 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. 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. Typical drilling activities for excavation works are intermittent.

Electrical

Faulty equipment or exposed cables can cause risks of electrocution.

Working environment temperature

The exposure of workers to high temperatures can result in dehydration and sun strokes. The execution of the project works for Marsa Matrouh are prohibited by the Governorate Authority during summer time. Therefore, no sun stroke is anticipated.

Working at heights

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

The impact of construction activities on OHS is of **medium** severity

5.3.1.16 Risk pertaining to child labor

As mentioned in the baseline, child labor is a common practice in the project communities in Marsa Matrouh,. Children below 18 work almost in all projects as they receive low salaries and they are less demanding. 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 on pertaining to child labor is of **low-medium** severity.

5.3.1.17 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**

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, 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 have 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 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 during maintenance activities.

Impact due to air emissions are considered to be **irrelevant**

5.3.2.4 Noise impact

No noise is generated from the operation of gas network. Therefore, no impacts due to noise during the operation of the gas network have been identified.

No impacts due to noise are considered to be **irrelevant**.

5.3.2.5 Impact on soil

The normal operation of the gas network does not have any impact on soil. However, risks of soil contamination are only associated with the possible spillage or leakage.

Impact on soil are considered to be **irrelevant**

5.3.2.6 Impact on water

No impacts due the normal operation of the gas network on water bodies have been identified.

Impacts on water bodies are considered to be **irrelevant**.

5.3.2.7 Impact on ecology

No impacts due the normal operation of the gas network on ecological systems have been identified.

Impacts on ecological systems are considered to be **irrelevant**

5.3.2.8 Impacts on fauna

No impacts due the normal operation of the gas network on fauna have been identified.

Impacts on fauna are considered to be **irrelevant**.

No fauna of significance have been identified in the project areas. **Impact assessment on fauna of significance is not applicable.**

5.3.2.9 Impacts on flora

No impacts due the normal operation of the gas network on flora have been identified.

Impacts on flora are considered to be **irrelevant**.

No fauna of significance have been identified in the project areas. **Impact assessment on fauna of significance is not applicable.**

5.3.2.10 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: ReGas**), 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.

5.3.2.11 Integrity of natural gas piping

Environmental impact

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.

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

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.

5.3.2.12 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 i**rrelevant** severity

5.3.2.13 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.

Table 5-1: Summary of impacts

Impact	Description of impact	Nature of impact	Significance
	During Construction Phase		
Reduction of Traffic Flow (disruption of local and regional traffic)	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.	Negative	Minor
	Coordinating with and obtaining approvals from local government and traffic police is vital to avoid delays, objections, and public inconvenience to the work program.	Negative	Minor
	Main roads (highways) No works are planned on main roads; therefore, the project will not directly impact circulation on main roads. An indirect impact can be increased flow of vehicles as urban roads are avoided.	Negative	Medium
	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. **Local roads** 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 Small vehicles 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 Small vehicles etc. in affected areas will last for the duration of the work day i.e., 8 hours.	Negative	Minor
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	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	Minor

Impact	Description of impact	Nature 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	Minor
Soil pollution	Soil may be susceptible to pollution resulting from uncontrolled dumping of wastes generated during construction.	Negative	Minor
Water pollution	Subsurface exist in area may affected by inappropriate liquid and hazardous waste during construction	Negative	Minor
Waste generation	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. It is highly unlikely that groundwater may be encountered on routes of the low pressure distribution networks as these have been previously excavated with no record of groundwater. Project works will be located in residential areas. Workers and employees typically utilize the bathrooms of surrounding facilities; especially mosques.	Negative	Minor
Risk on Infrastructure and underground utilities	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.	Negative	Minor

Impact	Description of impact	Nature of impact	Significance
	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	Minor
Impacts related to lands	The project will need plots of lands for the workshops and temporary storage areas. There exact locations were not determined to date. However, they are always selected from the side roads and vacant lands affiliated to the state. It is envisaged that the network installation will not entail any land acquisition in the four project areas rather than storage areas and workshops in the vicinity of the project sites. Additionally, the connection network will penetrate the main urban roads and streets. No land acquisition either temporary or permanent will result from project activities. **No socio-economic impacts on lands have been identified.**	Negative	Negligible
Possible effects on vulnerable structures[7]	Drilling vibrations: Workers are accustomed to manually drill to prevent vibrations near sensitive structures (if any). 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.	Negative	Negligible
Effect on Culturally Valuable Sites	Effects on culturally valuable sites (monuments, archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance) may involve: 1. Damages to monuments' foundations due to excavation works. 2. Damage to the monument body by vibration of machinery. 3. Reducing the aesthetic appeal of the site or building. 4. Improper management of discovered antiquities during excavation (chance finds). 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 **project sites** 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 4** that outlines procedures in case of chance finds.	Negative	Negligible
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	Minor

[7] If encountered within project areas.

Impact	Description of impact	Nature of impact	Significance
	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	Minor
Community health and safety	Impacts on community health and safety are expected to result from: Emissions of gaseous pollutants and dust, where increased emissions of dust can result in health problems to community members. *Increased background noise levels* resulting from the operation of jackhammers, which surpasses permissible limits for residential areas in the vicinity of commercial areas during the day *Waste accumulation* in illegal dumping and potential burning of construction waste, which will consist mainly of excavated soil and leftover PE and carbon steel pipes *Project infrastructure* 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 utilichties 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.	Negative	Minor
Occupational health and safety	**Noise** The noise intensity level resulting from jackhammers surpasses permissible level of 90 dB (A) for work place with up to 8 hour shifts **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 environment temperature** The exposure of workers to high temperatures can result in dehydration and sun strokes. The execution of the project works for project sites are planned during the months of July and August. The average temperatures for Marsa Matrouh in July, the hottest month of the year, are above 30 °C, which can cause heat strokes. **Working at heights** Household installations will require working at heights, which can result in falls and pose a safety hazard.	Negative	Medium
Risk pertaining to 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 Marsa Matrouh. 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

Impact	Description of impact	Nature of impact	Significance
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	Negligible
Labor conditions and Employment and workers condition	The project is expected to result in the creation of job opportunities, both directly and indirectly. Based on similar projects implemented recently by EGAS and the local distribution company, the daily average number of workers during the peak time will be about 60 workers. The local community of Matrouh Governorate could provide a proportion of this temporary labor force dependent on skills needed and the strategies of the individual contractors in sourcing their workforce	Positive	Minor
	Influx of construction workers in may stress local health services (e.g. hospitals, clinics).	Negative	Minor
	Influx of construction workers may cause transmission of communicable disease among the villagers or workers	Negative	Minor
	Influx of construction workers village may stress local utilities (e.g. potable water, sanitation, electricity, waste management).	Negative	Minor
	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 not limited to accommodation, food supply, transport, trade, security, manufacturing… etc.	Positive	Minor
During Operation Phase			
Community health and safety	In addition to a full array of safety and emergency precautions taken by EGAS and ReGas, 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	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. Sabotage: pipelines and other components may be targeted for sabotage. Adverse impact is expected in raising the fear of disruption of Gas supply	Negative	Minor
Visual intrusion impacts	The installation of house connection and the chimney will affect the building 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.		Negligible
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

This Natural Gas Connections to Households Project is expected to yield many economic and social benefits in terms of providing a more stable, energy source, achieve savings in LPG consumption and enhance safety in utilizing energy.

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 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.

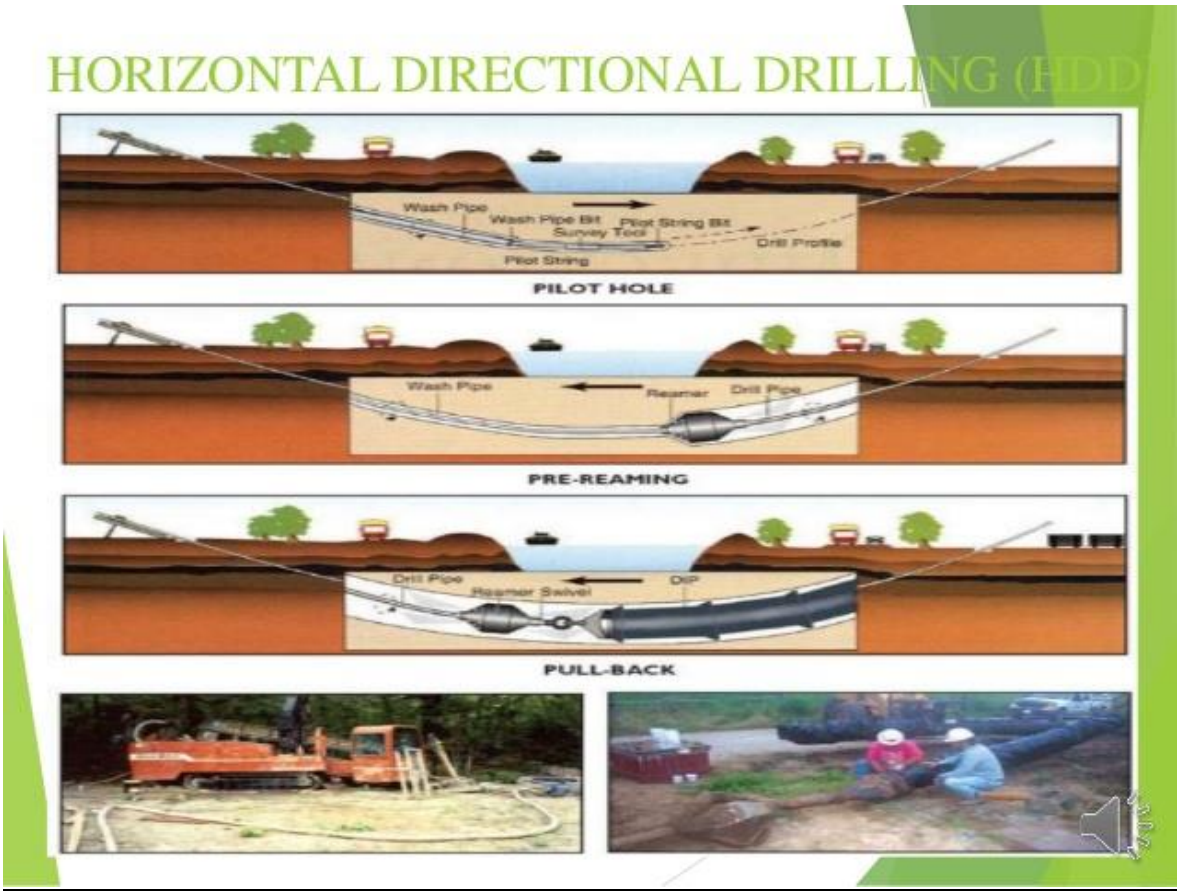

Figure 5-3: Horizontal Directional Drilling

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.

- **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

In the sectors of Marsa Matrouh, the pipeline route passes through existing urban roads and will not involve crossing of railways or water bodies etc. Hence, open-cut method has been selected.

Figure 5-4: Open Cut by ReGas

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
- They are safer to the surrounding communities

6.4 Working time

As stated in the traffic baseline, 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. Moreover, in some areas, there is a weekly market e.g. the market located in Marsa Matrouh city. Such market should be avoided. As a wrap up, the three alternatives related to working time are:

- Working during day time in most of project areas
- Working during night in overcrowded areas
- Avoid market working hours

6.5 Installation Costs

The average natural gas connection installation cost is about 7000 EGP (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.

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 mitigation measures. 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 companies in charge of project implementation: **ReGas**

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 ReGas/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 Marsa Matrouh city, 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
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.

7.2.7 Solid Waste

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

7.2.8 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.

7.2.9 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.

7.2.10 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.

7.2.11 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:

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

7.2.12 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[8] 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 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 ReGas.
3. The SDO within the LDC and EGAS
4. Email. info@***regas***.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 ReGas should maintain record of complaints and results.

Details on the GRM and the institutional arrangements required to implement it are presented in Annex 6.

[8] Falls under the budget of the LDCs

1.1.1 Activities Posing Risk on Structures Stability[9]

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.

[9] 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		
Ambient air quality	**Increased emissions of dust and gaseous pollutants**	• Controlled wetting and compaction of excavation/backfilling surrounding area • Excavated soil stockpiles and stored sand should be located in sheltered areas. Stored fine sand should be covered with appropriate covering material[10], such as polyethylene or textile sheets to avoid soil dispersion. • 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. • Appropriate maintenance, engine tuning and servicing of construction equipment to minimize exhaust emissions • Minimize unnecessary journeys and switching off machinery and equipment when not in use (idle mode).	Minor	- LDC - contractor	LDC HSE department	Contractual clauses + Field supervision	– Contractor costs – LDC management costs
Noise	**Increased noise levels**	• Ear muffs, ear plugs, certified noise PPE for workers • Avoid noisy works at night whenever possible • Complaints receipt from local administration	Minor	– LDC – Contractor	LDC HSE department	Contractual clauses + Field supervision (audits)	– Contractor costs – LDC management costs
Soil	**Degradation of soil quality**	• Decrease erosion by minimizing disturbances and scarification of the surface • Best practices for soil management should be followed • Good housekeeping to minimize spills/leaks • Proper handling and management of wastes	Minor	– LDC – Contractor	LDC HSE department	Field supervision (audits)	– Contractor costs – LDC management costs
Waste generation	**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 (at Alexandria) until disposal at a hazardous waste facility (Nasreya or UNICO in Alexandria). • Transfer to LDC depots for temporary storage (at Alexandria) • Disposal at licensed Alexandria hazardous waste facilities (Nasreya or UNICO)	Irrelevant	– LDC – Contractor – Water Authority	LDC HSE department	Field supervision and review of certified waste handling, transportation, and disposal chain of custody	Indicative cost items included in contractor bid: Trucks from licensed handler Pre-treatment (if needed) Disposal cost at Nasreya Approximate cost of the above (to be revised upon

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

Receptor	Impact	Mitigation measures	Residual	Responsibility		Means of supervision	Estimated Cost of
		• • 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. • 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 o Add sand to inventory of hazardous waste					project execution): 8,000-10,000 LE per ton
	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. Normally asphalt waste could be disposed of with other excavation waste/aggregates in the local non-hazardous waste site. 6. 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. 7.	Irrelevant	Excavation Contractor	LDC HSE department	Official coordination proceedings signed by representatives of utility authorities – Examination of site-specific reports and records – Field supervision	– Contractor management costs – LDC management costs
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	Minor	– Excavation contractors	– LDC + Traffic department – LDC HSE – Local Unit Traffic department LDC HSE	Contractor has valid conditional permit + Field supervision	Contractor costs LDC management costs
		Announcements + Signage indicating location/duration of works prior to commencement of work		– LDC Excavation contractors Contractor		Ensure inclusion in contract + Field supervision Field supervision	–

Receptor	Impact	Mitigation measures	Residual	Responsibility		Means of supervision	Estimated Cost of
		Traffic detours and diversion		Traffic Department	Traffic Department	Field supervision for detouring efficiency _ Complaints received from traffic department	Additional budget not required
		Road restructuring and closing of lanes				Fluidity of traffic flow	
Occupational health and safety	**Health and Safety**	• 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. • 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 detailed manuals adopted by EGAS • Ensure the provision of the appropriate personal protective Equipment and other equipment needed to ensure compliance to HSE manuals	Minor	- LDC Excavation Contractor	LDC–HSE department	Field supervision and review of HSE report+ Field supervision (audits)	- 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 in case of accidents and provide the injured persons with proper health insurance	Minor	• LDC Excavation Contractor/ subcontractor	LDC–HSE department	Field supervision and review of HSE report+ Field supervision (audits)	• Contractor costs LDC management costs

Receptor	Impact	Mitigation measures	Residual	Responsibility		Means of supervision	Estimated Cost of
Infrastructure and underground utilities	**Damage to underground utilities resulting in water/wastewater leaks, telecommunication and electricity interruptions**	If maps/data are unavailable: • Perform limited trial pits or boreholes to explore and identify underground utility lines using non-intrusive equipment • In case of breaking underground utility and infrastructure line, 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 on preventive measures and documentation: • Preparation and analysis of accidental damage reports • 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 • 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	Minor	• LDC • Local Governmental unit	LDC	Field supervision and review of complaints Coordination minutes of meeting with the local governmental unit	LDC management costs
Local communities and businesses	**Lack of accessibility to businesses due to delay in street rehabilitation**	Access to business due to excavating 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	Minor	- LDC - contractors	LDC and EGAS SDO	_ Ensure the implementation of GRM (see annex 6) Supervision on Contractors performance	No cost

Receptor	Impact	Mitigation measures	Residual	Responsibility		Means of supervision	Estimated Cost of
		Follow up the procedure of Grievance Redress Mechanism (please see Annex 6) • Ensure transparent information sharing • 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)**	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	Minor	LDC	LDC and EGAS SDO	_ List of awareness activities applied _ Lists of participants _ Documentation with photos Awareness reports	LDC management costs

7.4 Environmental and Social Monitoring Matrix during CONSTRUCTION

Table 7-3: 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 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.	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 encountered)	LDC HSE	During construction. Monthly reports	Around construction site	Observation and documentation	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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
		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 digging _ 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 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 _ 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 _ evacuation of the	Minor	LDC	LDC HSE.	- Map and local geotechnical report review - Site inspections - Awareness actions Periodical trainings and drills	LDC management costs

Receptor	Impact	Mitigation measures	Residual	Responsibility		Means of	Estimated
		affected area - Repair or replacement of failed component					
Economical disturbance	• **Financial burden on economically disadvantaged due to the installments** • **Loss of revenue for LPG distributors**	- Petro Trade should collect the installment immediately after the installation of NG - The installments should be collected on monthly basis in order not to add burden to the poor, as it will be easier for them to pay on monthly basis - The installment should not be high - 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	Minor	Petro trade (Company responsible for collecting the consumption fees and the installments	EGAS	Banks loans log Complaints raised by poor people due to the frequency of collecting the installments	No cost
				LDC	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	Minor	LDC	LDC	Complaints raised due to Gas leakage	No cost

Receptor	Impact	Mitigation measures	Residual	Responsibility		Means of	Estimated
		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 7 A of the study and only a small part concerning the followed procedures during some emergency scenarios is translated in annex 7 B					
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	LDC management costs

Receptor	Impact	Mitigation measures	Residual	Responsibility		Means of	Estimated
						complaints	

7.6 Environmental and Social Monitoring Matrix during OPERATION

Figure 7-1: 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
Financial burden on economically disadvantaged due to the installments	- Number of economically disadvantaged people who complained - Number of those who can't pay the installment	LDC and Petro Trade, EGAS	Quarterly	Desk work	- Complaints log - Bank reports - Petro trade reports	No cost
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

- **EGAS health and safety guidelines to be followed during construction works is presented in annex 8.**

7.7 Reporting of Mitigation and Monitoring Activities

LDC 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
- Evaluation of LDC and contractor's performance on applying his 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

7.8 Institutional Framework for ESM&MP Implementation

7.8.1 Environmental Management Structures

EGAS is the supervisory body. ReGas is the implementing body. Below is diagram presenting the management structure of ReGas .

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

One of the standard tasks of the HSE Departments of ReGas, 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.

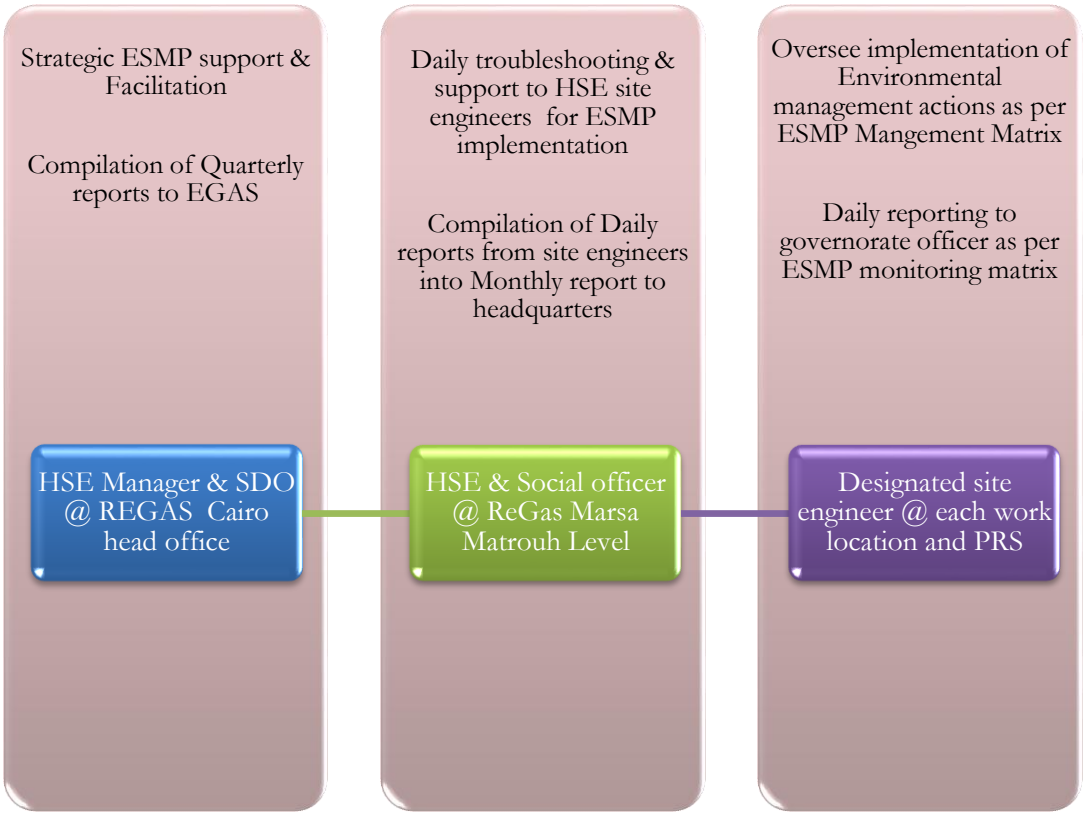

Figure 7-2: ReGas ESMP organogram

In the structure above, designated site engineers perform daily implementation, monitoring and reporting of activities as per the ESMP with special attention to:

1. Worker and contractor compliance to EGAS HSE manuals and procedures
2. Occurrence of HSE incidents and suggestions for incident avoidance
3. Management of broken asphalt (if any), unused backfill, solid waste, metal scrap
4. Management of paint cans, refueling & lubrication, soil contamination
5. Management of liquid wastes if any.
6. Checking that handling of hazardous waste is done according to the requirements of the Environmental Law, where a permit for handling hazardous material and Hazardous wastes is issued from EGAS Environment Department
7. Using analyzers to measure noise, SO_2, CO, and NO_2 in ambient air, and detect possible natural gas leaks
8. Measure noise at different locations of the PRS
9. Other tasks as outlined in ESM&MP

Daily reports are to be compiled and sent to the governorate HSE officer for preparation of monthly summary reports.

Monthly reports are sent to HSE officer at ReGas head office for compilation into quarterly reports to EGAS.

7.8.2 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 ReGas. Several versions of such manuals have been developed by Egypt Gas and should be mainstreamed to other LDCs, accompanied by the appropriate capacity-building.
3- An updated and detailed assessment of ReGas EHS institutional capacity and available resources for implementation of the ESMP
4- Specifically, ReGas 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 for the PRS-related ESIA study, developed for Marsa Matrouh City.

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).

8.3 Defining the stakeholder

For the purpose of the ESMP; qualitative information and data were collected through identifying those who residing in the project areas, 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, local Non-Governmental Organizations (NGOs) and Community Development Associations (CDAs). In this regard, key groups of relevance in Marsa Matrouh 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. In order to establish a more profound understanding of the local communities' perceptions and perspectives of the project, stakeholders' engagement and public consultation activities involved a broad base of community members; and Bedouin tribes.

Consultation activities in Matrouh took place in 2013 and completed on 2017. Two NGOs were recruited to take part in consultation activities with the community people. One of them is female headed NG that works with the persons with disabilities and Abnaa El Qabael NGO. (*Sons of tribes*) that work with the Bedouin tribes and headed by Bedouins.

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: Consultation event in Matrouh 25th of December 2013**

Figure 8-2: Head of persons with disabilities NGO in Marsa Matrouh

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

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

Phase	Participants	Number		Methods	Date
		Male	Female		
During Framework preparation					
During data collection phase	Potential beneficiaries and government officials	11	1	FGD	October-November 2017
	Governmental entities	7	1	In-depth	
	NGOs	2	12		
	Stakeholders and community people	19	6	Group meeting	

	Potential beneficiaries	24	35	Structured questionnaire	
Public Consultation	Stakeholders and community people	47	4		25th of December 2013
Total		110	59		
During Site Specific Studies					
During data collection phase	Potential beneficiaries and government officials	8	7	FGD	Apr-17
	Governmental entities	2	0	In-depth	
	NGOs	1	1		
	Stakeholders and community people	6	2		
Public Consultation	Stakeholders and community people	65	10	Public consultation event	27th of April 2017
Total		82	20		

8.4.1 Main results of consultation during the framework

The consultation activities conducted during the frame work preparation reflected overwhelming acceptance to the project. However, the PRS did not raise any of the community concerns. There was already in place many oil companies in Matrouh and pipelines were installed. Therefore, no safety concerns were raised about the PRS. However, the two main concerns raised are related to employment and the necessity to rehabilitate streets after any construction activities in place. (See Annex 9&10 for the consultation event conducted on the 25th of December 2013)

8.4.2 Main results of consultation during the data collection

With regard to the household connection, 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.

Figure 8-3: Consultation with the head of environmental department in Matrouh Governorate

Figure 8-4:Discussion with ReGas staff in the PRS

8.4.3 Final consultation event

The Final Consultation event was conducted in Matrouh governorate on the 27th of April 2017.
The following group of people attended the public consultation and sat on the panel:

- Eng. Ahmed Farag the project manager from EGAS
- Mr. Sayed Farag the deputy of Matrouh municipality
- As representative of the tribes, the Mayor Eid Awad attended
- The head of Supply department Mr. El Sayed Ahmed Abu El Yazeid
- The head of environmental department in the Governorate
- EcoConserv representative

Additionally there were the following groups who were ready to respond to any questions:

- From ReGas six engineers and technicians attended headed by Eng.Wael Tonsy the manager of Matrouh project
- Two representative from EGAS

A list of invitees was developed by environmental offices of the governorates, the sons of tribes and Tahady El Iqa NGOs. The list encompassed heads of tribes, NGOs and various government employees. 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 ReGas 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 Matrouh Governorate to distribute invitations in all project sites

Consultation was held in a hall affiliated to the tribes (Local Popular Council) 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.

Figure 8-5: Local Popular Council venue

Figure 8-7: Advertisement published in El Messa newspaper

Figure 8-6: Invitation sent to the invitees

Participants profile

The event was conducted on the 27th of April 2017

- 75 persons attended the consultation event: 65 males and 10 females
- Young people were keen to attend this meeting aiming to obtain a job opportunity
- The heads of tribes attended the consultation event

With regards to the occupational status:

Almost a third of participants were specialists' i.e. public managers, lawyers, accountants and physicians. The administrative staff represented about 12.5%. Skilled workers represented 19.4% who expressed their willingness to work in the project. 12.5% of the participants were heads of tribes (mayors "*Omda*"-wise men "*Awaqel*")

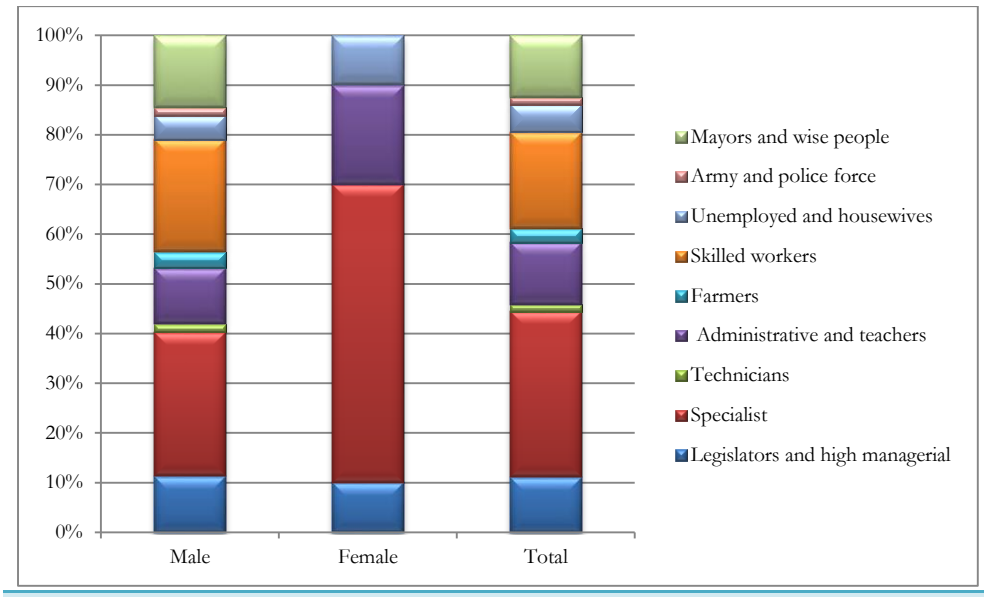

Figure 8-8: % Distribution of participants by occupation and sex

- 31.0% of the participants represents community people
- 14.5% of the participant were from local governmental in Marsa Matrouh
- 5.6% of female participants were affiliated to media sector
- 13.1% of the participants represent the civil society
- 7.2% of participants were from the traders and small scale shops
- 20.0% of participants were affiliated to Oil and Gas companies (EGAS, ReGas and others)

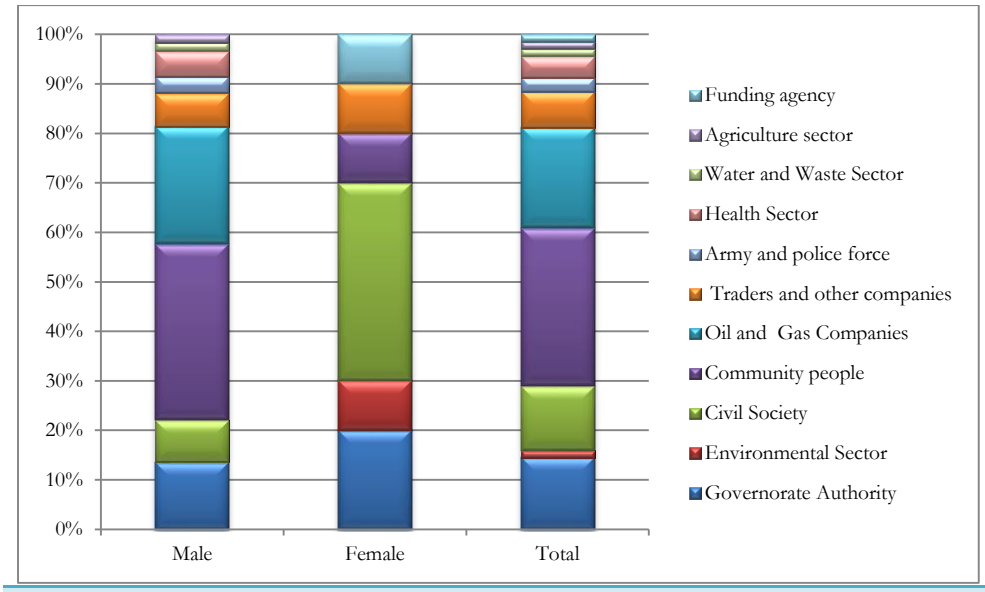

Figure 8-9: % Distribution of participants by sector and sex

Summary of discussions

- Mr Sayed Farag, the deputy chairmen of Marsa Matrouh municipality inaugurated the public consultation event
- Eng. Ahmad Farg, head of the project in EGAS made a brief lecture about the project
- The mayor Eid Awad welcomed the participants and the Natural Gas personnel
- Mr. Taher Moftah the head of environmental department in the governorate represented EEAA requirements
- A brief project description was presented by Eng. Wael Tony using power point presentation

Figure 8-10: The panel

- Using PowerPoint and multimedia, EcoConServ experts presented the ESIA to the attendees. 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.
- During discussion the Supply Manager attended the meeting and delivered a brief speech about the NG

Figure 8-11:Mr. Sayed Farag

Figure 8-12: Eng. Ahmad Farag

Figure 8-13: Mayor Eid Awad

Figure 8-14: Mr. Taher Moftah

Figure 8-15: Participants in the Public consultation event conducted on the 27th of April 2017

Figure 8-16:Open discussion in the Public consultation event conducted on the 27th of April 2017

Figure 8-17: EcoConServ consultant

Figure 8-18: Mr. Sayed Abu El Yazeid

Figure 8-19: Head of Tahady El Iqa NGO

Figure 8-20: Eng.Wael Tonsy responded to questions raised

It was notable that the reactions and attitudes of the local communities towards the project reflect overwhelming support of the NG installation 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 and that it carries many economic benefits for Marsa Matrouh. 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 ESIA study

Subject	Questions and comments	Responses	Addressed in the ESIA Study
Occupational health and safety	The LDC did not inform about the health and safety procedures they adopt. Additionally, the workers don't follow any basic health and safety measures	Prior to construction ReGas has prepared rigid health and safety guideline. The workers are obliged to adhere to this guideline. The LDC informed health and safety department prior to commencing any construction activities. However, the LDC monitoring activities showed that some of the workers are not fully obedient to health and safety measures. More on the job capacity building will be in place in order to avoid any occupational health and safety impacts.	addressed in section 5.3 , section 7.2 and 7.3

Subject	Questions and comments	Responses	Addressed in the ESIA Study
Coordination with the local authorities	The NG LDC should coordinate with the water and wastewater companies as well as the governmental local authorities prior to any construction activity takes place	It is the policy of the LDC to coordinate with the local authorities. Coordination meetings were prepared before any construction activities begin. All meetings were documented and kept in the LDC headquarter. With regards to coordination with the engineering department in the governorate and the municipality it is crucial in order to obtain maps for the underground utilities. These coordination activities continue after the project as no one of the above mentioned can do any maintenance work for their grids without having a representative from the LDC. In addition to that, special coordination with the Traffic Authority is required in order to inform them about the streets that will be drilled. We coordinated also with the governorate authority to get their approval on the extension of installation activities until the end of May 2017 as it is prohibited to work during summer time May- end of August. For more information please get in direct contact with ReGas after the session. The LDC also pay the cost of street restoration to the municipality, cost of information obtained from water companies and electricity companies.	Responded to in chapter 7 mitigation measures
Community health and safety	What are the safety measures adopted by the LDC	The LDC adhere to health and safety measures prepared by Egypt Gas. Additionally, a quantitative risk assessment study was prepared that contains various determinants i.e. flames, explosion, distance to the nearest community …etc. Reference to the LDC and EGAS long history with the households installation, it was noticed that no major problems took place during the previous 36 years. There is also an automatic controlled system that is monitored by EGAS. With regards to the pipelines passing in the main roads and streets different safety measures are adopted i.e. putting yellow ribbon and special sand around the pipelines	Responded in section 7 mitigation measures related to community health and safety

Subject	Questions and comments	Responses	Addressed in the ESIA Study
Rehabilitating damaged utility	The water companies grid was damaged by NG drilling activities and the police were informed about such destructive activities	The LDC staff are committed to rehabilitate any damaged underground utility. In case of any delay in fixing the damaged utility anyone can raise a complaint to ReGas regional branch in Matrouh, ReGas headquarter or EGAS.	Responded in section 7 mitigation measures related to damaging underground utility
Job opportunities	The LDC should employ all their personnel from Matrouh. For semi-skilled and skilled staff capacity building can be done to train young people here in order to raise their capacity. Matrouh Governorate is rich with its highly educated young people	All the panel agreed on that as the young people are fully aware about the NG installation and can participate actively in the project. Additionally, the Governor of Matrouh insisted on employing all the staff from Matrouh. Only few job opportunities can be recruited from outside the Governorate. It was also recommended to raise their capacity. At the beginning of the project, the LDC can recruit people from outside Matrouh in order to train young Matrouh people but later on special attention will go to Matrouh people as they will not cost the LDC accommodation, transportation and per-diem	Responded in section 5 positive impacts of the project
Street rehabilitation	The NG installation in Matrouh resulted in damage to streets. Until now, no streets have been paved. This caused damage to the cars and vehicles moving in these streets. It is strongly recommended to restore the streets condition by the LDC	The LDC has already disbursed street rehabilitation costs even before starting drilling activities. The municipality will be responsible to rehabilitate the streets after testing the network. It is worth mentioning that the NG installation is one of the projects implemented in the governorate. There are electricity and water supply projects that will entail excavating streets. Therefore, it is much useful to do all excavations prior to any paving taking place. The municipality is aware about various plans therefore, they are more capable to define the proper time to restore their street conditions. Coordinating with other entities prior to street restoration is crucial in order to pave whole streets and not only the damaged parts of the street. This will result in better street conditions	Section 7 street rehabilitation

Subject	Questions and comments	Responses	Addressed in the ESIA Study
Information sharing with the local community	Will the housewives and community people be informed about what to do in case of NG leakage?	The technicians who transform the cooker to NG will inform the housewives about the best procedures they can adopt in case of NG leakage. Additionally, there is a hotline number (129) that anyone can contact 24 hours a day 7 days a week.	Chapter 7 and hotline
Support from the Governorate	The Governorate Authority communicated with the LDC to support them. How did they managed to help the LDC?	The Governorate Authority tried to help the LDC in obtaining the lands needed for the PRS. After the military refused to provide the lands to the LDC, the Governorate approved to transfer 6,300 meter to the LDC. Additionally, His Excellency the Governor of Matrouh facilitated approvals and coordination with the LDC	Consultation section

Detailed results of consultation conducted in Marsa Matrouh on the 27th of April 2017 is presented in the Matrouh Governorate ESMP study.

8.5 Summary of consultation outcomes

ESMP-related consultation activities in Marsa Matrouh 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.

There was an overwhelming acceptance to the project. However, there were considerable concerns about health and safety measures and street conditions. There was a recommendation to coordinate with all governmental entities in order to facilitate project implementation. Additionally, employment activities remains as one of the major concerns among the community people.

8.6 ESMP disclosure

As soon as the site-specific ESIA gets approved by the World Bank and EEAA, a final report will be published on the WB, EGAS and ReGas websites. An executive summary in Arabic will be published on EGAS and ReGas 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: Environmental, Health, and Safety Guidelines

Annex 3: Site Air Quality & Noise

Annex 4: Chance find procedures

Annex 5 Impact Assessment

This is a comprehensive document in Arabic which covers H&S aspects of nearly all possible project activities with clear instructions, administrative requirements, and illustrations.

Attached below is the 3rd version of the guideline. This is currently under review from Re Gas prior to official release.

Annex 6 Grievance and Redress Mechanism

Annex 7A: Emergency Plan in Arabic

Annex 7B: English Emergency plan

Annex 7C: Classification of Emergency Levels

Annex 8 EGAS Health and Safety guidelines

Annex 9 Matrouh consultation event during the ESIA framework

Annex 10 Media items and list of participants