











1.5 Million Natural Gas Connections Project in 11 Governorates

Environmental and Social Management Plan

Executive Summary

Jazirat Mohamed, El-Kom El-Ahmar, Tanash, Suqayl, Ausim, Saft Al Laban, Hadayek El-Ahram, Al-Munib, Nazlet El-Semman and Kafr El-Gabal /

Giza, Governorate

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EGAS

Egyptian Natural Gas Holding Company

Developed by

"Petrosafe"

Petroleum Safety & Environmental Services Company

EcoConServ Environmental Solutions

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
CRN	Customer Reference Number
CULTNAT	Center for Documentation Of Cultural and Natural Heritage
EEAA	Egyptian Environmental Affairs Agency
EGAS	Egyptian Natural Gas Holding Company
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management framework
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
GIS	Global Information Systems
GPS	Global Positioning System
HH	Households
HSE	Health Safety and Environment
IDSC	Information and Decision Support Center
IFC	International Finance Corporation
IGE/SR	Institute of Gas Engineers/Safety Recommendations
LDC	Local Distribution Companies
LPG	Liquefied Petroleum Gas
STP	Sewage Treatment Plant
mBar	milliBar
NG	Natural Gas
NGO	Non-Governmental Organizations
P&A	Property and Appliance Survey
PAP	Project Affected Persons
PE	Poly Ethylene
PPM	Parts Per Million
PRS	Pressure Reduction Station
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SDO	Social Development Officer
SIA	Social Impact Assessment
SSIAF	Supplementary Social Impact Assessment
SYB	Statistical Year Book
Town Gas	The Egyptian Company for Natural Gas Distribution for Cities
WB	The World Bank
WHO	World Health Organization
$	United States Dollars
€	Euros

Exchange Rate: US$ = 17.57 EGP. as of March 2018

Exchange Rate: € = 21.69 EGP as of March 2018

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EXECUTIVE SUMMARY

1. Environment and Social Management Plan (ESMP)

1.1 Environment and Social Management Plan (ESMP)

The purpose of environmental management and social management plan is to consider and develop proper measures and controls to decrease the potential for environmental degradation during all phases of the Project, and to provide clearly defined action plans and emergency response procedures to account for human and environmental health and safety.

The proposed project represents an integral component of the National Energy Strategy which aims for greater use of natural gas for domestic users and reduction of government subsidies of (LPG) in Jazirat Mohamed, El-Kom El-Ahmar, Tanash, Suqayl, Ausim, Saft Al-Laban, Hadayek El-Ahram, Al-Munib, Nazlet El-Semman and Kafr El-Gabal districts.

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

- Describing project components and activities of relevance to the environmental and social impacts assessments.
- Identifying and addressing relevant national and international legal requirements and guidelines
- Describing relevant 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 has been prepared based on the Terms of Reference prepared by EGAS and cleared by the World Bank. Additionally, the ESMP follows national and WB requirements regarding scope and detail of assessment and procedure, and gives particular emphasis to public information and stakeholder participation.

The areas and the total number of households which will be covered in this ESMP are illustrated in table 1-1:

Table 1-1: Number of Areas and Potential clients

Governorate	Local Distribution Company	Areas	Potential clients
Giza	Town Gas	Jazirat Mohamed	7000
		El-Kom El-Ahmar	4000
		Tanash	2500
		Suqayl	3000
		Ausim	12000
		Saft Al-Laban	4000
		Hadayek El-Ahram	10000
		Al-Munib	9400
		Nazlet El-Semman and Kafr El-Gabal	23500
TOTAL:		9	75400

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

Table 1-2: List of contributors

Team Member	
1. Geo. Mohamed El-Ghazaly	2. Dr. Khaled Gamal
3. Dr. Zeinab Farghaly	4. Chem. Mohamed Saad Abdel Moein
5. Chem. Mohamed Abdel Moniem Aly	6. Chem. Mohamed Mahmoud Abdel Rady
7. Dr. Mahmoud sarhan	8. Dr. Mahmoud Nour El-Din

2. Project Description

2.1 Background

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

The project distribution network comprises the following components:

- Local Distribution Network: Distribution mains
- Local Distribution Network: City gate regulators
- Local Distribution Network: Connection lines

2.2 Project Work Packages

2.2.1 Intermediate Pressure Network-Main feeding line (7 bar system) for Jazirat Mohamed area:

Jazirat Moahmed area belongs to El-Warraq district, it will be connected with a polyethylene intermediate pressure feeding pipeline of about 3.665 km length.

Route

The proposed pipeline route will start from the Offtake point on an existing Intermediate Pressure gas pipeline which is located at Embaba-El-Kanater Rd., which feeding Jazirat Mohamed area.

Figure 2-1: Satellite Map showing The Location of Offtake point

The proposed pipeline route then extends to the south direction to entrance of Gas Companies St. for about 600 meter. Then turns west in Gas companies St. for about 865m and then 1.5 km in west direction till reaching to entrance of Jazirat Mohamed-El-Kom El-Ahmar road and going south west direction for about 700 m till reaching end point location as shown in Figure 2-2.

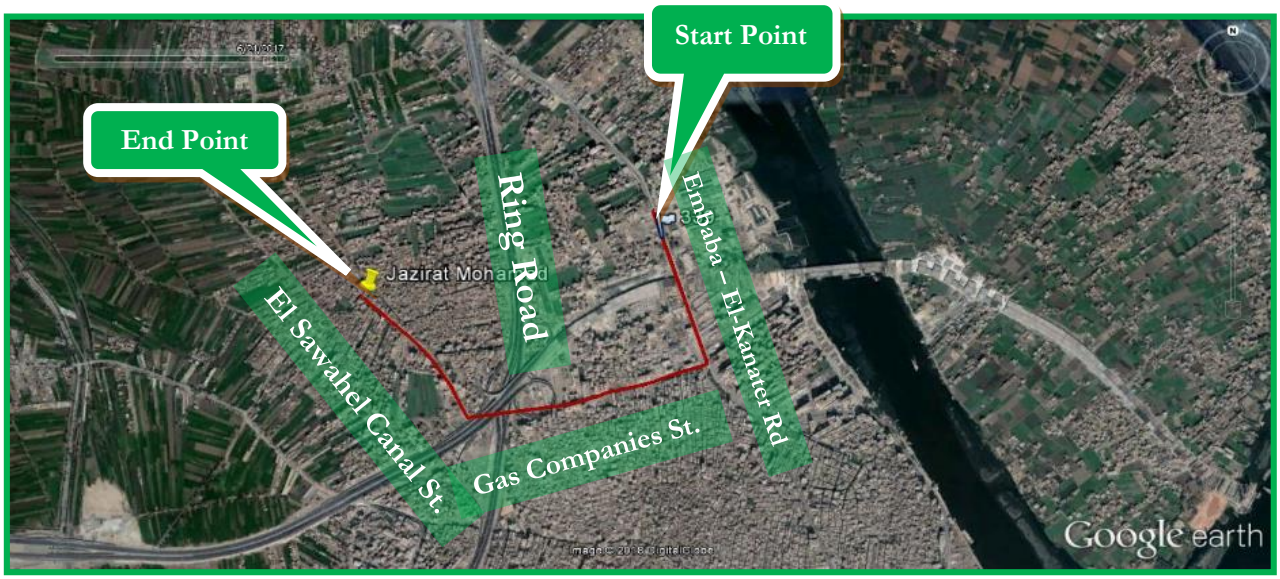

Figure 2-2: Satellite Map showing the proposed pipeline route feeding Jazirat Mohamed area

2.2.2 Low-pressure Distribution-Network for Jazirat Mohamed area:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will be installed horizontally underground for 10 sectors within Jazirat Mohamed as shown in figure 2-3 below.

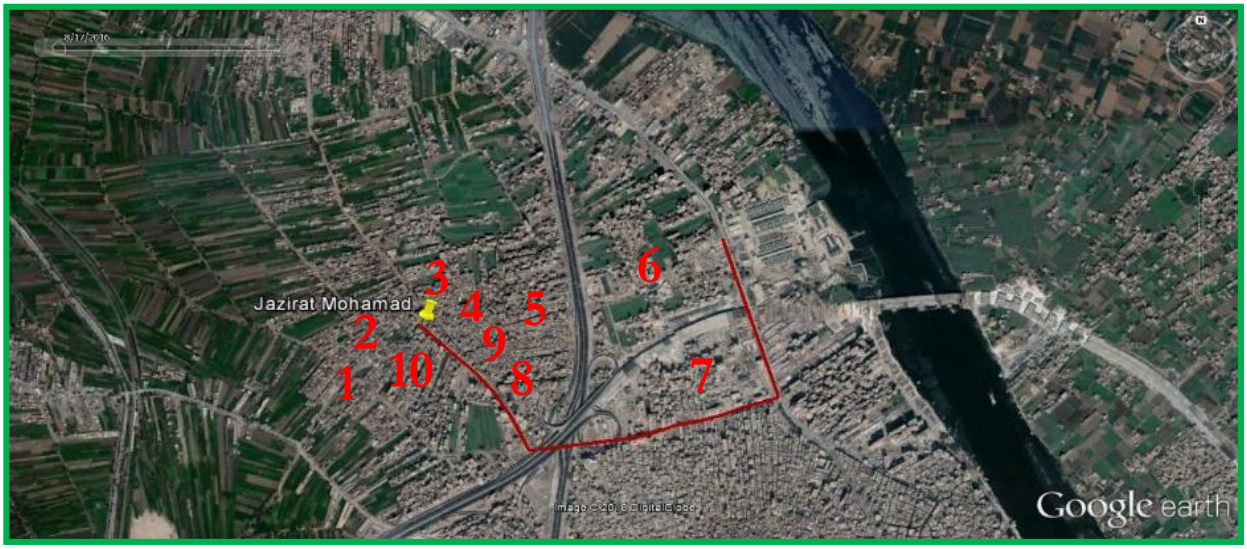

Figure 2-3: Satellite map showing the proposed Distribution - Network Jazirat Mohamed

2.2.3 Intermediate Pressure Network-Main feeding line (7 bar system) for El-Kom El-Ahmar area:

El-Kom Al-Ahmar belongs to Ausim district; it will be connected with a polyethylene intermediate pressure feeding pipeline of about 3.8 km length.

Route

The proposed pipeline route will start from the Offtake point on an existing Intermediate Pressure gas pipeline which is located at Embaba-El-Kanater Rd. (Lat. 30° 6'49.21"N, long. 31°12'36.26"E), which feeding EL-Kom El-Ahmar area.

Figure 2-4: The Location of Offtake point

The proposed pipeline route then extends to the south direction to entrance of Gas Companies St. for about 600 meter. Then turns west in Gas companies St. and going in the same direction for about 865m and then turns west and extends for about 200 m till reaching to the entrance of Jazirat Mohamed and going for about 700m in the north wet direction then turns south west and extends for about 720m then turns in the east direction and extends for about 2.285 km till reaching end point location.

Figure 2-5: Satellite Map showing the proposed pipeline route feeding EL-Kom El-Ahmar area

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for nine sectors within EL-Kom El-Ahmar as shown in figure 2-6 below.

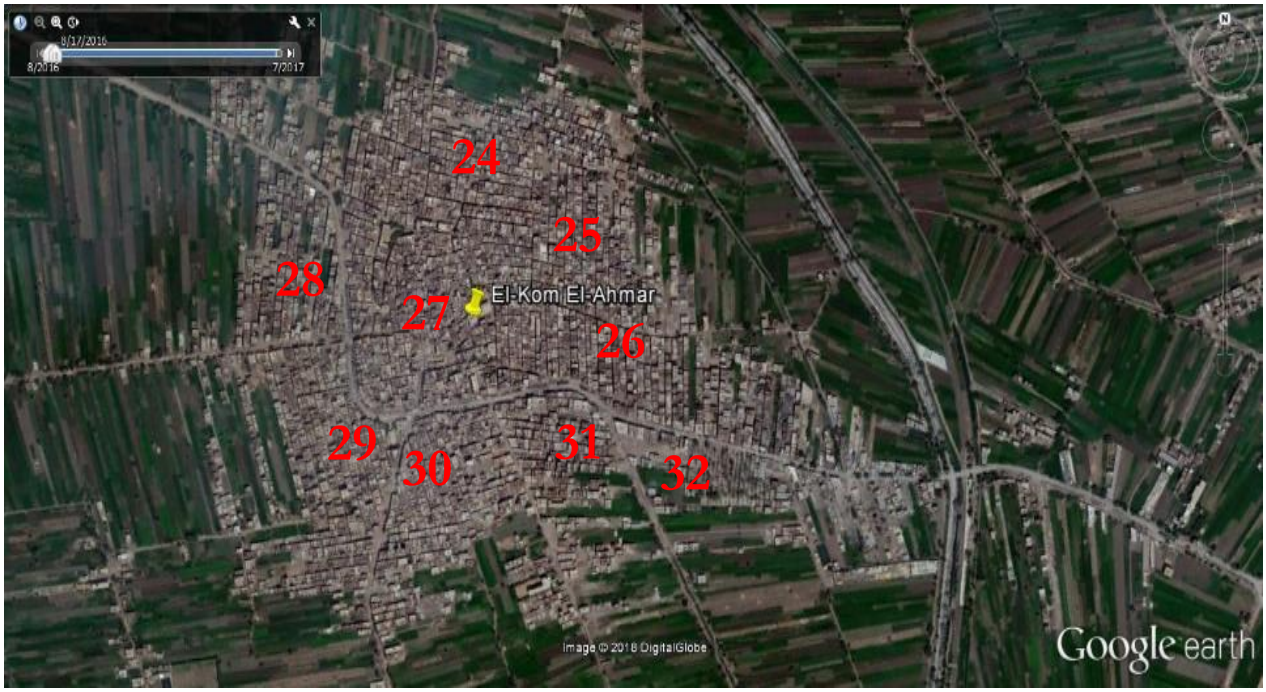

Figure 2-6: Satellite map showing the proposed distribution - network feeding EL-Kom El-Ahmar area

2.2.4 Intermediate Pressure Network-Main feeding line (7 bar system) for Tanash area:

Tanash belongs to El-Warraq district; it will be connected with a polyethylene intermediate pressure feeding pipeline of about 1.3 km length.

Route

The proposed pipeline route will start from the Offtake point will be on the proposed Valve room which is located at El Sawahel Canal Rd, which feeding Tanash area.

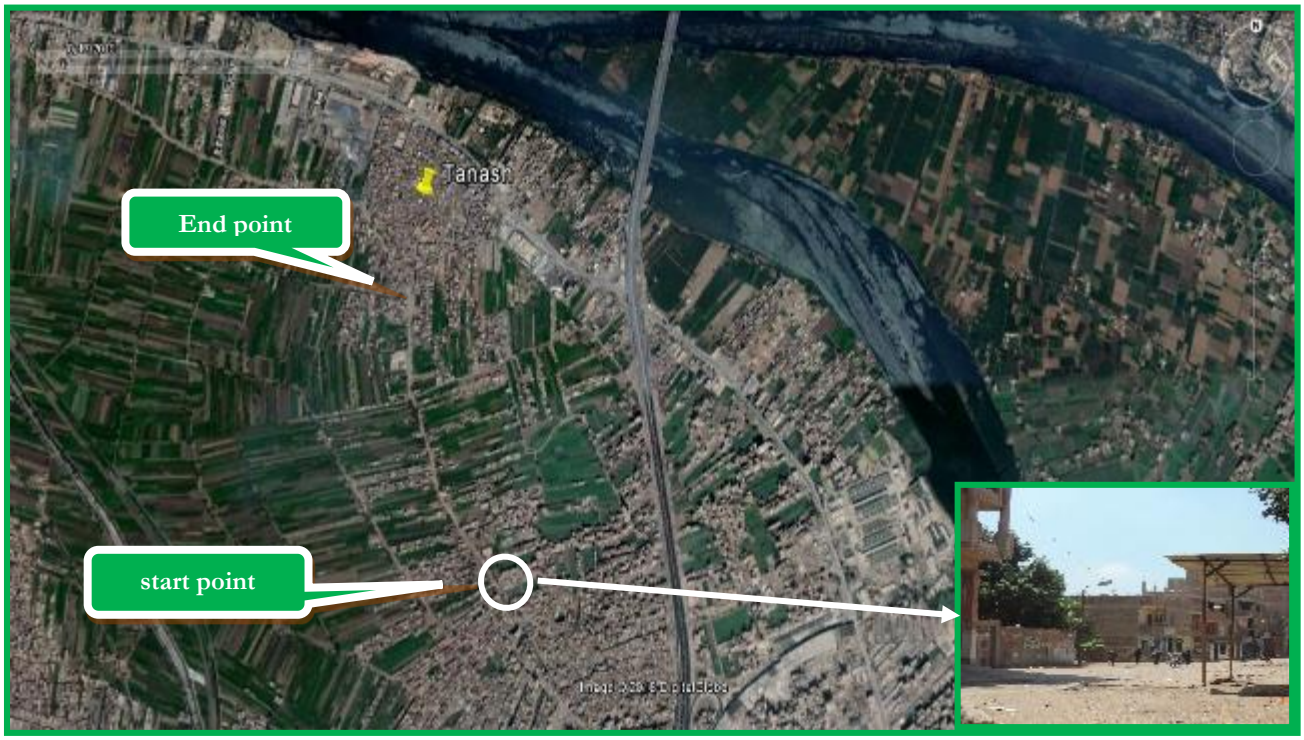

Figure 2-7: Satellite Map showing The Location of Offtake point (Tanash area)

The proposed pipeline route then extends from the proposed valve room to the north direction for about 1.3 km till reaching end point location.

Figure 2-8: Satellite Map showing the proposed pipeline route feeding Tanash area

2.2.5 Low-pressure Distribution-Network Network for Tanash area:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for seven sectors within Tanash as shown in figure 2-9 below.

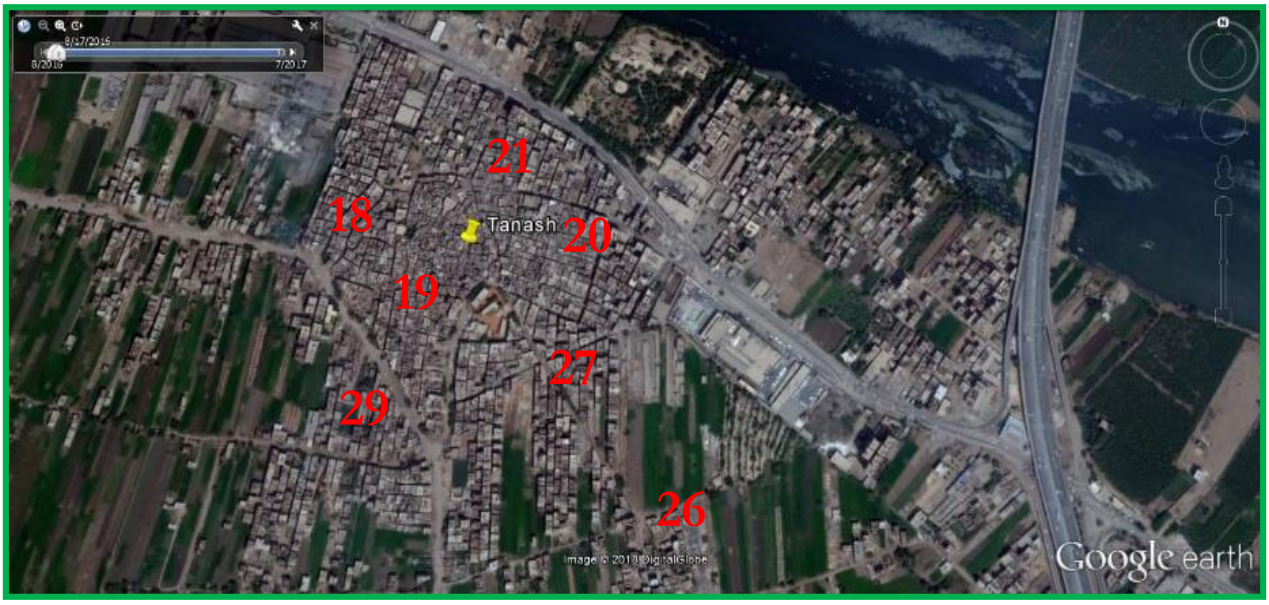

Figure **2-9**: Satellite map showing the proposed distribution - network feeding Tanash area

2.2.1 Intermediate Pressure Network-Main feeding line (7 bar system) for Suqayl area:

Suqayl area belongs to Ausim district, it will be connected with a polyethylene intermediate pressure feeding pipeline of about 2.4 km length.

Route

The proposed pipeline route will start from the proposed Valve room, which is located at El Sawahel Canal Rd., which feeding Suqayl area.

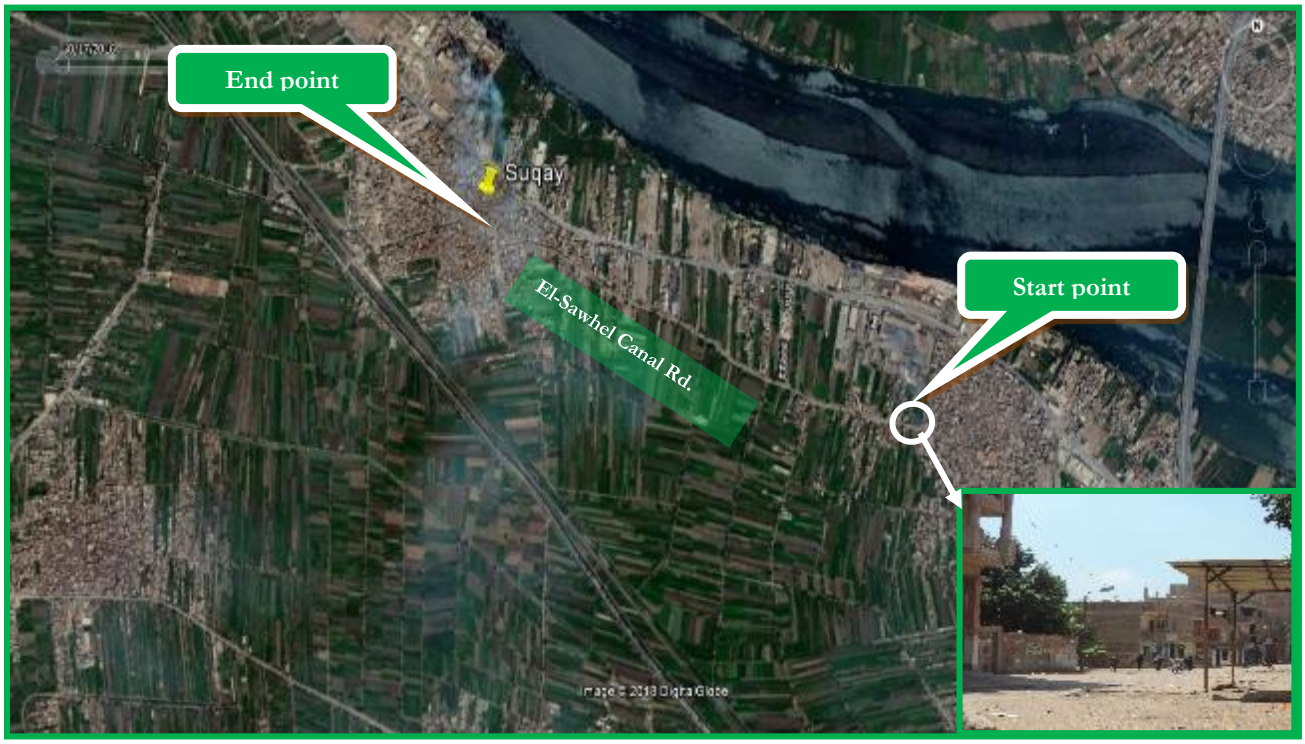

Figure 2-10: The Location of Offtake point (Suqayl area)

The proposed pipeline route then extends from the proposed valve room to the north direction for about 2.4 km till reaching end point location.

Figure 2-11: Satellite Map showing the proposed pipeline route feeding Suqayl area

2.2.1 Low-pressure Distribution-Network Network for Suqayl area:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for Suqayl sectors as shown in figure 2-12 below.

Figure 2-12: Satellite map showing the proposed distribution – network feeding Suqayel area

2.2.2 Intermediate Pressure Network-Main feeding line (7 bar system) for Ausim area:

Ausim area belongs to Ausim markaz, they are adjacent to each other; and thus, will be connected by the same polyethylene intermediate pressure feeding pipeline of about 6.10 km length.

Route

The proposed pipeline route will start from the proposed Valve room which is located at El Sawahel Canal Rd., which feeding Ausim area .as shown in figure 2-13

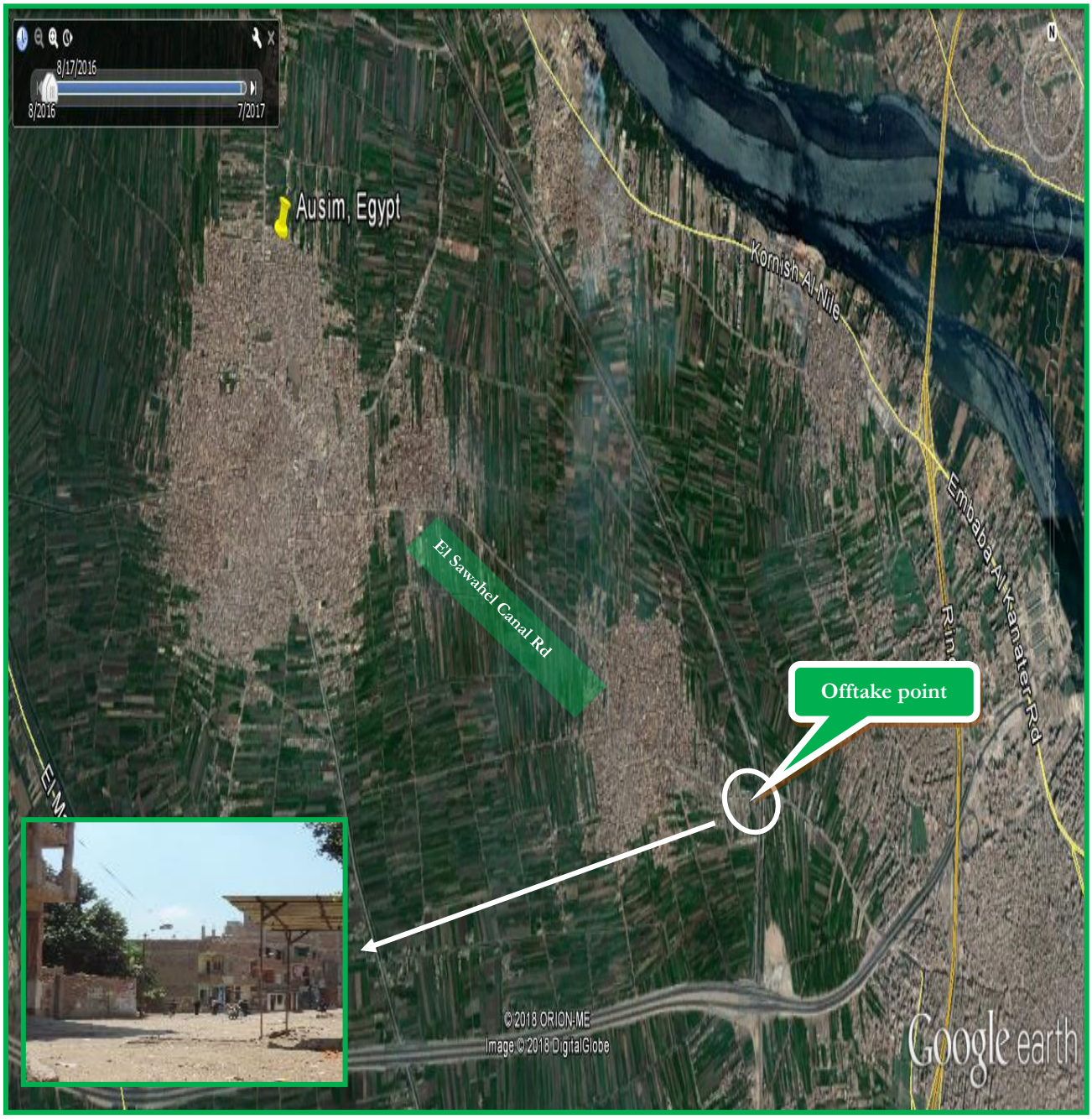

Figure 2-13: The Location of Offtake point Ausim area

The proposed pipeline route then extends from the proposed valve room to the south direction to entrance of Gazirt mohamed- Alkom El Ahmer st. for about 670 meters. Then turns west in the same street and for about 2.11 km and then 3.32 km in north western direction till reaching end point location.

Figure 2-14: Satellite Map showing the proposed pipeline route feeding Ausim area

2.2.3 Low-pressure Distribution-Network Network for Ausim area:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for 21 sectors within Ausim. as shown in figure 2-15 below.

Figure 2-15: Satellite map showing the proposed distribution - network feeding Ausim area

2.2.4 Intermediate Pressure Network-Main feeding line (7 bar system) for Saft Al-Laban area:

Saft Al-Laban area belongs to Boulaq district, it will be connected with an existing polyethylene intermediate pressure-feeding pipeline located in El-Tahrir St., which feeding Saft Al-Laban area. as shown in figure 2-16

Figure 2-16: Satellite Map showing the proposed pipeline route feeding Saft Al-Laban area

2.2.5 Low-pressure Distribution-Network Network for Saft El-Laban area:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for one sector within Saft –El-Laban area as shown in figure 2-17 below.

Figure 2-17: Satellite map showing the proposed distribution - network feeding Saft Al-Laban area

2.2.6 Intermediate Pressure Network-Main feeding line (2 bar system) for Hadayek EL-Ahram area:

Hadayek El-Ahram area belongs to El-Haram district, it will be connected with a polyethylene intermediate pressure feeding pipeline of about 2.9 km length.

Route

The proposed pipeline route will start from the Offtake Point on an existing metering station in street-1 (Lat. 29°58'51.76"N, long. 31° 6'14.58"E). Which is the feeding source for Hadayek EL-Ahram area (figure 2-18).

Figure 2-18: The Location of metering station

The proposed pipeline route then extends to the same street in the west direction for about 530m then turns to the south direction in street-9 northeast direction, and then going in the southern direction for about 2.410 km till reaching to the end point as shown in figure (2-19)

Figure **2-19**: Satellite map showing the proposed distribution - network feeding Hadayek EL-Ahram area

2.2.7 Low-pressure Distribution-Network Network for Hadayek EL-Ahram area:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for three sectors within Hadayek EL-Ahram as shown in figure (2-20) below.

Figure 2-20: Satellite map showing the proposed distribution - network feeding Hadayek EL-Ahram area

2.2.8 Intermediate Pressure Network-Main feeding line (2 bar system) for Al-Munib area:

Al-Munib area belongs to Ganoub El-Giza district, it will be connected with an existing polyethylene intermediate pressure-feeding pipeline, which existed in Osman Moharam St. (Lat. 29°58'53.17"N, long. 31°11'24.67"E) which is the feeding source for Al-Munib area (figure 2-21).

Figure 2-21: Satellite Map showing the proposed pipeline route feeding Al-Munib area

2.2.9 Low-pressure Distribution-Network Network for Al-Munib area:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for two sectors within Al-Munib as shown in figure (2-22) below.

Figure 2-22: Satellite map showing the proposed distribution – network feeding Al Munib area

2.2.10 Intermediate Pressure Network-Main feeding line (2 bar system) for Nazlet El-Semman& Kafr EL-Gabal area:

Nazlet E-Semman& Kafr EL-Gabal area belongs to EL-Haram district; it will be connected with a polyethylene intermediate pressure feeding pipeline of about 2 km length.

Route

The proposed pipeline route will start from the Offtake Point on an existing Intermediate Pressure gas pipeline, which is located on El-Mansouria St., which is the feeding source for Nazlet El-Semman &Kafr EL-Gabal.

Figure 2-23: The Location of Offtake point

The proposed pipeline route then extends to the southern direction in the same street for about 2 km, till reaching the end point location.

2.2.11 Low-pressure Distribution-Network Network for Nazlet El-Semman& Kafr El-Gabal area

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of 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. PE80 network will installed horizontally underground for five sectors within Nazlet El-Semman& Kafr El-Gabal as shown in figure 2-24 below.

Figure 2-24: Satellite map showing the proposed distribution - network feeding Nazlet El-Semman& Kafr El-Gabal

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 and its 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.
  - 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). Environmental Assessment (OP/BP 4.01) is the only applicable policy for the proposed project. OP/BP 4.12 will not be applicable to the low-pressure pipelines of Giza 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 Jazirat Mohamed, El-Kom El-Ahmar, Tanash, Suqayl, Ausim, Saft Al Laban, Hadayek El-Ahram, Al-Munib, Nazlet El-Semman and Kafr El-Gabal. The Pipelines network will not cross agricultural land in project area and accordingly no land acquisition or resettlement activities are anticipated and accordingly no compensation will be applied

3.2.1 World Bank Group General Environmental, Health and Safety Guidelines & WB Environmental, Health and Safety Guidelines for Gas Distribution Systems-IFC Guideline

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-3** from the report) are applicable to the project. Gaps between requirements outlined by WBG guidelines and actions detailed by the ESIA have been analyzed. There are no significant differences between the requirements outlined by the WBG EHS GUIDELINE on GAS DISTRIBUTION SYSTEMS and the management and monitoring actions outlined by the ESIA. In addition to the above-mentioned safeguards policies, the Directive and Procedure on Access to Information[1] will be followed by the Project.

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

4. Environmental and Social Baseline

4.1 Description of the Environment

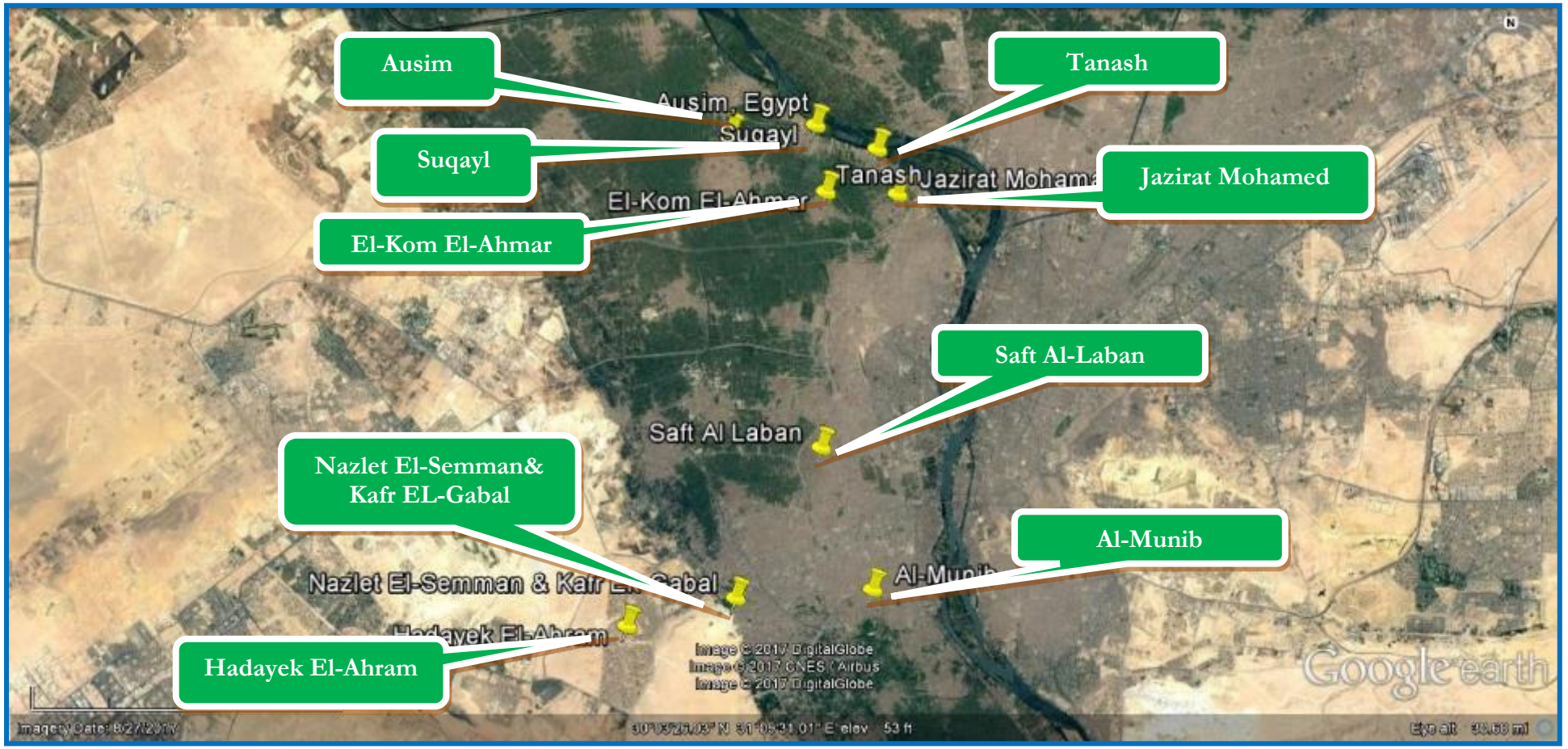

Figure 4-1: Distribution of cities in Giza governorate and proposed gas connections districts location

The proposed project aiming to construct a natural gas network feeding some districts of Giza governorate as per the following:

- **Jazirat Mohamed**
  Jazirat Mohamed district is located in El-Warraq district, bordered from north by Tanash district and from south by Kafr EL-Hanadwa district and from east by Jazirat Warraq El Hadar district and from west by El-Kom El-Ahmar district.
- **EL-Kom El-Ahmar**
  EL-Kom El-Ahmar district is located in Ausim district, bordered from north by Suqayl district and from south by El-Barajil district and from east by Jazirat Mohamed district and from west by Ausim district.
- **Tanash**
  Tanash district is located in Ausim district, bordered from north by Suqayl district and from south by Warraq El-Hadar district and from east by Nile River and from west by Ausim district.
- **Suqayl**
  Suqayl district is located in Ausim district, bordered from north by Nile River and from south by El-Kom El-Ahmar and from east by Tanash district and from west Ausim district.
- **Ausim**
  Ausim is located in Ausim district, bordered from north by Burtus district and from south by Al-Brajil district and from East by Suqayl district and from west by Mahmoud Abdel Samad district.
- **Saft Al-Laban**
  Saft Al-Laban is located in Boulaq district, bordered from north by Zinayn and Bulaq El-Dakror and from south by Faisal and from east by Nile River and from west Monshaat EL-Bakkary.
- **Hadayek El-Ahram**
  Hadayek El-Ahram is located in El-Haram, bordered from north Kafr Ghatati and from south by Cairo-El-Fayum desert road and from east by Nazlet El-Semman& Kafr El-Gabal and from west October City.
- **Al-Munib**
  Al-Munib is located in Ganoub El-Giza district, bordered from north by Saft Al-Laban and from east by Misr AL-Qadima and from west Nazlet El-Semman& Kafr El-Gabal.
- **Nazlet El-Semman& Kafr El-Gabal**
  Nazlet El-Semman& Kafr El-Gabal is located in El-Haram district, bordered from north by Kafr Ghatati and from south by Cairo-AL-Fayum desert road and from east by Al-Munib and from west Hadayek El-Ahram.

4.1.1 Air Quality

The concentrations of measured air pollutants in the studied areas are below national and WB guidelines (Table 4.2). Construction engines are certified, i.e., exhaust is below permissible levels. Ambient concentrations of gaseous pollutants, NOx, SOx and CO are unlikely to surpass permissible levels due to operation of construction equipment. Management and mitigation plans for ambient air pollution are further addressed in chapters 6 and 7.

Table 4-1: Jazirat Mohamed, El-Kom El-Ahmar, Tanash, Suqayl, Ausim, Saft Al-Laban, Hadayek El-Ahram, Al-Munib and Nazlet El-Semman& Kafr El-Gabal average Air Quality Measurements

Area	NO (µg/m3)	NO2 (µg/m3)	NOx (µg/m3)	SO2 (µg/m3)	CO (mg/m3)	PM10 (µg/m3)	T.S.P (µg/m3)
Jazirat Mohamed	15.78	26.91	43.24	16.38	2.39	122.12	151.66
El-Kom El-Ahmar	16.93	17.04	33.97	15.96	3.50	111	170
Tanash	15.74	26.45	41.06	18.24	1.60	101.11	130.56
Suqayl	18.80	16.14	34.94	16.09	3.49	101	129
Ausim	11.98	24.49	36.46	15.95	3.36	94	118
Saft Al-Laban	16.83	24.70	41.53	13.20	3.03	87	101
Hadayek El-Ahram	16.53	22.75	39.28	13.71	2.91	74	109
Al-Munib	17.58	22.45	40.03	15.20	3.09	80	113
Nazlet El-Semman& Kafr El-Gabal	8.89	16.79	25.70	10.79	1.60	74	109
Limits	150	200	150	350	30	150	230

4.1.2 Noise

Site specific noise measurements

The noise measurements in the studied areas are below national and WB guidelines as shown in Table 4-3. 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 workday, 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.

Table 4-2: Jazirat Mohamed, El-Kom El-Ahmar, Tanash, Suqayl, Ausim, Saft Al-Laban, Hadayek El-Ahram, Al-Munib and Nazlet El-Semman& Kafr El-Gabal Noise Measurements

Area	LAeq	National Limits	International Limits
Jazirat Mohamed	64.74	70	70
El-Kom El-Ahmar	67.76		
Tanash	63.98		
Suqayl	65.09		
Ausim	62.96		
Saft Al-Laban	51.79		
Hadayek El-Ahram	54.16		
Al-Munib	49.46		
Nazlet El-Semman& Kafr El-Gabal	55.10		

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

4.1.3 Water resources

- Groundwater is unavailable in the nine studied areas.
- There are no canals or drainages in the surroundings the project areas. The areas are mainly Semi urban with scarce trees and palms. However, at the entrance of El-Kom El-Ahmar and Ausim, There is a small drainage path (brackish water from agriculture wastes). The main feeding line gas pipelines will not cross it.

4.1.4 Terrestrial Biological Environment:

The projected work is planned along existing roads; no pipelines will be passing through any of the natural habitats. The gas route will be located in mixed agricultural and urban areas.

The proposed gas pipeline route and the connections of pipelines to households are planned in areas where flora and fauna of significance do not occur

Flora

There had not been flora recorded in the studied areas except some non- significant exotic species at Jazirat Mohamed, El-Kom El-Ahmar, Tanash, Suqayl, and Ausim.

Fauna

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

4.1.5 Waste Management:

Solid Waste:

The responsibility of service planning, delivery and monitoring in Al Giza Governorate is delegated to Cleansing and Beatification Agency managed by District Presidency.

In most cases, the proportion of waste collected in El-Warraq transfer station by small trucks then transferred to dump site (Shoubramant dumpsite)

Liquid Waste:

No liquid wastes are expected during the construction phase. However, if the sub-surface table is shallow, the trench should be dewatered (portable trash pumps are commonly used in construction projects) and discharge the water into a drain or sewer manhole after sampling and analysis before selecting appropriate disposal method, according to the arrangements with local authorities, where project workers will have access to public sanitary facilities. Therefore, no extra sanitary waste is anticipated.

4.2 Socioeconomic Baseline

The Social Impact Assessment (SIA) study is carried out through a combination of desktop and field survey in order to fully describe the social baseline of the Project area. The main methodology for the SIA is semi-quantitative assessment to convey accurate and relevant information for the project areas. There has been substantial data gathering on socioeconomic conditions in the area. A number of visits to the project sites were conducted during February 2017. SIA tools were employed during the field trip including observation and interviews with local officials, community leaders, local administrative units, LPG warehouse, local health units, and NGOs.

Project Area

Giza Governorate is located in the center of the country, situated on the west bank of the Nile River opposite Cairo. Its capital is the city of Giza. It includes a stretch of the left bank of the Nile Valley around Giza, and acquired a large stretch of Egypt's Western Desert, including Bahariya Oasis. The project will be implemented in nine districts of Giza governorate; Jazirat

Mohamed, El-Kom El-Ahmar, Tanash, Suqayl, Ausim, Saft Al-Laban, Hadayek El-Ahram, Al-Munib and Nazlet El-Semman& Kafr El-Gabal. The following table illustrates the project areas.

4.2.1 Administrative affiliation

The total area of Giza governorate is 85153 km^2. Giza's capital is the city of Giza. It is divided into (10) administrative districts (Markaz), (12) cities, (7) Sub-burb (Hay), (51) rural local units including (170) district and (581) and Ezbet/Kafr.

4.2.2 Urbanization Trends

Table 4-3 Urbanization indicators for the project districts[2]

Governorate	District	Urbanization Indicators	Buildings Density
Giza	Jazirat Mohamed	Semi-urbanized area overlooking River Nile. Hosts fishing community. Residential areas, large commercial activities i.e. restaurants, groceries, and local cafes.	**High**
	El-Kom El-Ahmar	Small district in Ausim surrounded by agriculture lands. Residential areas, small commercial activities i.e. basic restaurants, groceries, and local cafes.	**Medium**
	Tanash	District overlooking River Nile. Surrounded by agriculture lands. Large commercial activities i.e. El-Nasr for casting, Mostafa Aly for illumination,…etc	**Medium**
	Suqayl	Small district in Ausim overlooking River Nile and surrounded by agriculture lands. Residential areas, small commercial activities i.e. basic restaurants, groceries, and local cafes.	**Medium**
	Ausim	Semi urbanized city overlooking and surrounded by agriculture lands. Residential areas, larger commercial activities i.e. governmental offices, restaurants, groceries, and local cafes.	**High**
	Saft Al-Laban	Urbanized area and highly populated most commercial activities; shopping area, restaurants, groceries, local cafes.	**High**
	Hadayek El-Ahram	Newly established urbanized area, residential areas, most commercial activities; restaurants, groceries, local cafes, shopping areas and sporting clubs. Increasingly growing population due to the affordable housing especially for middle-class citizens.	**Medium**
	Al-Munib	Semi urbanized area Overlooking the ring road most commercial activities; Trade, shopping areas, groceries	**High**
	Nazlet El-Semman& Kafr El-Gabal	urbanized areas. Being near Giza Pyramids makes Nazlet Al-Semman a tourism service center for Giza area. Residential areas, small commercial activities i.e. restaurants, Bazaar , groceries, and local cafes.	**High**

[2] ***Source: field visits observations***

Dwelling Characteristics:

Table 4-4 Dwelling indicators3

Governorate	District	Urbanization Indicators
Giza	Jazirat Mohamed	Housing density is high. High to medium buildings height with 4-12 floors in average. Standard buildings' type with red bricks and concrete of ceiling. In many areas, the houses are joined to one another in a continuous row
	El-Kom El-Ahmar	Housing density is medium. Medium height buildings with 4-6 Floors in average. Standard buildings' type with red bricks and concrete of ceiling. In many areas, the houses are joined to one another in a continuous row.
	Tanash	Housing density is medium. High to medium height buildings with 4-10 Floors in average. Standard buildings' type with red bricks and concrete of ceiling. In many areas, the houses are joined to one another in a continuous row
	Suqayl	Housing density is medium. Medium height buildings with 4-6 Floors in average. Standard buildings' type with red bricks and concrete of ceiling. In many areas, the houses are joined to one another in a continuous row.
	Ausim	Housing density is high. Medium height buildings with 4-6 Floors in average. Standard buildings' type with red bricks and concrete of ceiling.
	Saft Al-Laban	Housing density is high. High to medium height buildings with 4-12 Floors in average. Standard buildings' type with red bricks and concrete of ceiling. In many areas, the houses are joined to one another in a continuous row
	Hadayek El-Ahram	Housing density is medium. Mostly medium height buildings with 3-5 Floors in average. Relatively good looking and newly established buildings' type with red bricks and concrete of ceiling. Most houses has small gardens.
	Al-Munib	Housing density is high. Medium height buildings with 4-6 Floors in average. Standard buildings' type with red bricks and concrete of ceiling.
	Nazlet El-Semman& Kafr El-Gabal	Housing density is medium. High to medium height buildings with 4-10 Floors in average. Standard buildings' type with red bricks and concrete of ceiling

[3] ***Source: field visits observations***

4.2.3 Road distribution network and traffic

Table 4-5 Streets status and traffic in the project areas

Governorate	District	Streets status	Traffic density
Giza	Jazirat Mohamed	Main streets are wide (5-8m) with asphalt where local streets are mix of asphalt and dirt, narrow and winding in some areas. Microbuses and Tuk Tuk are main means of transportation.	High traffic density.
	El-Kom El-Ahmar	Local streets consist mainly of narrow, dirt and winding footpaths. Tuk Tuk, motorcycle, microbus are main means of transportation.	Medium traffic density.
	Tanash	Main streets are wide. Local streets consist mainly of narrow, dirt and winding footpaths. Private cars, trucks, motorcycle, microbus are main means of transportation.	High traffic density
	Suqayl	District area. Local streets consist mainly of narrow, dirt and winding footpaths. Tuk Tuk, motorcycle, microbus are main means of transportation.	Low traffic density.
	Ausim	Main streets are wide (10-20m), Local streets are mix between asphat and dirt and winding footpaths. Private cars, microbus, Tuk Tuk, motorcycle are main means of transportation.	Medium traffic density.
	Saft Al-Laban	Main streets are wide (5-10m) with asphalt where local streets are mix of asphalt and dirt, narrow and winding in some areas.	Medium traffic density.
	Hadayek El-Ahram	New area. Main streets are wide (10-20m) with asphalt where local streets are mix of asphalt and dirt. Local streets are wide in most areas.	Medium to low traffic density
	Al-Munib	Local streets consist mainly of narrow, dirt and winding footpaths.	High traffic density
	Nazlet El-Semman& Kafr El-Gabal	Main streets are wide (20-40m) with asphalt where local streets are mix of asphalt and dirt, narrow and winding in some areas. Microbuses, private cars, bus, and Tuk Tuk are main means of transportation.	High traffic density

4.2.4 Demographic Characteristics

Total population:

Table 4-6 Distribution of population in project areas[4]

Governorate	District	Population	Potential clients
Giza	Jazirat Mohamed	25,121	7000
	El-Kom El-Ahmar	39,927	4000
	Tanash	19,789	2500
	Suqayl	27,842	3000
	Ausim	101,745	12000
	Saft Al-Laban	165,523	4000
	Hadayek El-Ahram	350000	10000
	Al-Munib	106,858	9400
	Nazlet El-Semman& Kafr El-Gabal	60,215	23500
Total	9	897,020	75,400

[4] ***Source: districts local units, CAPMAS, Town Gas***

4.2.5 Household size

Table 4-7 Average family size[5]

Governorate	District	Family size
Giza	Jazirat Mohamed	4.34
	El-Kom El-Ahmar	5.01
	Tanash	4.34
	Suqayl	5.01
	Ausim	5.01
	Saft Al-Laban	4.59
	Hadayek El-Ahram	
	Al-Munib	4.13
	Nazlet El-Semman& Kafr El-Gabal	4.21

4.2.6 Access to basic services

Table 4-8 Access to basic services[6]

Governorate	District	Percentage of persons having access to portable water	Percentage of persons using electricity for lighting	Percentage of persons having public sanitation network
Giza	Jazirat Mohamed	92.1%	89.7 %	92%
	El-Kom El-Ahmar	92.2 %	96.2%	89.7%
	Tanash	92.1%	96.1%	89.7%
	Suqayl	92.1%	96%	89.6%
	Ausim	92.1%	96.1%	89.7%
	Saft Al-Laban	91.9%	95.9%	89.5%
	Hadayek El-Ahram	92 %	96 %	89.6 %
	Al-Munib	92.1%	96%	89.6 %
	Nazlet El-Semman& Kafr El-Gabal	92.1%	96.1%	89.7%

[5] *Source: districts local units, CAPMAS*

[6] *Source: local units and city council's during site visit*

4.2.7 Human development profile

Education:

There are several educational institutions in the Giza governorate, which prepare annually a large number of skilled workers, a variety of expertise and competencies to enable them to join different fields of economic activity. The higher education institutions include Cairo University, Al-Azhar educational institutions and other public and private educational institutions. There are 33 vocational training centers in different locations in Giza governorate. There are wealth of trained workers in various professions and activities that can be utilized in the activities of the proposed NG project. The percentage of enrollment at all levels of education in Giza reached 74.5% (81% in urban areas and 65.7% in rural areas). The indicators show that the illiteracy rate among adults is 29% (40.8% in rural areas, 22% in urban areas). According to the Egypt's Human Development Report 2010, the education index for Giza is as high as 0.794 (Egypt is 0.689).

Unemployment and work status

In Giza, labour force (15+) is 29.3 % of total population at the governorate level according to the Human Development Report 2010. Percentage of women in labor force (15+)

Reached percentage 14.4. Percentage of labor force (15 +) who work in agriculture is 11.1%, industry 32.6%, and services 56.3%. Professional & technical staff (% of labor force 15+) reached 15.6%, wage earners (% of labor force 15+) is 67.3%, where employees in governmental public sector & public enterprise sector (% of total labor force (15+) is 23.4%. Number of unemployed persons in Giza has reached 124,000 persons (HDR 2010).

Observations from field visits and social assessment show that the majority of population resides in project area are skilled workers, government employees, and craftsmen. In Tanash, Al-Kom Al-Ahmar, Ausim, Suqayl, and are more skilled workers i.e. carpenters, drivers, and workers. There are no manufacturing projects, very few skills workers and craftsmen. In larger area i.e. Al-Al-Munib and Saft Al-Laban most set of skills is available. Hadayek Al-Ahram is relatively new area and mostly does not possess as much skills works as other areas.

Thus, the Gas Connection Company, should consider the current skills profile during local hiring. Observations and discussions indicates that the households can afford to pay NG installation costs where the availability of reasonable payments plan is highly desired.

4.2.8 Poverty index

Around 23% of people in Giza are considered poor. Number of poor persons in Giza has reached is 1,492,000 persons (HDR 2010). (CAPMAS 2013). Poverty percentage is estimated to be higher in Jazirat Mohamad, Tanash, Al-Kom Al-Ahmar, Ausim, and Suqayl, since they are rural areas where poverty rates are usually higher due to lack of industrial, commercial activities, income sources and job opportunities. During the social assessment, the majority of households in the project areas expressed their willingness to be connected to the NG and that they can afford to pay NG installation costs either in cash or in installments.

4.2.9 Income and expenditure

GDP refers to the total value of services produced using internal and external resources. According to Egypt Human Development Report 2010, Giza per capita reaches for GDP to 8240 EGP (Port Said the highest is 10527 EGP). The level of income is higher in Al-Munib, Nazlet Al-Semman & Kafr Al-Gabal, Saft Al-Laban, and Hadayek Al-Ahram as they are urban areas with more economic activities. Main sources of income are commercial businesses, industry, agriculture, and governmental occupation. Most of salaries are relatively medium in urban areas and low in rural areas. Social Assessment field visits estimates refers to the average income for adults in Jazirat Mohamad, Tanash, Al-Kom Al-Ahmar, Ausim, and Suqayl is between 2000 EGP-3000 EGP per month; Al-Munib, Nazlet Al-Semman & Kafr Al-Gabal, Saft Al-Laban, and Hadayek Al-Ahram 3000 EGP-4000 EGP per month.

4.2.10 Fuel currently used in households

The majority of the samples surveyed in the project areas reported that, the main type of fuel used for cooking is the LPG cylinders. The source of aforementioned type is mainly the LPG vendors (Sareha). The second source is the LPG outlets. Field survey stated that, the average cost of LPG cylinders per household in project areas is 30-45 EGP per month / 360-540 EGP per year. This cost is relatively high cost comparing to local people income.

The average consumption of LPG cylinders for cooking per household is ranges between 1 to 2 cylinders monthly. While during winter, each household consumes around 2 cylinders monthly. With regards to the fuel used for water heating, the majorities of the samples surveyed in the project areas rely upon LPG cylinders, while very few percentages of the samples surveyed rely upon electricity.

4.2.11 Problems faced with the current household fuel

The study aimed at highlighting problems associated with the LPG cylinders in order to verify the willingness of community people to convert to the natural gas. The majority of the samples surveyed in the nine districts reported the problems related to LPG cylinders

- High cost of LPG and price fluctuations especially during winter
- The tedious process to obtain LPG cylinders
- LPG cylinders are not available all the time
- LPG cylinder is a bomb in the house; it might explode in any minute.
- The LPG is not completely full. It is half filled
- Sometimes it might leak
- It is difficult to bring the LPG upstairs

With regards to the electricity heater, high electricity bill was the first major problems. The second problem is having weak water flow that does not enable heater working properly. The third major problem is the power cut. Therefore, the majority of samples surveyed in the project areas expressed their willingness to be connected to the NG.

4.2.12 Perception towards the project

During the social assessment fieldwork, the team recorded notable and tremendous public acceptance by the community towards the proposed project. The burdens and financial hardships experienced by the community people (especially women) in obtaining LPG cylinders (the current household fuel) created an actual need to install NG. It is obvious that the majority of the samples surveyed in the project areas (Nazlet Al-Semman & Kafr Al-Gabal, Jazirat Mohamad, Tanash, Al-Kom Al-Ahmar, Ausim, Suqayl, Saft Al-Laban, Hadayek Al-Ahram) have positive perceptions about NG connections project. They reported that NG has many benefits:

- NG will save community people effort and money
- It is reliable, safe, and available
- It will put limitation to the quarrels and fights occur to obtain an LPG
- It also will put limitation to the crisis of the LPG shortage
- It will save electricity that is used in electricity heater and reduce the cost of electricity bills

4.2.13 Gender dimension of the current type of fuel

- Females are the main player as they play a major role in the domestic labor relating handling LPG. According to the interviews and the focus group discussions,
- In most project areas, there is LPG outlet and LPG vendors spread in the area; however, women also are in charge of waiting the vendors in order to change the cylinders.

4.2.14 Willingness and affordability to pay

For the planned NG connection project, the contracting fee for each client is estimated to be 2160 EGP. This includes the cost for up to two devices (cooker / heater). There is an option for a payment plan through an agreement with El-Ahly bank, as a facilitation for the clients. From the social assessment and the field visits discussion, it has been found that most people at the project districts are highly willing to convert to the NG. The majority of the samples cannot pay NG installation costs in one installment, they strongly recommended to have payment plan and All NGOs interviewed expressed their willingness to act as communication channels with poor but no one of them will provide financial aid to the poor. However, the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG. Eligible households are those households with average monthly electricity consumption, calculated over a period of 12 months, is in the range of 50kWh and 130 kWh/month. This initiative has been approved and is currently being applied to all project areas. The grant covers 50% of the installation costs.

4.2.15 Physical cultural resources

Low pressure Natural Gas installation pipework shall only take place in the semi-urbanized areas in the project areas. These areas have already been excavated beforehand.

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5. Environmental and Social Impacts

The environmental and social impact assessment 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.

5.1 Impact Assessment Methodology

To assess the impacts of the project activities on environmental and social receptors, a semi quantitative approach based on the Leopold Impact Assessment Methodology with the Buroz Relevant Integrated Criteria was adopted.

The table below presents the classification of impact ratings and respective importance of impact values.

Table 5-1 Impact Assessment Methodology

Importance of Impact	Impact Rating	Color Code
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).	

Detailed impact assessments results are presented in two tables in **Annex 5**.

5.2 Impacts during Construction phase

5.2.1 Positive impacts

The project may result in the creation of job opportunities, both directly and indirectly.

- **Provide direct job opportunities to skilled and semi-skilled laborers**
- **Indirect benefits due to the need for more supporting services to the workers and contractors who will be working in the various locations.**

5.2.2 Negative Impacts

The process of environmental impact assessment during construction phase indicate that some receptors have irrelevant impacts; those receptors include Subsurface water, Ecological (fauna or flora), vulnerable structures, cultural vulnerable sites and land use.

5.3 Impacts during Operation

5.3.1 Positive impacts

- On a national level, reduced expenditure on imported LPG cylinders and subsidies
- The NG project is expected to be of special and major benefits to women.
- The NG connection will achieve the safety factor, as the LPG vendors will not enter the households in order to change the LPG
- Constantly available and reliable fuel for home use
- Reduced expenditure on LPG importation and subsidies.
- Significantly lower probability 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.
- Elimination of insects and dirt typically associated with LPG cylinders
- Limiting the LPG cylinder "black market" due to lower demand
- Eliminate the hardships that special groups like physically challenged, women, and the elderly had to face in handling LPG
- Limiting possible child labor in LPG cylinder distribution

5.3.2 Negative impacts

The process of environmental impact assessment during the operation phase indicate that some receptors have irrelevant impacts; those receptors include waste management, noise, air emission, soil and Ecological (Fauna and flora).

A Summary of Impact Assessment during construction and operation the is illustrated in table 5.2

Table 5-2 Impact Assessment

Detailed impact assessments results are presented in two tables in **Annex 5**.

Impact	Description	Type	Significance
During Construction			
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 SOx, NOx, 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	Medium
Noise	Construction activities of the gas distribution network will likely increase noise levels due to excavation and heavy machinery but not exceeding the WB/IFC guidelines and Law 4/1994-9/2009- 105/2015 standards for noise intensity. However, the activities will be temporary and for short time. Traffic interruption due to excavation can cause congestions, which can result in increased ambient average noise intensity levels.	Negative	Minor
Soil	Degradation of soil quality, Excavation and movement of heavy machinery on unpaved surface soils during site preparation and foundation-laying could cause a physical breakdown of soil particles potentially causing destabilization of the soil structure.	Negative	Medium
Water	Surface Water: Uncontrolled dumping of waste in canals can result in water pollution	Negative	Minor
Waste generation	Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination. Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. These wastes should be disposed in licensed sites by the local authority, which minimizes any aesthetic effects of such waste. Poor handling of Hazardous and non-hazardous materials may result in poor containment of induced leaks.	Negative	Medium

Impact	Description	Type	Significance
Traffic & Accessibility	- Traffic congestion and loss of access due to the excavation and installation works will be vary from district to another according to the population and the services within each district. - Affect the drivers and vehicles in case of non-rehabilitation of streets after the project implementation - Congestion and traffic disturbance for both pedestrians, cars as well as the livelihoods of taxi, Tuk Tuk and microbus drivers, Thus, clear traffic diversion plan should be settled. - Reduction of Traffic Flow Mobilization of heavy machinery, asphalt breaking, excavation, placement of piping, and backfill activities are bound to limit traffic and accessibility during construction. This may entail narrowing major roads by longitudinal and/or lateral excavation or totally blocking narrow or side roads. - In addition to reducing the lanes/space available for traffic, impacts May also entail limiting or prohibition of 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 persons and cargo. - Negative effects on the business of neighboring shopkeepers due to excavation close to such shops. The excavation activities affect having access to the shops.	Negative	Medium
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, exposure to high noise intensity levels. - Noise impacts on construction workers, technicians and engineers in direct vicinity of the excavation works and heavy machinery are considered more significant than those on residents. Traffic congestions, which could be caused by excavation works, may increase ambient average noise intensity levels.	Negative	Medium
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. - 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

Impact	Description	Type	Significance
Community health and safety	The excavation works within the project areas will affect the community health and safety by the following means: - Waste accumulation illegal dumping and potential burning of construction waste, which will consist mainly of excavated soil and leftover PE and carbon steel pipes can pose health and safety threats to local community. - Project infrastructure excavation works will result in the presence of open trenches in areas accessible to local community (e.g., in front of buildings 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, no trenches being left open after working hours. There was a fear that negligent workers may cause accidents harmful to themselves or to the community members, particularly children, especially close to the excavation sites. - Child labor and school dropout	Negative	Medium
Temporary Labor Influx	Possible social adverse impacts from Temporary Labor Influx - Risk of social conflict - Increased risk of illicit behavior and crime - Increased risk of communicable diseases and burden on local health services - Influx of additional population - Increase in traffic and related accidents - Increased pressure on accommodation and rents - Local inflation of prices - Overconsumption of community resource	Negative	Minor
Child labor	As mentioned in the baseline, child labor is a common practice in the project communities. Children below 18 works 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.	Negative	Medium
Street condition deterioration	Street condition deterioration Streets rehabilitation or restoration following pipeline network installation: is referred to by an Egyptian legal/institutional expression 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". 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

Impact	Description	Type	Significance
Land	Land needed Regard to the land needed, there will no land needed for the project, as there is PRS already existed. The implementation companies will be temporary storage area which maybe small plots of land usually are rented land or rented shops that will be rented for few days in order to store the equipment and excavation tools, in addition, temporary equipment for workers' services.	None	None
Visual resources and landscaping	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 may have impact on visual resources and landscaping.	Negative	Minor
Operation			
Community health and safety	In addition to a full array of safety and emergency precautions taken by EGAS and Town Gas, user safety is prioritized by stating emergency precautions on the household gas meter and by setting up emergency response centers. Impacts on user health and safety may occur through improper handling of piping and valves by the user, which can result from lack of awareness, illiteracy, or failures in piping or sealants.	Negative	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
Economic disturbance	- For those who will pay in installments, this may be an added financial burden on the poor families (a grant for poor through AFD is already in place for poor families based on an eligibility criteria (section 4.2.14). 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.	Negative	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 will be implemented only in the crossing of El-Kom El-Ahmar railway line, 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.
  - 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.
  - it is a surface-launched process which doesn't require drive pits.
  - it is a guided method, and accordingly can achieve high accuracy for the pipeline path.
- Can be employed for high depths, and accordingly can avoid any breakage accidents to the existing infrastructure lines/cables.

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

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

6.1.2 Open-Cut Method

This is the traditional method for pipeline installation. 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 9 studied areas since the pipeline route passes through urban and local roads and does not cross any main road or railway except the crossing of El-Kom El-Ahmar railway line,and it will be a cheap and safe option

6.2 Routing

The preferred route was selected on parameters like:

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

6.3 Regulators

Two types of 100 mbar regulators outlet pressure were considered; Kiosk regulators and Wall mounted regulators, Kiosk regulators were preferred because:

- Easier maintenance
- Less expensive
- More safe

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. Such market should be avoided if possible. 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 15590 EGP 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 mitigations. This section also presents an assessment of the institutional capacity and institutional responsibilities for implementing the ESMMP. Wherever applicable, the ESMMP is designed to accommodate alternative context-specific mitigations and monitoring measures.

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

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

7.2 Mitigation Measures During Construction Phase

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. **as per the Emergency Response Plan presented in Annex 6**..

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.

7.3 Environmental and Social Management Matrix during CONSTRUCTION

Table 7-1: Environmental and Social Management Matrix during CONSTRUCTION

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Local traffic and accessibility	**Traffic congestion** (and associated noise/air emissions)	Excavation during off-peak periods Time limited excavation permits granted by local unit & traffic department	Excavation contractors	– LDC + – Traffic department	Contractor has valid conditional permit + Field supervision	Contractor costs LDC management costs
		Announcements + Signage indicating location/duration of works prior to commencement of work	– LDC – Excavation contractors	– LDC HSE – Local Unit – Traffic department	Ensure inclusion in contract + Field supervision	
		Apply Horizontal Directional Drilling under critical intersections whenever possible to avoid heavy traffic delays	Contractor	LDC HSE	Field supervision	
		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	
Ambient air quality	**Increased emissions of**	Controlled wetting and compaction of excavation/backfilling surrounding area	Excavation Contractor	LDC HSE	Contractual clauses + Field supervision	– Contractor costs – LDC management

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
	dust and gaseous pollutants	Isolation, covering, transportation in equipped vehicles and disposal of stockpiles			Contractual clauses + Field supervision	costs
		Compliance to legal limits of air emissions from all relevant equipment			Measure and document emissions of machinery by regular audits request emission measurements	
		_ Availability of 24-7 hotline service (129) to all beneficiaries and the public for reporting possible leaks, damages or emergencies _ Quick response to gas leaks by evacuation of the affected area _ Repair or replacement of failed component	LDC	LDC HSE	Field Supervision	
Ambient noise levels Local community Workers	**Increased noise levels beyond WB/National permissible levels**	Ear muffs, ear plugs, certified noise PPE for workers	_ LDC _ Excavation Contractor	LDC HSE	Contractual clauses + Field supervision (audits)	_ Contractor costs _ LDC management costs
		Avoid noisy works at night whenever possible			Field supervision Complaints receipt from local administration	

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Ground utilities' integrity Local community	**Damage to underground utilities resulting in water/wastewater leaks, telecommunication and electricity interruptions**	Coordination with departments of potable water, wastewater, electricity, and telecom authorities to obtain maps/ data on underground utilities, whenever available	Excavation Contractor	LDC HSE	Official coordination proceedings signed by representatives of utility authorities – Examination of site-specific reports and records – Field supervision	– Contractor management costs – LDC management costs
		If maps/data are unavailable: Perform limited trial pits or boreholes to explore and identify underground utility lines using non-intrusive equipment		LDC HSE Supervisor	– Contractual clauses + Field supervision	
		Preparation and analysis of accidental damage reports		LDC HSE	– Review periodic HSE reports	
		Repair and rehabilitation of damaged components		LDC HSE Local Government Unit Local Police	– Contractual clauses + Field supervision	
Surface water	**Uncontrolled dumping of waste in canals can result in water pollution**	• Control all onsite wastewater streams and ensure appropriate collection, treatment and discharge. Prevent discharge of contaminants and wastewater streams to ground. • Adequate management and proper handling and storage of construction materials, oils and fuel to avoid spillages	LDC Contractor	LDC HSE department	– Field supervision (audits)	– Contractor costs – LDC management costs

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Streets (physical status) local community and workers (health and safety)	**Hazardous waste accumulation**	– Temporary storage in areas with impervious floor – Safe handling using PPE and safety precautions – Transfer to LDC depots for temporary storage – Disposal at licensed Alexandria hazardous waste facilities (Nasreya) – Hand-over selected oils and lubricants and their containers to Petrotrade for recycling	– LDC – Excavation Contractor	LDC HSE	Field supervision and review of certified waste handling, transportation, and disposal chain of custody	Indicative cost items included in contractor bid: Chemical analysis of hazardous waste Trucks from licensed handler Pre-treatment (if needed) Disposal cost at Nasreya Approximate cost of the above (to be revised upon project execution): 7890-9863 EGP per ton
		– Adequate management of asbestos and any possible hazardous waste	Water Authority + contractor		Field supervision + review of Water Authority manifests	– Contractor costs – LDC management

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
		– Minimize fueling, lubricating and any activity onsite that would entail production of hazardous materials empty containers – Pre-Plan the anticipated amounts of hazardous liquid materials (such as paint, oils, lubricants, fuel) to be used in the various activities in order to minimize leftovers and residuals. – To the extent practical, seek to combine leftovers or residuals of the same liquid material/waste in order to minimize the number of containers containing hazardous residuals – Ensure hazardous liquid material/waste containers are always sealed properly and secured from tipping/falling/damage/direct sunlight during transportation and storage – In case of spillage: o avoid inhalation and sources of ignition o cover and mix with sufficient amounts of sand using PPE o collect contaminated sand in clearly marked secure containers/bags – Add sand to inventory of hazardous waste	– LDC – Excavation Contractor		Field supervision	costs

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Local community	**Non-hazardous waste accumulation**	1. Designate adequate areas on-site for temporary storage of backfill and non-hazardous waste 2. Segregate waste streams to the extent possible to facilitate re-use/recycling, if applicable 3. Reuse non-hazardous waste to the extent possible 4. Estimate size of fleet required to transport wastes. **5.** Transfer waste to disposal facility East of the project area	– LDC – Excavation Contractor	LDC HSE	– Contractual clauses – Monitoring of waste management plan – Field supervision	– Contractor costs – LDC management costs
Local community	**Destruction of streets and pavement**	– Arrange Restoration and re-pavement (رد الشئ لأصله) with local unit – Communication with local community on excavation and restoration schedules.	– LDC	EGAS	Field supervision Coordination with LGU as needed	Included in re-pavement budget agreed by LDC with local units or Roads and Bridges Directorate

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
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 ESMP 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	Excavation Contractor	LDC HSE	Field supervision	_ Contractor costs _ LDC management costs

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Labor conditions	**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 ToR in order to warrantee no child labor is occurred in the project • The ToR also will oblige the contractor to keep a copy of IDs of laborers in order to monitor the hired staff below 18 years old • The contractor 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	LDC Excavation Contractor/ subcontractor	LDC HSE	_ Field supervision and review of HSE report+ Field supervision (audits)	_ Contractor costs LDC management costs

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Local communities and businesses	**Lack of accessibility to businesses due to delay in street rehabilitation**	• Access to business due to digging out the streets will be mitigated through enabling alternative entrances to the business. Also, special wooden bars will be used to enable the shoppers to get into the markets. Additionally, the duration of work will not exceed one working day. In case of digging main streets in the commercial areas, this can be only done during night after business closing • Ensure transparent information sharing • The telephone numbers of the social development officer responsible for grievances should be shared with the community people	During digging process LDC The sub-contractors	EGAS (SDO) LDC	_ Ensure the implementation of GRM _ Supervision on Contractors performance	No cost

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
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 _Install wooden bars or decks over trenches to allow safe crossing A worker should support old people to cross the digging areas, especially, on the wooden bars	During the construction LDC	EGAS (SDO) LDC	_ List of awareness activities applied _ Lists of participants _ Documentation with photos _ Awareness reports	_ 40838 EGP per awareness raising campaign _ 40838 for brochure and leaflets to be distributed (material available by EGAS-)

7.4 Environmental and Social Monitoring Matrix during CONSTRUCTION

Table 7-2: 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% ,opacity, TSP, PM10 and PM 2.5	LDC HSE	Once before construction + once every six months for each vehicle	Construction site	Measurements and reporting of dust and 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	weekly during site inspections	Construction site (residential area or near sensitive receptors such as hospitals)	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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
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.	Construction site	Documentation in HSE monthly reports	LDC management costs
		Observation of water accumulations resulting from dewatering (if encountered)	LDC HSE	During construction. Monthly reports	Around construction site	HSE monthly reports	LDC management costs
		Chain-of-custody and implementation of domestic wastewater (sewage)management	LDC HSE	During construction. Monthly reports	Construction site	Site inspection and document inspection	LDC management costs
Local community	Damaging 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
	Threat to Safety of users and houses (due to limited level of awareness and misconceptions)	– Observation of water accumulations resulting from dewatering (if encountered)	LDC, EGAS	Quarterly monitoring	Office	Reports Photos Lists of participants	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
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 Mitigation Measures During Operation Phase

7.5.1 Hotline

As mentioned previously, odorant is added to odorless natural gas to facilitate leakage detection by smell/odor. a 24-7 Hotline (**129**) is available for customers and the public to report leaks, damage, emergencies, and/or incidents related to gas connections, components, infrastructure, and activities (inside or outside households) and to request repairs/emergency response/assistance. In addition, an Emergency Response Plan has been prepared to address different emergency situations (Annex 6).

7.5.2 Community health and safety

Several measures are suggested to overcome obstacles to full understanding and adoption of safety measures by the clients in the social management plan. The LDC must communicate clear instructions to clients in order to ensure that NG piping and components (both inside the household and outside) are not be altered, violated, or intruded upon in any way without written approval from, or implementation of the alteration by, the LDC.

7.5.3 Management of network integrity

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

7.5.4 Emergency Response

In case of emergencies, the proper action will be taken according to Town Gas Emergency Response Procedure. The procedure includes the key personnel responsibilities and communication methods, as well as the emergency classes. Reports will be prepared after the necessary actions are taken to document the cause of the emergency and the remedial actions taken. as per the Emergency Response Plan presented in Annex 6.

7.5.5 Management of financial disturbance

Residential gas connection installation costs are around 15590 EGP. Customers pay 2160 EGP of that cost in cash. The balance is subsidized by the government of Egypt. The 2160 EGP can be made either upfront or in installments over a period of time. Typically, households opt for flexible monthly payment plans facilitated by the LDCs and local banks. NGOs expressed their willingness to act as communication channels with poor without provide financial aid. 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 4.2.14). This initiative has been approved and is currently being applied to all project areas.

7.6 Environmental and Social Management Matrix during OPERATION

Table 7-3: Environmental and Social Management Matrix during OPERATION

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Integrity of natural gas piping	**Network integrity**	_ Detailed review of the geotechnical 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 affected area _ Repair or replacement of failed component	Minor	LDC	LDC HSE.	- Map and local geotechnical report review - Site inspections - Awareness actions - Periodical drills	LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Economically disadvantaged Community members	**Financial burden on economically disadvantaged due to the installments**	- Petrotrade Co. 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	Petrotrade (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
Community health and safety	**Possibility of Gas leakage**	- Information should be provided to people in order to be fully aware about safety procedures - The hotline should be operating appropriately - People should be informed of the Emergency Numbers - People should be also informed about GRM telephone numbers The Egyptian Emergency Response Procedure. In addition, reference to the ERP is made in different sections of the report	Minor	LDC	LDC	Complaints raised due to Gas leakage	LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
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 commitment of workers to use protective equipment -Inspection and recording of the performance -Reports about the workers and complaints	LDC management costs

7.7 Environmental and Social Monitoring Matrix during OPERATION

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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
Integrity of natural gas piping	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
Economically disadvantaged Community members	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 Petrotrade, EGAS	Quarterly	Desk work	- Complaints log - Bank reports - Petrotrade reports	No cost
Community health and safety	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	Quarterly	Site and Desk work	Complaints log LDC	No cost

7.8 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
- Number and date of paint cans shipped to company depot or returned to supplier
- Evaluation of LDC and contractor's performance on applying his relevant mitigation measures
- Any accidents or breaking of utility pipes
- The number of complaints received and how they were dealt with
- Monitoring results of excavation machinery exhaust emission, noise and vibrations

During Operation, phase monthly reports should include as a minimum:

- Undertaken treatment and temporary storage and/or disposal activities of empty odorant containers
- Evaluation of the adherence of staff to safety measures
- Pipeline leakage or damage incidents
- The number of complaints received and how they were dealt with

7.9 Institutional Framework for ESM&MP Implementation

7.9.1 Environmental Management Structures

EGAS is the supervisory body. **Town Gas** is the implementing body. Being the implementing body of the natural gas network in project areas, **Town Gas** has a direct involvement with the environmental management and monitoring of the natural gas network. **Town Gas** has limited environmental and social background.

Therefore, an upgrade in their environmental and social capacity will be necessary. **EGAS** will be responsible for providing **Town Gas** staff with the needed information.

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

7.9.2 Required Actions

- Involvement of environmental and social officers during the design, costing, tendering, and construction phases would be advantageous.
- Detailed HSE manuals covering each activity must be developed and institutionalized in Town Gas Several versions of such manuals have been developed by Town Gas and should be mainstreamed to other LDCs, accompanied by the appropriate capacity building.
- An updated and detailed assessment of Town Gas EHS institutional capacity and available resources for implementation of the ESMP

Specifically, Town Gas should take steps to develop capacity of site engineers and HSE officers with specific courses focused on implementation of the ESMP detailed in this ESIA.

Stakeholder Engagement and Public Consultation

8. Stakeholder Engagement and Public Consultation

The public consultation chapter aims to highlight the key consultation and community engagement activities that took place as part of the preparation of the ESIAs and their outcomes. Public consultation activities have been implemented during the preparation of the framework and the site-specific studies. Following are the public consultation activities that have been implemented:

- Consultation activities (including site visits) were conducted on February 2017
- Public consultation session was conducted on 30 April 2017 in Giza city

8.1 Legal Framework for Consultation

The consultation activities used multiple tools and mechanisms (scoping, interviews, focus group discussions, public hearings/consultations) with various stakeholders and community people in the host communities were held for the proposed 1.5 million household NG connections project in 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 the public consultation
  - Environmental law No 4/1994 modified by Law 9/2009 and 105/2015 and its executive regulation until the last amendment by ministerial decrees no. 1963/2017
- While WB safeguards and regulations state that a minimum of two large-scale, well-publicized public consultation sessions are a must for projects classified as category "A" projects like the one at hand, additional consultation efforts (for example through focus group discussions, in-depth meetings, and interviews) were implemented to reach the most vulnerable and difficult to reach community members. Additionally, in order to obtain larger scale and more quantifiable information, the consultant should assess conducting surveys in the different sites.
- **In order to achieve that:**
  Community engagement plan has been developed for the different communities through three phases:
  - **Phase I:** Preparation of the framework study in March 2014
  - **Phase II:** The site-specific studies in 2016
  - **Phase III:** The consultation activities in 2017

Based on the identification of stakeholders, various questionnaires and guidelines were prepared in order to engage:

- The residents in the project areas
- Local community representatives
- Governmental Organizations and Authorities
- NGOs
- Educational institutions and universities
- Health departments
- Environmental administrations
- Formal and informal LPG distributors.
- In addition to, Town Gas company.

8.2 Consultation objectives

The objective of the Stakeholder Engagement is to ensure safe and successful Project delivery by:

- Informing stakeholders, including persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively;
- listening to their comments, ideas and concerns and recording the same for follow up;
- Avoiding conflict by addressing impacts and issues raised by stakeholders promptly; particularly with the communities that will not be served by the project
- Ensuring that fears and anxieties about the nature, scale and impact of the operation have been properly considered in the development and management of the Project
- Accessing and making good use of existing local knowledge of the area;

Communicating and implementing a viable community feedback mechanism.

The consultation outcomes will be used in:

- Define potential project stakeholders and suggest their possible project roles
- Identify the most effective outreach channels that support continuous dialogue with the community

Thereafter the results will provide proper documentation of stakeholder feedback and enhance the ESMP accordingly.

8.3 Defining the stakeholder

In order to ensure an inclusive and meaningful consultation process, a stakeholder's analysis was conducted to get better understanding of the various groups and their roles, interests and influence on the project. Full list of the stakeholders on the governorate level is included in **Annex 7 & 8.**

For the purpose of this site specific ESMP, a focused stakeholders' identification was conducted to identify the key groups of relevance to the project in this specific location. The main identified groups are very similar to those identified on the governorate level but on a smaller scale, (elaborated details on that are include in the Governorate level ESMP). In the meantime, local communities of both men and women of projects beneficiaries, local NGOs/CDAs were among the key stakeholders on the local level.

The abovementioned stakeholders were consulted using various tools (i.e. individual interviews, group meetings and public consultation). Most of them have attended the public consultation hearings conducted in 30 April 2017 in Giza governorate.

8.4 Consultation Methodology and Activities

The research team for this study has adopted multi-dimensional consultation activities that enable the marginalized, voiceless, youth and women to gain information about the project. As well as, gaining information about their concerns and worries that regarding the project during various implementation phases. Following are the main consultation activities to date:

1- The study team visited the project area in order to define various stakeholders.
2- Community engagement plan has been developed for the different communities through three phases:
   - Phase I: Preparation of the framework study in March 2014
   - Phase II: The site-specific studies in 2016
   - Phase III: The consultation activities in April 2017
3- The study team divided the various engagement activities of the project to:
   - Scoping phase,
   - Data collection phase,
   - Consultation activities and final public consultation.
4- All activities conducted were documented with photos and lists of participants in order to warrantee appropriate level of transparency.

Table 8-1: Summary of Field Consultation Activities in Giza Governorate

participants	Location	Number of participants (Male)	Number of participants (Female)	Methods	Date
Potential beneficiaries	Jazirat Mohamed	3	2	FGD In depth	February 2017
	El-Kom El-Ahmar	2	1		
	Tanash	3	2		
	Suqayl	2	2		
	Ausim	3	1		
	Saft Al-Laban	4	3		
	Hadayek El-Ahram	2	1		
	Al-Munib	3	2		
	Nazlet El-Semman and Kafr El-Gabal	5	3		
LPG vendors	Jazirat Mohamed	2	-	Structured questionnaire	February 2017
	El-Kom El-Ahmar	1	-		
	Tanash	2	-		
	Suqayl	1	-		
	Ausim	2	-		
	Saft Al-Laban	3	-		
	Hadayek El-Ahram	2	-		
	Al-Munib	2	-		
	Nazlet El-Semman and Kafr El-Gabal	3	-		
Governmental and NGOs	Jazirat Mohamed	2	1	In depth	February 2017
	El-Kom El-Ahmar	3	4		
	Tanash	2	2		
	Suqayl	3	2		
	Ausim	2	1		
	Saft Al-Laban	5	4		
	Hadayek El-Ahram	2	2		
	Al-Munib	2	4		
	Nazlet El-Semman and Kafr El-Gabal	3	2		
Community people	Jazirat Mohamed	3	2	FGD Structured questionnaire	February 2017
	El-Kom El-Ahmar	4	1		
	Tanash	2	1		
	Suqayl	4	2		
	Ausim	2	1		
	Saft Al-Laban	2	3		
	Hadayek El-Ahram	2	1		
	Al-Munib	3	1		
	Nazlet El-Semman and Kafr El-Gabal	2	1		
TOTAL		93	52		
Representatives from Town Gas		4	-	in–depth	February 2017
TOTAL		97	52		

8.5 Consultation processes

Following are the community participation and the consultation processes that were conducted in Giza Governorate throughout the following phases in order to prepare the study:

- Phase I: Preparation of the framework study 2014
- Phase II: Consultation activities and Final public consultation 2017

The results of the phases will be presented as follows:

Summary of phase I: Preparation of the framework study 2014 (see Annex 7)

The consultation session was conducted on December 2013

- Consultants (EcoConServ environmental and social) attended session
- Representatives of EGAS and Town Gas
- Representatives of EEAA accompanied the teams
- NGOs
- Media related expert was recruited to invite media people
- Community people

Summary of Phase II: Final public consultation 2017 (see Annex 8)

- The Consultation session was conducted in Giza governorate on 30 April 2017
  - Consultants (Petrosafe environmental and social) attended meeting
  - Representatives of EGAS and Town Gas
  - Representatives of EEAA accompanied the teams
  - Administrative managers
  - Media related expert was recruited to invite media people
  - Community people
- Key comments and concerns raised during the Final Public Consultations

Table 8-2: Consultation session 2017

Subject	Questions and comments	Responses	Addressed in the ESMP study
NG coverage	**Areas that have not been connected to the NG**	**There are certain specifications to install the NG to any area. In case the area is suitable, Government of Egypt tries to allocate financial resources to install the NG. Given the limited resources Egypt face, the installation plan might take some time**	**within Section 4.2.2**
LPG problems	The community appreciate having the NG project as the LPG cause many problems: -The LPG cost a lot of money -Sometimes residents can't find it -It is difficult to bring the LPG upstairs especially if the resident is in the upper floors and no elevator is available -Sometimes the LPG is not completely full. It is half filled - LPG cylinder is a bomb in the house; it might explode in any minute.	The government of Egypt has an ambitious plan to connect the NG to 2.4 million households. This will solve LPG problems.	**within Section 4.2.11**
Coordination	**Coordination with the local units in order to get information about the underground utilities**	**All LDCs coordinate with the Local Units, not only to obtain information but also to be able to get permissions for street cuts and crossings.**	**See Section 7.2 Environmental and Social Management Matrix During Construction**
Street restoration	**The streets not rehabilitated after the completion of the NG construction**	**The LDCs disburse the cost of street restoration to the local unit and road authority prior to construction phase. It took them long time to rehabilitate streets so that the streets left without being rehabilitated**	**See Section 7.2 Environmental and Social Management Matrix During Construction**
NG benefits	Members of the community acknowledged the importance of NG and the benefits of having NG connection to their households.	NG is of lower cost than LPG It is reliable, safe, and available It will put limitation to the quarrels and fights occur to obtain an LPG It also will put limitation to the crisis of the LPG shortage It will save electricity that is used in electricity heater and reduce the cost of electricity bill	**within Section 4.2.12**
Role of NGOs	**NGOs can pay for the installation of the NG to poor households. Alternatively, they can pay the advance payment. Thereafter, the poor people can pay few amounts of money as installment**	**This will be from the recommendations, but the project will be not obligated to achieve that**	**within Section 7**
Women hardship with LPG	**Women suffer from the LPG as they are responsible of bringing it from the LPG outlet and carry it upstairs.**	**NG connection will save women effort related to changing LPG cylinders**	**within Section 4.2.13**

Subject	Questions and comments	Responses	Addressed in the ESMP study
Impact on LPG vendors	The project might result in unfavorable impacts on the LPG vendors (Sareha).	The NG project will partially affected the vendors, but it will reduce the dangers of LPG cylinders which are considered bombs in houses	See The potential adverse impacts during the operation phase
Information desk	· It is recommended to have an information desk to share info with people about the project people can send their grievances to the information desk · They also can submit a request for the installation of NG · They should have answers to the technical and contracting aspects · Information provided should be in a simple form	The study recommended sharing information about the project not only in the location of contracts or at homes, but also in various public places. It also recommended holding regular meetings to inform the citizens about the natural gas project	See Final public consultation Annex
Role of community people	Community people can mobilize each other to install the NG. Additionally, they can provide guidance to the illiterate groups	The study recommended the participation of the community people in sharing information about NG project with the other people especially the illiterate groups Awareness raising campaigns should be tailored in cooperation with the community- based organizations	See Section 7.2 Environmental and Social Management Matrix During Construction
Safety Measures in case of natural disasters	Safety measures in cases of natural disasters (earthquakes) especially there is a risk of the high pressure and intermediate pressure pipelines	**High pressure pipeline :** The ESMP study scope not include PRS or HP pipeline . **intermediate and low-Pressure network:** intermediate and low-Pressure network pipelines are made from polyethylene which is a shrinkable material and all risers outside the houses ended with a flexible joint	See Section 2.2 Project Work packages
community health and safety	workers carrying out the installation within the household and maintenance works should be aware of and able to communicate the safe use of NG and procedures in case of emergency; in an appropriate manner that suits the culture of the customers	All LDC workers well trained to communicate all customer requests regarding the safe use of NG and procedures in case of emergency, in addition to safety and emergency precautions taken by EGAS and the implementing entities (Local Distribution Companies: Town Gas), user safety is prioritized by stating emergency precautions on the household gas meter and by setting up emergency response centers	See Section 5.3.2.1 Community Health and Safety

Figure 8-1: Public consultation in Giza – 30th of April 2017

8.6 Summary of consultation outcomes

The consultation outcomes revealed that:

- The key message from the consultation events carried out for this project is that public and government acceptance for and support to the project are very strong.
- There are many problems related to LPG cylinders such as: (high cost, price fluctuations, unavailable, the exerted effort to hold and install the cylinder, and the risks related to the existence of LPG cylinder within the household)
- The interviews and the focus group discussions revealed some concerns raised by the community regarding the NG connection such as:
    - The majority of the community people cannot afford to pay NG installation costs in one installment, they strongly recommended to pay in installments.
    - Some concerns about LPG security and safety.
    - Actual need to provide clear information about the project
    - Actual need to response to grievances in timely manner
- The interviews with the implemented companies revealed that, they are fully aware about security and safety procedures. As well as, the excavation work dates in accordance with the nature of the region, the traffic density and the population. For poor people, the study recommended that NGOs can act as communication channels with poor. However, the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG based on an eligibility criteria (section 4.2.14). This initiative has been approved and is currently being applied to all project areas. The study recommended the participation of the community people in sharing information about NG project with the other people especially the illiterate groups. (the recommendation is not obligated for the project)

8.7 ESMP disclosure

As soon as the site-specific ESMPs gets clearance from the World Bank and approval from EEAA, a final report, in English and Arabic, will be published on the WB, EGAS and Town Gas websites. A copy of the ESMP report in English and a Summary in Arabic will be made available in the customer service office. Additionally, an Arabic summary will be made available in the contracting offices. An A3 poster will be installed in the contracting office informing about the results of the ESMP and the website link for the full ESMP study