










2.3 Million Natural Gas Connections Project in 20 Governorates

Environmental and Social Management Plan
Giza Governorate
(El Talbieh, Shabramant, Manial Shiha and Abou Rawash)

Final Report

December 2021

EGAS

Egyptian Natural Gas Holding Company

Developed by

"Petrosafe"

Petroleum Safety & Environmental Services Company

List of acronyms and abbreviations

AFD	Agence Française de Développement (French Agency for Development)
CAPMAS	Central Agency for Public Mobilization and Statistics
CDA	Community Development Association
EEAA	Egyptian Environmental Affairs Agency
EGAS	Egyptian Natural Gas Holding Company
EIA	Environmental Impact Assessment
EMOP	Egyptian Ministry of Petroleum.
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management framework
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
GoE	Government of Egypt
GPS	Global Positioning System
HH	Households
HSE	Health, Safety and Environment
IFC	International Finance Corporation
LDC	Local Distribution Companies
LGU	Local Governmental Unit
LPG	Liquefied Petroleum Gas
mbar	millibar
NA	Not Available
NG	Natural Gas
NGO	Non-Governmental Organizations
P&A	Property and Appliance Survey
PE	Poly Ethylene
Project districts	El Talbieh, Shabramant, Manial Shiha, and Abou Rawash districts.
PRS	Pressure Reduction Station
SDO	Social Development Officer
SIA	Social Impact Assessment
Town Gas	Town Gas (LDC)
WBG	The World Bank Group
WHO	World Health Organization
$	United States Dollars
€	Euros

Exchange Rate: US$ = 15.76 EGP as of December 2021

Exchange Rate: € = 17.88 EGP as of December 2021

Contents

Annexes

List of Tables

List of Figures

0. Executive Summary

0.1 Introduction

This ESMP issued for NG households Connection in 4 Districts (El Talbieh, Shabramant, Manial Shiha, and Abou Rawash) of Giza governorate follows national and World Bank requirements regarding scope and detail of assessment and procedure, and gives particular emphasis to public information and stakeholder participation. It will identify and assess significant impacts of the proposed project on the local population and human health; on land, soil, water, air, and climate; on the landscape; on biodiversity; and cultural heritage. It will identify risks and will suggest mitigation measures where appropriate.

An Environmental and Social Impact Assessment Framework (ESIAF) was developed in March 2014 for 11 of the project's Governorates in Egypt. An updated (ESIAF) was developed in January 2017 to cover the expansion of the project in a new 9 Governorates. In March 2018, an ESMP study has been conducted for Nine districts in Giza Governorate and in September 2019, another ESMP study has been conducted for twelve districts also in Giza Governorate**.**

The aforementioned studies were cleared by the World Bank and disclosed on the EGAS website and the Bank website.

During the implementation phase of the Giza NG connection project, another 4 Districts (El Talbieh, Shabramant, Manial Shiha, and Abou Rawash) within the Giza governorate fulfilled the criteria of households NG connections and became ready to join the NG connection project. Three of those districts are rural Districts and were found to be significantly homogeneous in terms of environmental and social aspects and the fourth is an urban district. This ESMP study covers all the new relevant Environmental and social impacts, mitigation measures, management plans issued for the project up to the date for the new 4 Districts based on the Simplification Guidelines agreed upon between the World Bank and EGAS.

The studied districts (El Talbieh, Shabramant, Manial Shiha, and Abou Rawash) will be supplied by NG from Town Gas NG pipeline network (feed mainly from El Badresheen PRS). No major environmental or social risks can be foreseen which would prevent the project from reaching the targeted customers.

For the current ESMP study, Shabramant district was chosen to represent the project rural districts within Giza governorate due to its longer NG Pipeline networks, in addition to the greater number of households NG connections compared to other rural districts. While El Talbieh district represents the urban area. The locations for environmental measurements (receptors) also have been carefully selected to avoid any potential risks and could be followed up and monitored during the construction phase.

0.2 Project Description

An agreement between Town Gas Company and the Egyptian Natural Gas Holding Company "EGAS" was signed for supplying natural gas to 29,500 residential customers in the project districts within Giza governorate.

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

Town Gas Company will start the necessary installations needed to feed natural gas for the customers in project districts as follows: -

- Project districts will be connected by a polyethylene intermediate pressure feeding pipeline from the new proposed PRS which will be constructed.
- Low-pressure gas distribution piping system consisting of low-pressure service lines (100 mbar). They are mainly constructed from medium-density polyethylene pipes (MDPE) and will be installed horizontally underground for the project district's sectors.

The following activities will take place during the construction of the network:

- Clearing and grading activities and Pipe transportation and storage
- Site preparation and excavation
- Pipe laying
- Backfill and road repair
- Leakage testing
- Construction works of household installation
- Commissioning

0.3 Legislative and Regulatory Framework

The project will adhere to Egyptian legislations, WBG operational policies, and World Bank Group (WBG) General Environmental, Health, and Safety Guidelines & WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems as per following:

- **Applicable Environmental and Social Legislation in Egypt:**
  - Law 217/1980, Law 4 for the Year 1994 amended by Law 9/2009 and law 105 for the year 2015 and its Executive Regulation (ER), Law 38/1967, Law 93/1962, Law 117/1983, Law 66/1973 amended by Law 121/2008, Law 140/1956, Law 84/1968 and Law 12/2003 including decree 211/2003. (Environmental and social)
  - Law 12/2003 on Labor and Workforce Safety including Decree No. 211/2003, Decree No. 126 (2003), Decree No. 134 (2003) (social)
  - The Child Law No. 12 of 1996, of the Arab Republic of Egypt, Amended by Law No. 126 of 2008 (social).
  - Law No. 148/2019 on Comprehensive Social Insurance (Social).

- **World Bank Safeguard Policies:** During the early stages of the 2.3 million customer NG connections project, a framework study was prepared where, three policies are triggered for the project as a whole: Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12). OP/BP 4.01 will apply to this sub-project. It is not envisaged that the Low-Pressure Natural Gas Network in Giza Gov. in the 4 aforementioned districts, will result in any physical or economic dislocation of people in the project location, so OP/BP 4.12 will not be applicable. 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. Physical Cultural Resources OP/BP4.11 will be applicable since Giza governorate is known for some archeological and cultural sites, although no cultural resources are located in the subproject districts (since these districts have been excavated several times before for other public utilities). The chance find procedures will be part of the contracts of the contractors.
- **World Bank Group General Environmental, Health, and Safety Guidelines & WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems:**
  - The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which guide users on EHS issues in specific industry sectors.
  - Gap Analysis[1] showed that 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 ESMP

0.4 Environmental and Social Baseline

Methodology of the ESMP:

Based on the site visit conducted by the consultants and the secondary data collected between March-August 2021, the subproject sites located in Giza Governorate in the districts of El Talbieh, Shabramant, Manial Shiha, and Abou Rawash districts were found to be within a radius of 9.4 km, Three of the four districts (Shabramant, Manial Shiha, and Abou Rawash) are found significantly homogeneous in terms of environmental and social aspects (mainly rural villages) while there are some differences found between them and the last district (El Talbieh) which is characterized mainly by being the urban district with some commercial activities.

The environmental measurements were conducted in locations based on the sensitivity of receptors (environmental and/or social) and the significance of the impact (air and/ or noise)

[1] https://www.egas.com.eg/sites/default/files/2019-06/ESIAF%20for%20NG%20connections%20project%20for%2011%20Governorates.pdf

Environmental Baseline:

Air Quality and Noise measurements:

According to the study methodology the measurement locations were chosen on the basis that it is beside sensitive receptors close to the intermediate pipeline's routes.

The noise measurements and the concentrations of measured air pollutants in the studied districts are below national and WBG guidelines.

Climate:

The average annual temperature is 21.5 °C and the average annual rainfall is 1.9 mm.

Water resources:

The surface water resources of Giza Governorate are the Nile River and irrigation canals (Al Mansoureya, Al Zomor, and Al Rayah El Bahary canals), in addition to other branched waterways and drainages where it supplies about 977.51 million cubic meters annually. There are no available accurate data about subsurface water in Giza governorate but it is constantly renewable by the Nile River and irrigation water and used for irrigation. The groundwater aquifers in Giza Governorate are the quaternary deposits which can be divided into two hydrological units Holocene semi-permeable layer and Pleistocene main aquifer. During the project construction activities, the excavation depth does not exceed 1.5 meters, therefore groundwater is unlikely to be encountered in the four studied districts.

Terrestrial Biological Environment:

The proposed gas pipeline routes and pipeline network are planned to be implemented in areas where flora and fauna of significance do not occur.

Waste Management:

Solid wastes will be transferred by local units Trucks to the main Shoubramant dumpsite, the project districts are well covered by public sanitation network which takes all the municipal sewage to be treated in existing sewage treatment plants. There are no hazardous wastes certified disposal sites within Giza district, any hazardous Waste generated will be transported by licensed hazardous waste handling vehicles and personnel to the Town Gas temporarily storage facility in Abu Rawash (Giza) for final disposal at the Nassreya or UNICO hazardous waste facilities near Alexandria Governorate.

Socioeconomic Baseline:

Administrative Division:

The project districts lie within the jurisdiction of the Giza Governorate which is located in the center of the country, situated on the west bank of the Nile River opposite Cairo.

Urbanization Trends:

Three of the project districts (Shabramant, Manial Shiha, and Abou Rawash) are classified as rural areas, while El Talbieh district is classified as an urban area. The majority of the buildings in the rural areas is ranged to be between 3 to 5 stories high, while at El Talbieh the buildings are between 5- 10 or more stories. In rural areas, the average width of main streets ranges between (2 to 3) lanes wide, and the width in side streets ranges between (1 to 2) lanes wide, while in an urban area (El Talbieh) the main streets are wider (3 - 4 lanes wide). Most of the side streets are not paved out and in a bad condition, but they are convenient for NG installations.

Demographic Characteristics:

The total population for the project districts is about **246,770**. The birth rate is 19.7 per 1000 persons in Giza Governorate and the average household size is about 4 persons, while in the project districts the average household size is about 4 – 4.2 persons.

Access to basic services:

The project districts have access to basic services. Nearly 100% of individuals are using electricity, 98 - 100% of individuals have access to the public water network, while the percentage of individuals having public sanitation network is about 77% at Shabramant and about 99% at El Talbieh. However, according to the technical requirement for natural gas connection, only the households which have access to public sanitation will be eligible to be connected by natural gas. Thus, it will be possible to install the NG in the project districts according to the LDC survey.

Human development profile:

Schools are available and intermediate education is prevalent among all project districts (23% - 32%), the percentage of the illiteracy rate at the project representative districts ranges between 18% at El Talbieh and 34% at Shabramant. According to the data collected, the medical services are available and very close to all project districts, so if any injuries occur to the workers, they will be immediately transferred to the nearest hospital. The average monthly income for each household is estimated to be (4000 EGP at Shabramant) and (5000 – 6000 EGP at El Talbieh), agriculture is the main economic activity and the majority of the population is working as farmers at Shabramant while the commercial activity is the major activity at El Talbieh. The consulted community

members recommended paying NG installation costs in installment, they strongly asked for a flexible payment in an installment that varies between one year to five years.

Fuel currently used in households:

The main type of fuel used for cooking in project districts is the LPG cylinders. The formal price of LPG cylinder is 65 EGP, an additional cost (10-20 EGP) is usually added up for transportation and services costs. The average household consumption of LPG ranges between 1 to 3 cylinders monthly.

Willingness and affordability to pay:

The installation fee which goes around 2,350 EGP is too high to be paid in one installment. All participants demanded a system of monthly installments to settle the Installation fee as they can pay around (50 to 100 EGP) per month. The community socioeconomic characteristics and the willingness of people to convert from LPG cylinders to household NG are remarkable; the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG. Moreover, the Ministry of Petroleum has adopted an initiative to encourage more people to connect natural gas to their homes by paying the installation cost in installment for 6 years with a zero-interest rate (about 30 EGP per month).

Physical cultural resources

There are no identified archeological sites or sites with cultural or historical value, located within the project districts that would be affected by the NG pipework (since these districts have been excavated several times before for other public utilities). In case of any unanticipated archeological discoveries within the project districts; **Annex-6**, entitled 'Chance Find Procedure' details the set of measures and procedures to be followed.

0.5 Environmental and Social Impacts

Impacts during Construction:

- **Potential positive impacts:**
  - Provide direct job opportunities to skilled and semi-skilled laborers:
    - According to information gained from LDC, the daily average number of workers during the peak time will be about 50 excavation workers, 2 engineers, and 15 technicians.
    - Create indirect job opportunities, in terms of supporting services to the workers and contractors who will be working in the various locations. This could include, but not be limited to; accommodation, food supply, transport, trade, security, manufacturing… etc.

- **Potential Negative Impacts:**

Some receptors have irrelevant impacts. Those receptors include Ground water, Ecological (fauna or flora), vulnerable structures, and cultural vulnerable sites. The evaluation of the potential negative impacts on various receptors is based on a significant ranking process.

It is worth mentioning that impacts related to land tend to be of no significance, as the Local Distribution Company, Town Gas will rent temporary workshops and storage areas as a preferred option, and in case this is not possible will establish them in the side roads near to installation site. The lands are state-owned lands that require a kind of arrangement with the Local Governmental Unit. Using the side road will never entail any land acquisition. Accordingly, no socio-economic impacts on lands have been identified. Potential negative impacts are addressed in **Table 0-1**.

Impacts during Operation:

- **Potential Positive impacts:**
    - Reduce expenditure on imported LPG cylinders and subsidies
    - Help the household achieve a higher level of privacy.
    - Constantly available and reliable fuel for home use
    - Improved safety due to low pressure (20 mbar) compared to cylinders
    - Eliminate the hardships that special groups like the physically challenged, women, and the elderly had to face in handling LPG
    - Limiting possible child labor in LPG cylinder distribution
- **Potential Negative Impacts:**

A Summary of Negative Impact Assessment during construction and operation is illustrated in the following table:

Table 0-1: Summary of Impact Assessment during construction and operation

Impact	Type	Significance	Impact	Type	Significance
During Construction					
Deterioration of soil quality	Negative	Medium	Waste generation	Negative	Medium
Air emissions	Negative	Medium-Minor	Reduction of Traffic Flow	Negative	Medium
Noise	Negative	Medium	Water Pollution	Negative	Minor
Risks on Occupational health and safety	Negative	Medium	Risk on Community health and safety	Negative	Medium
Impacts due to Covid-19 pandemic	Negative	Medium	Risk on Infrastructure and underground utilities	Negative	Minor
Risk of Temporary Labor Influx	Negative	Medium	Street Condition Deterioration	Negative	Minor
Risk of Child labor	Negative	Medium-Minor	Effect on Visual resources and landscaping	Negative	Minor

Impact	Type	Significance	Impact	Type	Significance
During Operation					
Risk on Community health and safety	Negative	Minor	Risk of Economic disturbance	Negative	Minor
Impacts due to Covid-19 pandemic				Negative	Minor

0.6 Analysis of Alternatives

Pipeline Installation Technology Alternatives:

The Framework study of the Project discussed extensively and analyzed all possible project alternatives, for the current ESMP, the Pipeline installation technologies alternatives were discussed and concluded that the open-cut and HDD techniques (in 5 crossings) are recommended since this will not negatively affect the environment and are considered cheap and safe options.

Pipeline Installation Technology Alternatives:

Trenchless Technologies:

There are four Canals in Shabramant district and one canal in El Talbieh district along intermediate pipeline routes. HDD has some advantages compared to auger boring and open-cut technique as it does not cause interruption to traffic flow, it causes fewer disturbances to the surface and sub-surface soil layers, it can be used for larger distances and a wider range of pipeline diameters, and it is a surface-launched process which does not require drive pits.

Open-Cut Method:

It is a very simple technology which just depends on excavating the soil, laying the pipeline, and backfilling. 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. The open-cut method is the recommended solution in the four studied districts since the pipeline route passes through rural and local roads.

0.7 Environmental and Social Management & Monitoring Plan

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 (Tables: 7-1, 7-2, 7-3 & 7-4). The ESMMP identifies roles and responsibilities for different stakeholders for implementing and monitoring mitigations, as well as estimates costs for these mitigations. It also presents an assessment of the institutional capacity and institutional responsibilities for implementing the ESMMP. In addition, it is designed to accommodate alternative context-specific mitigations and monitoring measures. Also, a special emphasis on the Grievance Redress Mechanism (GRM) was addressed.

0.8 Stakeholder Engagement and Public Consultation

Consultation activities have been developed for the different communities through the following phases:

1. Phase I: Scoping phase session in Giza Governorate (during the preparation of the framework study) on 24th Nov. 2013, **Annex-12**.
2. Phase II: Public consultation session was conducted (during the preparation of the framework study) in Giza governorate, on 23rd Dec. 2013 **Annex-12**.
3. Phase III: Consultation activities in January and February 2017, during the preparation of ESMP study for 9 districts in Giza Governorate **Annex-13-1**.
4. Phase IV: Public consultation session was conducted on 30th April 2017 in Giza Governorate during the preparation of the ESMP study for 9 districts. **Annex-13-1**.
5. Phase V: Consultation activities in Giza new districts (El Talbieh, Shabramant, Manial Shiha, and Abou Rawash) (September – October 2021) Annex**-13-2.** (List of attendees)

The field research team engaged in several activities, including focus group discussions with potential beneficiaries; and with potentially affected people (LPG vendors), in-depth discussions with government officials, representatives of civil society, and community leaders. A consultation meeting was held, where the public officials of the Governorate stressed expediting the implementation of the project in their districts.

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 paying in installments.
- Some concerns about LPG security and safety.
- The actual need to respond faster to grievances and the need to provide more information about GRM.

The key message from the consultation events carried out for this project is that Public and government entities' acceptance for and support of the project are very strong.

0.9 ESMP disclosure

As soon as the ESMP gets clearance from the World Bank and approval from EEAA, a final report will be published on the WBG, 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 and contracting offices.

1. Introduction

1.1 Project Objectives

The proposed Natural Gas Connection project represents an integral component of the national energy strategy, which aims for greater use of natural gas for residential users.

The Government of Egypt (GoE) has immediate priorities to increase household use of natural gas by connecting 1.2 million households per year to the gas distribution network to replace the highly subsidized, largely imported Liquefied Petroleum Gas (LPG). The GoE is implementing an expansion program for Residential Natural Gas connections to an additional 3 to 5 million households. As part of the program, the project involves extending the network and accompanying infrastructure to connect 2.3 million households in 20 Governorates between 2016 and 2021.

In **March 2014** an Environmental and Social Impact Assessment Framework (ESIAF) was developed for 11 of the project's Governorates[2] followed by an update of the ESIAF in **January 2017** to cover the expansion of the project in a new 9 Governorates[3]. In **March 2018**, an ESMP study has been conducted for Nine districts in Giza Governorate[4] named 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 and in **September 2019**, another ESMP study has been conducted for twelve districts in Giza governorate[5] named Tumouh, El_Manawat, El_Qiratyeen, Bortos, El_Baragil, Al Abadiaa, El Hawamdeya, Om Khanan, El_Badresheen, Meet Rahina, Atfih and Kerdasa districts.

The aforementioned studies were cleared by the World Bank and disclosed on the EGAS website and the Bank's external website.

During the implementation phase of the Giza NG connection project, another 4 Districts (El Talbieh, Shabramant, Manial Shiha and Abou Rawash) within the Giza governorate fulfilled the criteria of households NG connections and became ready to join the NG connection project. Three of the four districts (Shabramant, Manial Shiha and Abou Rawash) are found significantly homogeneous in terms of environmental and social aspects (mainly rural villages) while the fourth district (El Talbieh) is characterized mainly by being urban with some commercial activities. This ESMP study covers the Environmental, social, and OHS impacts, mitigation measures, management plans issued for the new 4 districts.

The Low-Pressure Natural Gas Network ESMP study for the new 4 districts in Giza Governorate will cover the following districts:

[2] https://www.egas.com.eg/sites/default/files/2019-06/ESIAF%20for%20NG%20connections%20project%20for%2011%20Governorates.pdf

[3] https://www.egas.com.eg/sites/default/files/2019-06/updated%20environmental%20and%20social%20impact%20assessment%20framework%20for%2020%20governorates.pdf

[4] https://www.egas.com.eg/el-giza-esmp

[5] https://www.egas.com.eg/sites/default/files/2019-10/Giza%20ESMP.pdf

1. El Talbieh district (within Kism El_Talbieh)
2. Shabramant and Manial Shiha districts (within Abou El Nomros Markaz)
3. Abou Rawash district (within Kerdasa Markaz)

The new house connections are considered an extension to the current existing natural gas connection network in Giza.

This ESMP has been prepared based on the Simplification Guidelines agreed upon between EGAS and the World Bank in 2018. Additionally, the ESMP follows the Egyptian legislations, WBG operational policies and World Bank Group General Environmental, Health, and Safety Guidelines & WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems regarding scope and detail of assessment and procedure, and gives particular emphasis to public information and stakeholder participation.

The ESMP objectives include:

- Describing project districts 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 and OHS impacts of the project
- Developing environmental & social mitigation, management, and monitoring plans in compliance with the relevant environmental laws
- Documenting and addressing environmental and social concerns raised by stakeholders and the Public in consultation events and activities.

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

The districts and the total number of households that will be covered in this ESMP are illustrated in Table 1-1.

Table 1-1: Number of Districts and Potential clients

Governorate	LDC	Districts	Potential clients
Giza	Town Gas	El Talbieh	9000
		Shabramant	10000
		Manial Shiha	6000
		Abou Rawash	4500
TOTAL:		4	29500

The studied districts (El Talbieh, Shabramant, Manial Shiha and Abou Rawash) will be supplied by NG from Town Gas NG pipeline network (feed mainly from El Badresheen PRS) which its ESIA

cleared from the WBG[6]. No major environmental or social risks can be foreseen which would prevent the project from reaching the targeted customers within the first half of the year 2022. The extensive experience gained, by EGAS and affiliates; through the implementation of the current WB project and GoE funded Natural Gas Connection project all over Egypt plays a critical role in minimizing environmental and social risks and maximizing public ownership and acceptance.

1.2 Methodology

Based on the site visit conducted by the consultants and the secondary data collected between March-August 2021, the subproject sites located in Giza Governorate in the districts of El Talbieh, Shabramant, Manial Shiha, and Abou Rawash districts were found to be within a radius of 9.4 km, Three of the four districts (Shabramant, Manial Shiha, and Abou Rawash) are found significantly homogeneous in terms of environmental and social aspects (mainly rural villages) while there are some differences found between them and the last district (El Talbieh) which is characterized mainly by being an urban district with some commercial activities.

The study team has adopted a methodology, which helps accelerate the project implementation plan. The methodology aims to simplify the process of conducting the ESMPs studies depending on merging the homogenous districts and choosing only one of them to be representative of other districts depending on the following criteria:

- The length of the pipeline's networks.
- The number of households to be connected by NG connection.
- The nature of the districts (rural, urban, etc).
- The economic activities of the different districts (Tourism, commercial, agriculture, industry, etc.).
- The environmental measurement is to be conducted in only one location from the project's different sites, based on the significance of the impact (air and/ or noise) and/or area of potential sensitivity (environmental and/or social).

For the current ESMP study, Shabramant district is chosen to represent three of the project rural districts (Shabramant, Manial Shiha and Abou Rawash) within Giza governorate due to its longer low-pressure networks and its greater number of households NG connections compared to those districts, while El Talbieh district was chosen because it's the only urban district within the project districts. The locations for environmental measurements (receptors) also have been carefully selected to avoid any potential risks and could be followed up and monitored during the construction phase. The measurement location was chosen on the basis that it is beside a sensitive area (beside Almagd primary school in El Talbieh and Shabramant Preparatory school in Shabramant) and close to the pipeline route. Where excavation works are the common activity for the project on both rural and urban areas, but mitigation measures could be different especially with the traffic conditions as handled on impacts and mitigation chapters.

[6] https://www.egas.com.eg/badrasheen-prs-esia

1.3 Contributors

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

Table 1-2: Shortlist of Main Contributors

Shortlist of Petrosafe main Team Members				
Project Managers (Senior EISA consultants)		Social consultant	Team leader	Quality Control
Chem. Mohamed Saad Abdel Moein	Chem. Mohamed Abdel Moniem Aly	Economist/ Osama Kamal	Geo. Mohamed El-Ghazaly	Dr. Zeinab Farghaly

2. Project Description

2.1 Background

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

The city distribution network comprises the following components:

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

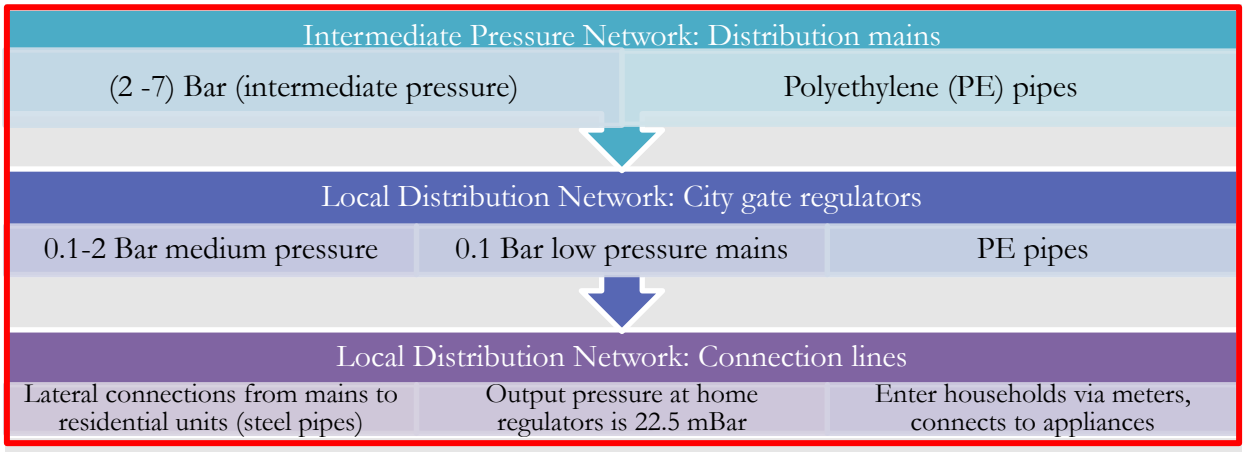

Figure 2-1: General components of the project districts distribution network (Surrounded by red frame)

2.2 Project Work Packages

According to the agreement between Town Gas Company and the Egyptian Natural Gas Holding Company "EGAS" has signed for supplying natural gas to 29500 residential customers in the project districts.

Town Gas Company will start the necessary installations needed to feed natural gas for the customers in these districts. The project scope within Giza Governorate's said districts will be as follows: -

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

2.2.1.1 Shabramant district:

Shabramant district will be connected to NG network by polyethylene intermediate pressure pipeline from the pipeline feeding El Moneeb and Abou El Nomros areas.

2.2.1.2 Route

The proposed pipeline route will start from the underground valve on the pipeline feeding El Moneeb and Abou El Nomros areas located on 6th October - Shabramant road at the intersection with Abou El Nomros central hospital road (Lat. 29°57'12.22" N, long. 31°12'49.42" E).

The proposed pipeline route will extend from the start point to the southwest direction along with 6th October - Shabramant road for about 860 m to cross Meet El Kadous branch canal using HDD technique (Lat. 29°57'0.34 N, long. 31°12'23.37" E).

The proposed pipeline route will continue extending to the southwest direction along with 6th October – Shabramant road for about 1100 m to meet the 2nd HDD point crossing Meet El Kadous canal (Lat. 29°56'35.71" N, long. 31°11'54.56" E). Then about 65 m to meet the 3rd HDD point crossing El Mansoureya road and El Mansoureya canal (Lat. 29°56'35.10" N, long. 31°11'52.25" E). And about 490 m to meet the 4th HDD point crossing El Maryouteya eastern road, El Maryouteya Drainage, and El Maryouteya western road (Lat. 29°56'35.10" N, long. 31°11'52.25" E).

The proposed pipeline route then will be divided into two branches. The first branch will follow El Maryouteya western road for about 870 m to reach the first end point at the entrance of El Mahkama road near Shabramant hospital (Lat. 29°56'42.90" N, long. 31°11'21.22" E).

While the second branch will follow Mahager bani Yousef Road for about 906 m to reach the second end point beside Shabramant club (Lat. 29°56'2.61" N, long. 31°11'18.75" E).

The total length of the proposed pipeline route is about 4.3 km. (**Figures: 2-2 and 2-3**).

Figure 2-2: The proposed Shabramant intermediate pipeline route

Figure 2-3: Pictures showing Shabramant intermediate pressure pipeline route.

2.2.1.3 El Talbieh district:

El Talbieh district will be connected to the NG network by a polyethylene intermediate pressure pipeline from the pipeline feeding El Omraneya area.

2.2.1.4 Route

The proposed pipeline route will start from an underground valve on the pipeline feeding El Omraneya area located at the intersection point between El Orouba road and Ez El-Din Omar Road (Lat. 29°59'07.82" N, long. 31°10'8.25" E).

The proposed pipeline route will extend from the start point to the south direction along with Ez El-Din Omar Road for about 362 m to reach the intersection point between El Ekhlas road and Ez El-Din Omar Road (Lat. 29°58'58.54" N, long. 31°10'16.27" E).

From the intersection point, the proposed pipeline route will extend to the east direction along with El Ekhlas road for about 1180 m reach the first end point near Almagd private school (Lat. 29°59'9.20" N, long. 31°10'58.52" E). And to the west direction for about 1106 m to reach the second end point at the intersection between El Ekhlas road and El Maryouteya road (Lat. 29°58'45.38" N, long. 31° 9'38.95" E).

Between the first and the second ends, the proposed pipeline route will branch twice. The first branch located after about 64 m to the west of the intersection point between El Ekhlas road and Ez El Din Omar Road at which the proposed pipeline route will cross El Ekhlas road and El Ekhlas canal using HDD technique then extend along with Mohamed Saafan Street for about 429 m to reach the third end (Lat. 29°58'45.65" N, long. 31°10'21.85" E).

While the second branch is located after about 703 m to the west of the intersection point between El Ekhlas road and Ez El Din Omar Road at which the proposed pipeline route will extend along with Ahmed Daifalla Road for about 635 m to reach the fourth end at the intersection between Ahmed Daifalla Road and El Maryouteya road (Lat. 29°58'34.97" N, long. 31°10'5.48" E).

The total length of the proposed pipeline route is about 4 km. (**Figures: 2-4 and 2-5**).

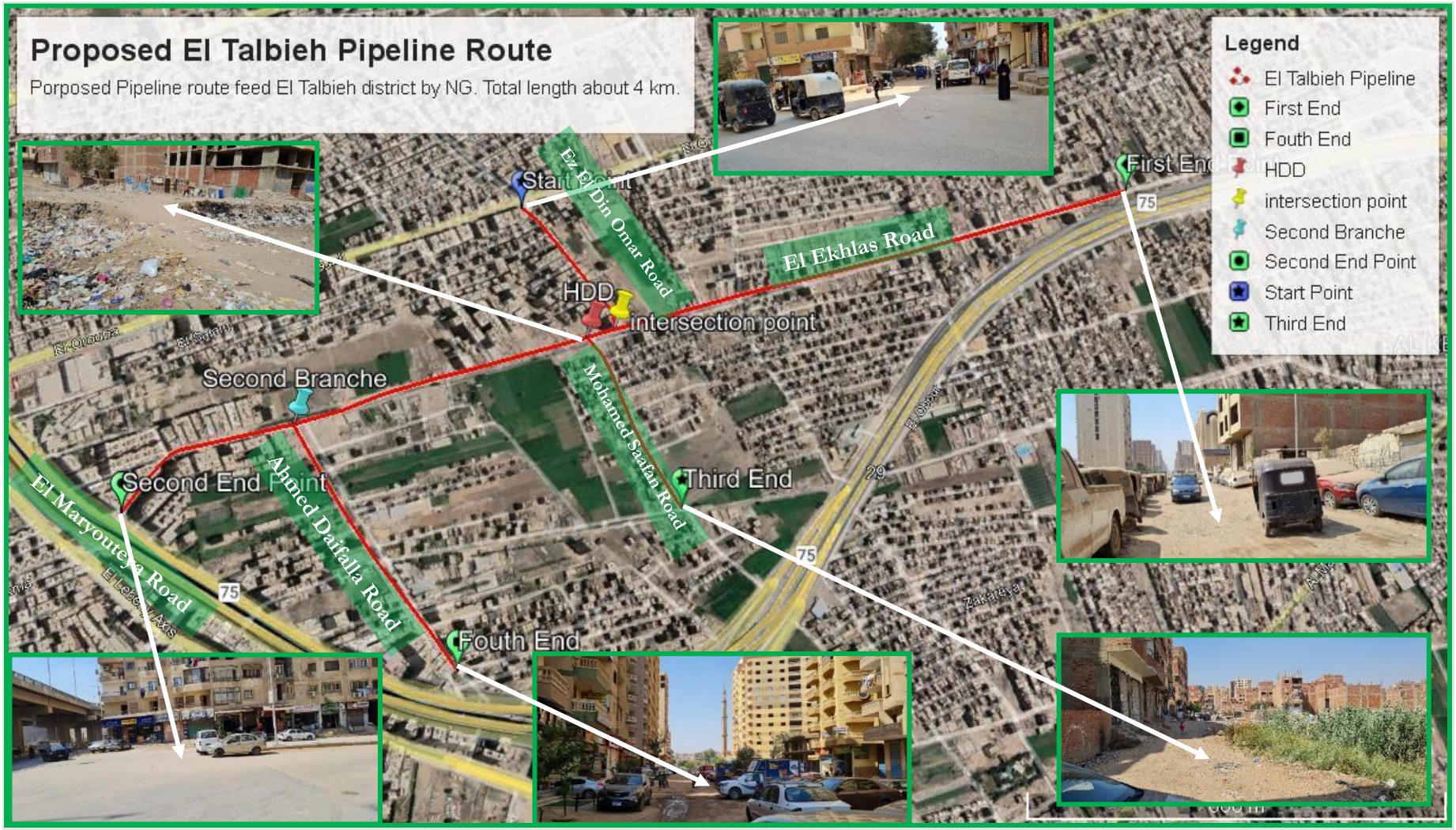

Figure 2-4: The proposed El Talbieh intermediate pipeline route

Figure 2-5: Pictures showing El Talbieh intermediate pressure pipeline route.

2.2.2 Low-pressure Distribution-Network for Project Districts:

Low-pressure 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 2000 mbar. PE80 network will be installed horizontally underground for Shabramant District as shown in **Figures 2-4 and 2-5**.

2.3 Project Execution Methodology

2.3.1 Project district selection criteria

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

A preliminary estimate was generated through a general survey, followed by a Property & Appliance (P&A) survey. The outcome of the P&A survey is a detailed listing of individual households to be connected after passing a safety and technical evaluations. The detailed listing is then used to finalize pipeline sizing and routing.

The technical criteria can be summarized as follow:

- EGAS prepared a list of technical specifications required to have the NG installed in the district:
    1. Districts that have access to all necessary public utilities, especially land networks (electricity, water, sewage, and telephone lines) and overhead utilities
    2. Adobe and wooden houses are not eligible for NG connections
    3. Districts that comply with the British standards and/or the applied standards for NG connections can be used for determining district's eligibility for NG connections.
    4. Districts adjacent to NG National Grid

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

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

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

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

2.3.3 Construction works of main feeding line/network "7bar system – PE100"

The distribution system shall consist of 7-Bar mains extending through city gate regulators, which in turn feed low-pressure networks via district regulators. Distribution mains are typically Polyethylene (PE) pipes connected to regulators. Regulators are fed by 7-Bar piping which is orange in color (referred to as PE 100) with diameters between 16 mm to 35 mm according to GIS PL2-8 and the information provided by Town Gas.

2.3.3.1 Clearing and grading activities and pipe transportation and storage

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

2.3.3.2 Site preparation

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

2.3.3.3 Excavation

The most commonly used excavation technique is the Open cut technique which starts by removing the asphalt layer and the base stone layer using either a mechanical excavator (used in urban roads) or an air compressor jack hammer for dusty roads (used in local roads). In case the jack hammer is used, road layers are removed by an excavator. The trench is excavated to a depth that provides sufficient cover over the pipeline after backfilling (1.2 m in depth and 0.6 m in wide). The road base soil, underneath asphalt and stones, is then excavated either by a backhoe excavator or by manual excavation. The advantage of manual excavation is that it reduces the risks of breaking water, sewerage,

electric, or telecommunication lines that are unmapped. At locations with irregular ground elevations, additional excavation may be applied to avoid undue bending of the pipe. In addition, and in case of having crossing with other underground infrastructure lines/cables, the trench shall be deepened so that the pipeline be installed below or above the existing lines/cables, as shown in **Figure 2-6**. The followed safety procedures are presented in **Annex-2**

Figure 2-6: Picture showing sample of a typical trench for PE pipes by Town Gas

A Horizontal Direct Drilling (HDD) method will be used for laying the underground pipe in the crossing of four Canals in Shabramant district and one canal in El Talbieh district along intermediate pipeline routes as shown in **Figure 2-7**.

Shabramant: Crossing Meet El Kadous branch canal

Shabramant: Crossing Meet El Kadous canal

Shabramant: Crossing Mansoureya canal

Shabramant: Crossing El Maryouteya Drainage

El Talbieh: Crossing El Ekhlas road and El Ekhlas canal

Figure 2-7: Pictures showing the proposed HDD crossings in Shabramant and El Talbieh districts

HDD is a trenchless methodology that uses high excavation depths (about 30-40 meters) and can be used for high pipeline length. HDD causes very little disruption to traffic as road narrowing or diverting are not required, in addition to the smaller work area requirements and it takes 2 working days, a reinforced concrete sleeve will be installed to further protect the piping from fatigue. as shown in Figure 2-8:

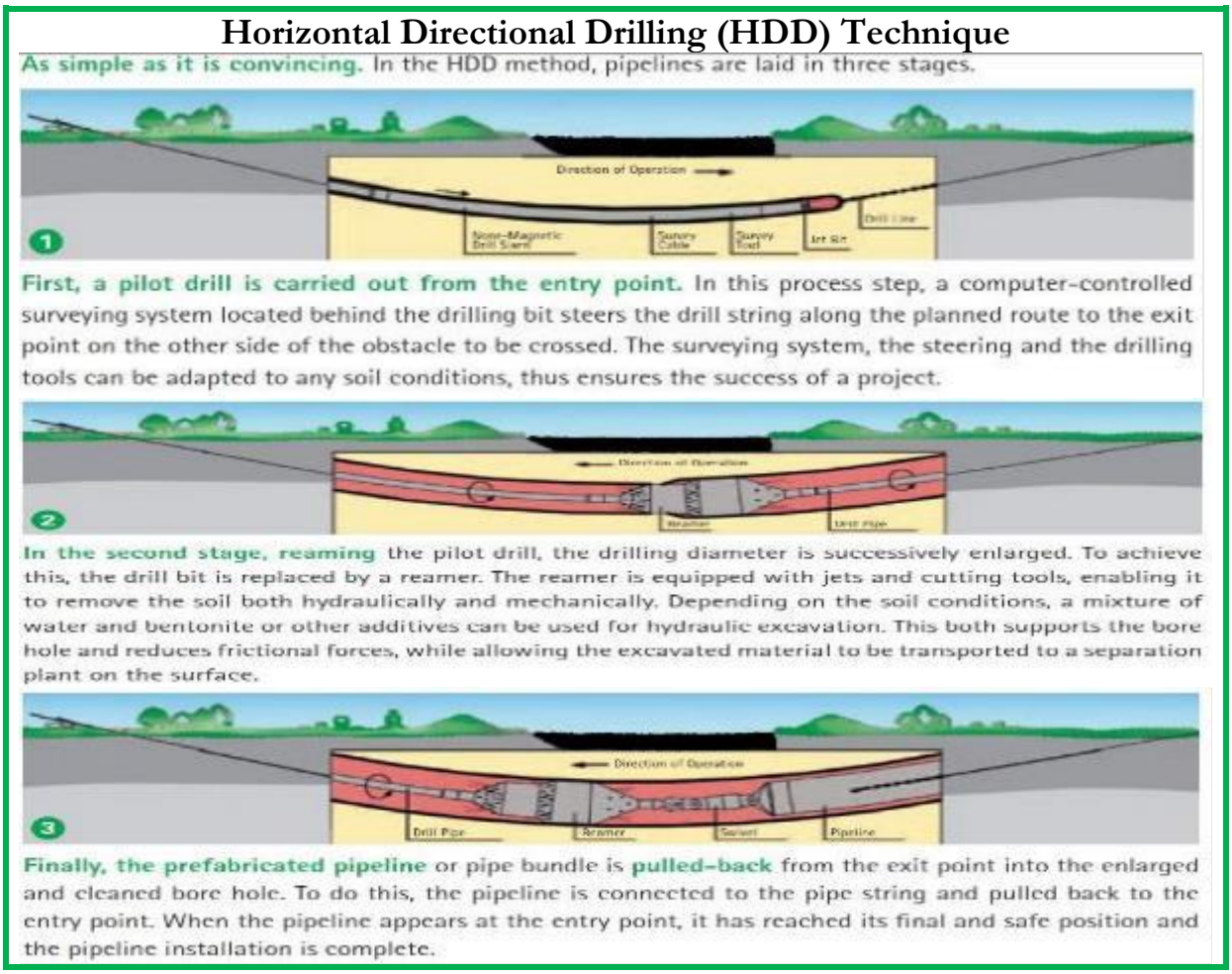

Figure 2-8: Pictures showing Horizontal Directional Drilling (HDD) Technique.

2.3.3.4 Pipe laying

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

2.3.3.5 Pipe welding

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

2.3.3.6 Backfill and road repair

The trench will be backfilled immediately after the pipeline has been laid considering that the finished backfilling level will be the same as the road level. The initial backfill will be to a minimum height of 20 cm of fine sieved sand either by a front loader or manually to protect the pipeline. The backfill will be then compacted by wet sand layers of 15 cm thickness to avoid road settlements and subsequent cracks. In some cases, an inverted U-shaped reinforced concrete slab is constructed around the pipeline after laying to improve shock resistance.

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

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

2.3.3.7 Leakage testing

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

2.3.3.7.1 Pneumatic testing

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

- Safety; and
- Reliability of operation.

It is recommended only for low-pressure applications. Pressure relief devices are a must during the test to ensure no over pressurization and to prevent deformation, dislocation, and rupture of the pipes.

First, the pipeline welded joints are checked, then the pipeline is preliminarily backfilled (about 10-20 cm from each side) then the pneumatic leakage test starts by a well-experienced staff to monitor the test. The test media is compressed air 1.5 higher than the designed pressures (from 0.0225 Bar to 7 Bar – Figure 2-1). Where the Pressure drop indicates any proposed leakage.

2.3.4 Construction works of distribution network "regulators, PE80 networks"

The distribution system shall consist of 100 mbar mains extending from the city gate regulators through distribution networks are typically Polyethylene (MDPE) pipes connected to regulators. Regulators are fed by 100 mbar yellow piping (referred to as PE80) with diameters between 16 mm to 250 mm according to the information given from Town Gas.

2.3.5 Construction works of household installation

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

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

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

2.3.6 Conversion of home appliances

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

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

2.3.7 Commissioning

Before starting the flow of Natural gas, the pipeline will be purged by flushing with dry nitrogen at ambient temperature to ensure that no operational problems arise from air or water left in the pipeline. The pressure of Nitrogen is gradually increased till it reaches the operating pressure pressures (from 0.0225 Bar to 7 Bar – Figure 2-1), and then the operation starts by replacing Nitrogen with Natural gas.

2.3.8 Types of Equipment Used

The proposed equipment which will be used is shown in **Table 2-1**.

Table 2-1: Types of Equipment used

Equipment	
• Heavy Truck	• 110 V Generator
• Medium Truck	• 220 V Generator
• Light Truck	• Welding machine
• Pickup Truck	• Cold cut machine
• Mini Van	• Hilti drill machine
• Air Compressors with jack hammer	• Excavators
• Pump	• Horizontal Directional Drilling machine

The following are the expected impacts from the above-mentioned equipment:

1. Exhaust from excavation equipment and heavy machinery mainly from air compressor with a jackhammer, generators, Excavators, containing SOx, NOx, CO, VOCs, etc.
2. Noise and vibration mainly from air compressor with a jackhammer, generator, Horizontal Directional Drilling machine, Excavators, and excavation tools.
3. Heat stress mainly from the welding machine

More detailed impacts and their mitigation measures are addressed in detail in sections 5 and 7.

(For more information, please see **Annex-3**)

2.3.9 Laborers Requirement

According to previous experience at similar project districts, many variables affect the number and type of workers needed at a specific time during construction. This includes but is not limited to; the number of connections, nature of work required, and time plan. The expected daily average number of workers during the peak time will be:

- About 50 excavation workers (unskilled workers).
- About 15 technicians (semiskilled workers).
- 2 site engineers (high skilled).
- 1 site OHS skilled supervisors.

It is worth mentioning that the skilled and experienced personnel are usually LDC staff who live in the project districts, while the unskilled laborers are hired by the contractor (or the subcontractors)

and come from the surrounding districts. So, no accommodation will be needed during the construction activities onsite. However, workers (if needed) from outside the Giza governorate receive accommodation allowance added to their salaries to lease apartments in the nearest residential districts to construction sites. Laborers usually rely on the surrounding community facility. They obtain potable water from shops located in the project sites. Regarding, sanitation and toilet facilities, the contractors (according to the contracting agreements) will provide suitable toilets through the provided nearby accommodation apartments, LDC nearby facilities (workshops, main contracting offices, portacabins, etc…). Workers generate limited domestic waste that is put in the public waste bins located in the streets.

2.3.10 On-site workshops, warehouses, and types of activities.

The contractor will rent an empty shop (3*4 meter) to be used as a workshop/warehouse during the construction and installation activities; where the workers/ laborers will carry out the welding and painting of the pipelines, in addition to the storage of the chemicals used such as paints and solvents. This shop must be facing the main street. In case of no availability for such a shop, the contractor occupies an open street area that is affiliated to the local governmental unit that should be in wide, low residence and low traffic streets.

2.3.11 Use of chemicals or other hazardous materials

The expected chemicals that will be consumed during this phase of the Subproject are 55 paint containers of capacity 20 liters and 15 solvents jerry cans of the capacity of 20 liters.

2.3.12 Activities of the operation phase

2.3.12.1 Operation of the network

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

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

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

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

2.3.12.2 Repairs in households

Repairs include appliance adjustments or piping/metering replacement.

3. Legislative and Regulatory Framework

3.1 Applicable Environmental and Social Legislation in Egypt

- Law 217/1980 for Natural Gas.
- Law 4 for the 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 the Year 1995 and the amended regulation No 1741 for the Year 2005, amended with Prime Ministerial Decree No 1095/2011, prime ministerial decree No 710/2012, Prime Ministerial Decree No 964/2015, Prime Ministerial Decree No 26/2016 and Prime Ministerial Decree No 618 & 1963/2017.
  - EEAA guidelines
  - Updated EGAS HSE guidelines, LDCs will comply with Updated EGAS HSE Guidelines (provided in **Annex-2** from the report)
- 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 and Law 142/2014.
  - 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 including Decree No. 211/2003, Decree No. 126 (2003), Decree No. 134 (2003).
- The Child Law No. 12 of 1996, of the Arab Republic of Egypt, Amended by Law No. 126 of 2008
- Law No. 148/2019 on Comprehensive Social Insurance.

The following tables present the Egyptian limits for ambient air quality, noise levels, and allowable emissions from vehicles and power generation units:

Table 3-1: Maximum limits of outdoor air pollutants

Annex 5 of the ER amended by Decree No. 710/2012					
Pollutant	Location Area[7]	Maximum Limit [µg/m³ unless otherwise noted]			
		1 hour	8 hours	24 hours	1 Year
Sulphur Dioxide	Urban Industrial	300 350	--- ---	125 150	50 60
Carbon Monoxide, mg/m³	Urban Industrial	30	10	--- ---	--- ---
Nitrogen Dioxide	Urban Industrial	300 300	- -	150 150	60 80
Ozone	Urban Industrial	180 180	120 120	--- ---	--- ---
Total Suspended Particles (TSP)	Urban Industrial	--- ---	--- ---	230 230	125 125
Particulate Matter less than 10 µm (PM_{10})	Urban Industrial	--- ---	--- ---	150 150	70 70
Particulate Matter less than 25 µm ($PM_{2.5}$)	Urban Industrial	--- ---	--- ---	80 80	50 50
Suspended Particles Measured as Black Smokes	Urban Industrial	--- ---	--- ---	150 150	60 60
Lead	Urban Industrial	--- ---	--- ---	--- ---	0.5 1.0
Ammonia (NH_3)	Urban Industrial	--- ---	--- ---	120 120	--- ---

[7] Urban limits will be used for the project districts

Table 3-2: Power generation by diesel engines

Table 2 of Annex 6 of the ER amended by Decree No. 710/2012				
Fuel Type	Maximum Emission Limits (mg/m^3)			
	TSP	CO	SO_2	NO_x
Natural Gas	50	150	100	**600**
Diesel	100	250	400	**600**
Reference conditions: O_2 is 15% & Temperature 273 K & Pressure 1 atm.				

Table 3-3: Maximum allowable emissions from vehicles that operate using gasoline fuel

Table 23 of Annex 6 of the ER amended by Decree No. 710/2012						
Pollutants	Before the year 2003		From 2003 to 2009		The year 2010 and later	
	Hydrocarbons HC (ppm)	CO%	HC (ppm)	CO%	HC (ppm)	CO%
Maximum allowable Limit	600	4	300	1.5	200	1.2
Measurements should be done at the idle speed from 600 to 900 rpm						

Table 3-4: Maximum allowable emissions from vehicles that operate using diesel fuel

Table 24 of Annex 6 of the ER amended by Decree No. 710/2012		
Manufacturing Year (model)	Before the year 2003	From 2003 and later
Smoke density factor K (m^{-1})	2.8	2.65
Opacity %	30	25
• **Measurements are done following the ISO-11614 international standard.** • **Opacity measured at light flow device 127 mm.**		

Table 3-5: Maximum permissible noise level limits

Table 3 of Annex 7 of the ER amended by Decree No. 710/2012		
Area Type	Maximum Permissible Equivalent Noise Level [$dB(A_{eq})$]	
	Day (7am – 10pm)	Night (10pm – 7am)
Sensitive areas to noise	50	40
Residential suburb with low traffic and limited activities service	55	45
Residential areas in the city and have commercial activities	60	50
Residential areas are located on roads less than 12 m and have some workshops or commercial activities or administrative activities or recreational activities … etc.	65	55

3.2 World Bank Safeguard Policies

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

Environmental Assessment OP/BP 4.01 will apply to the Subproject. Physical Cultural Resources OP/BP4.11 will be applicable since Giza governorate is known for some archeological and cultural sites, although no cultural resources are located in the subproject districts (since these districts have been excavated several times before for other public utilities). The chance finds procedures will be part of the contracts of the contractors. Involuntary Resettlement OP/BP 4.12 will not apply to the low-pressure pipelines network of the project districts 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 Subproject will result in any physical or economic dislocation of people for the construction of low-pressure pipelines in the project districts.

"Gap analysis for key environmental and social issues concerns: Egyptian laws and WBG Policies was conducted in the ESIAF of the project and disclosed on EGAS website[8]"

3.2.1 World Bank Group General Environmental, Health, and Safety Guidelines[9], WBG Environmental, Health, and Safety Guidelines for Gas Distribution Systems[10]

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which guide users on EHS issues in specific industry sectors (please see **Annex-4**).

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

The following tables present the IFC limits for ambient air quality, noise levels, and allowable emissions from vehicles and power generation units.

Table 3-6: WHO Ambient Air Quality Guidelines[11][12]

Pollutants	Averaging Period	Guideline value in mg/m3
Sulphur Dioxide	24-hour 10 minutes	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen Dioxide	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter less than 10 µm (PM_{10})	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)

[8] https://www.egas.com.eg/natural-gas-connections-project-11-egyptian-governorates

[9] https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES

[10] https://www.ifc.org/wps/wcm/connect/9c6e3d0048855ade8754d76a6515bb18/Final%2B-%2BGas%2BDistribution%2BSystems.pdf?MOD=AJPERES&id=1323162128496

[11] World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile.

[12] Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

Pollutants	Averaging Period	Guideline value in mg/m3
Particulate Matter less than 25 µm ($PM_{2.5}$)	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Table 3-7: Small Combustion Facilities Emissions Guidelines (3MWth – 50MWth) – (in mg/Nm³ or as indicated)

Combustion Technology / Fuel	Particulate Matter (PM)	Sulfur Dioxide (SO2)	Nitrogen Oxides (NOx)	Dry Gas, Excess O2 Content (%)
Engine				
Gas	NA	NA	200 (Spark Ignition) 400 (Dual Fuel) 1,600 (Compression Ignition)	15
Liquid	50 or up to 100 if justified by project-specific considerations (e.g. Economic feasibility of using lower ash content fuel, or adding secondary treatment to meet 50, and available environmental capacity of the site)	1.5 percent Sulfur or up to 3.0 percent Sulfur if justified by project-specific considerations (e.g. Economic feasibility of using lower S content fuel, or adding secondary treatment to meet levels of using 1.5 percent Sulfur, and available environmental capacity of the site)	If bore size diameter [mm] < 400: 1460 (or up to 1,600 if justified to maintain high-energy efficiency.) If bore size diameter [mm] > or = 400: 1,850	15
Notes: N/A/ - no emissions guideline; Higher performance levels than these in the Table should apply to facilities located in urban/industrial areas with degraded airsheds or close to ecologically sensitive areas where more stringent emissions controls may be needed.; MWth is heat input on HHV basis; Solid fuels include biomass; Nm3 is at one-atmosphere pressure, 0°C.; MWth category is to apply to the entire facility consisting of multiple units that are reasonably considered to be emitted from a common stack except for NOx and PM limits for turbines and boilers. Guidelines values apply to facilities operating more than 500 hours per year with an annual capacity utilization factor of more than 30 percent.				

Table 3-8: Noise Level Guidelines[13]

Area Type	One Hour LAeq (dBA)	
Receptor	**Daytime 07:00 - 22:00**	**Nighttime 22:00 - 07:00**
Residential; institutional; educational[14]	55	45
Industrial; commercial	70	70

[13] Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999. 55 For acceptable indoor noise levels for residential, institutional, and educational settings refer to WHO (1999).

14 Noise monitoring should be carried out using a Type 1 or 2 sound level meter meeting all appropriate IEC standards.

3.3 Permits Required

- Constructions permit to be obtained from the Local Governmental Unit.
- Road and Bridges Directorate permission for digging of main roads under Law number 84 of the year 1968 of the public roads.
- Environmental permit: according to Egyptian Law for the Environment, Law 4/1994 amended by Law 9/2009. EEAA approval on ESIA is considered the environmental permit.

4. Environmental and Social Baseline

4.1 Description of the Environment

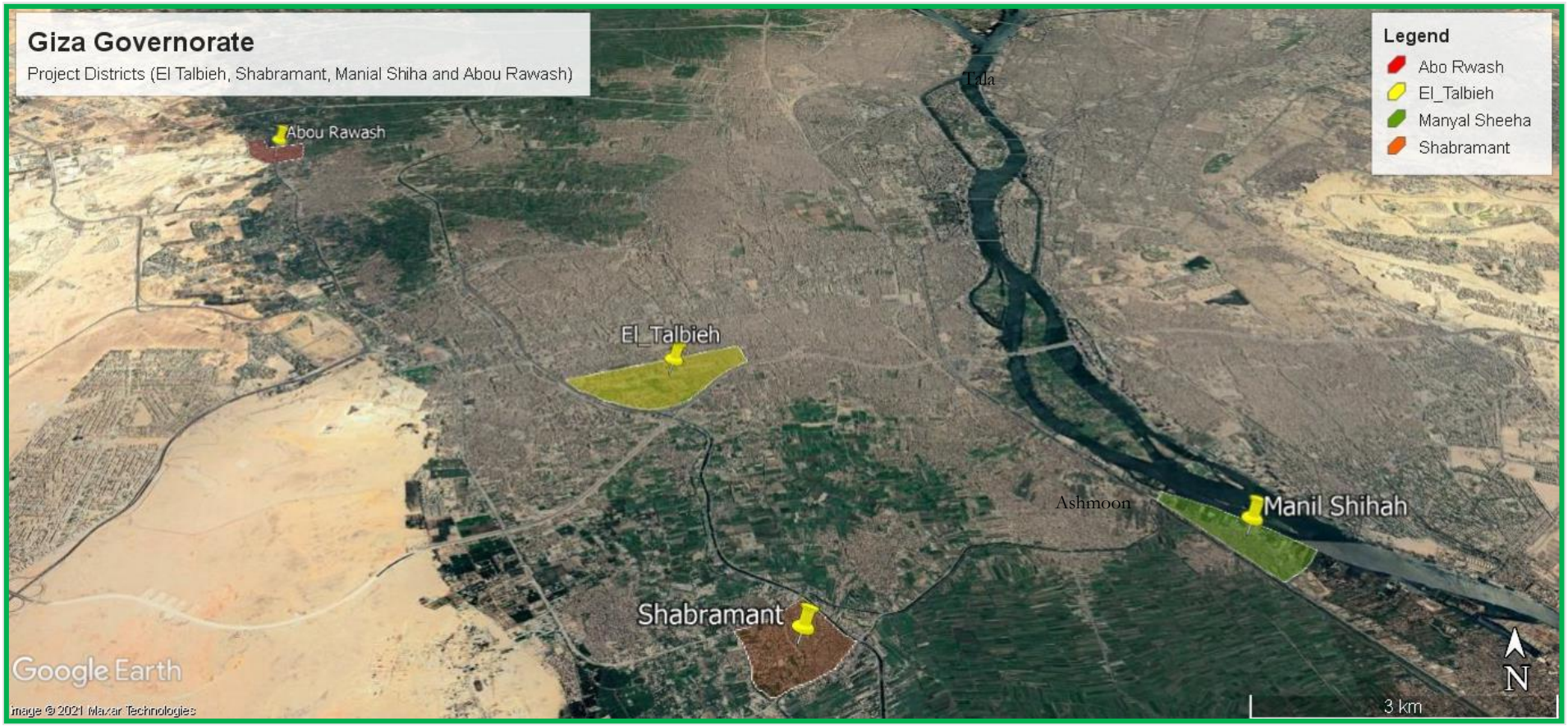

Figure 4-1: Distribution of cities in Giza governorate and proposed gas connections district's location

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

- **El Talbieh district (Kism El Talbieh)**

  El Talbieh district is an urban area that is located in Kism El Talbieh about 9 km from Cairo, bordered from north by Haram Street and King Faisal district, from the south by ring road and El Konaysa district, from the west by ring road and Haram district and east by Omrania district **(Figure 4-2)**

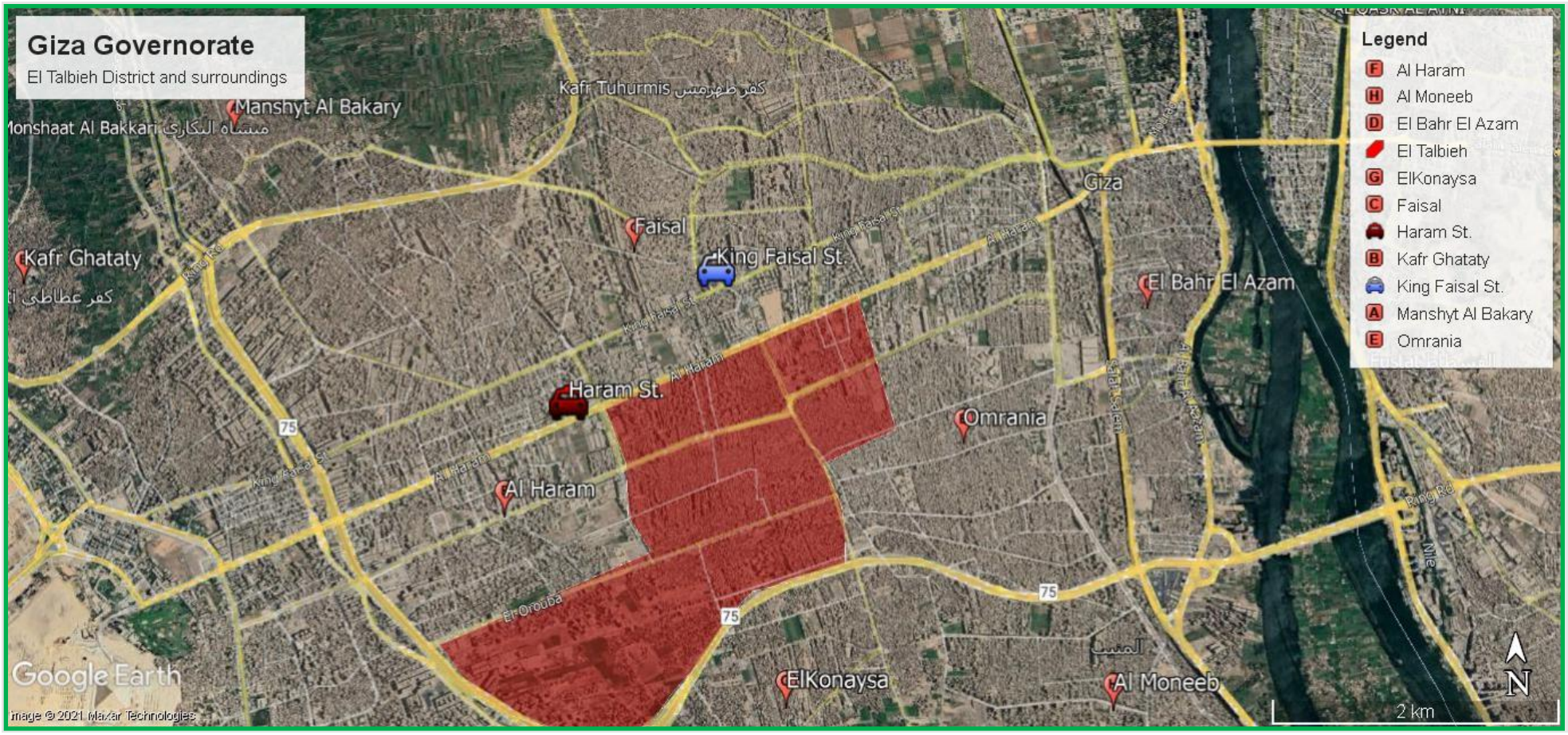

Figure 4-2: Satellite map showing El Talbieh district and surrounding communities

- **Shabramant and Manial Shiha districts (Markaz Abou El Nomros)**

  Shabramant and Manial Shiha districts are located in Abou El Nomros Markaz about 12.5 km and 10.5 km respectively from Cairo, bordered from north by Haraneya and Nazlet El Ashtar districts, from the south by Abu Suier and El Manawat districts, from the west by Fayoum desert road and from the east by Maadi district. **(Figure 4-3)**

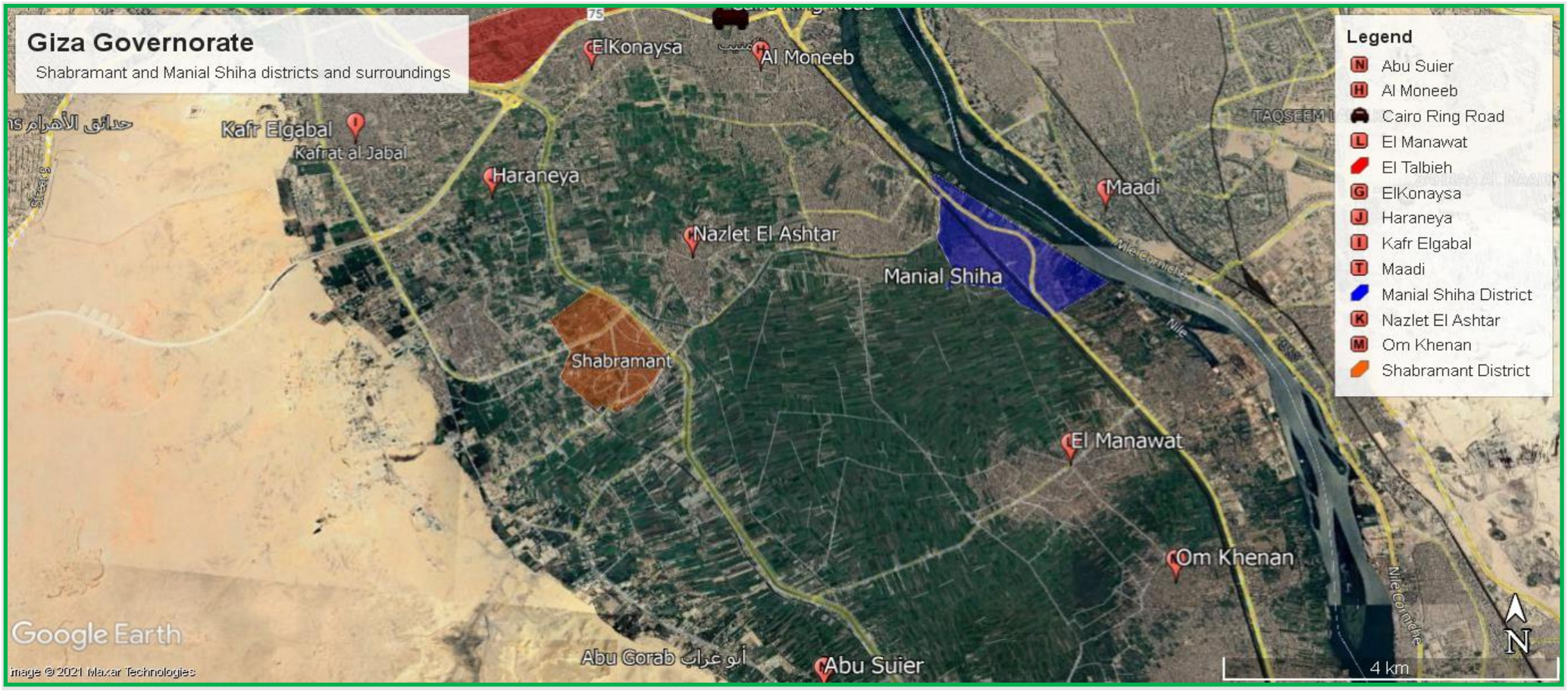

Figure 4-3: Satellite map showing Shabramant and Manial Shiha districts and surrounding communities

- **Abou Rawash district (Markaz Kerdasa)**

  Abou Rawash district is located in Kerdasa Markaz about 13.5 km from Cairo, bordered from the north by 26th of July corridor, and Kafr Hakeem district, from the south by Kerdasa district, from the west by Cairo - Alex Desert Road and from the east by Nahya district. **(Figure 4-4)**

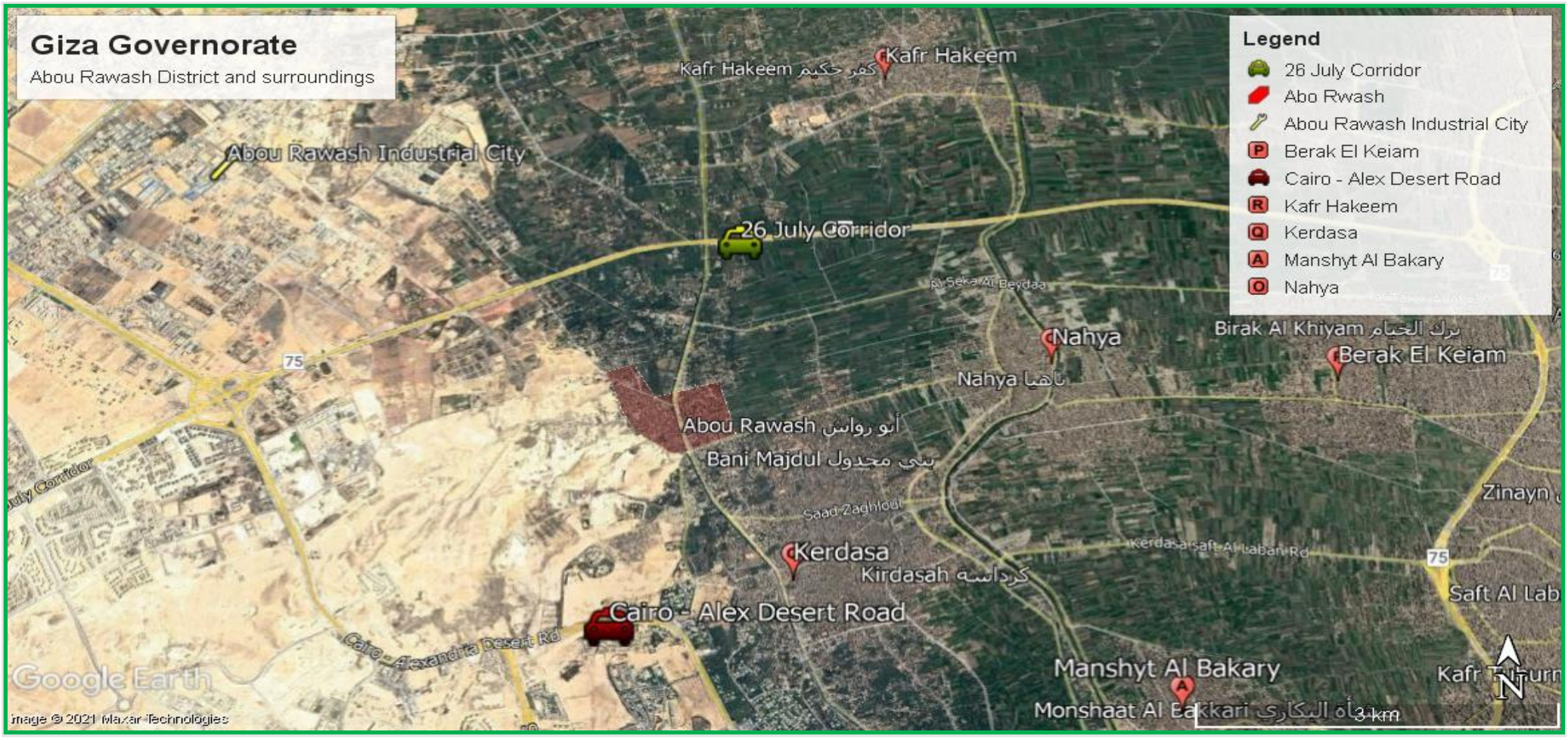

Figure 4-4: Satellite map showing Abou Rawash district and surrounding communities

4.1.1 Air Quality

4.1.1.1 Site-Specific Ambient Air Quality:

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

According to the study methodology, the measurement locations were chosen on the basis that it is close to the pipeline route beside Shabramant Preparatory School for Girls (Shabramant) and Almagd Private School (El Talbieh). The GPS coordinates of the selected Ambient Air monitoring locations are shown in the table below.

One-hour average results for 8 hours continuous measurements were conducted for pollutants of primary concerns, namely, carbon monoxide (CO), nitrogen oxides (NO2), sulfur dioxide (SO2), Total Suspended Particulates (T.S.P), and particulate matter (PM10).

Table 4-1: Location of Air and Noise measurements

District	Latitude	Longitude
El Talbieh (Almagd Private School)	29°59'9.56"N	31°10'51.13"E
Shabramant (Shabramant Preparatory School for Girls)	29°56'44.97"N	31°11'17.88"E

Methodology, instrumentation, and results of Air Quality measurements are detailed in Annex-5.

Results of ambient air quality measurements:

The concentrations of measured air pollutants for the representative districts (Shabramant and El Talbieh) are below national and WB guidelines as shown in **tables 4-2** and **4-3**. Construction engines are certified, i.e., the exhaust is expected to be below the permissible levels. Ambient air quality measurements for gaseous pollutants (NOx, SOx, and CO) resulting from the operation of construction equipment are unlikely to surpass permissible levels after applying the proposed management and mitigation plans for ambient air pollution (addressed in section 7)

During the construction phase, excavation and construction activities will likely cause dust levels to surpass permissible levels at the construction areas. 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 workday i.e., 8-10 hours. Management and mitigation measures for dust concentration beyond permissible levels are further addressed in section 7.

Table 4-2: Shabramant air Quality Measurements

Time		NO_2 (µg /m³)	SO_2 (µg /m³)	CO (mg/m³)	PM10 (µg /m³)	T.S.P (µg /m³)
10:AM		57.1	72.1	3.3	61.2	73.4
11:00		50.4	62.3	3.1		
12:00		53.9	68.9	3.3		
13:00		63.9	84.9	3.3		
14:00		51.0	72.1	3.0		
15:00		61.9	62.3	2.9		
16:00		59.4	68.9	3.1		
17:00		58.4	84.9	3.3		
Limits	**National**	**300/h**	**300/h**	**30/h**	**150/24h**	**230/24h**
	WB	**200/h**	**500/10min**	**-**	**150 /24h[15]**	**-**

Table 4-3: El Talbieh air Quality Measurements

Time		NO_2 (µg /m³)	SO_2 (µg /m³)	CO (mg/m³)	PM10 (µg /m³)	T.S.P (µg /m³)
10:AM		40.0	40.3	2.9	55.1	65.8
11:00		45.3	58.3	3.0		
12:00		35.7	46.9	2.9		
13:00		50.8	65.2	3.1		
14:00		33.8	59.8	2.8		
15:00		29.9	74.1	3.3		
16:00		36.3	54.9	3.0		
17:00		31.2	66.9	2.6		
Limits	**National**	**300/h**	**300/h**	**30/h**	**150/24h**	**230/24h**
	WB	**200/h**	**500/10min**	**-**	**150 /24h[16]**	**-**

4.1.2 Noise

4.1.2.1 Site-specific noise measurements

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

Table 4-4: Shabramant and El Talbieh Noise Measurements

Time From 10:00 AM to 5:00 PM	Sound Level Equivalent & Percentile Recordings in dBA for 8 Hours					Permissible Limits LAeq (dBA)	
	LAeq	LA10	LA50	LA90	LA95	National	International
Shabramant	53.46	56.29	51.94	48.16	47.36	**55**	**70**
El Talbieh	52.97	55.13	47.85	43.01	39.50	**65**	**70**

Methodology, instrumentation, and results of Noise measurements were shown in Table (4-4) and are detailed in Annex-5.

[15] Interim target-1

[16] Interim target-1

Results of noise measurements

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

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 workday i.e., 8-10 hours Management and mitigation measures for noise levels beyond permissible levels are further addressed in section 7.

4.1.3 Climate

The mean monthly values for temperature are more or less in the same range all over the studied districts as they are located within the same governorate which reflects regional identity. The average annual temperature is 21.5 °C and the average annual rainfall is 1.9 mm.

4.1.4 Water resources

4.1.4.1 Surface water

The surface water resources of Giza Governorate include the Nile River and irrigation canals (Al Mansoureya, Al Zomor, and Al Rayah El Bahary canals), in addition to other branched waterways and drainages where it supplies about 977.51 million cubic meters annually used for agriculture and the rest for industrial and domestic uses.

Six freshwater canals are starting from the boundary of Atfih Markaz in the south to Monshaat Al Qanater Markaz in the north by the total length of 123 km, as follows:

1- Giza canal supplies about 498.8 million cubic meters/year
2- Al Ibrahimeya canal supplies about 43.9 million cubic meters/year
3- Al Korayemat irrigation Station supplies about 198.92 million cubic meters/year
4- Al Lithy irrigation Station supplies about 151.89 million cubic meters/year
5- Al Rayah El Bahary canal supplies about 56 million cubic meters/year
6- Al Rayah Al Nasery canal supplies about 28 million cubic meters/year

The projected work is planned along existing roads; no pipelines will be passing through any major canals or Nile branches within the studied districts.

4.1.4.2 Subsurface water

There is no available accurate data about subsurface water in Giza governorate but it is constantly renewable by the Nile River and irrigation water and used for irrigation. During the project construction activities, the excavation depth does not exceed 1.2 meters, therefore Subsurface water is unlikely to be encountered.

4.1.4.3 Groundwater

The groundwater aquifers in Giza Governorate are the quaternary deposits which can be divided into two hydrological units Holocene semi-permeable layer and Pleistocene main aquifer.

Holocene semi-permeable layer: contained from shale and clay. Its thickness differs from one area to another and generally ranges between 1 – 15 m.

Pleistocene main aquifer: contained from sand, flint, and scattered spots from clay. Lies between the Holocene semi-permeable layer from the upwards and Pliocene clay from the downward. Its thickness ranges between 100 – 200 m, with groundwater levels ranging between 15 to 15 m sourced from the Nile River and irrigation canals.

During the project construction activities, the excavation depth does not exceed 1.5 meters.

4.1.5 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 districts.

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

4.1.6 Waste Management:

Solid Waste:

The responsibility of service planning, delivery, and monitoring in the Giza Governorate is delegated to the Cleansing and Beatification Agency managed by the Presidency of the City Council. Solid waste collected by trucks then transferred to dumpsite (Shoubramant dumpsite) as shown in **Figure 4-5**:

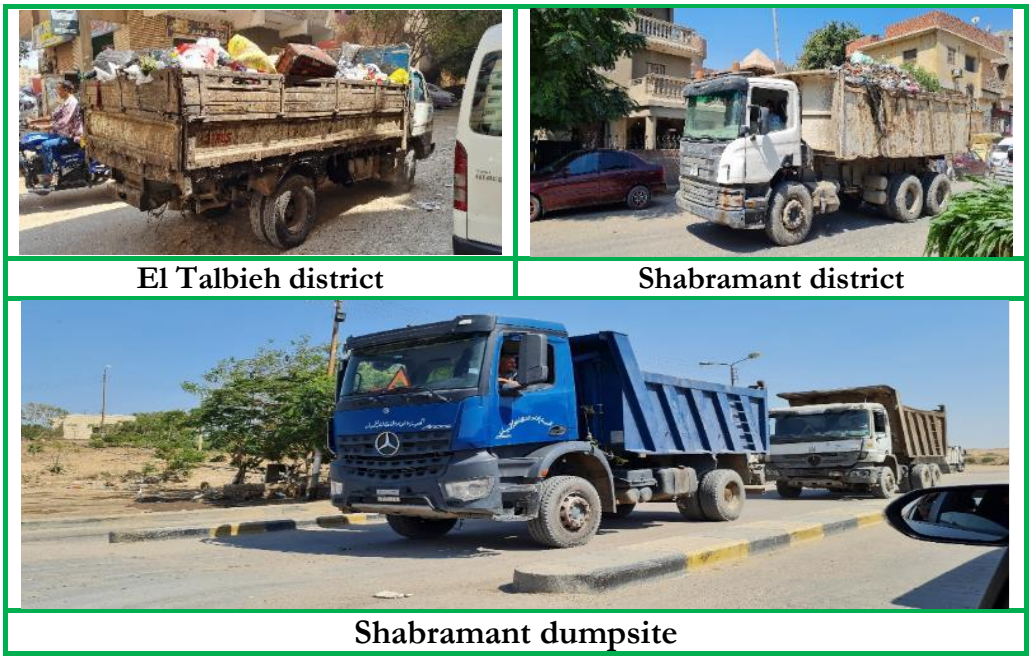

Figure 4-5: Shows waste handling at project representative districts and Shabramant dumpsite.

Liquid Waste:

The project representative districts are well covered by a public sanitation network which takes all the municipal sewage to be treated in the existing sewage treatment plants.

People in the streets can use available public sanitary facilities which can be located within the existing mosques, restaurants, or any public coffee shops.

Hazardous Waste:

There is no hazardous wastes landfill within the Giza district, any hazardous waste generated within the project site will be temporarily stored in an isolated area (in the generated site) and will be transported- by licensed hazardous waste handling vehicles and personnel to the Town Gas temporarily storage facility in Abu Rawash (Giza) for final disposal at the Nassreya or UNICO hazardous waste facilities near Alexandria Governorate.

4.1.7 Roads and traffic:

The traffic within the project activities areas in El Talbieh district is relative of moderate to low density, while in Shabramant district it is relative of low density. The rush hours can be divided into two major periods. The first is between 7-10 a.m., and the second one is between 2-4 p.m.

There are many types of vehicles moving inside and outside El Talbieh and Shabramant districts including private cars, microbuses, motorcycles, and tricycles (Tuk Tuk). The main roads within Shabramant project district are 6th October - Shabramant and Mahager bani Yousef roads which have relatively low traffic density. While the main roads within El Talbieh project district are Ez El-Din Omar and El Ekhlas roads which have relatively moderate to low traffic density.

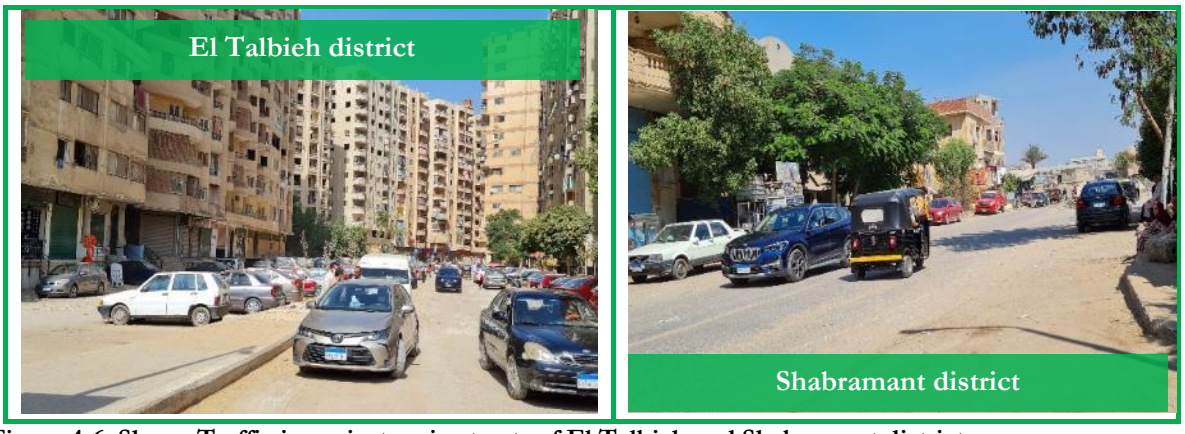

Figure 4-6: Shows Traffic in project main streets of El Talbieh and Shabramant districts

4.2 Socioeconomic Baseline

Depending on a combination of both primary data collected from the field and secondary resources reviewed including statistical data, this section will highlight the following: administrative division, urbanization trends, demographic characteristics, human development profile, access to basic services, roads and transport, poverty index, income and expenditure, fuel currently used in households, problems faced with the current household fuel, perception towards the project, and gender dimension of the current type of fuel.

4.2.1 Administrative division

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. The total area of the Giza governorate is 85,153 km^2. It is divided into (10) administrative districts (Markaz), (12) cities, (7) suburbs (Hay), (51) rural local units including (170) villages, and (581) Ezbet/Kafr.

The project will be implemented in 4 districts of Giza governorate: El Talbieh (Kism El Talbieh), Markaz Abou El_Nomros (Shabramant and Manial Shiha), and Markaz Kerdasa (Abou Rawash)

The following table shows the project target districts:

Table 4-5 Project Target Districts

Project districts	
Area	Districts
Kism El_Talbieh	El Talbieh
Markaz Abou El_Nomros	Shabramant
	Manial Shiha
Markaz Kerdasa	Abou Rawash

4.2.2 Urbanization Trends

According to the frequent site visits to the project districts and the field observations, all districts are classified as rural areas except El Talbieh which is an urban area. The type of dwelling should be highlighted to identify the probability to install the NG in those houses. Most of the buildings are constructed of concrete and red bricks. Almost all of the samples surveyed live in brick/ concrete houses. The conditions and characteristics of the houses comply with the bases and preconditions for connecting NG. The majority of buildings at Shabramant (as a representative of the rural areas) range between 3 to 5 stories in height while El Talbieh (as an urban area) ranges between 5 to 10 or more stories in height.

Regarding the legal status of buildings, all buildings and neighborhoods are mostly legal as reported by the Local Government Unit (LGU) at Shabramant and El Talbieh (Hay).

Building Condition at Shabramant

Building Condition at El Talbieh

Figure 4-7: Pictures showing Building Condition at Shabramant and El Talbieh.

Regarding the condition of the streets at Shabramant District, the average width of main streets ranges between 2 to 3 lanes wide, and side streets range between 1 to 2 lanes wide, while at El Talbieh the main streets are wider, more than 3 lanes wide. Most of the side streets at Shabramant and El Talbieh are not paved out and are in a bad condition but they are convenient for NG installations. According to the local authorities, all streets will be paved after NG connections, where the Governorate is giving high priority to an infrastructure upgrade, which includes roads and streets, sanitary and sewage systems, and restoring main squares.

Streets Condition at Shabramant

Streets Condition at El Talbieh

Figure 4-8: Pictures showing Streets Conditions at Shabramant and El Talbieh.

4.2.3 Demographic Characteristics

4.2.3.1 Total population:

The total population number of households and the potential clients within the project districts are presented in the table below:

Table 4-6 Distribution of the population in project representative districts[17]

District	Population			No. of Households	Average Family size	Potential NG Clients (No. of Households)
	Male	Female	Total			
Shabramant	16,093	15,154	31,247	7,733	4	2000
El Talbieh	110,397	105,126	215,523	51,346	4.2	4000
Total	**126,490**	**120,280**	**246,770**	**59,079**	**4.1**	**6,000**

4.2.3.2 Rate of natural increase and Household size:

The birth rate in Giza Governorate in 2017 was 24.9 births per 1000 persons, while the mortality rate was 5.2 per 1000 persons. That gives a natural growth rate of 19.7 per 1000 persons in the Giza Governorate. The average household size in Giza Governorate is about 4 persons while in the project districts are about 4 – 4.2 persons per household as shown in Table 4-6.

[17] ***Source: CAPMAS, 2017 and LDC***

4.2.4 Access to Basic Services[18]

Access to basic services, water supply, sanitation, and electricity is one of the main pillars that determine the economic well-being of the community. According to the frequent site visits to the project district, statistics data collected and the focus group discussions, the project districts have access to basic services. Nearly 100% of individuals are using electricity, 98 - 100% of individuals have public water network, while the percentage of individuals having public sanitation network is about 77% in Shabramant and about 99% in El Talbieh. However, according to the technical requirement for natural gas connection, only the households which have access to public sanitation will be eligible to be connected by natural gas. LDC always conducts its survey to select the technically eligible districts before preparing their connection plan. Thus, it will be possible to install the NG in the project districts which have access to basic services.

4.2.5 Human development profile

Educational, health facilities, poverty index, income and expenditure, and human activities, and work status should be highlighted to determine the current socioeconomic conditions of the target districts in Giza Governorate.

4.2.5.1 Education:

Education is perceived as the first shell that can help the population to withstand poverty. The review of secondary data and the focus group discussions showed that intermediate education is prevalent among project districts. They also revealed that schools are available there. The education level -especially the percentage of illiterate- is very important to be aware of to choose suitable channels to share the project information with the community.

Table 4-7 Distribution of the project districts' population by educational status[19]

District	Percent illiterate	Percent with university education	Percent intermediate education
Shabramant	34%	6%	23%
El Talbieh	18%	22%	32%

4.2.5.2 Health Facilities

Providing health facilities is very important to save workers in case of accident and emergency cases at the project districts. According to the data collected, the medical services are available and very close to all project districts, so if any injuries occur to the workers, they will be immediately

[18] *Source: CAPMAS data 2017*

[19] *Source: CAPMAS data 2017*

transferred to the nearest hospital or medical care center where the hospitals lie near the project sites within two to three kilometers distance. Shabramant district has one new hospital and one medical center While El Talbieh district is Al Haram hospital and many other private hospitals where all hospitals are providing emergency medical services 24 hours/day The LDC (Town Gas) is giving a high priority to protecting their workers. All contracts between LDC and contractors /subcontractors have a special clause to guarantee to provide the necessary medical services to the workers. In addition, Town Gas in emergency cases provides the worker with all the required medical services.

4.2.5.3 Poverty index, Income, and Expenditure

According to the data collected from LGU Shabramant, the percentage of poor people is about 16% while the average income is 4000 EGP. While the residents of El Talbieh district enjoy a higher level of income about 5000 – 6000 EGP where commercial activities are the main source of income. According to CAPMAS's recent Income, Expenditure and Consumption Survey in 2017/2018, the percentage of poor people in the Giza Governorate is about 35%.[20]

However, the samples surveyed provide information that their monthly expenditure is almost equivalent to their income, and they prefer to pay NG installation costs in installments.

4.2.5.4 Human activities in the project districts

According to the data collected from the LGU, agriculture is the main economic activity at the Shabramant district (35%). Shabramant has some industries such as food and beverages, and clothes industries in addition to the commercial activities. The total areas of the cultivated lands in Shabramant district are 1255 acre. El Talbieh as an urban area, commercial activities are the main source of income for the population (30%) in addition to governmental authorities which absorb about 20%. Some other activities such as Tok Tok drivers and workshops are available. So, connecting NG to Giza Governorate districts will help so much for achieving the social and economic development plans, hence the standard of living for people there.

4.2.5.5 Unemployment and work status

Concerning the work status, CAPMAS Annual Bulletin of Labor Force 2017 indicates that the unemployment rate in Giza Governorate is about 12.5%. The unemployment rate for females is about 25%, which is higher than this rate for males (10%). The unemployment rate is similar at the project districts as provided by local authorities (12% at Shabramant) and (10% at El Talbieh).

[20] no data was found about poverty in the mentioned districts

Table 4-8 Estimation of Labor Force, Employed, and Unemployment in Giza Governorate[21]

Labor Force (15 years and above)			Estimated Employed Persons			Unemployment Rate		
Male	Female	Total	Male	Female	Total	Male	Female	Total
1,946,800	468,600	2,415,400	1,760,100	352,600	2,112,700	10%	25 %	12.5 %

It is worth mentioning that the CAPMAS Annual Bulletin of Labor Force 2017, regarding labor force, reflected that the age of starting work is 15 years old. Both the Child Law and the Labor Law state that children shall not be employed before they complete 14 years old, nor shall they be provided with training before they reach 12 years old; however, children between 12 and 14 years old are permitted to work as trainees. Furthermore, the governor concerned in each governorate, in agreement with the Minister of Education may permit the employment of minors aged 12-14 years in seasonal work which is not harmful to their health and growth, and which does not conflict with regular school attendance. Consequently, there is always a high probability to detect child labor in most of the projects implemented in Egypt. In the project districts where agriculture work and sales activities are in place, a big number of underage laborers were noticed. In a conclusion, there is a risk that the contractors might employ young people below 18 years old.

Therefore, rigid restrictions to employ this category must be added to the contractor's obligations.

4.2.6 Fuel currently used in households

The LPG cylinders are the main source of fuel used for cooking and water heating, as reported by the majority of the samples surveyed in the project districts. The LPG cylinders can be obtained from the LPG vendors or through the LPG outlets. The formal price of LPG cylinder is 65 EGP, an additional cost (10-20 EGP) is usually added up for transportation and services. The average consumption of LPG cylinders per household ranges between 1 to 2 cylinders monthly. While during winter, each household consumes between 1 to 3 cylinders monthly. Electricity (as a source of energy) is also available for water heating, but it is not preferred by the majority of families due to its high cost.

4.2.7 Problems faced with the current household fuel

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

[21] ***Source: CAPMAS data 2017***

- The high price of LPG cylinders.
- The fluctuations of the informal LPG price, especially during winter.
- Some LPG cylinders are invalid to be used due to poor maintenance.
- The tedious process to obtain LPG cylinders.
- The LPG is not completely full. It is half-filled.
- Sometimes it might leak.
- It is difficult to bring the LPG cylinders upstairs.

Concerning the electric heater, the high electricity bill was the main major problem due to the high price of electricity, which increases every year. Therefore, the majority of samples surveyed in the project districts expressed their willingness to be connected to the NG.

4.2.8 The gender dimension of the current type of fuel

Females are the main player when it comes to handling LPG within the boundaries of the household. According to the interviews and the focus group discussions, women are responsible for carrying the LPG cylinders from the outlets and installing them to their stoves or water heaters, which adds more pressure on women in terms of time, effort, safety, and money.

4.2.9 Perception towards the project

Throughout the various consultation and focus group discussions, the team experienced and recorded remarkable and overwhelming public acceptance, even eagerness, 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.

The majority of the samples surveyed in the project districts have positive perceptions about the 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 limitations to the different problems of LPG.
- It will save electricity that is used in electric heaters and reduce the cost of electricity bills.

4.2.10 Willingness and affordability to pay

Based on the latest formal price of LPG and analysis of the data obtained, each household consumes (on average) between (1 – 2) LPG cylinders monthly in summer and (1 - 3) in winter, indicating that each household will pay about 170 - 255 EGP as a maximum per month according to the average price of LPG cylinder 75 - 85 EGP (the formal price plus transportation and services cost).

During the consultation activities, the participants were asked about their opinion on the NG installation fee. They stated that the installation fee, which goes around 2350 EGP, is too high to be paid in one installment. All participants demanded a system of monthly installments to settle the installation fee within a period between one to five years. Participants stated that they could

pay around (50 to 100 EGP) per month to settle the installation fee. The majority of people consulted did not have information about the different available options to cover and pay the installation cost and there is a need to provide clear information about the available options (especially the AFD Grant for poor people and areas), which currently are applicable to settle the installation cost. All available options will be shared with the different stakeholders during all the project consultation activities. The following are these options :

- Bank installment system for a period of up to 5 years, according to the agreements between LDCs and the Egyptian Banks.
- The Ministry of Petroleum initiative to encourage more people to connect natural gas to their homes by paying the installation cost in installment for 6 years with a zero-interest rate (about 30 EGP per month). This initiative is currently the most popular option and helps so much in increasing the number of households' contracts of natural gas connections.
- AFD Grant in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG. The grant (1500 EGP) will cover more than 50% of the NG installation cost according to eligibility criteria. This eligibility criterion depends on selecting the beneficiary households based on their electricity consumption rate. The average monthly consumption for eligibility shall range from 50 kWh to 300 kWh on average, calculated over 12 months. The average monthly electricity consumption is highly correlated to the poverty level of households. Consumers must submit their application to the relevant LDC, which will liaise with the involved entities to check the eligibility of the households. Subsequently, eligible consumers will receive the subsidy in the form of a deduction applied to the connection fees. The implementation of the Targeted Financial Support based on this eligibility criterion involves many entities; namely EGAS and LDCs under the Ministry of Petroleum, Ministry of Social Solidarity as well as Ministry of Electricity and Renewable Energy. Additionally, other criteria have been added up, by selecting the poor areas according to CAPMAS and the Ministry Social Solidarity to determine the poor areas which can benefit from the grant.

  Based on the approved eligibility criteria mentioned above, it is expected that the grant would support in covering the expenses to connect to natural gas to a targeted 500,000 deprived households in all project' governorates. Town Gas has disclosed all information about the grant in its contract offices, but more information dissemination about the grant is required in Giza Governorate.

4.2.11 Physical cultural resources

Low-pressure Natural Gas installation pipework shall only take place in the areas of the project districts which are already excavated beforehand to install other public utilities such as water, sanitary, sewage, and electricity networks. It is least likely to find any artifacts or antiquities where low-pressure NG installation pipework is going to take place. There are no identified archeological sites or sites with cultural or historical value located within the project areas that would be affected by the NG pipework. (All public services (sewage, water, electricity have been installed) except limited areas still waiting for public sanitation

In case of any unanticipated archeological discoveries within the project districts, **Annex-6**, entitled 'Chance Find Procedure,' details the set of measures and procedures to be followed in such a case.

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 the 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 worksite 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-7**.

5.2 Impacts during Construction

5.2.1 Positive impacts

5.2.1.1 Impacts related to employment

The project will result in positive impacts through the provision of job opportunities both directly and indirectly.

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

  Based on similar projects implemented recently by EGAS and Town Gas, the daily average number of workers during the peak time will be about 50 excavation workers, 2 engineers, one OHS supervisor, and 15 technicians. The workers can also include drivers, digging staff, technicians, and welders. About half of them can be recruited from the local community.

- **Indirect benefits**

As part of the construction stage, many indirect benefits are expected to be sensed in the targeted areas due to the need for more supportive services to the workers and contractors who will be working in the various locations. This could include, but will not be limited to accommodation, food supply, transport, trade, security, manufacturing… etc. For example, the transportation of workers from different villages to project districts will work for the benefit of car lease offices.

5.2.2 Negative Impacts

The process of environmental impact assessment during the construction phase indicates that some receptors have irrelevant impacts. Those receptors include groundwater, Ecological (fauna or flora), vulnerable structures, and cultural vulnerable sites.

A Summary of Impact Assessment during construction and operation is illustrated in **Table -5.2**

5.3 Impacts during Operation

5.3.1 Positive impacts

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

5.3.2 Negative impacts

The process of environmental impact assessment during the operation phase indicates that some receptors have irrelevant impacts. Those receptors include waste management, air quality, soil, and Ecological (Fauna and flora).

A Summary of Impact Assessment during construction and operation is illustrated in **Table 5.2**

Table 5-2 Impact Assessment

Detailed impact assessment results are presented in two tables in **Annex-7**.

Impact	Description	Type	Significance
During Construction			
Deterioration of soil quality	Degradation of soil quality, Excavation, and movement of heavy machinery on unpaved surface soils during site preparation and pipeline laying could cause a physical breakdown of soil particles potentially causing destabilization of the soil structure.	Negative	Medium
Air emissions	WBG requirements and Law 4/1994 (modified by-laws 9/2009 & 105/2015) stipulate strict air quality standards. Air emissions (gases and particulates) during construction (from transportation and machine operation) 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 congestion resulting from road closure or slowing down of traffic due to excavation works. - Dust: 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 the impact of dust generation (particulate matter) can lead to a temporary reduction of air quality, however, is unlikely to cause major air emissions impacts as it will be limited to the working hours as excavation and backfilling are carried out within the same day.	Negative	Medium
	<u>Gaseous pollutants emissions</u> 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 WBG permissible levels.	Negative	Minor
Noise	Construction activities of the gas distribution network will likely increase noise levels due to excavation and heavy machinery. Typical construction noise includes noise intensity due to engine operation and intermittent impacts that may take place during the demolition of asphalt by jackhammers.	Negative	Medium
Risks on Occupational health and safety	Inhalation of air pollutants, high noise levels, potential injuries or death as a result of slips, falls, operating heavy equipment and handling hazardous materials, working at height, excavation, hot works, ergonomic and electrical hazards. Electrocution in sites with intersection points of overhead power lines.	Negative	Medium
Impacts due to Covid-19 pandemic	During the project activities, the Movement of staff can increase the risk of transmission of COVID-19 to the workers and community members.	Negative	Medium

Impact	Description	Type	Significance
Impacts related to Labor Influx	If not properly managed, there is a risk that labor inappropriate behaviors or misconduct might pose negative impacts on the community groups, particularly on women, children, and other vulnerable groups (including inconvenience and impacts on worksites)	Negative	Medium
Child Labor	As mentioned in the baseline, child labor is a common practice in the project districts communities. Children below 18 years old work almost in all projects as they receive low salaries, and they are less demanding. Due to the technicality of the work in NG projects, LDCs always seek technical workers that are highly trained and experienced, so the risk of contracting children under 18 years is medium to minor. This risk should be carefully handled in the ESMP.	Negative	Medium -Minor
Waste generation	Inappropriate waste disposal (including sewage or dewatering wastewater if exist) and improper management of construction waste materials could lead to spillages that will cause soil contamination. Excavated soil and concrete/brick waste are inert materials. Improper disposal of such waste will only have aesthetic effects on the disposal site. The legal standards of Law 4/1994-9/2009-105/2015 for the Environment and Law 38/1967 stipulate that these wastes should be disposed of in licensed sites by the local authority, which minimizes any aesthetic effects of such waste. Hazardous materials available onsite during construction activities are likely to include fuel, engine oil, paints, Poor handling of those materials and their inappropriate storage may result in poor containment of induced leaks.	Negative	Medium
Reduction of Traffic Flow	- Traffic congestion and loss of access due to establishing temporary workshops and storage areas, excavation, and installation works will be varying from one district to another according to the population, rush hours (**Figure 4-5**), and the services within each district. - 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 blocking narrow or side roads. - In addition to reducing the lanes/space available for traffic, impacts may also entail limiting or prohibiting parking along the length of the works.	Negative	Medium
Water Pollution	No crossings of main surface waters are expected, only they will be crossings for one small canal using the HDD technique. However, uncontrolled dumping of waste in the canal can result in water pollution.	Negative	Minor

Impact	Description	Type	Significance
Risk on Community health and safety	The excavation works and establishing temporary workshops and storage areas within the project districts will affect the community health and safety by the following means: - Emissions of gaseous pollutants and dust from equipment and machinery used - Increased background noise levels resulting from the operation of jackhammers, which surpasses permissible limits for residential districts in the vicinity of commercial areas during the day - Waste accumulation in illegal dumping and potential burning of construction waste, which will consist mainly of excavated soil and leftover PE and carbon steel pipes - Excavation works will result in the presence of open trenches in areas accessible to the local community (e.g., in front of buildings and shops.) The presence of open trenches can pose risks of accidental falls and injuries. - Installation of household connections may involve working at height, which can result in falling objects causing health and safety hazards to the local community. - Construction works will involve the use of equipment such as jackhammers and welding machines, which can cause injuries to the local community as a consequence of the contact. - Congestion and traffic disturbance for pedestrians, cars as well as the livelihoods of the taxi, TukTuk, and microbus drivers. - Access to buildings (including schools) 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. - Children in schools might get affected in case of excavating in the proximity of their schools. - Walking People in the streets or living in narrow or blocked streets might get affected in case of excavating or establishing temporary workshops in their streets. - Installing temporary working platforms (scaffolds) in front of houses may result in accidents for residents - Underground utilities and infrastructure pipelines (such as water, sewerage, and telecommunication) were installed years ago without accurate documentation and maps for their 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 accumulates in the trench. There is also the possibility of overflowing into the streets causing a nuisance to the surrounding environment. - Breaking a water supply pipe may result in cutting the supply to some residential units, which may lead residents to use other sources of water that may be either expensive or unsafe. - Damaging sanitary pipelines, electricity, telecommunication cables, and water supply result in severe disturbance to community people.	Negative	Medium

Impact	Description	Type	Significance
Risk on Infrastructure and underground utilities	- Underground utilities and infrastructure pipelines (such as water, sewerage, and telecommunication) were installed years ago without accurate documentation and maps for their 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 accumulates in the trench. There is also the possibility of overflowing into the streets causing a nuisance to the surrounding environment. - Breaking a water supply pipe may result in cutting the supply to some residential units, which may lead residents to use other sources of water that may be either expensive or unsafe. - Damaging sanitary pipelines, electricity, telecommunication cables, and water supply result in severe disturbance to community people.	Negative	Minor
Street Condition Deterioration	Street's rehabilitation or restoration following pipeline network installation is referred to by an Egyptian legal/institutional expression (رد الشيء لأصلة) 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 on a restoration fee with the local government unit (district) to cover the balance of the restoration and pavement cost. The local unit uses the fee to include the restoration and re-pavement of the streets in its "pavements plan".	Negative	Minor
	Delays in street restoration may lead to varying degrees of damage to vehicles, loss of access and business, traffic congestion with associated delays and emissions, and potentially significant public discontentment.	Negative	Minor
Impacts Related to Land	The project will need plots of land for the workshops and temporary storage areas. Town Gas will establish the workshops and temporary storage areas on the side roads near to installation site. The lands are state-owned lands that require a kind of arrangement with the Local Governmental Unit to use the land for storage purposes and establish a temporary workshop. Using the side road will never entail any land acquisition. **No socio-economic impacts on lands have been identified.**	None	None
Effect on Visual resources and landscaping	Project activities will entail the piling of sands and the 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 an impact on visual resources and landscaping.	Negative	Minor

Impact	Description	Type	Significance
	Operation		
Risk on 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. - 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
Risk of Economic disturbance	- For those who will pay in installments, this may be an added financial burden on poor families. Also, there could be a Minor negative economic impact on LPG cylinders distributors. (Governmental sector- private sector who have a 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.	Negative	Minor
Impacts due to Covid-19 pandemic	- During the project maintenance or check NG meter activities, the Movement of staff inside houses may increase the risk of transmission of COVID-19 to Community members.	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, achieving savings in LPG consumption, and enhancing safety in utilizing energy.

In March 2014, an ESIA framework was developed for the project's Governorates including Giza Governorate. This report managed to identify all project alternatives that can be addressed in project locations. This ESMP utilized the alternatives that are only applicable to Giza governorate sites.

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

Install a natural gas pipeline beneath the ground level, which 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 anticipated the crossing of four Canals in Shabramant district and one canal in El Talbieh district along intermediate pipelines routes[22]. HDD[23] has some advantages compared to auger boring and open-cut technique as follows:

- Compared to the open-cut technology, it does not cause interruption of traffic flow.
- Compared to the open-cut technology, it causes fewer disturbances to the surface and sub-surface soil layers.
- Compared to the auger boring technology, it can be used for larger distances and a wider range of pipeline diameters.

[22] **See figure number 2-7**
[23] **See figure number 2-8**

- Compared to the auger boring technology, it is a surface-launched process that does not require drive pits.
- Compared to the auger boring technology, it is a guided method and accordingly can achieve high accuracy for the pipeline path.
- Can be employed for high depths, and accordingly can avoid any breakage accidents to the existing infrastructure lines/cables.

6.1.2 Open-Cut Method

This is the traditional method for pipeline installation. It is a very simple technology which just depends on excavating the soil, laying the pipeline, and backfilling. However, it is technically not possible to be used in crossings with major waterways. It can be used in crossings with major roads and railways; however, this will cause huge interruption to traffic that necessitates either re-routing or reducing the number of lanes. This will lead to a reduction in the average speed of the vehicles on the road and may affect the areas devoted to parking. This may also increase the probability of having car accidents, in addition to negative socio-economic impacts because of interrupting the flow of people and goods. The open-cut method is the recommended solution in the four studied districts since the pipeline route passes through urban and local roads.

6.2 Routing, regulators, working time, and payment

Description and details of the preferred routing selected, types of regulators, preferred working hours to avoid the rush hours, as well as the alternative of paying for installation costs are discussed in detail in the ESIAF developed for the whole project; 2.3 million Natural Gas Connections Project in 20 Governorates.[24]

[24] https://www.egas.com.eg/sites/default/files/2019-06/updated%20environmental%20and%20social%20impact%20assessment%20framework%20for%2020%20governorates.pdf

7. Environmental and Social Management & Monitoring Plan

7.1 Objectives of the ESMMP (Environmental and Social Management and Monitoring Plan)

The Environmental and Social Management and Monitoring Plan (ESMMP) consists of a set of mitigation, management and monitoring measures to be taken during the implementation of the project to avoid, reduce, mitigate, or compensate or offset any adverse social and environmental impacts analyzed in the previous chapter. The ESMMP distinguishes between mitigation measures and monitoring plans that should be implemented during the construction and operation of the project.

The ESMMP identifies certain roles and responsibilities for different stakeholders for implementing, supervising, and monitoring the environmental and social performance of the project as well as some of their estimated costs during its life cycle. Roles and responsibilities for implementing the ESMMP during the construction and operation phases have been proposed. During construction, EGAS/LDC will assign supervision staff who will undertake supervision over the contractor to make sure that the mitigation measures specified in the design/tender document are implemented in the field.

Overall, the following Environmental and Social measures are complementary to and do not substitute compliance with the detailed updated HSE guidelines, procedures, and actions adopted by EGAS and its subsidiary LDCs. Annex-2 attached to this report

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 Environmental and Social Management Matrix during CONSTRUCTION

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

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical Receptor	Degradation of soil quality	- Decrease erosion by minimizing disturbances and scarification of the surface - Best practices for soil management should be followed - Good housekeeping to minimize spills/leaks - Proper handling and management of waste	Minor	- LDC HSE Contractor	- LDC HSE	Field supervision (audits)	Contractor costs LDC management costs
Physical receptor	Air emission	- Controlled wetting and compaction of excavation/backfilling surrounding area - Excavated soil stockpiles and stored sand (if any) should be located in sheltered areas. Stored fine sand should be covered with an appropriate covering material, such as polyethylene or textile sheets to avoid soil dispersion. - Transportation of excavation/construction waste should be through licensed and sufficiently equipped vehicles with a suitable special box or provided with a cover to prevent loose particles of waste and debris from escaping into the air or dropping on the road. - Disposal of excavation/construction waste should be in locations licensed by the local authority. - Compliance with legal limits of air emissions from all relevant equipment - Availability of 24-7 hotline service (129) to all beneficiaries and the public for reporting leaks, damages, or emergencies - Quick response to gas leaks by evacuation of the affected area - Repair or replacement of the failed component	Minor-negligible	Excavation Contractor LDC HSE	- LDC HSE	- Contractual clauses - Field supervision Measure & document emissions of machinery by regular audits request emission measurements	– Contractor costs – LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical receptor	**Noise**	- Restrictions on lorry movements to prevent noise nuisance in the early morning/late evening - All machines and vehicles should be shut off when not used. - choosing vehicles, equipment of good technical specifications, and status - good maintenance of this equipment to reduce the resulting noise - effective scheduling of construction activities to avoid the overlap of noise sources - All machinery is to be fitted with effective exhaust silencers. - Air compressors should be of the type, which is sound reduced with properly, lined, and sealed acoustic cover and to be operated with the covers closed - All machines and vehicles should be shut off when not used. - Avoid noisy works at night whenever possible - Avoid construction activities during peak hours of heavy traffic whenever possible; especially when the project site is in the proximity of a sensitive receptor. - Provide Earmuffs, earplugs, certified noise PPE for workers - Noise exposure periods should be minimized for workers so as not to exceed the safe limits mentioned in the environmental laws in addition to the occupational health and safety standards. - Workers operating in areas or activities of high noise level intensities should be supplied with earmuffs - Contractors should train all the workers before the commencement of construction activities about this hazard and how to avoid it.	Minor	- LDC HSE Excavation Contractor	- LDC HSE	– Contractual clauses – Field supervision (audits) – Complaints receipt from the local administration	– Contractor costs – LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical receptor	waste generation	**Non-hazardous waste accumulation:** - Allocating certain areas, in each Sector, for stockpiling waste soil and construction waste, in coordination with the local authority. - No soil stockpiling is allowed on banks of waterways. - Segregate waste streams to the extent possible to facilitate re-use/recycling, if applicable - Maximize re-use of excavation waste as backfill for natural gas pipeline trenches. - Reuse non-hazardous waste to the extent possible - Estimate size of fleet required to transport waste. - Normally asphalt waste could be disposed of with other excavation waste/aggregates in the local non-hazardous waste site. - Solid waste from unlikely scenarios such as domestic site activities (such as temporary offices or rest areas) should be addressed in specific waste management plans, as appropriate - If septic tanks are used in case of temporary toilet facilities, make contractual arrangements with a wastewater removal contractor (in coordination with the local unit) to purge and dispose of possible septic tanks in the case they are utilized in work sites	Minor	- LDC Excavation Contractor	- LDC HSE	– Contractual clauses – Monitoring waste management plan – Field supervision	– Contractor costs – LDC management costs
Physical receptor	waste generation	**Hazardous waste accumulation:** - Temporary storage in areas with impervious floor - Safe handling using PPE and safety precautions - Empty cans of oil-based paint resulting from painting the steel connection pipes to households are to be collected and sent back to the nearest LDC depots for temporary storage until disposal at a hazardous waste facility (Nassreya /Unico). - Transfer to LDC depots for temporary storage - Disposal at licensed Alexandria hazardous waste facilities (Nassreya) by licensed contractors.	Minor	– LDC – Excavation Contractor – Water Authority + contractor – 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

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		- If hazardous waste quantities generated are too small for isolated transport to the Nassreya /Unico landfill, a temporary storage site can be created. Coordination with waste authority will be imperative to secure a location and implement adequate procedures for storage depending on quantities and type of waste until collection and shipping to Nassreya /Unico landfill. - Hand-over selected oils and lubricants and their containers to Petrotrade for recycling - In case of damaging asbestos pipes during excavation, the Water Authority, which will carry out the repairs, will be responsible for handling the waste asbestos according to their procedures. - Adequate management of asbestos and any possible hazardous waste - Minimize fueling, lubricating, and any activity on-site that would entail the 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 various activities to minimize leftovers and residuals. - Preplanning drainage of dewatering water (subsurface water) and taking necessary permits from the Water and Wastewater Company, or irrigation authority. No land disposal should be accepted for the water - If dewatering is taking place from a contaminated trench or contains hydrocarbons that could be observed or smelled, contaminated water should be collected in barrels and transported to a wastewater treatment facility. - Testing the subsurface water sample before selecting the appropriate disposal option - Asphalt waste may contain hazardous components, such as tar, lubricating oils, heavy metals, etc. However, its solid				_ Field supervision + review of Water Authority manifests	_ Trucks from licensed handler _ Pre-treatment (if needed) _ Disposal cost at Nasreya _ Approximate cost of the above (to be revised upon project execution): 8000 EGP - 10000 EGP per ton _ Contractor costs _ LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		nature minimizes the transport risk of such components to the environment. Disposal of asphalt waste to the municipal waste disposal site is common practice in Egypt as this is normally not associated with significant environmental risks because of the dry weather nature of the country. - To the extent practical, seek to combine leftovers or residuals of the same liquid material/waste 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: - avoid inhalation and sources of ignition - cover and mix with sufficient amounts of sand using PPE - collect contaminated sand is marked secure containers/bags - Add sand to the inventory of hazardous waste					
Social receptor (health and safety)	**Impacts on occupational health and safety**	- The project will hire a qualified contractor/sub-contractor with high health and safety standards. In addition, the ToR for the contractor and the ESMP will provide the provision of 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 trenches. - Regular inspection to compel workers to use their PPE - Specialized training for technicians and supervisors - Training and licensing industrial vehicle operators of specialized vehicles.	Minor	– LDC – Excavation Contractor	– LDC – HSE Department	– Field supervision inspection and review of HSE report+ Field supervision (audits)	– Contractor costs – LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		

		- The contractor also should keep an attendance worksheet and Laborers ID to verify the age of workers
		- Health insurance should apply to the contractor workers and workers contracted by a subcontractor.
		- The new contracts with contractors/subcontractors will include an annex with mitigation measures to address labor-management issues through having in place labor-management procedures. The annex will include all the social requirements in the worker ' contract such as:
		  - The right of workers to report their thoughts
		  - The right of the worker to know all the terms and conditions of his contract. (Salary, business hours, insurance, etc...
		  - Ensuring that there are adequate facilities for workers (cafeteria, health care facilities, toilet)
		  - Worker GRM, that allows the worker to submit his complaint.
		- Medical reports should be submitted for all workers before joining the worksite and Drug tests should be conducted every 3-6 months.
		- The contractor also will be obliged to maintain daily attendance sheets to verify the age of workers and maintain evidence for their attendance to ensure 6 working days and 1 day off per week for all workers and to be able in case of accidents to provide the injured persons with proper benefits of the health insurance.
		- Full compliance with EGAS and LDC HSE requirements, manuals, and actions as per detailed manuals adopted by EGAS
		- All workers should be trained to use their right to stop the work in case they identified unsafe action/ condition.
		- Segregate/ barricade work areas					

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		- The safety work Permits, in general, will be issued before each activity on-site by the LDC safety team according to the Updated EGAS HSE guidelines (**Annex-2**) - Ensure the provision of the appropriate personal protective equipment and other equipment needed to ensure compliance with HSE manuals					
Social receptor (health and safety)	**Impacts due to COVID-19 pandemic**	**Assessing Workforce Characteristics** - minimize contact and keep a distance not less than 1 meter with community people **Entry/Exit to the Work Site and Checks on Commencement of Work** - Confirm that workers are vaccinated and fit for work - Check and record temperatures of workers - Update daily personnel count log (in/out) in each area/ working site - Provide briefings to workers before commencing work, focusing on COVID-19 specific considerations, and reminding workers to self-monitor for possible symptoms and to report to their supervisor or the COVID-19 focal point if they have symptoms or are feeling unwell - Prevent a worker from an affected area or who has been in contact with an infected person from returning to the site for 14 days or isolating such worker for 14 days. - Prevent sick workers from entering the site, referring them to local health **General Hygiene** - Train workers and staff on-site on the signs and symptoms of COVID-19, how it is spread, how to protect themselves (including regular hand washing and social distancing), and what to do if they or other people have symptoms - Place informative, illustrative posters and signs around the site,	Minor	LDC	_ LDC Patrolling committees _ EGAS HSE department	_ Field supervision inspection and review of HSE report+ Field supervision (audits)	_ Contractor costs _ LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		- Ensure handwashing facilities supplied with soap, disposable paper towels, and closed waste bins exist at key places throughout the site, if such facilities aren't available then Alcohol-based sanitizers should be supplied **Cleaning and Waste Disposal** - Provide adequate cleaning equipment, materials, and appropriate PPE (face masks, gloves….) as necessary - Train on appropriate cleaning procedures and appropriate frequency in high use or high-risk areas - Train on proper hygiene, how to use PPE, and waste control **Adjusting Work Practices** - Adapting work processes to enable social distancing and training workers on these processes - Continuing with usual safety training includes the use of PPE, adding COVID-19 specific considerations - Review overall work schedule and assess whether adjustments are needed, considering Government advice and instructions **Project Medical Services** **Local Medical and Other Services** - Any suspected case should leave the site immediately and refer to the nearest hospital / local medical facility for medical examination - any suspected cases should be self-quarantined for 14 days **Instances or Spread of the Virus** - If a worker has symptoms of COVID-19, the worker should be removed immediately from work activities - The worker should be referred to the local health facilities to be tested. - Implement sanitization practices in affected sites - Inform fellow workers of possible exposure to the virus if a worker is confirmed to have Covid-19 infection but maintain confidentiality					

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		Training and Communication with Workers - Workers are made aware of the procedures that have been put in place by the project, and their responsibilities in implementing them - Training is conducted regularly, providing workers with a clear understanding of how they are expected to behave and carry out their work duties **In addition to EMOP and WBG Guidelines related to COVID-19 infection (Annex-8).**					
Social receptor (health and safety)	**Child Labor**	- The project will hire a qualified contractor/sub-contractor with 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. - Rigid obligations and penalties will be added to the contractor ToR to warrantee no child Labor occurs in the project - The ToR will also oblige the contractor to keep a copy of the IDs of Laborers to monitor the hired staff below 18 years old - The contractor will also be obliged to maintain daily attendance sheets to verify the attendance of workers to ensure first, that workers below 18 years old are not included on-site, second, in case of accidents the injured persons will be provided with proper health requirements according to the health insurance supported by contractor/subcontractor.	Minor - Negligible	– LDC – Excavation Contractor /subcontractor	– LDC HSE department	– Field supervision and review of HSE report+ Field supervision (audits)	– Contractor costs – LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Social receptor (health and safety)	**Disturbance to Community due to Labor Influx**	**To minimize impacts of labor influx the following should be thoroughly implemented:** - Preparation of appropriate code of conduct that stipulates the different commitment of labor towards community groups and the different behavior that should be avoided (please see **Annex-9** of this report). - All workers should be trained on the Code of Conduct. - All workers should sign their attendance to the code of conduct training. - Code of conduct to be signed by sub-contractor. - Code of conduct induction to be done every 2 weeks for the recurrent workers and the newcomers before starting work. - According to availability, try to rent all apartments in the same building. - Apply the full requirements related to operating the grievance mechanism, including anonymous channels - Raising awareness of the local populations about the project commitment towards communities and the measures taken for that through public consultation and focus group discussions - Conduct women-only consultations and confirm that women are aware of the channels to submit any complaints - Apply Penalties to workers violating the code of conduct.	Minor	_ Contractors and subcontractors	_ LDC HSE for guidance supervision	_ Field supervision by LDC and EGAS. _ Review: • Received grievances • Documentation on the code of conduct training • Consultation activities documentation • Documented penalties	_ Contractor costs _ LDC management costs
Community	**Traffic congestion**	- Excavation during off-peak periods for example governmental employees and schools' entry and exit times. - Time-limited excavation permits granted by local unit & traffic department in order to prevent any disturbance near public facilities (schools, hospitals, official administrations buildings) - Safety precautions taken during night driving will be according to Updated EGAS HSE guidelines (**Annex-2**) - Coordination with traffic department (ministry of interior) for vehicles route and movement	Minor	_ LDC _ Excavation contractors	_ LDC HSE+ _ Traffic department	_ The contractor has a valid conditional permit + Field supervision	_ Contractor costs _ LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		- Announcements + Signage indicating location/duration of works before the commencement of work as example Coordination with commercials shops and schools. - Flagman will be considered whenever needed	Minor	_ LDC _ Excavation contractors	_ LDC HSE _ Local Unit _ Traffic Dept.	_ Ensure inclusion in contract + Field supervision	
		- Establishing temporary workshops and storage areas in wide, low residence and low traffic streets. - The workshops and storage areas will be established with a kind of arrangement with LCU to avoid any disturbance to people and traffic. - Safety signs (warning/ mandatory/ prohibition/ allowance) will be provided and posted on sites	Minor	_ LDC _ Excavation contractors	_ LDC HSE _ Local Unit _ Traffic Dept.	_ Field supervision _ Conditional permit _ The fluidity of traffic flow	
		- Apply Horizontal Directional Drilling under critical intersections whenever possible to avoid heavy traffic delays	Minor	_ Contractor	_ LDC HSE	_ Field supervision	
		- Traffic detours and diversion	Minor	_ Traffic Department _ contractor	_ Traffic Department _ LDC HSE	_ Field supervision for detouring efficiency _ Complaints received from the traffic department	_ Additional budget not required
		Road restructuring and closing of lanes	Minor			_ The fluidity of traffic flow	

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Community	Destruction of streets and pavement	- Arrange Restoration and re-pavement with the local unit - Communication with the local community on excavation and restoration schedules. - Standard protocols adhering to national/local administrative requirements are to be followed: - Close and early coordination between the LDC (and the excavation contractor, if applicable), the local unit, and any other relevant authorities (in the case of public roads, the Roads and Bridges Directorate may become the counterpart to the LDC) - Agreement on the restoration arrangements, schedules, fees, and payment schedules - Coordination with the General Utilities before starting work, especially the Traffic Department, sewerage, water, telephones, and electricity departments. - Payment of restoration fees by the LDC before works commencement - Documentation of the agreement and adoption by all involved parties - Communication with the Public and relevant authorities (such as the security and the traffic departments) regarding excavation and restoration plans.	Negligible	_ LDC HSE _ subcontractor	_ LDC HSE _ EGAS	_ Field supervision _ Coordination with LGU as needed	Included in re-pavement budget agreed by LDC with local units or Roads and Bridges Directorate

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Community	Affecting children by excavating in the proximity of their schools	- As an avoidance measure, constructions in the proximity of schools should be avoided during the entrance and exit times. - The contractor is obliged to use yellow warning caution tape. - Arrangement with school administration to avoid dismissing children without informing site engineers to be ready to support children. - The contractor should secure safe access roads for children. In case of excavating close to the entrance gate, the site workers should be sure that proper access is installed. - The contractor should ask the school administration's support to share information with the school children in terms of safety aspects - Workers should oversee children exit/ entrance roads to avoid any accidents	Minor	_ LDC (HSE+SDO) _ Excavation Contractor	_ LDC HSE _ LGU	_ Field supervision _ Coordination with LGU as needed	_ Contractor costs _ LDC management costs
Community	Affecting Walking People in the streets or living in narrow or blocked streets might by establishing temporary workshops in their streets.	**As an avoidance measure:** - Working in the workshops should be avoided at night. - Renting a space for Establishing temporary workshops and storage areas and if a renting space is not found, the workshop should be in a wide, low residence and low traffic streets with full coordination with LGU. The contractor is obliged to use yellow warning caution tapes and signs. - The contractor should secure safe access roads to people. In case of excavating across the street entrance, the site workers should be sure that proper access is installed. - The contractor should work only within his workshop boundaries. Or rent a suitable area to cover all of his activities.	Minor	_ LDC _ Excavation Contractor	LDC HSE	_ Field supervision _ Coordination with LGU as needed	_ Contractor costs _ LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Community	Lack of accessibility to businesses due to delay in street rehabilitation	_ Access to business due to digging out the streets will be mitigated by 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 the case of digging main streets in the commercial areas, this can only be done during the night after business closing. _ Notify business owners about that work plan before construction giving them time to adapt _ Follow up the procedure of Grievance Redress Mechanism _ Ensure transparent information sharing _ The telephone numbers of the social development officer responsible for grievances should be shared with the community people _ Consider beneficially working in rehabilitation during official vacations.	Minor	– LDC HSE+ SDO – Excavation Contractor	– EGAS (SDO) – LDC HSE+SDO	– Ensure the implementation of GRM – Supervision on Contractors performance	No cost
Community	Threat to Safety of users and houses (due to limited level of awareness and misconceptions)	Prepare a work plan for community and stakeholder engagement Awareness-raising campaigns should be tailored in cooperation with community-based organizations. The following are some mitigation procedures to be adopted: _Using caution tapes that help to keep people away from the site, _Informing residents and shopkeepers about the timeline of the project (street by street) as well as the working hours for the residents to know when to avoid certain streets _Informing residents through posters about the project details, location signing up to the network and receiving the system, project-level GRM _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	Minor	– During the construction – LDC HSE+ – SDO	– EGAS (SDO) – LDC HSE+SDO	– List of awareness activities applied – Lists of participants – Documentation with photos – Awareness reports	– 40838 EGP per awareness-raising campaign – 40838 EGP for brochure and leaflets to be distributed (material available by EGAS)

Community	**Damage to underground utilities resulting in water/wastewater leaks, telecommunication and electricity interruptions**	_Coordination with departments of potable water, wastewater, electricity, and telecom authorities to obtain maps/ data on underground utilities, whenever available _Mitigation measures for avoiding breaking underground utilities and infrastructure pipes: _Collecting the most accurate maps for underground utilities and infrastructure routes from Information Centers in the various Governorates and asking them for site markings, whenever available, and making such data available to the contractor before commencing the works. _If maps/data are unavailable, perform limited trial pits or boreholes to explore and identify underground utility lines using non-intrusive equipment _Once underground utilities are mapped or uncovered, horizontal and vertical clearances between natural gas lines and electricity lines must be respected for safety considerations. _LDCs follow established procedures to deal with emergencies related to breaking underground utility and infrastructure lines. The company supervisor stops work in the affected area, calls the Police Department and emergency department in the relevant utility company for immediate repair of the damage, which the contractor is invoiced for. The mitigation measures below focus on preventive measures and documentation _In case an underground utility and infrastructure pipe has been damaged, standard procedures should be followed, as described before, in addition to preparing a documentation report for the accident. **The documentation report should include:** • Time and place of accident; • Name of the contractor; • Type of underground utilities, infrastructure line; • Description of accident circumstances & causes; • Taken actions and responses of different parties, such as infrastructure company; • Duration of fixing the damage; and • Damage caused (description shall be according to observation, expert judgment, reports of infrastructure company). _Repair and rehabilitation of damaged components	Negligible	_ LDC HSE 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

7.3 Environmental and Social Management Matrix during OPERATION

Table 7-2: 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		
Community	Risk on Community health and safety	**Possibility of Gas leakage:** • Information should be provided to people to be fully aware of safety procedures • The hotline should be operating appropriately • People should be informed of the Emergency Numbers the ERP should be activated **(Annex-10)**	Negligible	– LDC HSE+SDO	– EGAS (HSE+ SDO)	– Complaints raised – due to Gas leakage	LDC management – costs
Community	Risk on Community health and safety	**Network integrity**: • A detailed review of the geotechnical history of the project district • Development of a full emergency response plan • Random inspections and awareness campaigns to ensure that NG piping and components (both inside the household and outside) are not 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 & the public for reporting possible leaks, damages, or emergencies • Quick response to gas leaks by evacuation of the affected area • Repair or replacement of the failed component • Scheduled inspection and preventive maintenance activities • Inspection will include any activities that could potentially lead to damage in the pipeline • In case of emergency, the source of the leak will be isolated until the maintenance team performs the required maintenance • Signs will be posted over the pipeline path showing the numbers to be called in case of emergency	Negligible	– LDC	– LDC HSE.	– Map and local geotechnical report review – Site inspections – Awareness actions – Periodical drills	– LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Community	Risk of economic disturbance	**<u>The financial burden on economically disadvantaged due to the installments:</u>** _Information should be provided to people to be fully aware of the different available options to cover and pay the installation cost. _Also, posters and leaflets could be published and distributed in the contracting offices. **<u>LPG distributors:</u>** _LPG distributors should be informed about the NG potential areas to enable them to find alternative areas They should be informed about the GRM to enable them to voice any hardship.	Negligible	_ LDC (SDO) _ LGU	_ LDC (SDO) in coordination with LGU	_ Complaints raised by LPG distributors to the LGU due to loss of jobs	_ No cost
	Impacts due to COVID-19 pandemic	**Assessing Workforce Characteristics** - Minimize contact and keep the mask of the face and a distance not less than 1 meter with community people **Entry/Exit to the Houses for NG check meters and maintenance activities** - Confirm that workers are fit for work - Provide briefings to workers before commencing work, focusing on COVID-19 specific considerations, and reminding workers to self-monitor for possible symptoms and to report to their supervisor or the COVID-19 focal point if they have symptoms or are feeling unwell - Prevent a worker from an affected area or who has been in contact with an infected person from returning to work for 14 days or isolating such worker for 14 days. - Prevent sick workers from entering the houses, referring them to local health **General Hygiene** - Train workers and staff on the signs and symptoms of COVID-19, how it is spread, how to protect themselves (including regular hand washing and social distancing), and what to do if they or other people have symptoms	Negligible	_ LDC	_ LDC Patrolling committees _ EGAS HSE department	_ Field supervision inspection and review of HSE report+ Field supervision (audits)	_ Contractor costs _ LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		Adjusting Work Practices - Adapting work processes to enable social distancing and training workers on these processes - Continuing with usual safety training includes the use of PPE, adding COVID-19 specific considerations - Review overall work schedule and assess whether adjustments are needed, considering Government advice and instructions **Project Medical Services** **Local Medical and Other Services** - Any suspected case should leave work immediately and be referred to the nearest hospital / local medical facility for medical examination - any suspected cases should self-quarantine for 14 days **Instances or Spread of the Virus** - If a worker has symptoms of COVID-19, the worker should be removed immediately from work activities - The worker should be referred to the local health facilities to be tested. - Implement sanitization practices for workers - Inform fellow workers of possible exposure to the virus if a worker is confirmed to have Covid-19 infection but maintain confidentiality **Training and Communication with Workers** - Workers are made aware of the procedures that have been put in place by the project, and their responsibilities in implementing them - Training is conducted regularly, providing workers with a clear understanding of how they are expected to behave and carry out their work duties **Using alternative methods for NG meters readings** - Raising awareness of the local community about different ways to report their NG meters reading through the online					

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		website or phone calls or in the posters on their doors to avoid direct contact with workers. **In addition to EMOP and WBG Guidelines related to COVID-19 infection (Annex-8).**					

7.4 Monitoring and Review

Procedures to monitor and measure the effectiveness of the management plan, as well as compliance with any related legal and/or contractual obligations and regulatory requirements will be established. In addition to recording information to track performance and establishing relevant operational controls, dynamic mechanisms, such as internal inspections and audits, where relevant, to verify compliance and progress toward the desired outcomes will be utilized.

Monitoring will normally include recording information to track performance and comparing this against requirements in the management plan. The monitoring results shall be documented and the necessary corrective and preventive actions in the amended management plans shall be identified consequently.

7.4.1 Monitoring procedures

To fulfill the monitoring requirements and to ensure that any non-compliances are corrected, the following tasks should be followed:

- LDC HSE staff are responsible for carrying out periodic audits to follow up on ESMP implementation.
- Any observed non-compliance is recorded, and corrective actions are requested.
- LDC report these non-compliances and the corrective actions taken to EGAS in their monthly reports.

EGAS has signed a new contract with PETROSAFE company (as an independent entity) to conduct the supervision, monitoring visits on behalf of EGAS to ensure that all mitigation measures are appropriately adhered to, non-compliances are reported to the LDC and an action plan to correct the situation is requested and followed within the LDC monthly reports to EGAS.

7.5 Environmental and Social Monitoring Matrix during CONSTRUCTION

Table 7-3: Environmental and Social Monitoring Matrix during CONSTRUCTION

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Physical receptor	Degradation of soil quality	_Observation of good housekeeping and waste management	LDC HSE	During construction. Monthly reports	Construction site	Site inspection and document inspection	LDC management costs
Physical receptor	Air emission	_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
Physical receptor	Noise	_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 +SDO	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
Physical receptor	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
Social receptor (health and safety)	Impacts on occupational health and safety	_Total number of complaints raised by workers _Periodic Health report _safety inspection record _Periodic safety report _insurance policy and Attendees lists with workers IDs _The insurance expiry dates.	LDC HSE +SDO	Daily Biannual Daily Monthly Daily Daily	Construction site	Documentation in H&S monthly reports Complaints log	No cost
Social receptor (health and safety)	Impacts due to COVID-19 pandemic	_Number of Suspected or confirmed Covid-19 cases, their location, condition, and all related actions taken _ Periodic Health report _Using Face Masks and other Covid-19 protective measures	LDC Covid-19 Patrolling committee EGAS HSE	Daily	Construction site	As per the instructions of the Ministry of Petroleum (MoP), Patrolling committees have been formed across all LDCs to ensure that mitigation measures are being implemented on all construction sites, these committees report to EGAS on daily basis whereas EGAS report to MoP weekly	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Social receptor	Child Labor	_Attendees' lists with workers' IDs are in place. _Complaints and accident reports.	LDC HSE	Monthly for construction sites	Construction site	_ The safety supervisor observes the Laborers _ Random checkup for Laborers IDs	LDC management costs
Social receptor (health and safety)	Disturbance to Community due to Labor Influx	_Code of conduct is in place _A list of workers who have attended the proper training on code of conduct (with dates). _Complaints were raised by the local community GRM. _Conduct spot checks/audits on the worker's behaviors during field visits. _Women-only consultation activities conducted	LDC HSE	When reported and during field visits at least monthly	Construction sites	Supervision & reporting	Contractor Cost
Community	Traffic congestion	Comments and notifications from Traffic Department	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports Complaints log	LDC management costs
Community	Destruction of streets and pavement	_Street quality after finishing digging _ Number of complaints due to street damage	LDC HSE+SDO, EGAS (SDO)	Three times per year, each three months	Site and Desk work	Checklists and complaints log	No cost

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Community	Affecting children by excavating in the proximity of their schools Affecting Walking People in the streets or living in narrow or blocked streets might by establishing temporary workshops in their streets.	– Assuring coordination with schools before the construction work. – Presence of yellow warning tapes in the project sites. – Presence of Secured safe access roads to children and elders in case of excavating close to the entrance gate of schools as well as residential buildings. – Presence of project signs with details about projects sites, the timeline of the implementation, and GRM. – The number of awareness-raising implemented for children in school. – Number of participants in information dissemination – Number of complaints due to excavating work	LDC HSE, EGAS	Monthly during construction Quarterly monitoring	Construction site	– 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
Community	Lack of accessibility to businesses due to delay in street rehabilitation	_Presence of alternative entrances to the business. _The presence of special wooden safe bars in front of businesses doors, to be used to enable the shoppers to get into the shops. _The number of participants in information dissemination including Business owners. _Number of complaints due to excavating work	LDC HSE, EGAS	Monthly during construction Quarterly monitoring	Construction site	_ Reports _ Photos _ Lists of participants	LDC management costs
Community	Threat to Safety of users and houses (due to limited level of awareness and misconceptions)	_Number of awareness-raising implemented _Number of participants in information dissemination)	LDC HSE, EGAS	Monthly during construction 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
Community	Damage to underground utilities resulting in water/wastewater leaks, telecommunication and electricity interruptions	_Official coordination reports with relevant authorities _Accidents documentation	LDC HSE	Monthly during construction	Construction site	Documentation in HSE monthly reports	LDC management costs

7.6 Environmental and Social Monitoring Matrix during OPERATION

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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Community	Risk on Community health and safety	**Possibility of Gas leakage:** _Complaints raised by the community people _Number of leakage accidents reported/raised _Number of received complaints through the hotline	LDC HSE+SDO, EGAS	Quarterly	Site and Desk work	Complaints log LDC	No cost
		Network integrity: _Earthquakes or geotechnical settlements _Emergency response time and corrective actions during emergency drills _Reports of alteration or tampering with any gas components	LDC HSE	Bi-annual inspections and annual emergency response drills	Along with the network and inside and outside households	Inspection, leakage detection, running the drills	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Community	Risk of economic disturbance	**The 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 SDO	Quarterly	Desk work	Complaints log	No cost
		LPG distributors: _Grievance received from the informal LPG distributors _Information shared with them	LDC SDO and EGAS	Quarterly	Desk work	Complaints log	No cost

7.7 Reporting of Mitigation and Monitoring Activities

During construction and operation, environmental performance against targets is reviewed by management monthly and reported to the contractor and LDC. The plan is designed to record incidents and to ensure investigation, root cause analysis, corrective action, and follow-up. Records are kept of all incidents, investigations, and actions.

Regulatory and HSE reporting systems will be brought together monthly to be collated and input into the LDC's (Town Gas) reporting system to be submitted to EGAS' Environment Department during the construction phase.

During operation, the reporting of any occurrence and /or the result will take the following path:

- recording of the nature and scale of the occurrence.
- reporting to the necessary competent/ responsible persons; and
- Internal reporting and external regulatory notification.

7.7.1 During the Construction phase reports should include as a minimum

- Monthly report for the implementation of the ESMMP submitted by the contractor to LDC HSE staff.
- Monthly report on incidents and complaints from the surrounding establishments and residents near the construction site.
- Unusual traffic delays or accidents caused during construction, or any complaints received should be reported in the monthly report prepared by the construction contractor supervisor. And /or permits and any comments or recommendations by Traffic Department
- Monthly reports should include any incidents of high dust emissions or smoke during construction works including the natural dust that might be encountered.
- The monthly report should include the number of near misses and the number of incidents including injuries.
- There should be a form prepared by LDC's HSE department for the contractor to keep records of quantities, types of wastes received, and the location where it has been received from.
- The monthly report of the HSE supervisor from LDC should include an evaluation of the contractor's compliance with mitigation measures and any comments noticed by the HSE site supervisor about mismanagement of construction waste during the month.
- The HSE team from LDC observer should report monthly of the accident or the worker's obedience.
- Reporting monthly, the total number, and the type of heavy equipment used during the construction phase.

- Reporting on the implementation of the labor-management procedures on the ground, including child labor, worker GRM, disturbance to communities due to labor influx, insurance coverage,
- Reporting on the activities related to the dissemination of information
- Reporting on the activities related to the implementation of the gender-based violence action plan
- Monthly report on health and safety performance. This report will include any incident and complaint regarding health and safety measures performed by the contractor.
- Monthly report on GRM as per the GRM Manual. This report will include (as a minimum) the number of grievances received, type of grievance received, number of grievances solved and closed/unsolved (reasons for not solving them). The GRM report will also include the number of complaints due to labor influx (community disturbance). Data to be disaggregated by gender and channels for receiving the complaints. All complaints to be registered in an online unified system (for example Excel Sheet).
- Daily and monthly reports to be prepared on construction work of the intermediate pipeline construction works.

7.7.2 Reporting of severe incidents

- In case of worker/community work-related severe accidents or fatalities, immediate reporting should take place by the LDC to the relevant regulatory authorities and the Project Management at EGAS.
- EGAS will report the major accident to the World Bank within 24 hours at the latest.
- The report will include all actions taken by LDC to investigate the root cause of the accident and the plan to prevent the occurrence of future accidents will be included in the final investigation report

7.7.3 During the operation phase reports should include as a minimum

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

7.8 Emergency Response Plan

Town Gas developed an Emergency Response Plan (ERP) which relates to its operations for the PRS and for its intermediate and low-pressure distribution network. The purpose of this document is to outline emergency responsibilities, organizational arrangements and responses and procedures to be followed by personnel based in the field in the event of an emergency. The said

ERP will be in line with EGAS's Emergency Response Plan Main Elements & Notification Procedures Summary, kindly refer to **Annex-10** attached to this report.

Emergency Levels are classified as Levels (Level 1, Level 2, and Level 3) as follows:

The first level of Emergency:

- Potential hazards to life, safety, property, and the environment are limited and do not exceed the emergency zone or the boundaries of the public site or facility.
- The personnel of the enterprise or the site possess adequate training, capacity, personal protection equipment, and necessary tools to manage and control the situation, and there is no need for external assistance.
- Alarm bells are not required to warn those outside the site or facility.
- The situation does not require the evacuation of the emergency zone.
- There is no possibility of losing control or escalating the situation.
- The accident management team is not used.

The Second level of Emergency:

- There is a serious risk to life, safety, property, and the environment and may exceed the limits of the emergency zone, but do not exceed the limits of the public site or facility.
- There is a need to use the assistance of external parties to manage the emergency, or at least the presence of a stand-by team in the presence of a potential escalation of the situation, but the situation does not extend its influence outside the facility or site.
- Members of the facility or site do not have sufficient capacity or resources to deal with the incident
- Requires evacuation and/or warnings to warn those outside the emergency zone
- Security breach or situation leading to constant threat to life and safety
- The accident management team intervenes

The Third level of Emergency:

- There is a serious risk to life, safety, property, and the environment and may exceed the limits of the emergency zone and the possibility of exceeding the limits of the public site or facility.
- There is a need to use the help of external parties to fight the fire, rescue, dealing with hazardous materials, large number of injuries and deaths.
- Measures must be taken to protect units, nearby areas and/or communities, and the environment beyond the boundaries of the public site or facility
- There is a potential risk that the reputation of the company, its business, or its revenues will be affected
- Any incident involving the exit of the operating system beyond the limits of safe operation with the possibility of escalation

- There is a danger to the public
- There is a possibility to start or run the communication system for emergency reporting
- The accident management team is used.

7.8.1 Hotline

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

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 the project districts, **Town Gas** has direct involvement with the environmental management and monitoring of the natural gas network. They have a wide range of experience in managing occupational health and safety aspects. Also, they have a good knowledge of environmental and social aspects. Town Gas has assigned social officers (SDOs) in all project districts. However, they are still enhancing their capacity in terms of managing environmental and social aspects. Therefore, an upgrade in their environmental and social capacity is recommended.

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. There must be immediate training to inform health and safety, social and environmental staff about the management plan.

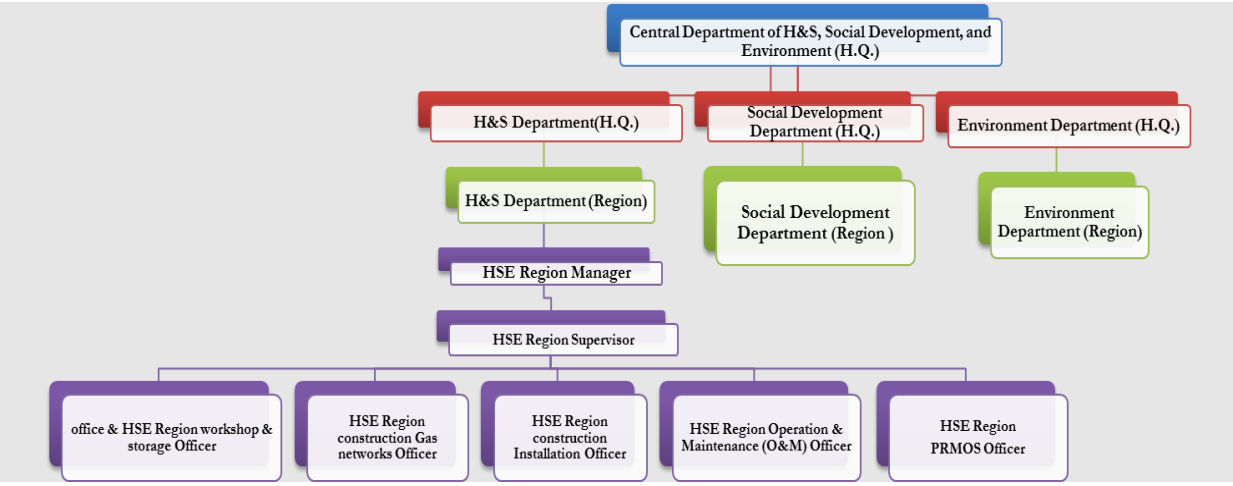

Figure 7-1: Town Gas H&S organizational structure.

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

- Worker and contractor compliance to Updated EGAS HSE Guidelines.
- Occurrence of HSE incidents and suggestions for incident avoidance
- Management of broken asphalt (if any), unused backfill, solid waste, metal scrap
- Management of paint cans, refueling & lubrication, soil contamination
- Checking that handling of hazardous waste is done according to the requirements of the Environmental Law, where a permit for handling hazardous material and Hazardous waste is issued from the EGAS Environment Department
- Other tasks as outlined in ESM & MP

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

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

Moreover, EGAS has signed a new contract with PETROSAFE company (as an independent entity) to conduct the supervision, monitoring visits on behalf of EGAS to ensure that all mitigation measures are appropriately adhered to, non-compliances are reported to the LDC and an action plan to correct the situation is requested and followed within the LDC monthly reports to EGAS. Petrosafe conducts at least one to two supervision visits each month according to the EGAS plan.

7.9.2 Required Actions

- Involvement of OHS, environmental and social officers in the initial phase of the project planning.
- Following up the updated EGAS HSE Guideline
- Town Gas should keep internal training and awareness for site engineers and HSE officers with OHS, environmental and social courses focused on the implementation of the ESMP

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

EGAS and the LDCs aim to be recognized as responsible operators exemplary in the management of the impacts of its activities. As such, EGAS and the LDCs are committed to preventing, limiting, and if necessary, remedying any adverse impacts caused by its activities on local populations and their social and physical environment.

Identifying, preventing, and managing unanticipated impacts are facilitated by a grievance redress mechanism (GRM).

Well-designed and implemented GRMs can help project management significantly enhance operational efficiency in a variety of ways, including generating public awareness about the project and its objectives; deterring fraud and corruption; mitigating risk; providing project staff with

practical suggestions/feedback that allows them to be more accountable, transparent, and responsive to beneficiaries; assessing the effectiveness of internal organizational processes; and increasing stakeholder involvement in the project. For task teams more specifically, an effective GRM can help catch problems before they become more serious or widespread, thereby preserving the project's funds and its reputation. The LDC has an internal division responsible for receiving, recording, and tracking the resolution of grievances.

Effective grievance management helps to:

- Build trust through having a dialogue with stakeholders.
- Detect weak signals and propose a solution.
- Reduce the risk of conflict between the affiliate and local communities.
- Reduce the risk of litigation by seeking fair solutions through mediation in the event of an established impact.
- Identify and manage unanticipated impacts of the operation.
- Avoid delays to operations and additional costs.
- Avoid future impacts through analysis of weak signals.

The detailed grievance mechanism (GRM) below is to be shared with the community beneficiaries. Posters will be prepared and made available to the beneficiaries in the contracting office. Additionally, they will be available in the customer services office. It is worth mentioning that the customer's services offices are the main channel to receive complaints of Town Gas clients all over the country, while the hotline is the main channel to receive complaints in emergency cases. On the other hand, the GRM system for the current project has been tailored to handle the complaints of the project beneficiaries in a professional manner. Thus, sufficient and appropriate information about the GRM will be disseminated to the communities before the construction phase. Information dissemination about the GRM should be shared with the beneficiaries during the process of contracting and disclosed in the contracting office and other publicly accessible venues. All GRM activities should be conducted as per EGAS GRM Manual. The following figure demonstrates the various stages of the grievances mechanism. The proposed mechanism is built on three tiers of grievances:

1. The level of site engineer of Town Gas in the project area.
2. On the level of LDC headquarter
3. On the level of EGAS

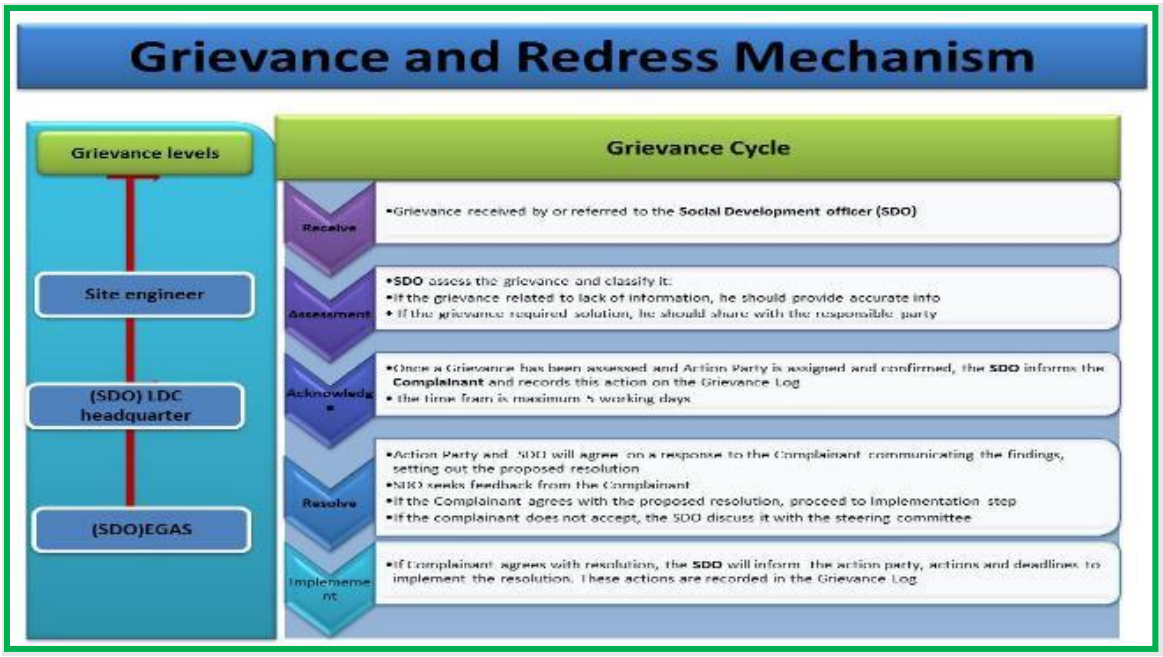

Figure 7-2 Proposed Grievance and Redress Mechanism

7.10.1.1 First-tier of grievances

To ensure a high level of responsiveness to the local communities, it is essential to ensure that a local grievance mechanism is functioning and that the communities are aware of it. Town Gas will assign a Social Development Officer (SDO) (can be more than one) who will be working closely with the assigned SDO of EGAS. It is the responsibility of Town Gas SDO to ensure that the GRM system is widely known and well explained on the local level. Moreover, s/he will follow up on the complaint until a solution is reached. The turnaround time for the response/resolution should be 10 business days and the complainant should know that he/she should receive a response by then.

The grievances should be presented to the following:

- The foreman working on the ground in the study area,
- The project manager in the study area,

The regional department of Town Gas in Giza Governorate, it is worth noting that most of the previous experience of EGAS is suggesting that complaints are usually handled efficiently and resolved on the local level. In case the problem is not solved, the complainant may reach out to the second level of grievance

7.10.1.2 Second-tier of grievances:

If the aggrieved person is not satisfied with the decision of the first tier, they can present the case to Town Gas headquarters. SDO, where they should provide resolution within 10 business days, following is the second level of grievances:

- The Social Development Officer in Town Gas headquarters will handle technical, environmental, and land acquisition complaints. Town Gas headquarters SDO should receive the unsolved problems. Thereafter, the SDO gets in contact with the petitioner for more information and forwards the complaint to the implementing entities for a solution.
- The SDO should follow the complaints and document how they were solved within 10 business days.

7.10.1.3 Third-tier of grievances:

If the aggrieved person is not satisfied with the decision of the SDOs of Town Gas at Stage 2, they can present the case to EGAS SDO where they should provide a resolution within 10 business days. The following section presents the third level of grievances:

- The Social Development Officer in EGAS will handle technical, environmental, and land acquisition complaints. He should receive the unsolved problems. Thereafter, they get in contact with the petitioner for more information and forward the complaint to the implementing entities for a solution.
- The SDO should follow the complaints and document how they were solved within 10 business days.
- The SDO should update the complainant on the outcome of his/her complaint.

7.10.1.4 Grievance channels

Due to the diversity of the context in different governorates and the socioeconomic characteristics of the beneficiaries, the communication channels to receive grievances were locally tailored to address all petitioner's concerns and complaints. The following are the main channels through which grievances will be received:

- Foremen act as the main channel for complaints. They are always available on construction sites. However, complaints raised to him/her are mostly verbal. Thus, s/he should document all received grievances in writing form using a fixed serial number that the complainant should be informed about to be able to follow up on the complaint.
- Phone numbers of site engineer and SDO.
- Hotline: 129 is the hotline for Town Gas.
- The SDO within the LDC and EGAS

- Egyptian Governmental portal and Ministry of Petroleum website.
- Trustworthy people, community leaders, and NGOs/CDAs will be an appropriate channel to guide petitioners about the various tiers of grievances, particularly, in rural areas.
- Anonymous complaints.

7.10.1.5 Response to grievances

Response to the grievance will be through the following channels:

- The response to grievances should be through an officially recognized form to ensure proper delivery to the complainant. It is the responsibility of the SDOs to ensure that complainants were informed about the results of handling their complaints.
- Apply the full requirements related to operating the grievance mechanism as per the GRM Manual, including the possibility of receiving anonymous complaints.
- Response to grievances should be handled promptly as mentioned above, thereby conveying a genuine interest in and understanding of the worries put forward by the community.
- EGAS and Town Gas should maintain a record of complaints and results. However, an anonymous complaint can receive a code and should be investigated appropriately and treated courteously, as per the requirements of the complainer. The correction action should be published on the LDC website.

7.10.1.6 Worker Grievances

- The Egyptian Labor Law No. 12 for the year 2003 provides for the Formal Grievance Procedure in case a worker, who has been laid-off, discharged, dismissed, removed, or otherwise terminated from employment. So, the Project Management Unit (PMU) will require the Contractor/subcontractors to develop and implement a Grievance Redress Mechanism (GRM) for their workforce before the start of civil works. The GRM must be well circulated and written in a language understood by all. The new contracts with contractors/subcontractors will include an annex with mitigation measures to address labor-management issues, through having in place the labor-management procedures. One of the main items that will be included in the annex is the Worker GRM, which allows the worker to submit his complaint.

The workers GRM will include:

- Channels to receive grievances such as comment/complaint form, suggestion boxes, email, a telephone number, hotline, and anonymous complaint including reaching out to the LDC.
- Stipulated timeframes to respond to grievances;

- A register to record and track the timely resolution of grievances;
- A responsible section/committee to receive, record, and track resolution of grievances.

Monitoring of grievances

All grievances activities should be monitored to verify the process. The monitoring process should be implemented on the level of EGAS and the LDC. The following indicators will be monitored.

Table 7-5 Means of verification and indicators

Monitoring dimensions	Means of verification and indicators
GRM is fully operational	○ Number of received grievances monthly (Channel, gender, age, basic economic status of the complainants should be mentioned) ○ Type of grievance received (according to the topic of the complaint ○ Documentation efficiency
The efficiency of responses and corrective procedures	○ Number of grievances solved and closed ○ Feedback offered to the grievances ○ Number of unsolved grievances and the reasons behind not solving them ○ Time consumed to solve the problem
The efficiency of information sharing about GRM	○ Dissemination activities undertaken ○ Total number of brochures distributed (if any) ○ Total number of awareness meetings conducted (if any)

Institutional Responsibility for the Grievances

The entity responsible for handling grievances will mainly be the Environmental Affairs Department within the implementing agency (EGAS). The Social Development Officer (SDO) working within EGAS in cooperation with the Town Gas will address all grievances raised by community members. The main tasks related to grievances of the SDOs on the various levels are:

- Raise awareness about channels and procedures of grievance redress mechanisms
- Collect the grievances received through different communication channels
- Document all received grievances
- Transfer the grievance to the responsible entity
- Follow up on how the problem was addressed and solved
- The document, report and disseminate the outcome of received grievances
- Ensure that each legitimate complaint and grievance is satisfactorily resolved by the responsible entity
- Identify specific community leaders, organizations, and citizen groups required to enhance the dialogue and communication through a public liaison office to avoid or limit friction and respond effectively to general concerns of the community
- Monitoring grievance redress activities

(For more information about GRM and Town Gas complaint form, please see **Annex-11**)

8. Stakeholder Engagement and Public Consultation

The public consultation section aims to highlight the key consultation and community engagement activities that took place as part of the preparation of the ESIAs, ESMPs, and their outcomes. The new household connections in the project sites are supplementary to the current existing natural gas connection network in Giza Governorate. ESMPs for other districts were prepared, stakeholder engagement and public consultation activities were held, and studies were cleared by the Bank and disclosed on the EGAS website and the Bank's external website. Stakeholder Engagement activities and a series of public consultations were conducted all through the past 8 years from the early stages of the project in December 2013 until recently. Stakeholders were identified, a work plan was developed, information was adequately disclosed, used different engagement instruments. Fair gender-based participation and engagement of the different stakeholders and documentation of all conducted events were made. Public concerns were responded to and addressed in the ESIAF /ESIAs/ESMPs of the project.

Consultation activities showed an overwhelming acceptance of the consulted participants to host the NG. With their willingness to be connected to the NG, some potential beneficiaries expressed their willingness to pay the installation cost in cash, while others were much in favor of paying in installment. This high level of enthusiasm from the local communities towards the project is attributed to the high level of awareness of the benefits of natural gas and the current hardships that the households are facing to secure LPG provision and usage.

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 2.3 million household NG connections project in compliance with the following legislation:

- WBG policies related to disclosure and public consultation, namely,
  - World Bank Operational Policy (OP 4.01).
  - Directive and Procedure on Access to Information
- Law 4/1994 modified by Law 9/2009 and its amendments
- Egyptian regulations related to the public consultation

While WBG 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, the second public consultation was canceled due to the precaution measures to prevent the spread of Covid-19 pandemic. In the meantime, 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.

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;
- Avoid 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 to:

- 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

To ensure an inclusive and meaningful consultation process, a stakeholder analysis was conducted to get a better understanding of the various groups and their roles, interests, and influence on the project. For this site-specific ESMP, a focused stakeholders' identification shown in Table 8-1, was developed 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 a smaller scale. Local communities involving both men and women of projects beneficiaries, as well as the PAPs, local NGOs/CDAs, contractors, and suppliers were among the key stakeholders on the local level.

Table 8-1: Stakeholders identified in Giza Governorate

Stakeholder Category	Stakeholder Group	Relevance/Importance of the Stakeholder to the Project
Communities in the project sites	Residents of communities within the project sites: • Shabramant • El Talbieh • Manial Sheha Abou Rawash	Residents of these communities are more likely to be adversely affected by environmental and social impacts; for example, traffic during construction and other impacts relating to community health and safety. Residents of local communities will also potentially benefit from job opportunities or other positive economic outcomes, particularly; they will have access to natural gas.
	Residents of other districts of Giza Governorate	Residents of other districts in Giza will benefit from the job opportunities available in the project. Additionally, they will benefit from the savings of the LPG cylinders result due to the project implementation
	Vulnerable groups within the local communities of the project districts.	Vulnerable groups may be likely to be adversely affected by environmental and social impacts, while also being least likely to benefit from the Project. Women, persons with disabilities, old people, and children might get injured if they crossed the excavated areas in main streets and allies. Children also may fall in the excavated areas
	Small business owners	Local businesses have the potential to benefit economically from the Project. However, as residents, this group also has the potential to be impacted by any social and environmental risks and impacts (positive and/or negative). For example, the effects of excavation work.
Businesses outside of the Area of Influence	Suppliers and contractors	They will benefit from any supplies available for the project.
Project Workforce (both direct and through subcontractors)	Project workers	Workers will benefit from available job opportunities in the project. The workforce is fundamental to the Project and a sound worker-management relationship is key for the sustainability of a company.
Health care providers	• Community health care providers • Health institutions • Health services providers	The Project will secure health facilities for the workers through contracting health facilities in Giza to provide the required service
NGOs and civil society	• Local Social Development Association. Shabramant. • Local Social Development Association. Manial Sheha. • Local Social Development Association. Abou Rawash • Resala, NGO	NGOs might share information about the project: terms of contracting and safety measures of the NG
National government stakeholders	Egyptian Environmental Affair Agency	Responsible for reviewing and approving ESIAs/ESMPs, and monitoring implementation of the Environmental Management Plan

Stakeholder Category	Stakeholder Group	Relevance/Importance of the Stakeholder to the Project
	Information Centers on the governorate level	Provide NG companies with underground utilities and infrastructure maps.
	Security Department	Secure the construction sites and prevent people from flushing into it
	Ministry of Antiquities	Very important to issue permissions for excavations and accompany the working teams,
	Ministry of Transportation	This Ministry may have interest in issues relating to transportation and traffic planning related to the Project.
	General Authority for Roads, Bridges and Land Transport	Responsible for permitting related to any road work for the Project (e.g., road cutting)
Local/provincial government stakeholders	Giza Governorate Authority	They are cooperating with the project in terms of facilitating permissions and coordinating with other local governmental units
	Local Governmental units (District authorities and village authorities) at: • Shabramant • El Talbieh • Manial Sheha • Kerdasa (Abou Rawash)	Rehabilitation of roads, which is one of the major issues raised by the community, will be performed by the LGU. Provision of solid waste management facility
Media	Television and radio representatives Newspaper Websites	Inform the community about the project and its impacts and support dissemination of the main results of the ESIAs/ESMPs studies
Universities and Educational institutes	Faculty of Engineering	Review and enrich the ESMP study with feedback
	Secondary vocational schools	Propose needed capacity building for their students to potentially find employment with the project
	Researchers/consultants	Review results of the study and provide feedback
Natural Gas companies	EGAS	Implementing agency overseeing activities of the Environmental and Social Management Plan
	Town Gas	Local distribution company (LDC) who will implement, operate, and manage the ESMP
	Butagasco	It is the firm responsible for the LPG distribution. They will benefit from the project in terms of reducing the demand for LPG cylinders
	Petro trade	They are the responsible entity for collecting the consumption fees and the bank installment

The abovementioned stakeholders were consulted using various tools (i.e. individual interviews, group meetings, and public consultation). Most of the stakeholders have attended the public consultation hearings conducted during December 2013 in the 11 Governorates and the final public consultation in 2017. However, some of them were interviewed on their premises to enable them to spell out their concerns and worries freely.

8.4 Consultation Methodology and Activities

The research team for the project studies 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. Due to the current situation of the Covid-19 pandemic and the required precautionary measures, the research team has adopted a new methodology for consultation. Small group meetings, FGDs, and individual meetings have been arranged at the project districts. The following are the methodology and the main consultation activities adopted by the research team during the all-project studies and the current study as well:

1. The study team visited the project districts to define various stakeholders.
2. The study team divided the various engagement activities of the project to:
    - Scoping phase,
    - Data collection phase,
    - Consultation activities and final public consultation.
3. The study team has adopted many tools during the consultation process such as:
    - Conducting Focus Group Discussions (FGDs) with the local communities.
    - Conducting panel meetings with the governmental officials and potentially affected people.
    - Public consultation sessions.
    - Various NGOs participated actively in the preparation of the FGDs and provided data collectors to assist the team in collecting the data
4. Consultation activities have been developed for the different communities through the following phases:
    - Phase I: Scoping phase session in Giza Governorate on 24th Nov. 2013, during the preparation of the framework study
    - Phase II: Public consultation session in Giza Governorate was conducted on 23rd Dec. 2013 during the preparation of the framework study.
    - Phase III: Consultation activities January and February 2017, during the preparation of ESMP study for 10 districts in Giza Governorate.
    - Phase IV: Public consultation session was conducted on 30th April 2017 in Giza Governorate during the preparation of the ESMP study for 9 districts.
    - Phase V: Consultation activities in Giza new districts (El Talbieh, Shabramant, Manial Shiha, and Abou Rawash

1. Information about the project has been has been shared through:
    - During the site visits for P&A survey at the early stage for project planning.
    - Consultation activities during the preparation of ESIAs and ESMPs for different phase of the project.
    - Site engineers and Contracting offices

All activities conducted were documented with photos and lists of participants to warrantee appropriate level of transparency as follows:

Table 8-2: Summary of Consultation Activities in Giza Governorate (2013-2021)

Participants	Number		Methods	Date
	Males	Females		
During the preparation of the framework				
Various stakeholders	68	21	Scoping Session	November 2013
	73	26	Public consultation	December 2013
Community residents	257	299	Structured questionnaire	December 2013
Potential beneficiaries and governmental entities	18	17	FGD	
Governmental entities& NGOs	11	1	In-depth interview	
Total	**427**	**364**		

Table 8-3: Summary of Consultation Activities During the preparation of ESMP study for 10 districts in Giza Governorate (February 2017).

Participants	Location	Number		Methods	Date
		Male	Female		
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**	**-**		

Participants	Location	Number		Methods	Date
		Male	Female		
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		
Sub TOTAL		93	52		
Representatives from Town Gas		4	-	in-depth	February 2017
Various stakeholders		45	11	Public consultation	April 2017
TOTAL		**142**	**63**		

Table 8-4: Summary of Consultation Activities for the current ESMP in Shabramant, Manial Shiha, Abu Rawash, and Talbieh Districts) (September – October 2021)

Participants (During the site-specific study)	Number		Methods	Date
	Male	Female		
Shabramant District				
Government officials	3	3	FGD & Individual discussion	29th September 2021
Member of Parliament		1	FGD	
NGOs	1		In-depth discussion	
Community people	14	10	FGD	

Potential affected people	1		FGD	
Town Gas Representatives	2		FGD	
Total	21	14		

Participants (During the site-specific study)	Number		Methods	Date
	Male	Female		
El Talbieh District				
Government officials	3	14	FGD & Individual discussion	30th September 2021
Community people	10	5	FGD	
Potential affected people	5		FGD & Individual discussion	
Town Gas Representatives	2		FGD	
Total	20	19		

Participants (During the site-specific study)	Number		Methods	Date
	Male	Female		
Markaz Kerdasa (Abo Rawash District)				
Government officials	4	2	FGD& Individual discussion	3Rd October 2021
Community people	11	6	FGD	
Potential affected people	3		FGD& Individual discussion	
Town Gas Representatives	2		FGD	
Total	20	8		

Participants (During the site-specific study)	Number		Methods	Date
	Male	Female		
Manial Sheha District)				
Government officials	4		FGD & Individual discussion	10th October, 2021
Member of Parliament	1			
Community people	18	9	FGD	
NGOs	2			
Potential affected people	2		FGD	
Town Gas Representatives	2		FGD	
Total	28	9		
Total Project Districts	89	50		

FGD with the Seller's at Abo Rawash Market

Interviews with PAPs at Shabramant District

Consultation meeting at LGU, Markaz Abo El nomros district

Interviews with PAPs and Community people at Abo Rawash district

Interviews with the small business owners at El Talbieh District

FGD with Community people at El Talbieh District

Governmental officials at El Talbieh

Governmental officials at Shabramant

Figure 8-1: Shows Consultation activities at the project districts

8.5 Summary of consultation activities

The field research team engaged in several social activities. These activities include focus group discussions with potential beneficiaries; and with potentially affected people (LPG vendors), in-depth discussions with government officials, representatives of civil society, and community leaders. Consultation activities were held at both El Talbieh, Shabramant, Manial Shiha, and Abou Rawash Local Governmental Units, where the public officials of Governorate stressed expediting the implementation of the project in all of the districts.

Throughout the discussions, interviewees were asked about seven main points:

- The type of fuels currently in use, and its associated problems
- The criteria of areas to be connected to natural gas
- The upsides and downsides of NG, compared to other types of fuels
- The effects of the project during construction and operations
- The cost of NG installation to households
- The future positive/negative impact of the NG connections project.
- A high value of NG bills due to the irregular reading of NG meters and accumulating the NG consumption for two or three months.

It was notable that the reactions and attitudes of the local communities towards the project are in favor of the project. The field research team noted strong public support and eagerness towards the project. Besides some legitimate concerns expressed by the public, the field research team recorded the general view that NG is a far better substitute for the type of fuel currently in use.

The following table illustrates the different subjects, questions, comments, and responses that were discussed throughout the different public consultation activities.

Table 8-5: Key comments and concerns raised during the different consultation activities, and the way they were addressed in the ESMP study

Subject	Questions& comments	Responses	Addressed in the ESMP Study
Cost of installing NG to households and options for payments	How much is the cost of NG installation, can you inform us if there is a system of monthly installments to settle the installation fee?	The cost of the installation fees is expensive but the Government of Egypt provides a huge subsidy to enable all citizens' benefit from the NG, and NG cost is cheaper than LPG. There is an agreement with the Egyptian Banks to finance the cost of connection to the client, and he/she can pay the cost in installment. AFD in cooperation with EU provides a grant of 1500 EGP for poor people according to illegibility criteria. Moreover, the Ministry of Petroleum has announced a new initiative to encourage more people to connect with NG by paying the cost in installment for 6 years at a zero-interest rate.	Section 4. Environment and Social Baseline. And section 5 **Table 5-2 Impact Assessment**

Subject	Questions& comments	Responses	Addressed in the ESMP Study
Criteria for Natural Gas connection	Why are all the households and villages not included in the connection plan	Connection to villages depends on the availability of other public utilities (water, sewage, and electricity) Additionally, the village should be close to the national NG grid. The Government is giving a high priority to connect NG to all households.	Section 2. Project Description
Information sharing about NG	The people should be informed about NG. Group meetings will be useful	The NG project team provided information to the communities as follows: 1- During the site visits for the P&A survey 2- During the preparation of the ESIA 3- During the contracting process	Section 7. ESM&MP and Section 8. Stakeholder engagement
Complaint system	What if we have any complaints about the project, where we can raise our complaints	The project is adhering to a grievance mechanism. This enables anyone to submit a complaint and respond to it in 10 working days	Section 7. (GRM)
Street rehabilitation & land refill	-Who is responsible for rehabilitating the street and land refill after the end of construction works?	Town Gas responded to this question as they will be the implementing agency responsible for street rehabilitation in terms of budget. However, the local Council Centre will implement streets rehabilitation works	Section 7. ESM&MP
Loss of income for LPG Vendors	The NG connection project will affect the source of income for LPG vendors and the distributors	NG is not going to cover all areas; the Local Council Center will give new licenses in other areas.	Section 7. ESM&MP
LPG problems	LPG is not always full and in a bad condition	Some private companies are working in fuelling LPG bottles, and need more control and monitoring from the government.	Section 4. Environment and Social Baseline.
NG Bills problems	High prices and accumulation of NG consumption for two or three months.	NG tariff is imposed by the government and takes into consideration poor families. The consumer can overcome the problems of accumulation of NG consumption by registering his monthly consumption through the Petrotrade website.	Section 4. Environment and Social Baseline.

8.6 Summary of Consultation Results

The consultation outcomes revealed that the interviews with the implemented companies revealed that they are fully aware - of the following:

- security and safety procedures following the nature of the region.
- The announcement of the Ministry of Petroleum initiative to encourage more people to connect NG, by paying the cost in installment for 6 years at a zero-interest rate (30 EGP/ month).

The AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG (more than 50% of the NG connection cost according to specific criteria, and the principles which have been adopted by the Ministry of the Social Solidarity to determine the poor areas). This initiative has been approved and will be applied to all project districts. The study recommended the participation of the community people in sharing information about the NG project with other people, especially the illiterate groups. (The recommendation is not obligated for the project)

- 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 actual need to provide clear information about the project and some concerns about NG security and safety.
    - The majority of the community people cannot afford to pay NG installation costs in one installment, they strongly recommended paying in installments.
    - Some concerns about LPG security, safety (poor maintenance), and the lack of its weight.
    - NG consumption tariff and the problem of delay in collecting NG consumption bills.
    - The actual need to respond to grievances on time,

The key message from the consultation events carried out for this project is that: The acceptance and the support of governmental officials and the Public for the project are very strong.

8.7 ESMP disclosure

A final report will be published on the WBG, 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.