



1.5 Million Natural Gas Connections Project in 11 Governorates

Environmental and Social
Management Plan
Besion and El Santa cities,
Bashbesh and El Dalgamoon
districts,
Al Gharbya Governorate

Final Report
August, 2019



EGAS
Egyptian Natural Gas Holding Company

Developed by



“Petrosafe”

Petroleum Safety & Environmental Services
Company

EcoCon Serv
ENVIRONMENTAL SOLUTIONS

EcoConServ Environmental Solutions



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
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
NG	Natural Gas
NGO	Non-Governmental Organizations
P&A	Property and Appliance Survey
PE	Poly Ethylene
Project districts	Besion, El Santa, Bashbesh and El Dalgamoon districts
PRS	Pressure Reduction Station
SDO	Social Development Officer
SIA	Social Impact Assessment
Egypt Gas	Egypt Gas (LDC)
WB	The World Bank
WHO	World Health Organization
\$	United States Dollars
€	Euros

Exchange Rate: US\$ = 16.59 EGP as of August 2019

Exchange Rate: € = 18.55 EGP as of August 2019



Contents

0.	EXECUTIVE SUMMARY	7
0.1	INTRODUCTION	7
0.2	PROJECT DESCRIPTION	7
0.3	LEGISLATIVE AND REGULATORY FRAMEWORK	8
0.4	ENVIRONMENTAL AND SOCIAL BASELINE	9
0.5	ENVIRONMENTAL AND SOCIAL IMPACTS	12
0.6	ANALYSIS OF ALTERNATIVES	13
0.7	ENVIRONMENTAL AND SOCIAL MANAGEMENT & MONITORING PLAN	14
0.8	STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION	14
0.9	ESMP DISCLOSURE	15
1.	INTRODUCTION	16
1.1	PROJECT OBJECTIVES	16
1.2	METHODOLOGY	18
1.3	CONTRIBUTORS	18
2.	PROJECT DESCRIPTION	19
2.1	BACKGROUND	19
2.2	PROJECT WORK PACKAGES	19
2.3	PROJECT EXECUTION METHODOLOGY	23
3.	LEGISLATIVE AND REGULATORY FRAMEWORK	31
3.1	APPLICABLE ENVIRONMENTAL AND SOCIAL LEGISLATION IN EGYPT	31
3.2	WORLD BANK SAFEGUARD POLICIES	33
3.3	PERMITS REQUIRED	35
4.	ENVIRONMENTAL AND SOCIAL BASELINE	36
4.1	DESCRIPTION OF THE ENVIRONMENT	36
4.2	SOCIOECONOMIC BASELINE	45
5.	ENVIRONMENTAL AND SOCIAL IMPACTS	53
5.1	IMPACT ASSESSMENT METHODOLOGY	53
5.2	IMPACTS DURING CONSTRUCTION	53
5.3	IMPACTS DURING OPERATION	54
6.	ANALYSIS OF ALTERNATIVES	61
6.1	PIPELINE INSTALLATION TECHNOLOGY ALTERNATIVES	61
6.2	ROUTING, REGULATORS, WORKING TIME AND PAYMENT	62



7.	ENVIRONMENTAL AND SOCIAL MANAGEMENT & MONITORING PLAN	63
7.1	OBJECTIVES OF THE ESM&MP	63
7.2	MANAGEMENT OF GRIEVANCES (E&S GRIEVANCE REDRESS MECHANISM)	63
7.3	ENVIRONMENTAL AND SOCIAL MANAGEMENT MATRIX DURING CONSTRUCTION	67
7.4	ENVIRONMENTAL AND SOCIAL MONITORING MATRIX DURING CONSTRUCTION	81
7.5	ENVIRONMENTAL AND SOCIAL MANAGEMENT MATRIX DURING OPERATION	84
7.6	ENVIRONMENTAL AND SOCIAL MONITORING MATRIX DURING OPERATION	86
7.7	REPORTING OF MITIGATION AND MONITORING ACTIVITIES	87
7.8	INSTITUTIONAL FRAMEWORK FOR ESM&MP IMPLEMENTATION	87
8.	STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION	89
8.1	LEGAL FRAMEWORK FOR CONSULTATION	89
8.2	CONSULTATION OBJECTIVES	90
8.3	DEFINING THE STAKEHOLDER	90
8.4	CONSULTATION METHODOLOGY AND ACTIVITIES	93
8.5	SUMMARY OF CONSULTATION ACTIVITIES	95
8.1	MAIN RESULTS OF CONSULTATION ACTIVITIES DURING ESMP STUDY FOR THE NEW PROJECT SITES (BESION, EL SANTA, BASHBESH AND EL DALGAMOON DISTRICTS) IN 2018	96
8.1	SUMMARY OF CONSULTATION OUTCOMES	97
8.2	ESMP DISCLOSURE	98

Annexes

ANNEX 1:	CONTRIBUTORS TO THE ESMP
ANNEX 2:	HSE DOCUMENTATION
ANNEX 3:	EQUIPMENT USED AND EMISSION MEASUREMENTS
ANNEX 4:	IFC GUIDELINE
ANNEX 5:	NOISE AND AIR MEASUREMENTS
ANNEX 6:	CHANCE FIND PROCEDURE
ANNEX 7:	IMPACT ASSESSMENT
ANNEX 8:	GRM & COMPLAINT FORM
ANNEX 9:	CODE OF CONDUCT
ANNEX 10:	EMERGENCY PLAN
ANNEX 11:	STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION (11 -GOVERNORATES 2013)
ANNEX 12:	STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION (GOVERNORATE OF GHARBYA - 2017)



List of Tables

Table 0-1: Summary of Negative Impact Assessment during construction and operation	13
Table 1-1: Number of Districts and Potential clients	17
Table 1-2: Shortlist of the Main Contributors	18
Table 2-1: Types of Equipment used	29
Table 3-1: Maximum limits of outdoor air pollutants	31
Table 3-2: Power generation by diesel engines	32
Table 3-3: Maximum allowable emissions from vehicles that operate using gasoline fuel	32
Table 3-4: Maximum allowable emissions from vehicles that operate using diesel fuel	32
Table 3-5: Maximum permissible noise level limits	32
Table 3-6: WHO Ambient Air Quality Guidelines	33
Table 3-7: Small Combustion Facilities Emissions Guidelines (3MWth – 50MWth) – (in mg/Nm ³ or as indicated)	34
Table 3-8: Noise Level Guidelines	35
Table 4-1: Location of Air measurements	41
Table 4-2: Besion city air Quality Measurements	42
Table 4-3: Besion city Noise Measurements	42
Table 4-4: Distribution of population in project districts	46
Table 4-5: Percentage of individuals' access to basic services in the project districts	47
Table 4-6: Distribution of the project districts' population by educational status	48
Table 4-7: Poverty indicators	48
Table 5-1 Impact Assessment Methodology	53
Table 5-2 Impact Assessment	56
Table 7-1: Environmental and Social Management Matrix during CONSTRUCTION	67
Table 7-2: Environmental and Social Monitoring Matrix during CONSTRUCTION	81
Table 7-3: Environmental and Social Management Matrix during OPERATION	84
Table 7-4: Environmental and Social Monitoring Matrix during OPERATION	86
Table 8-1: Stakeholders identified in Gharbya Governorate	91
Table 8-2: Summary of Consultation Activities in Gharbya Governorate	93
Table 8-3: Key comments and concerns raised during the different public consultation activities, and the way they were addressed during in the ESMP study	95



List of Figures

Figure 2-1: General components of the Besion, El Santa, Bashbesh and El Dalgamoon districts distribution network (Surrounded by red frame).....	19
Figure 2-2: The proposed Besion pipeline Network routes.	21
Figure 2-3: Pictures showing Besion intermediate pressure pipeline route.....	22
Figure 2-4: Picture showing sample of typical trench for PE pipes by Egypt Gas	25
Figure 2-5: Pictures showing the proposed location of HDD crossings in Besion City	25
Figure 2-6: Pictures showing Horizontal Directional Drilling (HDD) Technique.....	26
Figure 4-1: Distribution of cities in Gharbya governorate and proposed gas connections districts location	36
Figure 4-2: Satellite map showing Besion City and surrounding communities.....	37
Figure 4-3: Satellite map showing El Santa city and surrounding communities.....	38
Figure 4-4: Satellite map showing Bashbesh village and surrounding communities	39
Figure 4-5: Satellite map showing El Dalgamoon Village and surrounding communities	40
Figure 4-6: Shows Mashal intermediate waste handling area at Besion Markaz.....	44
Figure 4-7: Shows Traffic in Besion city	44
Figure 4-8: Building Condition in Besion city.....	46
Figure 4-9: Streets Condition in Besion city.	46
Figure 7-1: Egypt Gas H&S organizational structure.	88
Figure 8-1: Consultation Activities in Besion and El Dalgamoon.....	98



0. Executive Summary

0.1 Introduction

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 on human health; on land, soil, water, air and climate; on landscape; on biodiversity; and on cultural heritage. It will identify risks and will suggest mitigation measures where appropriate.

The Four districts hosting the project (Besion, El Santa, Bashbesh and El Dalgamoon districts) are found significantly homogeneous in terms of environmental and social aspects. As such, this report will present the study findings based on the homogeneity of project districts.

This ESMP has been prepared based on the Simplification Guidelines agreed upon between the World Bank and EGAS.

Two of the studied districts (Bashbesh and El Dalgamoon) will be supplied by NG from the existing pressure reduction stations (Samnud PRS and Kafr El Zayat PRS respectively), El Santa district will be supplied by NG from the new Zefta PRS which its ESIA was cleared from WB, while Besion district will be supplied by NG from Qtor PRS which will be constructed and an ESIA will be prepared for it. No major environmental or social risks can be foreseen which would prevent the project from reaching the targeted customers over the proposed 2-year timeframe.

For the current ESMP study, Besion City has been chosen to represent Gharbya governorate due to its longer low-pressure networks, in addition to the greater number of households NG connection, comparing to El Santa, Bashbesh and El Dalgamoon districts. The locations for environmental measurement (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

According to the agreement between Egypt Gas Company and the Egyptian Natural Gas Holding Company “EGAS” signed for supplying natural gas to more than 32000 domestic customers **in Besion, El Santa, Bashbesh and El Dalgamoon districts, Gharbya 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.



Egypt Gas Company will start the necessary installations needed to feed natural gas for the customers in Besion city as follows: -

- Besion city will be connected by polyethylene intermediate pressure feeding pipeline from the new Qtor PRS station.
- 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 13 sectors within Besion city.

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

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

0.3 Legislative and Regulatory Framework

The project will adhere to Egyptian legislations, WB 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 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, Articles 43 – 45 of Law 4/1994 and Law 12/2003.
- **World Bank Safeguard Policies:** During the early stages of the 1.5 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 whereas It is not envisaged that the Low-Pressure Natural Gas Network in Gharbya 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. Although no cultural resources are located in the subproject areas,



OP/BP4.11 will be applicable since Gharbya governorate is known of some archeological and cultural sites Although no cultural resources are located in the subproject districts. 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 provide guidance to users on EHS issues in specific industry sectors.
 - Gap Analysis 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 in 2018 and the secondary data collected, the subproject sites located in Gharbya Governorate in the districts of Besion (under the jurisdiction of Besion Markaz), El Santa (under the jurisdiction of El Santa Markaz), Bashbesh (under the jurisdiction of El Mahalla El Kobra Markaz) and El Dalgamoon (under the jurisdiction of Kafr El Zayat Markaz) sites were found to be within a radius of 25 km and classified as semi urban residential areas of the same environmental and socioeconomic conditions. Thus, the environmental and social conditions of the subproject sites are of homogeneous characteristics. The environmental measurements were conducted in one location based on the sensitivity of receptors (environmental and/or social) and significance of the impact (air and/ or noise)

Environmental Baseline:

The homogeneity of the project sites, in terms of environmental aspects and economic activities, shows the following:

Air Quality and noise measurements:

According to the study methodology the measurement location was chosen on the basis that it is beside a pediatrician Medical Centre (**Al-Mustakbal pediatrician Medical Centre**) in Besion city and close to the pipeline route.

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

Climate:

The average annual temperature is 20.3 °C to 26.6 °C in the four project districts.

**Water resources:**

The surface water resources of Gharbya Governorate are limited to the Nile River Branches (Rosetta and Damietta). subsurface water located at depths ranging from 3.4 to 4.2 meters it is constantly renewable by the Nile River and irrigation water. the groundwater aquifers is the Nile delta aquifer During the project construction activities, the excavation depth does not exceed 1 meter, therefore the subsurface water or groundwater is unlikely to be encountered in the four studied districts.

Terrestrial Biological Environment:

The proposed gas pipeline route and pipeline network are planned in areas where flora and fauna of significance do not occur.

Waste Management:

Solid wastes will be transferred by local units Trucks to intermediate waste handling areas then to be transferred by larger trucks to the main Kafr Dawood in Sadat city dumpsite, the project districts are well covered by public sanitation network which take all the municipal sewage to be treated in existing sewage treatment plants. There are no hazardous wastes certified disposal sites within Gharbya district, any hazardous Waste generated will be transported- by licensed hazardous waste handling vehicles and personnel for final disposal at a licensed hazardous waste facility (Nassreya or UNICO in Alexandria).

Socio - economic Baseline:**Administrative Division:**

The project districts lay within the jurisdiction of the Gharbya Governorate which located in the north of Cairo. It is bordered by Kafr El Sheikh Governorate to the north, by Monofeya to the south, by Dakahliya to the east, and by Behera Governorate to the West.

Urbanization Trends:

The project districts are classified as semi-urban residential areas, the majority of buildings is ranged between 5 to 8 stories high, the average width of main streets range between (2 to 3) lanes wide, and side streets range between (1 to 2) lanes wide, they are mostly paved out and convenient for NG installations.

Demographic Characteristics:

The total population for the project districts is about 296355, the birth rate is 29.2 births per 1000 persons and the average household size is about 4.02 persons.

**Access to basic services:**

The project districts have access to basic services. Nearly 100% of individuals have access to electricity, public water network and sanitation network. Thus, it will be possible to install the NG to the project districts as access to basic services is one of the prerequisites required to install NG.

Human development profile:

Schools are available and intermediate education is prevalent among all project districts. Education is one of the main determinants of any awareness campaign for the project. According to the data collected, the medical services are available and very close to all project districts, so if any injuries occurred to the workers, they will be immediately transferred to the nearest hospital. The average monthly income for household is estimated to be between 2500 and 3500 EGP. Site surveys showed that the majority of the community samples cannot pay NG installation costs in one installment, they strongly recommend flexible payment in installment that vary between one year to seven years.

Fuel currently used in households:

The main type of fuel used for cooking in project districts are the LPG cylinders. The price of LPG cylinder ranges between 55 to 65 EGP and its average consumption ranges between 1 to 3 cylinders monthly.

Willingness and affordability to pay:

The installation fee which goes around (2300 to 2650 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 150 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 according to specific criteria. 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. 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 60-70 excavation workers, 2 engineers and 18 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 Subsurface 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 significance ranking process.

It is worth mentioning that impacts related to land tends to be of no significance, as the Local Distribution Company, Egypt Gas will establish temporary workshops and storage areas 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 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 physically challenged, women, and the elderly had to face in handling LPG
 - Limiting possible child labor in LPG cylinder distribution
- **Potential Negative Impacts:**

Some receptors have irrelevant impacts. Those receptors include waste management, air quality, soil and Ecological (Fauna and flora).



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

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

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

0.6 Analysis of Alternatives

The Framework study of the Project discussed extensively and analysed all possible project alternatives, this ESMP discusses the alternative Pipeline installation technologies, that concluded, open cut technology is recommended since this will not negatively affect the environment and a cheap and safe option. However, for the crossings, HDD is needed for the crossings under railway specified in section 2.3.3.3

Pipeline Installation Technology Alternatives:

Trenchless Technologies:

HDD is anticipated in crossing of one railway along Besion city intermediate pipeline route. HDD has some advantages compared to auger boring and open-cut technique as it doesn't 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 wider range of pipeline diameters and it is a surface-launched process which doesn't require drive pits.

Open-Cut Method:

It is 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. Open-cut method is the recommended solution in the four studied districts since the pipeline route passes through urban 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. The ESMMP identifies roles and responsibilities for different stakeholders for implementation and monitoring of mitigations. It's 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. Special emphasis on the Grievance Redress Mechanism was addressed.

0.8 Stakeholder Engagement and Public Consultation

The new house connections in the project sites are supplementary to the current existing natural gas connection network in Al Gharbya Governorate. ESIAs/ESMPs for other districts were prepared, and studies were cleared by the Bank and disclosed on EGAS website and the Bank info shop. Stakeholder Engagement activities and a series of public consultations were conducted all through the past 5 years. A consultation work plan has been developed for the different communities through the following phases:

- a. Public Consultation session during the preparation of the framework (ESIAF) in 2013.
- b. Consultation activities during the preparation of the site-specific studies (ESMPs) for 9 districts in January and February, 2017.
- c. Public Consultation session in Gharbya Governorate in April 2017.
- d. Consultation activities during the preparation of the current site-specific study (ESMP) for 4 districts in July and December 2018,

A work plan was developed, information 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 ESIAs/ESMPs / ESIAF of the project. Consultation activities showed an overwhelming acceptance of the consulted participants to host the NG and 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 to pay in installments. This high level of enthusiasm from the local communities towards the project is attributed to the high level of awareness of the benefits of the natural gas and the current hardships that the households are facing to secure LPG provision and usage.

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



0.9 ESMP disclosure

As soon as the site-specific ESMPs gets clearance from the World Bank and approval from EEAA, a final report will be published on the WB, EGAS and Egypt 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 to 1.5 million Households in 11 Governorates represents an integral component of the national energy strategy, which aims for greater use of natural gas for domestic users.

This Environmental and Social Management Plan study is one of the reports developed for the NG installation project in Gharbya Governorate. It is worth mentioning that in **March 2014**, an Environmental and Social Impact Assessment Framework (ESIAF) was developed for the project's Governorates including Gharbya Governorate.

In March 2018, 1 ESMP and 2 site specific ESIA's in Gharbya Governorate were also developed for the following project districts:

1. ESMP for Zefta, Kafr El Zayat, Seberbay, Ghofran district, Qotour, Mahalet Zeyad, Kherset – kafr Essam, Akhnaway and Perma districts,
2. ESIA for Kafr El Zayat PRS,
3. ESIA for Zefta PRS.

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

This Low-Pressure Natural Gas Network ESMP study covers the following districts:

1. Besion city (within Besion Markaz)
2. El Santa city (within El Santa Markaz)
3. Bashbesh (within El Mahalla El Kobra Markaz)
4. El Dalgamoon village (within Kafr El Zayat Markaz)

The new house connections are supplementary to the current existing natural gas connection network.

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, WB operational policies and World Bank Group General Environmental, Health, and Safety Guidelines & WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems.

Additionally, the ESMP follows national and IFC requirements regarding scope and detail of assessment and procedure, and gives particular emphasis to public information and stakeholder participation.

The ESMP objectives include:

- Describing project components in Besion city (Markaz Besion), El Santa city (within El Santa Markaz) Bashbesh (within El Mahalla El Kobra Markaz) and El Dalgamoon (within Kafr El Zayat Markaz) and activities of relevance to the environmental and social impacts assessments
- Identifying and addressing relevant national and international legal requirements and guidelines
- Describing relevant baseline environmental and social conditions
- Assessing project alternatives if different from those presented in ESIA framework
- Assessing potential site-specific environmental and social impacts of the project
- Developing environmental & social management and monitoring plans in compliance with the relevant environmental laws
- Documenting and addressing environmental and social concerns raised by stakeholders and the Public in consultation events and activities.

This ESMP 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 on human health; on land, soil, water, air and climate; on landscape; on biodiversity; and on cultural heritage. It will identify risks and will suggest mitigation measures where appropriate.

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

Table 1-1: Number of Districts and Potential clients

Governorate	Local Distribution Company	Districts	Potential clients
Gharbya	Egypt Gas	Besion City	12000
		El Santa city	6000
		Bashbesh village	5000
		El Dalgamoon Village	9000
TOTAL:		4	32000

Two of the studied districts (Bashbesh and El Dalgamoon) will be supplied by NG from the existing pressure reduction stations (Samnud PRS and Kafr El Zayat PRS respectively), El Santa district will be supplied by NG from the new Zefta PRS which its ESIA was cleared from WB, while Besion district will be supplied by NG from Qtor PRS which will be constructed and an ESIA will be prepared for it. No major environmental or social risks can be foreseen which would prevent the project from reaching the targeted customers over the proposed 2-year timeframe. The extensive experience gained, by EGAS and affiliates; through implementation of the previous WB and GoE funded Natural Gas Connection project in Greater Cairo (and 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 in 2018 and the secondary data collected, the subproject sites located in Gharbya Governorate in the districts of Besion, El Santa, Bashbesh and El Dalgamoon sites were found to be within a radius of 25 km and classified as residential urban areas of the same environmental and socioeconomic conditions. Thus, the environmental and social conditions of the subproject sites are of homogeneous characteristics.

The study team has adopted a new methodology, which it may help of accelerating the project implementation plan. The new 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 networks pipelines.
- 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 (agriculture, industry,...etc.).
- The environmental measurement to be conducted in only one location from the project 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, Besion City has been selected due to its longer low-pressure networks, in addition to the greater number of households NG connection, comparing to El Santa, Bashbesh, and El Dalgamoon districts. The locations for environmental measurement (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 close to the pipeline route and potential sensitive areas.

1.3 Contributors

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

Table 1-2: Shortlist of the Main Contributors

Team Member	
• Geo. Mohamed El-Ghazaly	• Dr. Khaled Gamal
• Dr. Zeinab Farghaly	• Chem. Mohamed Saad Abdel Moein
• Chem. Mohamed Abdel Moniem Aly	• Economist/ Osama Kamal

2. Project Description

2.1 Background

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

The city distribution network comprises the following components:

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

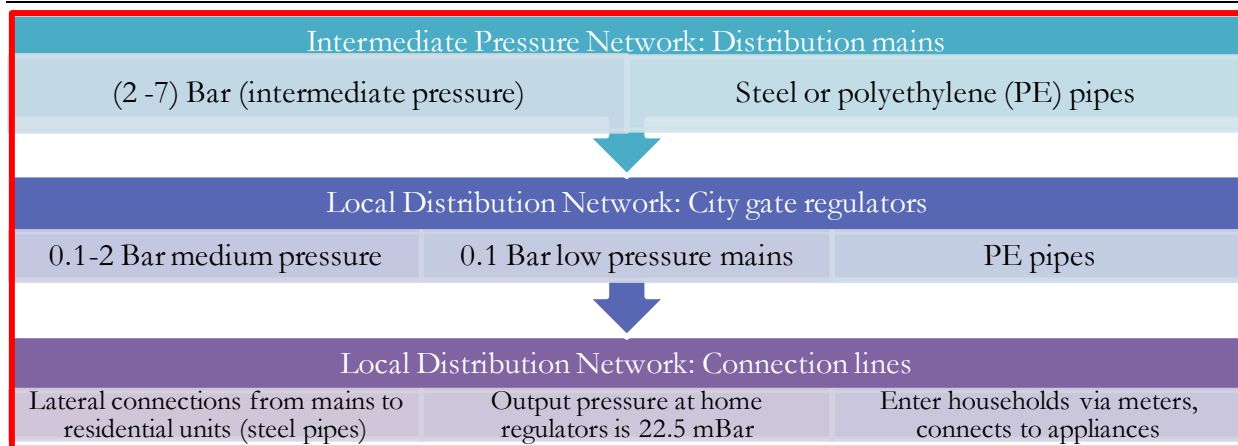


Figure 2-1: General components of the Besion, El Santa, Bashbesh and El Dalgamoon districts distribution network (Surrounded by red frame)

2.2 Project Work Packages

According to the agreement between Egypt Gas Company and the Egyptian Natural Gas Holding Company “EGAS” signed for supplying natural gas to more than 32000 domestic customers in **Besion, El Santa, Bashbesh and El Dalgamoon districts,**

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

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

Besion city will be connected by polyethylene intermediate pressure feeding pipeline from the proposed new Qtor PRS station.

2.2.1.1 Route

The proposed pipeline route will start from the proposed location of Qtor PRS which will be located on Dafra – Hwen road at the geographical Coordinates of (Lat. 31° 00' 01.8" N, long. 30°54' 54.6"E).



The proposed Pipeline route then extends to the south west cutting Tanta – Kafr El Sheikh railway using Horizontal Directional Drilling technique (HDD). The proposed Pipeline route then turns to the north-west direction along with Dafra – Hwen road for about 2.4 km. Then change direction to the south west along with Besion – El Shen road for about 6.1 km.

The proposed pipeline route will continue extending to the south west direction along with Besion – Tanta road for about 6.7 km.

The proposed pipeline route then will change direction the west along with 23rd July street for about 10.5 km to reach the end of the proposed pipeline route in the front of National Bank of Egypt (Besion Branch) at geographical coordinates of (Lat. 30° 56' 22.5" N, long. 30°48' 21.7" E) (Figures: 2-2 and 2-3).

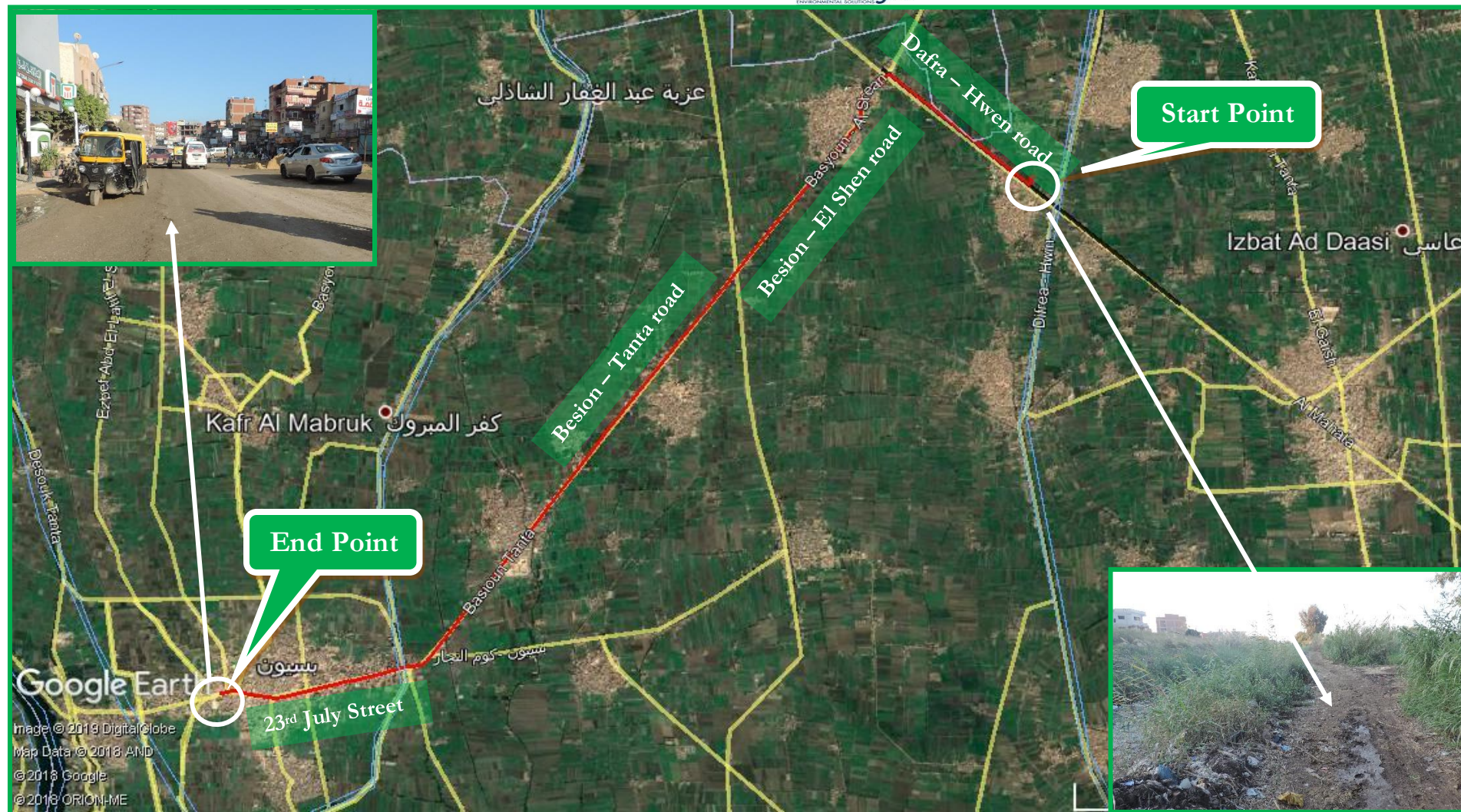


Figure 2-2: The proposed Besion pipeline Network routes.



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



2.2.2 Low-pressure Distribution-Network for Besion city:

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 100 mbar. PE80 network will be installed horizontally underground for 13 sectors within Besion city as shown in Figures 2-2 and 2-3.

2.3 Project Execution Methodology

2.3.1 Project area selection criteria

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

A preliminary estimate was generated through a general survey, followed by a Property & Appliance (P&A) survey. The outcome of the P&A survey is a detailed listing of individual households to be connected after passing 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 specification required to have the NG installed in the area:
 1. Areas that have access to all necessary public utilities especially land networks (electricity, water, sewage, telephone lines)
 2. Adobe and wooden houses are not eligible for NG connections
 3. Areas that comply with the British standards and/or the applied standards for NG connections that can be used for determining areas eligibility for NG connections.
 4. Areas adjacent to NG National Grid

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

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



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

Design of the transmission and distribution pipelines is utilized to estimate the materials needed 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 feeds low-pressure networks via district regulators. Distribution mains are typically Polyethylene (PE) pipes connected to regulators. Regulators are fed by 7-Bar piping which is orange in color (referred to as PE 100) with diameters between 16 mm to 35 mm according to GIS PL2-8 and the information provided by Egypt Gas.

2.3.3.1 Clearing and grading activities and pipe transportation and storage

The first step of construction includes: flagging the locations of approved access route of pipeline, allocating 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 reasonably level work surface. Additionally, equipment and piping will be transported to the site (temporary storage area). Quality control procedures during the transportation and handling of pipes should take place to ensure protection from any effects that may damage the pipes, and prevent any traffic accidents.

2.3.3.2 Site preparation

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

2.3.3.3 Excavation

The most commonly used excavation technique is the Open cut technique which start by removing the asphalt layer and the base stone layer using either a mechanical excavator (used in urban roads) or an air compressor jack hammer for dusty roads (used in local roads). In case the jack hammer is used, road layers are removed by excavator. The trench is excavated to a depth that provides sufficient cover over the pipeline after backfilling. The road base soil, underneath asphalt and stones, is then excavated either by a backhoe excavator or by manual excavation. The advantage of manual excavation is that it reduces the risks of breaking water, sewerage, electric or telecommunication lines which 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 2-4](#). The followed safety procedures are presented in [Annex 2](#)



Figure 2-4: Picture showing sample of typical trench for PE pipes by Egypt Gas

A Horizontal Direct Drilling (HDD) method will be used for laying the underground pipe in crossing under one railway (Tanta – Kafr El Sheikh) along Besion city intermediate pipeline route as shown in [Figure 2-5](#).



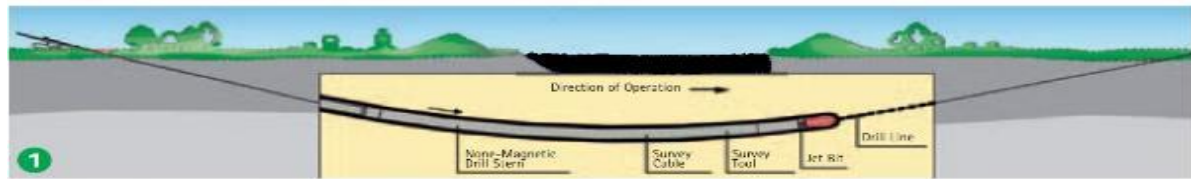
Figure 2-5: Pictures showing the proposed location of HDD crossings in Besion City

HDD is a trenchless methodology that use high excavation depths (about 30-40 meters) and can be used for high pipeline length. HDD causes very little disruption to traffic as road narrowing or diverting are not required, in addition to the smaller work area requirements and it takes 2 working days, a reinforced concrete sleeve will be installed to further protect the piping from fatigue. as shown in [Figure 2-6](#):

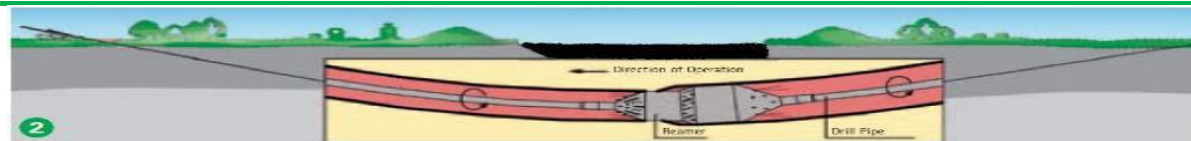


Horizontal Directional Drilling (HDD) Technique

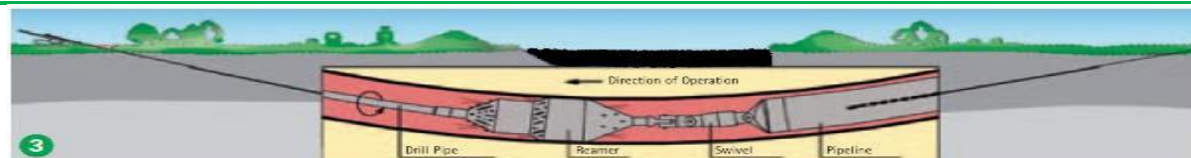
As simple as it is convincing. In the HDD method, pipelines are laid in three stages.



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



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



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

Figure 2-6: 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 subsurface 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 subsurface 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, butt fusion welding technique will be used for pipe welding (hot plate softening the tips of the PE pipes before joining) and electro fusion welding (fittings with heating coils installed inside) will be used to weld fittings. In both cases, diesel generators and relevant cabling would be needed.



2.3.3.6 Backfill and road repair

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

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

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

2.3.3.7 Leakage testing

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

2.3.3.7.1 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 in order to prevent deformation, dislocation, and rupture of the pipes.

Leakage testing through pressurization must be performed after backfilling the excavation under (10 cm), around (10 cm), and above the pipes (20 cm, at least).

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

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 piping which is yellow in color (referred to as PE80) with diameters between 16 mm to 250 mm according to the information given from Egypt Gas.

2.3.5 Construction works of household installation

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

1. Connections work will connect the distribution network to the households.
2. 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.
3. 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.
4. Gas meters will be installed with a suitable regulator (governor) at internal pressures of 20 mbar.
5. 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 at 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. In order to allow the installation of the conversion of the heater and installation of the stack, the bathroom volume must exceed 5.6 cubic meters. Installation of the stack may require scaffolding and breaking of the wall or ceiling.



2.3.7 Commissioning

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

2.3.8 Types of Equipment used

The proposed equipment which will be uses are 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 jackhammer, generators, Excavators, containing SO_x, NO_x, CO, VOCs, etc.
2. Noise and vibration mainly from air compressor with jackhammer, generator, Horizontal Directional Drilling machine, Excavators, and the excavation tools.
3. Heat stress mainly from the welding machine

More detailed impacts and their mitigation measures are addresses in details in sections 5 and 7.

(For more information please see [Annex-3](#))

2.3.9 Laborers Requirement

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

- About 60 -70 excavation workers (unskilled workers).
- About 18 technicians (semiskilled workers).
- About 2 site engineers (skilled workers).



It worth to mention that the skilled and experienced personnel are usually LDC' staff who live at the project districts, while the unskilled laborers are hired by the contractor (or the subcontractors) come from the surrounding districts. so no accommodation will be needed during the construction activities onsite. However, workers (if needed) from outside Gharbya 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, they use available toilets in the mosques. 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 workshop/warehouse during the construction and installation activities; where the workers/labours 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 shop, the contractor occupies an open street area that is affiliated to local governmental unit.

2.3.11 Use of chemicals or other hazardous materials

The expected chemicals that will be consumed during this phase of the Subproject are 75 paint containers of capacity 20 liters and 20 solvents jerry cans of capacity 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 operation will include routine audits on pressures and condition of the network. Normal maintenance and monitoring works for the network include:

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

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

1. Stopping leaking line by valves when available or by squeezing the lines before and after the damaged part.
2. Excavating above the effected part (in case of distribution main or underground line)
3. Venting the line
4. Removing affected pipe, replacing and welding, 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 Year 1994 for the environmental protection, amended by Law 9/2009 and law 105 for the year 2015 and its Executive Regulation (ER) No 338 for Year 1995 and the amended regulation No 1741 for Year 2005, amended with ministerial decree No 1095/2011, ministerial decree No 710/2012, ministerial decree No 964/2015, and ministerial decree No 26/2016
- Law 38/1967 for General Cleanliness
- Law 93/1962 for Wastewater
- Law 117/1983 for Protection of Antiquities
- Traffic planning and diversions
 - Traffic Law 66/1973, amended by Law 121/2008.
 - Law 140/1956 on the utilization and blockage of public roads.
 - Law 84/1968 concerning public roads.
- Work environment and operational health and safety
 - Articles 43 – 45 of Law 4/1994, air quality, noise, heat stress, and worker protection
 - Law 12/2003 on Labor and Workforce Safety

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	Maximum Limit [$\mu\text{g}/\text{m}^3$ unless otherwise noted]			
		1 hour	8 hours	24 hours	1 Year
Sulphur Dioxide	Urban	300	---	125	50
	Industrial	350	---	150	60
Carbon Monoxide, mg/m^3	Urban	30	10	---	---
	Industrial	---	---	---	---
Nitrogen Dioxide	Urban	300	-	150	60
	Industrial	300	-	150	80
Ozone	Urban	180	120	---	---
	Industrial	180	120	---	---
Total Suspended Particles (TSP)	Urban	---	---	230	125
	Industrial	---	---	230	125
Particulate Matter less than $10\ \mu\text{m}$ (PM_{10})	Urban	---	---	150	70
	Industrial	---	---	150	70
Particulate Matter less than $25\ \mu\text{m}$ ($\text{PM}_{2.5}$)	Urban	---	---	80	50
	Industrial	---	---	80	50
Suspended Particles Measured as Black Smokes	Urban	---	---	150	60
	Industrial	---	---	150	60
Lead	Urban	---	---	---	0.5
	Industrial	---	---	---	1.0
Ammonia (NH_3)	Urban	---	---	120	---
	Industrial	---	---	120	---



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		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
<ul style="list-style-type: none"> Measurements are done in accordance with 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 Gharbya governorate is known of some archeological and cultural sites Although no cultural resources are located in the subproject districts. Chance find procedures will be part of the contracts of the contractors. Involuntary Resettlement OP/BP 4.12 will not be applicable to the low-pressure pipelines 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 WB Policies was conducted in the ESIAF of the project and disclosed on EGAS website as per the following link <http://www.egas.com.eg/docs/RPF%20for%20NG%20connections%20project%20for%2011%20Governorates.pdf>”

3.2.1 World Bank Group General Environmental, Health, and Safety Guidelines¹, WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems²

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which provide guidance to users on EHS issues in specific industry sectors (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 Guidelines³⁴

Pollutants	Averaging Period	Guideline value in mg/m3
Sulphur Dioxide	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minutes	500 (guideline)
Nitrogen Dioxide	1-year	40 (guideline)
	1-hour	200 (guideline)

¹<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

²<https://www.ifc.org/wps/wcm/connect/96e3d0048855ade8754d76a6515bb18/Final%2B-%2BGas%2BDistribution%2BSystems.pdf?MOD=AJPERES&cid=1323162128496>

³ World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile.

⁴ 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/m ³
Particulate Matter less than 10 µm (PM ₁₀)	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter less than 2.5 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 (SO ₂)	Dioxide	Nitrogen (NO _x)	Oxides	Dry Gas, Excess O ₂ 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 be applicable 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 NO_x 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 Guidelines⁵

Area Type Receptor	One Hour LAeq (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational ⁶	55	45
Industrial; commercial	70	70

3.3 Permits Required

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

⁵ 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).

⁶ Noise monitoring should be carried out using a Type 1 or 2 sound level meter meeting all appropriate IEC standards.

4. Environmental and Social Baseline

4.1 Description of the Environment

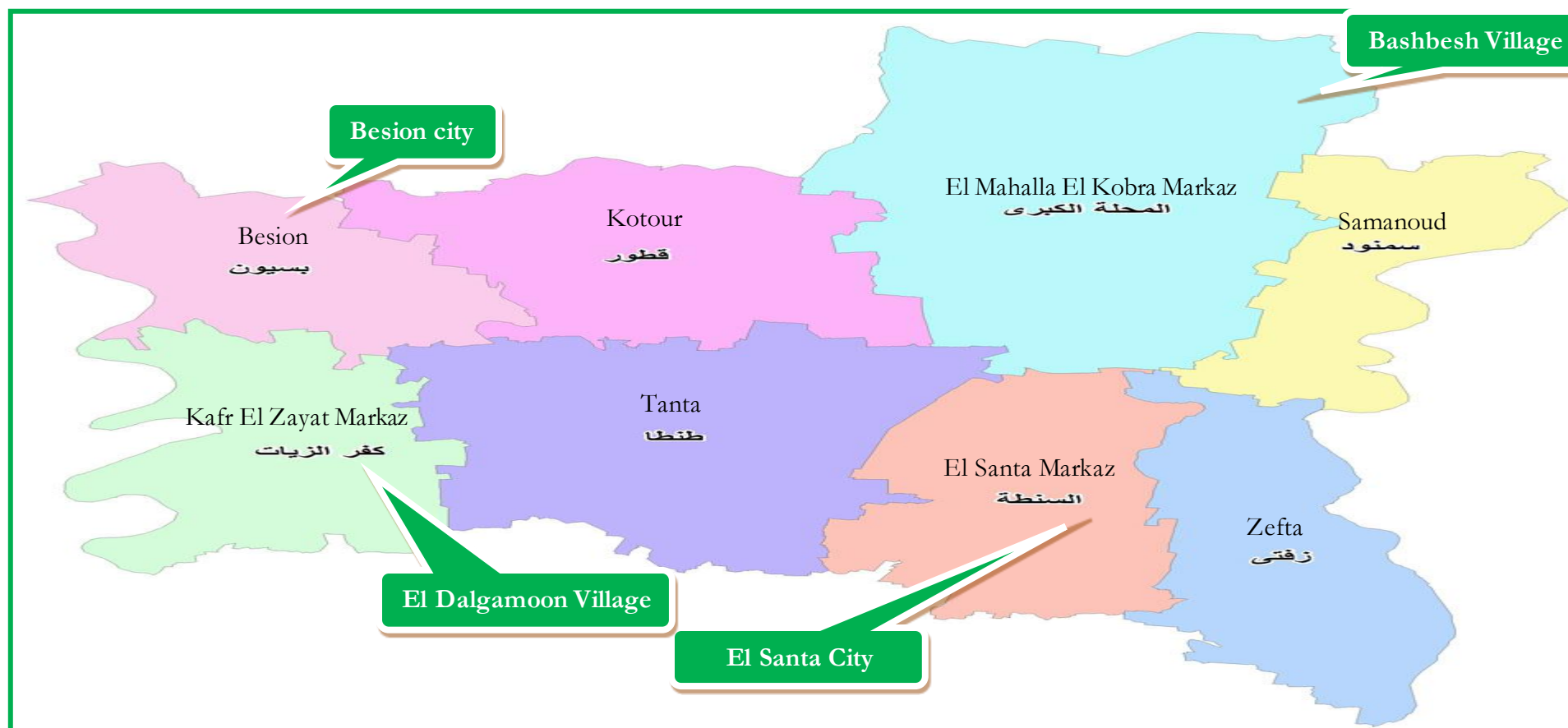


Figure 4-1: Distribution of cities in Gharbya governorate and proposed gas connections districts location



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

- **Besion:**

Besion City is located in Besion Markaz about 107 km from Cairo, bordered from north west by San El Hajar Village and from south east by Qaranshu village and from east by Mashsl village and from south west by Al Farastaq village. (Figure 4-2)

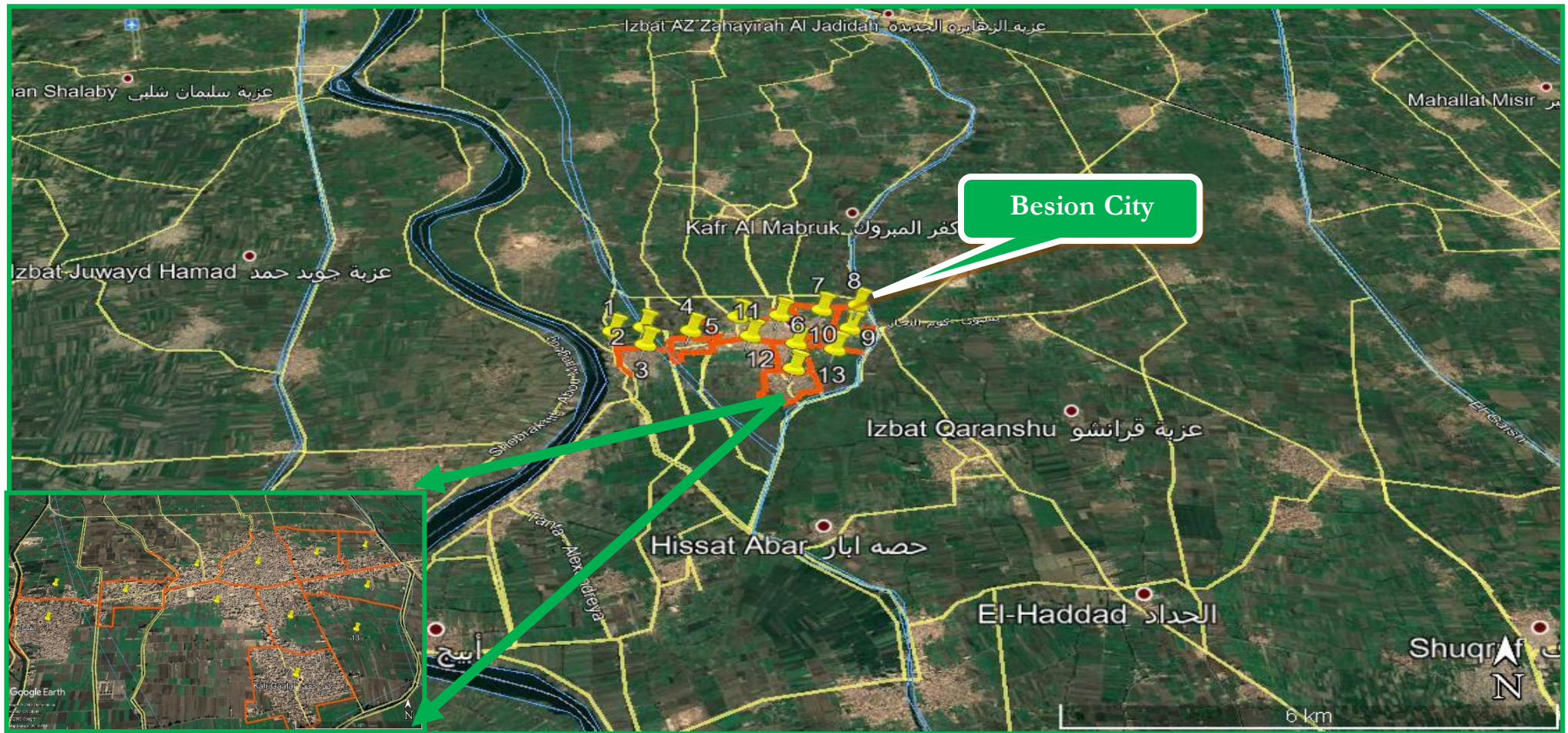


Figure 4-2: Satellite map showing Besion City and surrounding communities



- **El Santa City**

El Santa city located in El Santa Markaz about 77 km from Cairo, bordered from north east by Ezbet Al Minshawi and from south by Abu Al Juhur village and from north east by Shubra Bill village and from west by Mishalah village. (Figure 4-3)

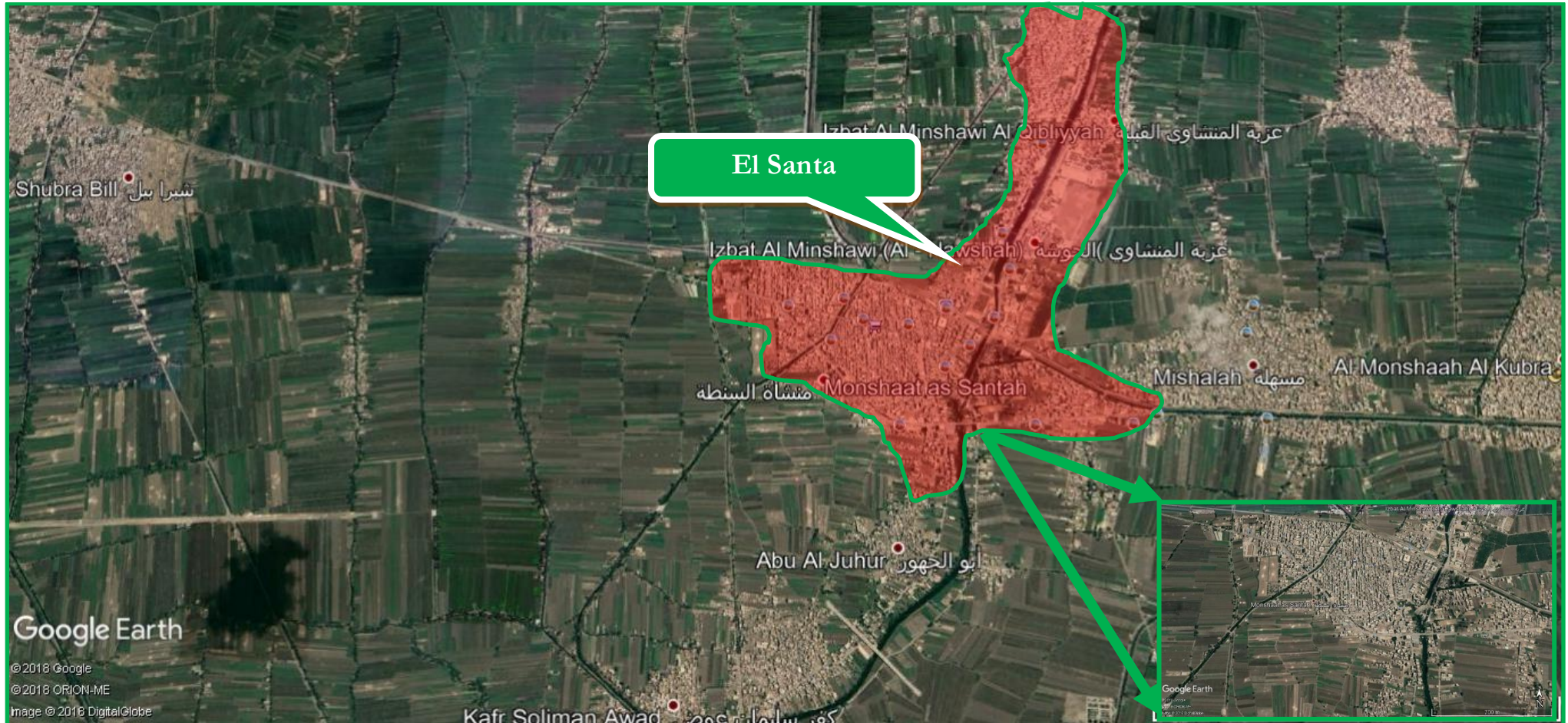


Figure 4-3: Satellite map showing El Santa city and surrounding communities.



▪ Bashbesh

Bashbesh village is located in El Mahalla El Kobra Markaz about 119 km from Cairo, bordered from north by Ezbet Sidi Omar village and from south east by Ezbet Sidi Abd El Maguid village and from north east by Kafr Al Abhar village and from west by Sinabara village. (Figure 4-4)

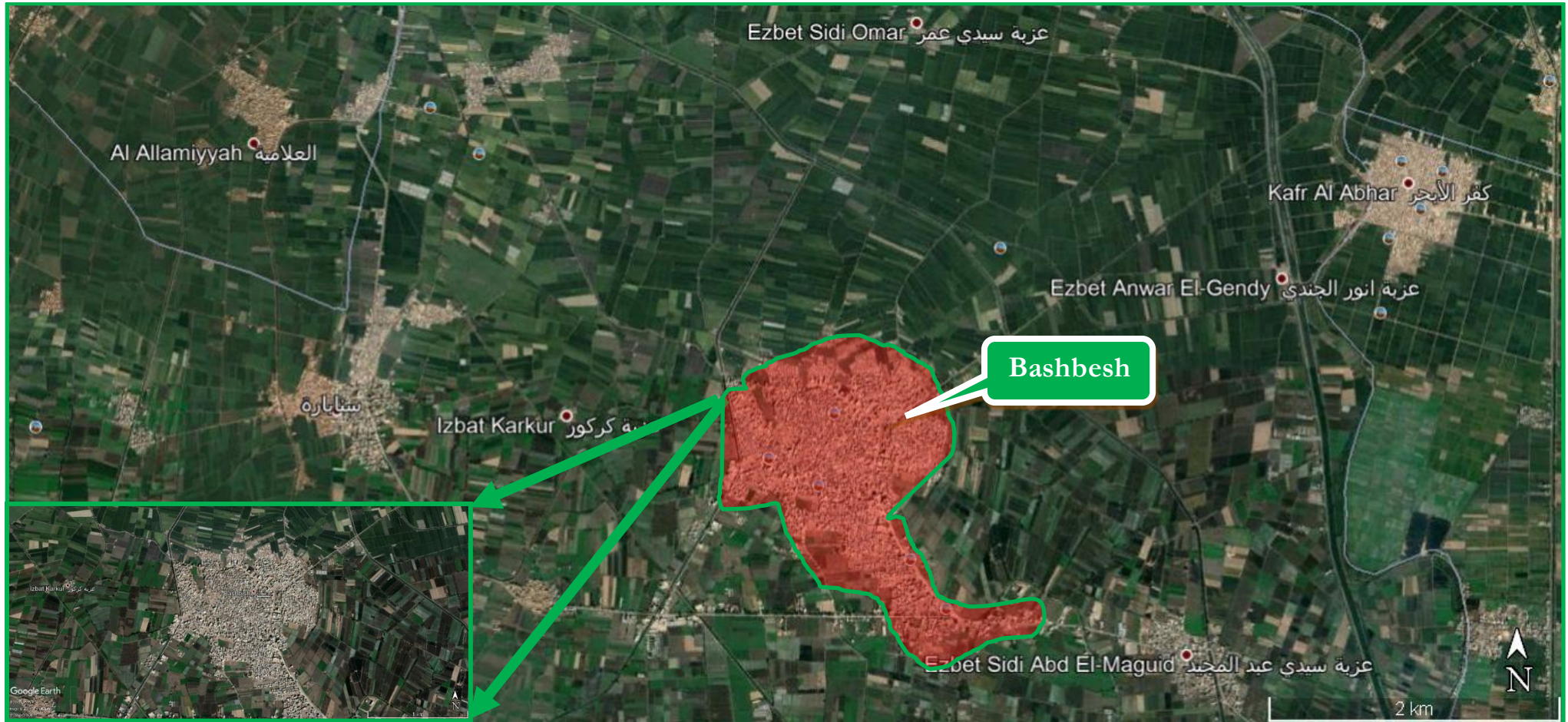


Figure 4-4: Satellite map showing Bashbesh village and surrounding communities



■ **El Dalgamoon:**

El Dalgamoon Village is located in Kafr El Zayat Markaz about 93 km from Cairo, bordered from north west by Kafr El Zayat city and from south by Qasr Nasr Ad Din village and from east by Kafr Dima village and from west by Kafr Mogahed village. (Figure 4-2)

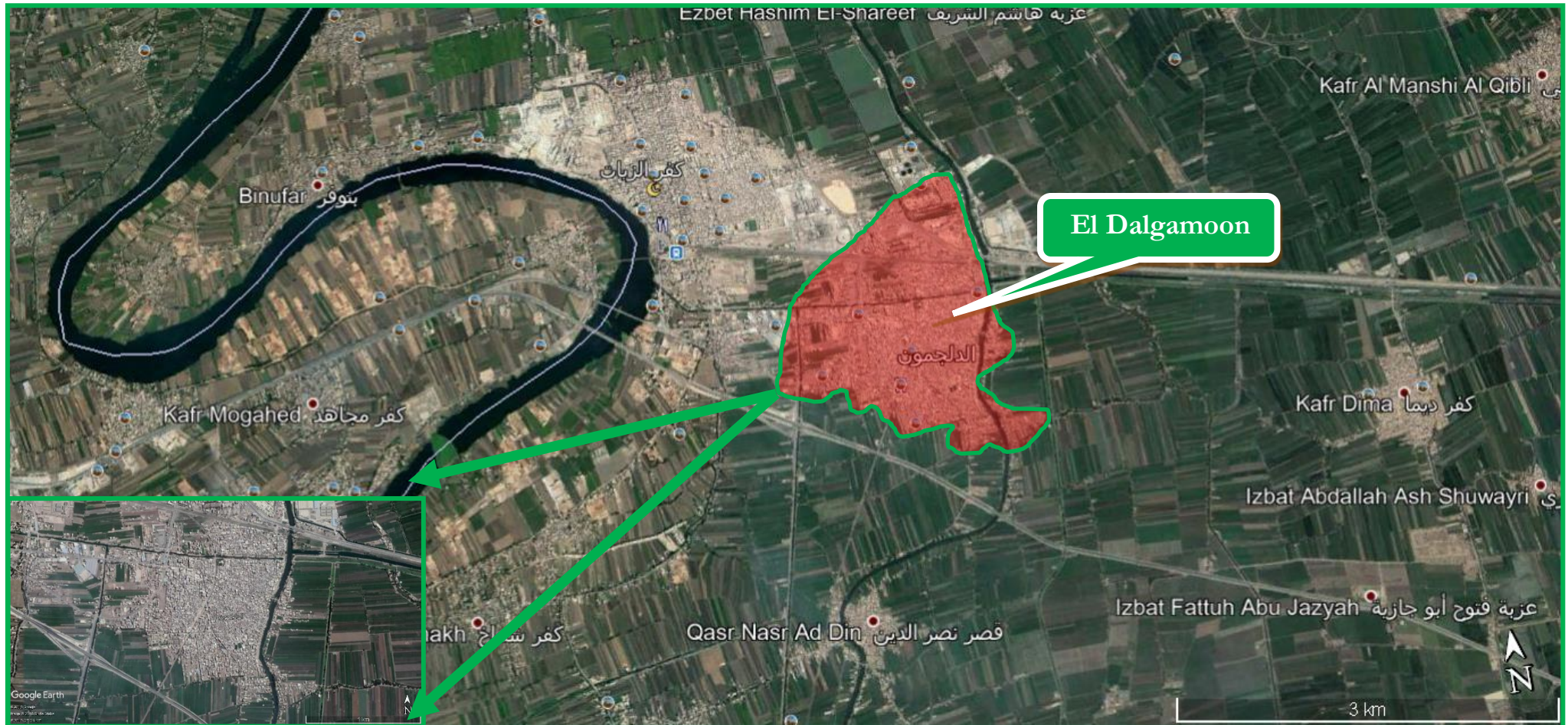


Figure 4-5: Satellite map showing El Dalgamoon Village and surrounding communities

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 with respect to the project plots, prevailing wind direction, site topography and the future layout of the proposed project components. Moreover, the selection is based on the guidelines stated in the American Society for Testing Materials (ASTM) reference method.

According to the study methodology the measurement location was chosen on the basis that it is beside a pediatrician Medical Centre (**Al-Mustakbal pediatrician Medical Centre**) in Besion city and close to the pipeline route. 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 measurements

Area	Latitude	Longitude
Al-Mustakbal pediatrician Medical Centre	30°57'25"N	30°50'44"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 in the studied districts as shown in (Table 4.2) are below national and WB guidelines. Construction engines are certified, i.e., exhaust is below permissible levels. Ambient concentrations of gaseous pollutants, NO_x, SO_x and CO may in some cases surpass permissible levels due to operation of construction equipment. management and mitigation plans for ambient air pollution are further addressed in sections 7.

During the construction phase, excavation and construction activities will likely cause dust levels to surpass permissible levels at the construction districts. 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 plans for dust concentration beyond permissible levels are further addressed in section 7.



Table 4-2: Besion city air Quality Measurements

Time		NO (µg/m³)	NO ₂ (µg /m³)	SO ₂ (µg /m³)	CO (mg/m³)	PM10 (µg /m³)	T.S.P (µg /m³)
8:00 AM		17.9	24.5	12.24	1.8	80.6	170.3
9:00 AM		10.1	26.8	20.04	2.1		
10:00 AM		8.06	29.4	18.5	1.9		
11:00 AM		18.2	22.6	16.3	1.6		
12:00 PM		12.4	25.1	16.44	1.7		
1:00 PM		20.6	23.3	17.8	2.2		
2:00 PM		10.4	28.8	15.7	2.4		
3:00 PM		13.6	25.11	18.2	1.9		
4:00 PM		11.1	23.9	14.86	1.8		
Limits	National	-	300/h	300/h	30/h	150/24h	230/24h
	WB	-	200/h	500/10min	-	50/24h	-

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 in the same location of the ambient air quality measurements (Table 4-1).

Table 4-3: Besion city Noise Measurements

Time	Sound Level Equivalent & Percentile Recordings in dBA for 8 Hours					Permissible Limits	
						LAeq (dBA)	
	LAeq	LA10	LA50	LA90	LA95	National	International
From 8:00 AM to 16:00 PM	53.2	54.2	50.6	40.6	39.96	60	70

Methodology, instrumentation, and results of Noise measurements were shown in Table (4-3) and are detailed in Annex-5.

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 plans 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 all are located within the same governorate which reflects regional identity. The average annual temperature is 20.3 °C to 26.6 °C in the four project districts.



4.1.4 Water resources

4.1.4.1 Surface water

The surface water resources of Gharbya Governorate are limited to the Nile River Branches (Rosetta and Damietta) where it supplies about 2.61 billion cubic liters annually (94% for agriculture and the rest for industrial and domestic uses.

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

4.1.4.2 Subsurface water

subsurface water in Gharbya located at depths ranging from 3.4 to 4.2 meters it is constantly renewable by the Nile River and irrigation water. It is used for irrigation, the amount of water consumed annually is 111.12 million cubic meters. **During the project construction activities, the excavation depth does not exceed 1 meter, therefore Subsurface is unlikely to be encountered**

4.1.4.3 Groundwater

The groundwater aquifers in Gharbya Governorate is the Nile delta aquifer. **During the project construction activities, the excavation depth does not exceed 1 meter, therefore groundwater is unlikely to be encountered.**

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 Al Gharbya Governorate is delegated to Cleansing and Beatification Agency managed by Presidency of the City Council.

Solid wastes will be transferred by local units Trucks to intermediate waste handling areas then to be transferred by larger trucks to the main Kafr Dawood in Sadat city dumpsite as follows:



Figure 4-6: Shows Mashal intermediate waste handling area at Besion Markaz

Liquid Waste:

The project districts are well covered by public sanitation network which take all the municipal sewage to be treated in 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 are no hazardous wastes site within Gharbya district, any hazardous Waste generated within the project will be Temporarily stored in isolated area (in the generated site) and will be transported- by licensed hazardous waste handling vehicles and personnel for final disposal at a licensed hazardous waste facility (Nassreya or UNICO in Alexandria).

4.1.7 Roads and traffic:

The traffic in Besion city is relatively of moderate 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 Besion city including private cars, minibuses, (Tuk Tuk). Main streets were defined in this study. They were 23rd July St., Dafra – Hwen road and Besion – El Shen road. The traffic is relatively of high density in 23rd July St. particularly, as of its commercial nature and moderate in rest of main streets.



Figure 4-7: Shows Traffic in Besion city



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. The project will be implemented in four districts at Al Gharbya Governorate. According to the sites visits and data provided by the LDC, all project districts (semi urban) in Al Gharbya Governorate are homogeneous in geographical, environmental and social features.

4.2.1 Administrative Division

The project will be implemented in four districts in Al Gharbya Governorate. Al Gharbya Governorate is located in the north of Cairo, south of Kafr El Sheikh Governorate, and north of Monofeya Governorate. Its capital is Tanta City, which is 90 km north of Cairo, and 120 km south east of Alexandria. The largest city in Al Gharbya is El Mahalla El Kobra. The total area of Al Gharbya governorate is 1942 km². The project districts are located in four districts as following:

- Besion city which is administratively affiliated to Markaz and City of Besion
- El Santa City which is administratively affiliated to Markaz and City of El Santa
- Bashbish district, which is administratively affiliated to Mahala El Kobra City.
- El Dalgamoon village, which is administratively affiliated to Kafr el-Zayat City.

4.2.2 Urbanization trends

According to the frequent site visits to Besion city and the field observations, Besion is classified as semi-urban residential district. Most of the buildings (90%) are constructed of concrete and red bricks. About 10% is rural houses, huts or other types of structures (i.e. graveyard) which are illegal buildings and cannot be connected by NG. Almost all of the samples surveyed live in urban houses (apartments). The conditions and characteristics of urban houses are in compliance with the bases and preconditions for connecting NG. The majority of buildings at Besion are ranged between 5 to 8 stories high. The LGU has reported that, it is not allowed to build any rural buildings or building without obtaining the necessary approvals. So, all buildings and neighborhoods are mostly legal. The LGU representatives reported that the well control system and applying the immediate punishments on the illegal buildings, help so much to control the buildings construction especially on the agriculture lands.



Figure 4-8: Building Condition in Besion city.

Regarding the condition of the streets in Besion city, the average width of main streets range between (2 to 3) lanes wide, and side streets range between (1 to 2) lanes wide. The main streets are in good conditions and mostly paved out and well asphalted, while the side streets are paved out but not asphalted. As a conclusion of the research team, the streets conditions are convenient for NG installations. According to the LGU, the Governorate is giving high priority on infrastructure upgrade in Besion.



Figure 4-9: Streets Condition in Besion city.

4.2.3 Demographic characteristics

4.2.3.1 Total population

Total population and number of households, within the four project districts are presented on the following table:

Table 4-4: Distribution of population in project districts

City	<u>Population</u>			No. of Households	Average Family size	Potential NG Clients (No. of Households)
	Male	Female	Total			
Besion	152,223	144,132	296,355	80,247	3.7	12,000
Bashbesh	18,039	18,204	36,243	9,027	4	5,000
El Santa	246,051	234,837	480,888	118,624	4.1	6,000
El Dalgamoon	22,283	21,984	44,267	12,292	3.6	9,000

Source: CPMAS, 2017 Data & LDC



4.2.3.2 **Rate of natural increase**

The birth rate in Al Gharbya Governorate is 29.2 births per 1000 persons. The adult mortality rate is 6.7 per 1000 people. That gives a natural increase rate of 22.5 per 1000 persons in Al Gharbya Governorate which is nearly the same at the project districts.

4.2.3.3 **Household size**

The average household size in Gharbya Governorate is about 4persons which is similar to the average at the four project districts, except in both El Dalgamoon and Besion which is lower than the Governorate level, (3.6, 3.7 persons respectively) as shown in the above table.

4.2.4 **Access to basic services**

Access to basic services, water supply, sanitation and electricity is one of the main technical criteria to connect natural gas to any new districts for the safety reason. 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. According to data received from LGU and the in-depth discussion with the governmental official representatives, nearly 100% of the licensed households in Besion city have access to the basic services. Thus, it will be possible to install the NG to the project districts.

The following table contains the percentage of individuals who have access to basic services in the project districts according to the CAPMAS data, 2017.

Table 4-5: Percentage of individuals' access to basic services in the project districts

City	% of individuals having public water network	% of individuals using electricity for lighting	% of individuals having public sanitation network
Besion city	100%	100%	100%
Bashbesh	99.2%	99.9%	89%
El Santa	96.1%	99.7%	44%
El Dalgamoon	99.7%	100%	92%

Source: CAPMAS data 2017.

4.2.5 **Human development profile**

Educational and work status, poverty index, income and expenditure should be highlighted in order to determine the current socioeconomic conditions of the target districts at Al Gharbya Governorate.



4.2.5.1 Education

Education is perceived as the first shell that can help population to withstand poverty. The review of secondary data, and the focus group discussions showed that the intermediate education is prevalent among all project districts. They also revealed that, the schools are available there. The community level of education should be taken into consideration for any awareness activities and information sharing.

Table 4-6: Distribution of the project districts' population by educational status

City/village	Percent Illiterate	Percent Illiterate among females	Percent with University Education	Percent Intermediate Education
Besion	26%	32%	10%	34%
Bashbesh	25%	29%	9.3%	36%
El Santa	19%	24.6%	12%	37.6%
Dalgamoon	20%	25%	16%	36%

Source: CAPMAS data, 2017

4.2.5.2 Health Facilities

Provision of health facility is essential as one of major factors to achieve proper working conditions. Given the importance of provision of health services to the workers, the study team managed to define various health facilities available to be used by workers. According to data collected from Besion LGU, there is a public hospital and a hospital for fevers diseases in Besion city, there are also four medical units and one center for chest diseases. Providing health facilities is very important to safe workers during accident and emergency cases. According to the published data on Al Gharbya Governorate web page, the health facilities are provided at others project districts.

4.2.5.3 Poverty index

The standard of living is considered as one of the main challenges to expand the natural gas use in different districts, especially that the cost of natural gas connection is not cheap. According to the latest Poverty Mapping developed by CAPMAS in 2013, the percentage of poor people in the project districts is limited, as shown in the following table. So, the majority of households in the project districts are not below the poverty line. However most of the consulted groups in the project districts expressed their willingness to be connected to the NG and that they prefer to pay NG installation costs in installments.

Table 4-7: Poverty indicators

	Besion	Bashbesh	El Santa	Dalgamoon
Percentage of poor people	15%	15.2 %	10 %	16.3 %
Per capita consumption (EGP /year)	1553	1523	1761	1674

Source: CAPMAS Poverty Mapping data 2013



4.2.5.4 Income and expenditure

According to the frequent field visits to Besion city, and data collected, the average monthly income for each household is estimated to be between 2500 - 3500 EGP. This indicates that the majority of households enjoys a middle level of income, and can afford to pay NG installation costs. 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 especially after increasing the installation fee. Participants of the focus groups asked for a clear system of monthly payment to settle the installation fee within a period between one to five years. Participants of focus group discussions stated that they can pay around (30 to 100 EGP) per month to settle the installation fee.

4.2.5.5 Human activities in the project districts

According to the data collected from the (LGU) in Besion, about 70% of the total labor force is working at agriculture activities, 7% is working at furniture industry, and 5% working at food and chemical industries. Some other activities such as handicraft workshops, drivers and governmental employees, etc. are attracting a small percentage of the labor force.

4.2.5.6 Unemployment and work status

With regards to the frequent site visits and the focus group discussions, the unemployment rate is varying from one district to another, this rate in Besion is about 13% comparing to about 16% at the Governorate level.

The percentage of unemployment among females is relatively high (34%) comparing to the Governorate level. Also, the formal Statistics obtained from the CAPMAS Poverty Mapping Data 2013, regarding manpower 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, there is a big number of underage laborers were noticed. As a conclusion, there is a high risk that the contractors might employ young people below 18 years old.

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



4.2.6 Fuel currently used in households

According to the focus groups discussion, and the samples surveyed in the project district, the majority of people reported that, the main type of fuel used for cooking is the LPG cylinders. in Besion, there are 21 main LPG outlets with a capacity of 115000 cylinders/ month. The LPG vendors (Sareha) play an important role as the second source of LPG supply and prices. Currently, the price of LPG cylinder ranges between 55 to 65 EGP, and the average consumption of LPG cylinders for cooking per household is ranges between 1 to 2 cylinders monthly and this rate increase to about 3 cylinders in winter due to the water heating Also a few percentages of the samples surveyed rely upon electricity for water heating.

4.2.7 Problems faced with the current household fuel

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

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

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

4.2.8 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.

It is obvious that the majority of the samples surveyed in the project district have positive perceptions about NG connections project. They reported that NG has many benefits:

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



4.2.9 Gender dimension of the current type of fuel

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 and money.

4.2.10 Willingness and affordability to pay

Residential gas connection installation costs are around 7000 EGP. Customers pay around (2300 to 2650 EGP while the Government pays around 4350 EGP as a subsidy for each client) of that cost in cash. Based on the focus group discussions, each household consumes between (1 – 3) LPG cylinders monthly, indicating that each household will pay up to 195 EGP per month according to the average price of LPG cylinder (50-65 EGP). So connected NG to the households will save community people money and effort if we take into consideration the average monthly consumption cost of NG (which is nearly 1/3 of LPG cost)

Participants of the FGD were asked about their opinion of the NG Installation fee. They stated that the installation fee which goes around (2300 to 2650 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 of focus group discussions stated that they can pay around (30 to 150 EGP) per month to settle the Installation fee.

The community socioeconomic characteristics and the willingness of people to convert from LPG cylinders to household NG are remarkable. Community members are much in favor of the project. However, there is a need to provide clear information about the project in order to guarantee full support to the project. The majority of the samples cannot pay NG installation costs in one installment, they strongly recommended to have payment plan and All NGOs interviewed expressed their willingness to act as communication channels with poor but no one of them will provide financial aid to the poor. However, the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG. The grant (1500 EGP) will cover more than 50% of the NG instillation cost according to eligibility criteria. This eligibility criteria 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 a period of 12 months. The average monthly electricity consumption is highly correlated to the poverty level of households. Consumers have to 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 a number of entities; namely EGAS and LDCs under the Ministry of Petroleum, Ministry of Social Solidarity as well as Ministry of Electricity and Renewable Energy.

Based on the current approved eligibility criteria, it is expected that the grant would support in covering the expenses to connect to natural gas to a targeted 500,000 deprived households by the



end of October 2019. It was agreed to increase the unit subsidy amount from EGP 800 to EGP 1,500. Egypt Gas has disclosed all information about the grant in October 2017.

Moreover, the Ministry of Petroleum has adopted a new 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).

4.2.11 Physical cultural resources

Low pressure Natural Gas installation pipework shall only take place in the semi-urbanized areas in the project districts which are already excavated beforehand in order 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 those semi-urban areas that would be affected by the NG pipework.

In case of any unanticipated archeological discoveries within the project districts; the [Annex-6](#), entitled 'Chance Find Procedure,' details the set of measures and procedures to be followed in such 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 respective importance of impact values.

Table 5-1 Impact Assessment Methodology

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

Detailed impact assessments results are presented in two tables in [Annex-7](#).

5.2 Impacts during Construction

5.2.1 Positive impacts

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

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

- According to information gained from Egypt Gas, the daily average number of workers during the peak time will be about 60 -70 excavation workers, 2 engineers and 18 technicians.
- In order to maximize employment opportunities in the local communities it is anticipated that on the job capacity building activities will be required for currently unskilled workers. On-the-job training will also supplement opportunities for the local workforce for both temporary construction roles and for long-term operation phase positions, where these are available.



5.2.1.2 **Create indirect opportunities**

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

5.2.2 **Negative Impacts**

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

5.3 **Impacts during Operation**

5.3.1 **Positive impacts**

- On a national level, reduced expenditure on imported LPG cylinders and subsidies
- The NG connection will help the household achieve a higher level of privacy by eliminating the need for informal LPG distributors from entering private homes. Constantly available and reliable fuel for home use
- The NG project is expected to be of special and major benefits to women.
- The NG connection will achieve the safety factor, as the LPG vendors will not enter the households in order to change the LPG
- Constantly available and reliable fuel for home use
- Reduced expenditure on LPG importation and subsidies.
- Significantly lower probability gas leakage and fire risk compared to LPG
- Improved safety due to low pressure (20 mBar) compared to cylinders
- Beneficiaries to benefit from good customer service and emergency response by qualified personnel/technicians.
- Elimination of insects and dirt typically associated with LPG cylinders
- Limiting the LPG cylinder “black market” due to lower demand
- Eliminate the hardships that special groups like physically challenged, women, and the elderly had to face in handling LPG
- Limiting possible child labor in LPG cylinder distribution



5.3.2 Negative impacts

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

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



Table 5-2 Impact Assessment

Detailed impact assessments results are presented in two tables in [Annex-7](#).

Impact	Description	Type	Significance
During Construction			
Air emissions	<p>Air emissions (gases and particulates) during construction can exceed permissible limits and shall arise from:</p> <ul style="list-style-type: none"> - Particulate matter and suspended solids from excavation/backfilling operations - Possible dispersion from stockpiles of waste or sand used for filling trenches. - Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO_x, NO_x, CO, VOCs, etc. - Traffic congestions resulting from road closure or slowing down of traffic due to excavation works. - Dust: The impact of dust generation (particulate matter) will be limited to the working hours as excavation and backfilling are carried out within the same day. - Excavation on dusty or rocky roads such as local roads and some urban roads are likely to generate more dust compared to asphalted streets due to the dusty status of those roads. 	Negative	Medium
Noise	Construction activities of the gas distribution network will likely increase noise levels beyond permissible limits due to excavation and heavy machinery. Typical construction noise includes noise intensity due to engine operation, and intermittent impacts which may take place during demolition of asphalt by jack hammers.	Negative	Minor
Deterioration of soil quality	Degradation of soil quality, Excavation and movement of heavy machinery on unpaved surface soils during site preparation and foundation-laying could cause a physical breakdown of soil particles potentially causing destabilization of the soil structure.	Negative	Medium
Water Pollution	No crossings of surface waters are expected. However, uncontrolled dumping of waste in canals can result in water pollution.	Negative	Minor



Impact	Description	Type	Significance
Waste generation	<p>Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination.</p> <p>Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. These wastes should be disposed in licensed sites by the local authority, which minimizes any aesthetic effects of such waste.</p> <p>Poor handling of Hazardous and non-hazardous materials may result in poor containment of induced leaks.</p> <p>Empty containers of chemicals, lubricating oils from fueling/lubricating activities, and paint are considered hazardous waste.</p> <p>It is highly unlikely that groundwater may be encountered at the routes of the pressure distribution networks as these have been previously excavated with no record of groundwater.</p> <p>In the unlikely case that subsurface water is encountered during excavation, improper drainage of dewatering water may result in forming stagnant water ponds around the construction site, which can develop, if not drained, infiltrated or evaporated, to form nuisance and an environment for breeding of insects. Normally dewatered product is relatively clean water, which should be drained to the sewer system. To conserve water, if dewatered subsurface water is free of perceivable pollution, it will be to the extent possible- used on- or around the work site or discharged into the nearest canal to be used for irrigation. When dewatering is performed from a contaminated trench or near a source of pollution seepage to subsurface water, contaminated water is collected for certified treatment/disposal according to WB/IFC guidelines and National Laws 93/1962 and 48/1982, respectively.</p>	Negative	Medium
Reduction of Traffic Flow	<ul style="list-style-type: none"> - Traffic congestion and loss of access due to establishing temporary workshops and storage areas, excavation and installation works will be varying from village to another according to the population and the services within each village. - Reduction of Traffic Flow Mobilization of heavy machinery, asphalt breaking, excavation, placement of piping, and backfill activities are bound to limit traffic and accessibility during construction. This may entail narrowing major roads by longitudinal and/or lateral excavation or totally blocking narrow or side roads. - In addition to reducing the lanes/space available for traffic, impacts May also entail limiting or prohibition of parking along the length of the works. 	Negative	Medium
Risks on Occupational health and safety	<ul style="list-style-type: none"> - General risks associated with construction sites and anticipated include slips and falls; moving lorries and machinery; exposure to chemicals and other hazardous materials; exposure to electric shock and burns, exposure to high noise intensity levels. - Noise impacts on construction workers, technicians and engineers in direct vicinity of the excavation works and heavy machinery are considered more significant than those on residents. Traffic congestions, which could be caused by excavation works, may increase ambient average noise intensity levels. 	Negative	Medium



Impact	Description	Type	Significance
Risk on Infrastructure and underground utilities	<ul style="list-style-type: none"> - Underground utilities and infrastructure pipelines (such as water, sewerage and telecommunication) have been installed years ago without accurate documentation and maps for its routes and depths. Therefore, the risk of damage to such utilities during excavations for natural gas pipeline installation is possible. - The most significant potential environmental impact will arise in case a sewerage pipe is broken and wastewater potentially accumulating in the trench. There is also the possibility of overflowing to the streets causing nuisance to the surrounding environment. - Breaking a water supply pipe may result in cutting the supply to a number of residential units, which may lead residents to use other sources of water which may be either expensive or unsafe. - Damaging sanitary pipelines, electricity and water supply result in severe disturbance to community people. Yet such problem takes short time (no more than 4-8 days). Additionally, the contractor will be responsible of compensating for damaged pipes. 	Negative	Minor
Risk on Community health and safety	<p>The excavation works and establishing temporary workshops and storages areas within the project districts will affect the community health and safety by the following means:</p> <ul style="list-style-type: none"> - 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 local community (e.g., in front of building and shops.) The presence of open trenches can pose risks of accidental falls and injuries. Trenches are expected to be open during the workday, with no trenches being left open after working hours. - Installation of household connections may involve working at height, which can result in falling objects causing health and safety hazards to local community. - Construction works will involve the use of equipment such as jackhammers and welding machines, which can cause injuries to local community as a consequence of contact. - Congestion and traffic disturbance for pedestrians, cars as well as the livelihoods of taxi, TukTuk and microbus drivers, Thus, clear traffic diversion plan should be settled. - 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 shopkeeper's 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. 	Negative	Medium



Impact	Description	Type	Significance
Risk of Temporary Labor Influx	The contractors or subcontractors may rely on using a number of workers from other governorates during the excavation and installation works. 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 privacy and health and safety)	Negative	Medium
Risk of Child labor	As mentioned in the baseline, child labor is a common practice in the project communities in Besion, El Santa, Bashbesh and El Dalgamoon districts. Children below 18 years-old work almost in all projects as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project.	Negative	Low - Medium
Street Condition Deterioration	Streets rehabilitation or restoration following pipeline network installation: is referred to by an Egyptian legal/institutional expression (رد الشيء لأصله) that signifies the responsibility to “restore to original condition”. In the context of the project, it applies to the responsibility of the implementing company to provide the necessary resources to re-pave roads and streets to the original state after natural gas excavation and installation works. The current arrangement is that the implementing entity performs the backfilling of the excavated trenches and agrees a restoration fee with the local government unit (district) to cover the balance of the restoration and pavement cost. The local unit uses the fee to include the restoration and re-pavement of the streets in its “pavements plan”.	Negative	Minor
	Delays in street restoration may lead to varying degrees of damage to vehicles, loss of access and business, traffic congestions with associated delays and emissions, and a potentially significant public discontentment.	Negative	Minor
Impacts Related to Land	The project will need plots of lands for the workshops and temporary storage areas. Egypt Gas will establish the workshops and temporary storage areas 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 in to use the lands for storage purpose 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 piling of sands and moving of vehicles in various construction sites. Moreover, the temporary storage areas will be used to store pipes, painting materials and safety equipment. That may have impact on visual resources and landscaping.	Negative	Minor



Impact	Description	Type	Significance
Operation			
Risk on Community health and safety	<ul style="list-style-type: none"> - In addition to a full array of safety and emergency precautions taken by EGAS and Egypt 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	<ul style="list-style-type: none"> - For those who will pay in installments, this may be an added financial burden on the poor families. Also, there could be a Minor negative economic impact on LPG cylinders distributors. (Governmental sector- private sector who have license to distribute LPG cylinders- non-official distributors). The LPG distributors will lose their income. However, their ability to move to other areas or change their business is high. Various previous NG projects have not influenced the informal LPG vendors. 	Negative	Minor

6. Analysis of Alternatives

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

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

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

6.1.1 Trenchless Technologies

HDD is anticipated in crossing of one railway along Besion city **intermediate pipeline route**⁷. HDD⁸ has some advantages compared to auger boring and open-cut technique as follows:

- Compared to the open-cut technology, it doesn't cause interruption to traffic flow.
- Compared to the open-cut technology, it causes fewer disturbances to the surface and sub-surface soil layers.
- Compared to the auger boring technology, it can be used for larger distances and wider range of pipeline diameters.
- Compared to the auger boring technology, it is a surface-launched process which doesn't require drive pits.

⁷ See figure number 2-4

⁸ See figure number 2-5



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



7. Environmental and Social Management & Monitoring Plan

7.1 Objectives of the ESM&MP

The objective of the Environmental and Social Management and Monitoring Plan (ESMMP), is to outline actions for minimizing or eliminating potential negative impacts and for monitoring the application and performance of mitigation measures. The ESMMP identifies roles and responsibilities for different stakeholders for implementation and monitoring of mitigations as well as some estimate costs for these mitigations. This section also presents an assessment of the institutional capacity and institutional responsibilities for implementing the ESMMP. Wherever applicable, the ESMMP is designed to accommodate alternative context-specific mitigations and monitoring measures.

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

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

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

EGAS and the LDCs aim to be recognized as a responsible operator 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). As the World Bank's governance and anticorruption (GAC) agenda moves forward, grievance redress mechanisms (GRMs) are likely to play an increasingly prominent role in Bank-supported projects.

Egypt Gas as the responsible LDC for the project and its sub- contractors are committed to organize grievance mechanism to avoid any adverse impacts may cause delay for its implementation plan. 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 availed in the customer services office. Thus, sufficient and appropriate information about the GRM will be disseminated to the communities prior to 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.

The following section illustrates the grievance mechanism:

**7.2.1.1 GRM objectives:**

The objective of a grievance procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner. The effective grievance management can help to:

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

7.2.1.2 Complaints 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 petitioners concerns and complaints. The following are the main channels through which grievances could be received:

- ✓ Project site engineer.
- ✓ Egypt Gas customer services' offices.
- ✓ Hot line 129 available for 24 hours
- ✓ The SDO within the LDC and EGAS
- ✓ Email. info@*Egypt Gas*.com.eg
- ✓ Ministry of Petroleum.
- ✓ Governmental complaint gate.

Also, complaints and comments can be made by post, fax, on the telephone or in person.

7.2.1.3 Grievance Tiers and Time Interval

The following is the different tiers of grievances mechanism:

- **First Tier:** The foremen (site engineer) who are working on the ground in the project districts in Gharbya Governorate. The turnaround time for the response/resolution should be 10 business days and the complainant should know that he/she should receive response by then.
- **Second Tier:** Egypt Gas head quarter of in Cairo (SDOs) the turnaround time for the response/resolution should be 10 business days.
- **Third Tier:** EGAS Social Officer (SDOs). The turnaround time for the response/resolution should be 10 business days.
- The aggrieved person has the full right to immediately use second tier or third tier upon his convenience. Additionally, he can resort to any other governmental entities i.e. Ministry



of Petroleum. He/ She also have the full right to bring a lawsuit without resorting to any of the grievance's tiers.

7.2.1.4 Response to grievances:

All comments and complaints will be responded to either verbally or in writing, in accordance to preferred method of communication specified by the complainant. Comments will be reviewed and taken into account in the project preparation.

7.2.1.5 Registration of GRM:

After receiving the comments and complaints it will be summarized and listed in a Complaints/Comments Log Book, containing the name/group of commenter/complainant, date the comment was received, brief description of issues, information on proposed corrective actions to be implemented (if appropriate) and the date of response sent to the commenter/complainant. The acknowledgement of grievances will be within 3 business days and the response will be between 10 - 30 business days (depending on the nature of grievance). The project management will keep a grievance log and report on grievance management, as part of annual project progress reports, which will be available on the LDC and EGAS.

7.2.1.6 Confidentiality:

- Individuals who submit their comments or grievances have the right to request that their name be kept confidential, though this may mean that the LDC is unable to provide feedback on how the grievance is to be addressed. However, an anonymous complaint can receive a code and should be investigated appropriately and treated courteously. The correction action should be published on the LDC website. Disclosure of information about GRM should inform the stakeholders about their rights and the confidentiality of data they may submit.

7.2.1.7 Management of GRM:

- During construction and operation phases, the LDC and the construction contractor will manage grievances in relation to construction activities. The LDC will provide contact information to project districts.
- A separate grievance mechanism is available in the same manner for workers, including employees of both the LDC-employed and contractors.



7.2.1.8 Monitoring of Grievances:

All grievances activities should be monitored in order to verify the process. The monitoring process should be implemented on the level of EGAS and the LDC (both in the site and in the headquarter).

7.2.1.9 Institutional Responsibility for the Grievances

The entity responsible for handling grievances will mainly be the Environmental Affair Department within the implementing agency (Egypt GAS). The Social Development Officers (SDOs) working within Egypt Gas in cooperation with the EGAS (SDOs) will address all grievances raised by community members.

(For more information about GRM and Egypt Gas complaint form, please see [Annex-8](#))



7.3 Environmental and Social Management Matrix during CONSTRUCTION

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

Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Local traffic and accessibility	Traffic congestion (and associated noise/air emissions)	Excavation during off-peak periods Time limited excavation permits granted by local unit & traffic department	Minor	Excavation contractors	<ul style="list-style-type: none"> – LDC HSE+ – Traffic department 	Contractor has valid conditional permit + Field supervision	Contractor costs LDC management costs
		Announcements + Signage indicating location/duration of works prior to commencement of work	Minor	<ul style="list-style-type: none"> – LDC – Excavation contractors 	<ul style="list-style-type: none"> – LDC HSE – Local Unit – Traffic Dept.. 	Ensure inclusion in contract + Field supervision	
		<ul style="list-style-type: none"> -Establishing temporary workshops and storage areas in a 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. 	Minor	<ul style="list-style-type: none"> – LDC – Excavation contractors 	<ul style="list-style-type: none"> – LDC HSE – Local Unit – Traffic Dept.. 	Field supervision Conditional permit 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	Traffic Department	Field supervision for detouring efficiency Complaints received from traffic department	Additional budget not required



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		Road restructuring and closing of lanes	Minor			Fluidity of traffic flow	
Ambient air quality	Increased emissions of dust and gaseous pollutants	Controlled wetting and compaction of excavation/backfilling surrounding area	Minor	Excavation Contractor	LDC HSE	Contractual clauses + Field supervision	<ul style="list-style-type: none"> Contractor costs LDC management costs
		<ul style="list-style-type: none"> Excavated soil stockpiles and stored sand (if any) should be located in sheltered areas. Stored fine sand should be covered with 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. 	Minor			Contractual clauses + Field supervision	
		Compliance to legal limits of air emissions from all relevant equipment	Minor			Measure & document emissions of machinery by regular audits request emission measurements	



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> Availability of 24-7 hotline service (129) to all beneficiaries and the public for reporting possible leaks, damages or emergencies Quick response to gas leaks by evacuation of the affected area Repair or replacement of failed component 	Minor	LDC HSE	LDC HSE	Field Supervision	
Ambient noise levels	Increased noise levels beyond WB/National permissible levels	<ul style="list-style-type: none"> Ear muffs, ear plugs, certified noise PPE for workers Noise exposure periods should be minimized for workers so as not to exceed the safe limits mentioned in the environmental laws in addition to the occupational health and safety standards. . Workers operating in areas or activities of high noise level intensities should be supplied with earmuffs Contractors should train all the workers before the commencement of construction activities about this hazard and how to avoid it. Restrictions on lorry movements to prevent noise nuisance in the early morning/late evening All machine and vehicles should be shut-off when not used. 	Negligible	<ul style="list-style-type: none"> LDC HSE Excavation Contractor 	LDC HSE	Contractual clauses + Field supervision (audits)	<ul style="list-style-type: none"> Contractor costs LDC management costs
Local community Workers		<ul style="list-style-type: none"> Avoid noisy works at night whenever possible Avoid construction activities during peak hours of heavy traffic whenever possible; especially when project site is in proximity of a sensitive receptor. 	Negligible			Field supervision Complaints receipt from local administration	



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		If maps/ data are unavailable: Perform limited trial pits or boreholes to explore and identify underground utility lines using non-intrusive equipment	Negligible		LDC HSE Supervisor	– Contractual clauses + Field supervision	
		LDCs follow established procedures to deal with emergency situations related to breaking underground utility and infrastructure lines. The company supervisor stops work in the affected area, calls the Police Department and emergency department in the relevant utilities company for immediate repair of the damage, which the contractor is invoiced for. The mitigation measures below focus on preventive measures and documentation. Preparation and analysis of accidental damage reports	Negligible		LDC HSE	– Review periodic HSE reports	
		Repair and rehabilitation of damaged components	Negligible		LDC HSE Local Government Unit Local Police	– Contractual clauses + Field supervision	
Streets (physical status) local community and workers (health and safety)	Hazardous waste accumulation	<ul style="list-style-type: none"> – Temporary storage in areas with impervious floor – Safe handling using PPE and safety precautions – Empty cans of oil-based paint resulting from painting the steel connection pipes to households are to be collected and sent back to nearest LDC depots for temporary 	Minor	<ul style="list-style-type: none"> – LDC – Excavation Contractor 	LDC HSE	Field supervision and review of certified waste handling, transportation, and disposal chain of custody	Indicative cost items included in contractor bid: Chemical analysis of hazardous waste Trucks from licensed handler



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		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) – 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 wastes until collection and shipping to Nassreya /Unico landfill. – Hand-over selected oils and lubricants and their containers to Petrotrade for recycling	Minor				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
		– In case of damaging of asbestos pipes during excavation, the Water Authority, which will carry out the repairs, will be responsible for handling the waste asbestos according to their procedures. – Adequate management of asbestos and any possible hazardous waste		Water Authority + contractor		Field supervision + review of Water Authority manifests	– Contractor costs – LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> Minimize fueling, lubricating and any activity onsite that would entail production of hazardous materials empty containers Pre-Plan the anticipated amounts of hazardous liquid materials (such as paint, oils, lubricants, fuel) to be used in the various activities in order to minimize leftovers and residuals. Preplanning drainage of dewatering water (subsurface water) and taking necessary permits from the Water and Wastewater Company, or irrigation authority. No land disposal should be accepted for the water If dewatering is taking place from a contaminated trench, or contains hydrocarbons that could be observed or smelled, contaminated water should be collected in barrels and transported to a wastewater treatment facility. Testing the subsurface water sample before selecting the appropriate disposal option Asphalt waste may contain hazardous components, such as tar, lubricating oils, heavy metals, etc. However, its solid nature minimizes the transport risk of such components to the environment. Disposal of asphalt waste to the municipal waste disposal site is common practice in Egypt as this is normally not associated with significant environmental risks because of the dry weather nature of the country. 	Minor	<ul style="list-style-type: none"> LDC Excavation Contractor 		Field supervision	



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> – To the extent practical, seek to combine leftovers or residuals of the same liquid material/waste in order to minimize the number of containers containing hazardous residuals – Ensure hazardous liquid material/waste containers are always sealed properly and secured from tipping /falling /damage /direct sunlight during transportation and storage – In case of spillage: <ul style="list-style-type: none"> – avoid inhalation and sources of ignition – cover and mix with sufficient amounts of sand using PPE – collect contaminated sand in clearly marked secure containers/bags – Add sand to inventory of hazardous waste 					
Local community	Non-hazardous waste accumulation	<ul style="list-style-type: none"> – 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 wastes. 	Minor	<ul style="list-style-type: none"> – LDC – Excavation Contractor 	LDC HSE	<ul style="list-style-type: none"> – Contractual clauses – Monitoring of waste management plan – Field supervision 	<ul style="list-style-type: none"> – Contractor costs – LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> 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 					
Local community	Destruction of streets and pavement	<ul style="list-style-type: none"> Arrange Restoration and re-pavement (رد الشيء لأصله) with local unit Communication with local community on excavation and restoration schedules. Standard protocols adhering to national/local administrative requirements are to be followed: Close and early coordination between the LDC (and the excavation contractor, if applicable), the local unit, and any other relevant authorities (in the case of public roads, the Roads and Bridges Directorate may become the counterpart to the LDC) Agreement on the restoration arrangements, schedules, fees, and payment schedules 	Negligible	<ul style="list-style-type: none"> 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	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> – 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. 					
	Affecting children by excavating in the proximity of their schools	<ul style="list-style-type: none"> – 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 engineer in order to be ready for supporting children. – The contractor should secure safe access roads to children. In case of excavating close to the entrance gate, the site workers should be sure that a proper access is installed. – The contractor should ask 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	<ul style="list-style-type: none"> – LDC (HSE+SDO) – Excavation Contractor 	LDC HSE LGU	Field supervision Coordination with LGU as needed	<ul style="list-style-type: none"> – Contractor costs – LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
	Affecting Walking People in the streets or living in narrow or blocked streets might by establishing temporary workshops in their streets.	<ul style="list-style-type: none"> <u>As an avoidance measure:</u> <ul style="list-style-type: none"> Working in the workshops should be avoided at night. Establishing temporary workshops and storage areas in a wide, low residence and low traffic streets 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 a proper access is installed. The contractor should work only within his workshop boundaries. 	Minor	<ul style="list-style-type: none"> LDC Excavation Contractor 	LDC HSE	Field supervision Coordination with LGU as needed	<ul style="list-style-type: none"> Contractor costs LDC management costs
Occupational health and safety	Health and safety	<ul style="list-style-type: none"> The project will hire a qualified contractor/sub-contractor with the high health and safety standards. In addition, the ToR for the contractor and the ESMP will provide the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction. Also TOR should oblige the contractor and subcontractor to keep attendance worksheet and laborers ID in order to verify the age of workers. Standard protection by placing clear project signs. Time management for vehicles movement; especially avoiding the peak hours 	Minor	Excavation Contractor	LDC HSE+SD O	Field supervision	<ul style="list-style-type: none"> Contractor costs LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> Standard protection for the workers especially working at elevated heights or trench. Regular inspection to compelling worker to used their PPE Training and licensing industrial vehide operators of specialized vehides. Health insurance should be applicable to the contractor workers and workers contracted by a sub-contractor Full compliance to EGAS and LDC HSE requirements, manuals, and actions as per detailed manuals adopted by EGAS Ensure the provision of the appropriate personal protective Equipment and other equipment needed to ensure compliance to HSE manuals The contractor also will be obliged to maintain daily attendance sheets in order to verify the attendance of workers in case of accidents and provide the injured persons with proper health insurance 					
Labor conditions	Child labor	<ul style="list-style-type: none"> The project will hire a qualified contractor/sub-contractor with the high health and safety standards. In addition, the ToR for the contractor and the ESMP will provide the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction. Rigid obligations and penalties will be added to the contractor ToR in order to 	Minor	LDC Excavation Contractor/ subcontractor	LDC HSE+SD O	Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> Contractor costs LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<p>warrantee no child labor is occurred in the project</p> <p>_The ToR also will oblige the contractor to keep a copy of IDs of laborers in order to monitor the hired staff below 18 years old</p> <p>_The contractor also should keep attendance worksheet and laborers ID in order to verify the age of workers</p>					
Local Community	Disturbance to Community due to Labor Influx	<p>In order to minimize impacts pertaining to labor influx the following should be thoroughly implemented:</p> <p>_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)</p> <p>_All workers should be trained on the Code of Conduct)</p> <p>_Apply the full requirements related to operating the grievance mechanism including anonymous channels</p> <p>_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</p> <p>_Apply Penalties to workers violating the code of conduct</p>	Minor	Contractors and subcontractors	LDC HSE+ SDO EGAS (SDO)	Field supervision on contractor and subcontractor by LDC and EGAS	_ Contractor costs
Local communities and businesses	Lack of accessibility to businesses due to delay	<p>Access to business due to digging out the streets will be mitigated through enabling alternative entrances to the business. Also, special wooden bars will be used to enable the shoppers to get into the markets. Additionally, the duration of work will not</p>	Minor	<ul style="list-style-type: none"> • LDC HSE+ SDO • Excavation Contractor 	EGAS (SDO) LDC HSE+SDO	_ Ensure the implementation of GRM	No cost



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
	in street rehabilitation	<p>exceed one working day. In case of digging main streets in the commercial areas, this can be only done during night after business dosing. notify business owners about that work plan before construction giving them time to adapt</p> <p>Follow up the procedure of Grievance Redress Mechanism</p> <ul style="list-style-type: none"> - Ensure transparent information sharing - The telephone numbers of the social development officer responsible for grievances should be shared with the community people 				<ul style="list-style-type: none"> - Supervision on Contractors performance 	
Local community Health and safety	Threat to Safety of users and houses (due to limited level of awareness and misconceptions)	<p>Prepare a work plan for community and stakeholder engagement</p> <p>Awareness raising campaigns should be tailored in cooperation with the community-based organizations. The following are some mitigation procedures to be adopted:</p> <ul style="list-style-type: none"> - Using caution tapes that help to keep people away of the site, - Informing residents and shopkeepers about the timeline of the project (street by street) in order for the residents to know when to avoid certain streets - 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	<ul style="list-style-type: none"> - List of awareness activities applied - Lists of participants - Documentation with photos - Awareness reports 	<ul style="list-style-type: none"> - 40838 EGP per awareness raising campaign - 40838 EGP for brochure and leaflets to be distributed (material available by EGAS)



Receptor	Impact	Mitigation measures	Residual impact	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
	Damage to underground utilities resulting in water/wastewater leaks, telecommunication and electricity interruptions	<p>Coordination with departments of potable water, wastewater, electricity, and telecom authorities to obtain maps/ data on underground utilities, whenever available</p> <p>Mitigation measures for avoiding breaking underground utilities and infrastructure pipes:</p> <p>Collecting most accurate maps for underground utilities and infrastructure routes from Information Centers in the various Governorates and asking them for site markings, whenever available, and making such data available to the contractor prior to commencing the works.</p> <p>Boreholes to locate underground utilities before using mechanical excavation.</p> <p>Once underground utilities are mapped or uncovered, horizontal and vertical clearances between natural gas lines and electricity lines must be respected for safety considerations.</p> <p>In case an underground utility and infrastructure pipe has been damaged, standard procedures should be followed, as described before, in addition to preparing a documentation report for the accident. The documentation report should include:</p> <ul style="list-style-type: none"> - Time and place of accident; - Name of contractor; - Type of underground utilities, infrastructure line; - Description of accident circumstances & causes; - Actions taken and responses of different parties, such as infrastructure company; - Duration of fixing the damage; and <p>Damage caused (description shall be according to observation, expertise judgment, reports of infrastructure company).</p>	Negligible	LDC HSE Excavation Contractor	LDC HSE	<p>Official coordination proceedings signed by representatives of utility authorities</p> <ul style="list-style-type: none"> - Examination of site-specific reports and records - Field supervision 	<ul style="list-style-type: none"> - Contractor management costs - LDC management costs



7.4 Environmental and Social Monitoring Matrix during CONSTRUCTION

Table 7-2: Environmental and Social Monitoring Matrix during CONSTRUCTION

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Local traffic and accessibility	Reduction of traffic flow and accessibility to local community	Comments and notifications from Traffic Department	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports Complaints log	LDC management costs
Ambient air quality	Increased air emissions	HC, CO%, opacity, TSP, PM10 and PM 2.5	LDC HSE	Once before construction + once every six month for each vehicle	Construction site	Measurements and reporting of dust and exhaust emissions of construction activities machinery Complaints log	LDC management costs
Ambient noise levels	Increased noise levels	Noise intensity, exposure durations and noise impacts	LDC HSE	weekly during site inspections	Construction site (residential area or near sensitive receptors such as hospitals)	Measurements of noise levels Complaints log	LDC management costs
		Complaints from residents	LDC HSE +SDO	Monthly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs
Underground utilities	Damages to underground utilities and infrastructure	Official coordination reports with relevant authorities Accidents documentation	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs



Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Physical state of street	Waste generation	Observation of accumulated waste piles	LDC HSE	During construction.	Construction site	Documentation in HSE monthly reports	LDC management costs
		Observation of water accumulations resulting from dewatering (if encountered)	LDC HSE	During construction. Monthly reports	Around construction site	HSE monthly reports	LDC management costs
		Chain-of-custody and implementation of domestic wastewater (sewage) management	LDC HSE	During construction. Monthly reports	Construction site	Site inspection and document inspection	LDC management costs
Local community	Damaging to the streets	<ul style="list-style-type: none"> Streets quality after finishing digging Number of complaints due to street damage 	LDC HSE+SDO, EGAS (SDO)	Three times per year, each three month	Site and Desk work	Checklists and complaints log	No cost
	Threat to Safety of users and houses (due to limited level of awareness and misconception)	<ul style="list-style-type: none"> Number of awareness raising implemented Number of participants in information dissemination) 	LDC HSE, EGAS	Quarterly monitoring	Office	Reports Photos Lists of participants	LDC management costs



Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
	Disturbance to local community due to labor influx	<ul style="list-style-type: none"> Complaints raised by the local community (GRM) conduct spot checks/audits on the worker's behaviors during field visits 	LDC HSE+ SDO	When reported and during field visits	Construction sites	Supervision & reporting	LDC management costs
Labor conditions	Occupational Health and Safety	Total number of complaints raised by workers Periodic Health report Periodic safety inspection report insurance policy and Attendees lists with workers IDs	LDC HSE +SDO	Biannual	Construction site	Documentation in H&S monthly reports Complaints log	No cost
	Child labor	Attendees lists with workers IDs Complaints and accidents reports	LDC HSE +SDO	Biannual	Construction site	Documentation in H&S monthly reports Complaints log	No cost



7.5 Environmental and Social Management Matrix during OPERATION

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

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Economically disadvantaged Community members	Financial burden on economically disadvantaged due to the installments.	<ul style="list-style-type: none"> - Information should be provided to people in order to be fully aware about the available options for paying the installation cost which they are: - An agreement with the Egyptian Banks to finance the cost of connection to the client. - A grant from the AFD and EU, for poor people according to illegibility criteria. - The Ministry of Petroleum initiative by paying the installation cost in installment for 6 years with a zero-interest rate - LPG distributors should be informed about the NG potential areas in order to enable them to find alternative areas - They should be informed about the GRM in order to enable them to voice any hardship 	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
	LPG distributors						
Community health and safety	Possibility of Gas leakage	<ul style="list-style-type: none"> - Information should be provided to people in order to be fully aware about safety procedures - The hotline should be operating appropriately - People should be informed of the Emergency Numbers - the ERP should be activated (Annex-10) 	Negligible	LDC HSE+SDO	EGAS (HSE+SDO)	Complaints raised due to Gas leakage	LDC management costs
	Network integrity	<ul style="list-style-type: none"> - Detailed review of the geotechnical history of the project area - Development of a full emergency response plan 					
			Negligible	LDC	LDC HSE.	- Map and local geotechnic	LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> Random inspections and awareness campaigns to ensure that NG piping and components (both inside the household and outside) are not be altered, violated, or intruded upon in any way without written approval from, or implementation of the alteration by, the LDC. Availability of 24-7 hotline service (129) to all beneficiaries & the public for reporting possible leaks, damages or emergencies Quick response to gas leaks by evacuation of the affected area Repair or replacement of failed component Scheduled inspection and preventive maintenance activities Inspection will include any activities that could potentially lead to damage in the pipeline In case of emergency, the source of the leak will be isolated until the maintenance team performs the required maintenance Signs will be posted over the pipeline path showing the numbers to be called in case of emergency 				<ul style="list-style-type: none"> al report review - Site inspections - Awareness actions - Periodical drills 	



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	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
Economically disadvantaged Community members	Financial burden on economically disadvantaged due to the installments	<ul style="list-style-type: none"> - 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
	Impact on the informal LPG distributors	<ul style="list-style-type: none"> - Grievance received from the informal LPG distributors - Information shared with them 	LDC SDO and EGAS	Quarterly	Desk work	- Complaints log	No cost
Community health and safety	Possibility of Gas leakage	<ul style="list-style-type: none"> - Complaints raised by the community people - Number of leakage accidents reported/raised 	LDC HSE+SDO, EGAS	Quarterly	Site and Desk work	Complaints log LDC	No cost
	Network integrity	<ul style="list-style-type: none"> - Earthquakes or geotechnical settlements - Emergency response time and corrective actions during emergency drills - Reports of alteration or tampering with any gas components 	LDC HSE	Bi-annual inspections and annual emergency response drills	Along the network and inside and outside households	- Inspection, leakage detection, running the drills	LDC management costs



7.7 Reporting of Mitigation and Monitoring Activities

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

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

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

Reporting of severe incidents:

1. 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 to the Project Management at EGAS.
2. EGAS will report the major accident to the World Bank within 24 hours at the latest.
3. The report will be including 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.

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

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

7.8 Institutional Framework for ESM&MP Implementation

7.8.1 Environmental Management Structures

EGAS is the supervisory body. **Egypt Gas** is the implementing body. Being the implementing body of the natural gas network in project districts, **Egypt Gas** has a 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 in environmental and social aspects. Egypt 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 will be recommended.



One of the standard tasks of the HSE Departments of Egypt 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 an immediate training to inform health and safety, social and environmental staff about the management plan.

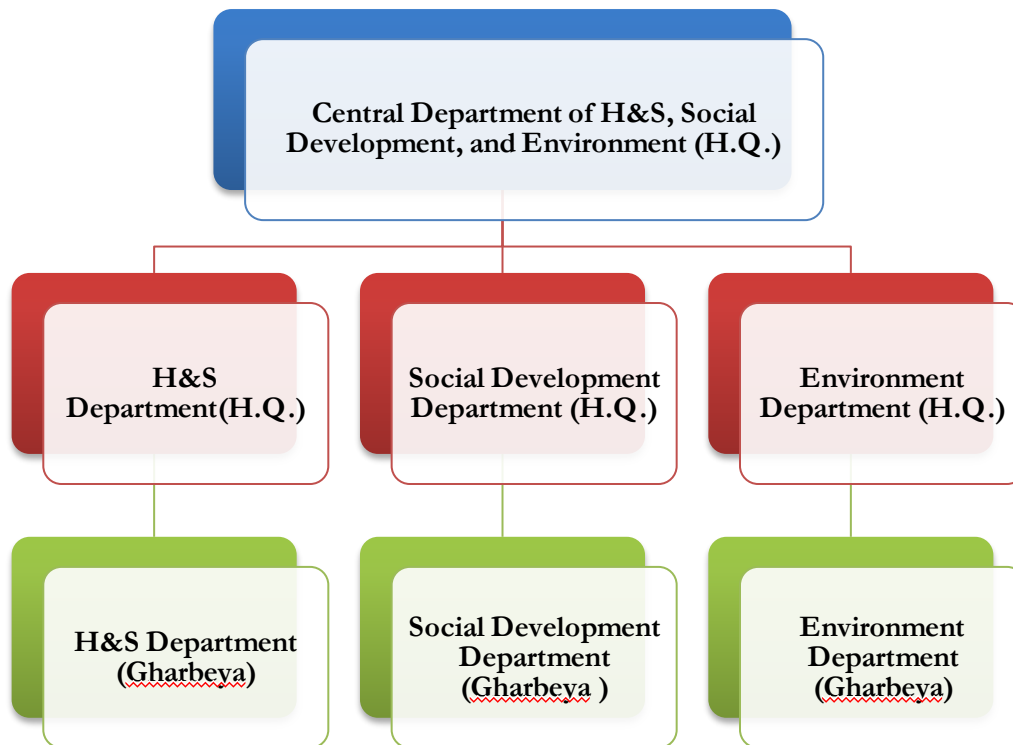


Figure 7-1: Egypt Gas H&S organizational structure.

7.8.2 Required Actions

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

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



8. Stakeholder Engagement and Public Consultation

The public consultation section aims to highlight the key consultation and community engagement activities that took place as part of the preparation of the ESIA's, ESMP's and their outcomes. The new house connections in the project sites are supplementary to the current existing natural gas connection network in Gharbya Governorate. ESIA's/ESMP's for other districts were prepared, stakeholder engagement and public consultation activities were held, and studies were cleared by the Bank and disclosed on EGAS website. Stakeholder Engagement activities and a series of public consultations were conducted all through the past 5 years since the early stages of the project in December 2013 until recent. In July and December, 2018 consultation was conducted for the project sites under study in Besion, El Santa, Bashbesh and El Dalgamoon districts. Stakeholders were identified, a work plan was developed, information 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 /ESIA's/ESMP's of the project.

Consultation activities showed an overwhelming acceptance of the consulted participants to host the NG. 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 to pay 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 the 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 were conducted in full compliance with the following legislations:

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



8.2 Consultation objectives

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

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

8.3 Defining the stakeholder

In order to ensure an inclusive and meaningful consultation process, a stakeholder's analysis was conducted to get better understanding of the various groups and their roles, interests and influence on the project. For the purpose of 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 on 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 Gharbya 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: <ul style="list-style-type: none"> Besion, El Santa, Bashbesh and El Dalgamoon districts 	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 the natural gas.
	Residents in Gharbya City	Residents of other districts in Gharbya will benefit from 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	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, disabled, old people and children might get injured if they crossed the excavated areas in main streets and allies. Children also may fall down in the excavated areas
	Small business owners	Local businesses have the potential to benefit economically from the Project. However, as local residents this group also have 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 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 to the workers through contracting health facility in Gharbya to provide required service
NGOs and civil society	El Shoban El Moslemein, Resala, Misr El Kheir 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 ESIA/ESMPs, and monitoring implementation of the Environmental Management Plan
	Information Centers on the governorate level	Provide NG companies with underground utilities and infrastructure maps.



Stakeholder Category	Stakeholder Group	Relevance/Importance of the Stakeholder to the Project
	Security Department	Secure the construction sites and prevent people from in-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	Gharbya 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)	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	Inform the community about the project and its impacts and support dissemination of the main results of the ESIA/ESMPs studies
	Newspaper Websites	
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
	Egypt 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 on 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. However, some of them were interviewed in their premises in order to enable them to spell out their concerns and worries freely.



8.4 Consultation Methodology and Activities

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

- 1- The study team visited the project districts in order 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 potential affected people.
 - Public consultation sessions.
- 4- Consultation activities have been developed for the different communities through the following phases:
 - a. Public Consultation session during the preparation of the framework (ESIAF) in 2013. [Annex-11](#)
 - b. Consultation activities during the preparation of the site-specific studies (ESMPs) for 9 districts in January and February, 2017.
 - c. Public Consultation session in Gharbya Governorate in April 2017. [Annex-12](#)
 - d. Consultation activities during the preparation of the current site-specific study (ESMP) for 4 districts in July and December 2018.

All activities conducted were documented with photos and lists of participants in order to warrantee appropriate level of transparency.

The following table summarizes all the consultation activities in Gharbya Governorate, during the last five years since December, 2013 till now.

Table 8-2: Summary of Consultation Activities in Gharbya Governorate

Participants	Number		Methods	Date
	Males	Females		
During the preparation of framework				
Various stakeholders	55	24	Public Consultation event	29 th of December 2013
Community residents	25	36	Structured questionnaire	December 2013



Participants		Number		Methods	Date
Males	Females				
Potential beneficiaries and governmental entities		16	8	FGD	
Governmental entities		4		In-depth interview	
Total		100	68		
During the ESMP for 9 districts					
Potential beneficiaries and governmental entities	Ekhaway	12	8	FGD	January-February 2017
	Perma	11	7		
	El Ghofran	6	7		
	Kheret	5	6		
	Zefta	5	5		
	Seberbay	8	7		
	Qotour	10	6		
	Kafr El Zayat	4	17		
	Mahlet Zeyad	11	7		
Governmental and public sector	Ekhaway	4	1	In-depth interview	January-February 2017
	Perma	4	1		
	El Ghofran	5	1		
	Kheret	5			
	Zefta	5	1		
	Seberbay	2	2		
	Qotour	1	1		
	Kafr El Zayat	4	1		
	Tanta Markaz	5	2		
Civil society	Mahlet Zeyad	8		In-depth interview	January-February 2017
	Tanta Markaz		1		
	Qotour	2			
	Kafr El Zayat	1			
	Mahlet Zeyad	1			
LPG Street vendors	Zefta	2	0	In-depth interview	January-February 2017
	El Ghofran	5	1		
Governmental, NGOs and community people	Kafr El Zayat	34	1	Group meeting in Kafr El Zayat	15 th of February 2017
	Zefta	11	1	Group meeting in Zefta	16 th of February 2017
Total		171	84		
Governmental, NGOs and community people		79	30	Public Consultation event	11 th April, 2017



Participants	Number		Methods	Date
	Males	Females		
During the current study (ESPM) for 4 Districts (Besion, El Santa, Bashbesh and El Dalgamoon districts) in July and December 2018				
Governmental and NGOs	15	10	consultation meeting	July and December, 2018
LPG vendors	3		in-depth meetings	
Community people	20	12	FGD	
Egypt Gas representatives	7	-	FGD	
Total	45	22		

8.5 Summary of consultation activities

The following table summarize the main issues that were raised during the previous consultation activities (2013 – 2018):

Table 8-3: Key comments and concerns raised during the different public consultation activities, and the way they were addressed during 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 can pay the cost in installment. There is also a grant of 1500 EGP from the AFD and EU, for poor people according to illegibility criteria. In addition to the new initiative adopted by the Ministry of Petroleum 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).	Section 4. Environment and Social Baseline. And section 7 Table 7.3
Criteria for natural Gas connection	Why all the households and villages are not included in the connection plan	Connection to villages is depend on the availability of other public utilities (water, sanitation, 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.



Subject	Questions& comments	Responses	Addressed in the ESMP Study
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 follow: 1- During the site visits for P&A survey 2- During the preparation of the ESMP 3- During contracting process	Section 7 and Section 8.
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 enable anyone to submit a complaint and respond to in 15 working days	Section 7. (GRM)
Street rehabilitation & land refill	-who is responsible to rehabilitate the street and land refill after the end of construction works?	Egypt Gas responded to this question as they will be the implementing agency responsible for street rehabilitation in terms of budget. However, the LGU will implement the streets rehabilitation according to the street rehabilitation plan.	Section 7. ESM&MP
Losses 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 license for another areas.	Section 7. ESM&MP

8.6 Main results of consultation activities during ESMP study for the new project sites (Besion, El Santa, Bashbesh and El Dalgamoon districts) in 2018

Based on consultation activities conducted during July and December, 2018, 22 women and 45 men were consulted with. Throughout the discussions, interviewees were asked about six 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 constructions and operations
- The cost of NG installation to households
- The future positive/negative impact of NG connections project

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

8.7 Summary of consultation outcomes

The consulted groups expressed their overwhelming acceptance to host the NG. They also indicated their willingness to be connected to the NG regardless to the amount of money they can afford to pay. Almost all surveyed sample were willing to have the NG installed to their houses. Some of them expressed their willingness to pay the installation cost in cash, while others were much in favor to pay 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 the natural gas and the current hardships that the households are facing to secure LPG usage.

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



A panel meeting with Government Officials in Besion and El Dalgamoon headquarters



FGD discussion with NGOs

FGD discussion with the local Community



Interviews with LPG vendors



Interviews with potential affected persons (small business) at El Dalgamoon Village

Figure 8-1: Consultation Activities in Besion and El Dalgamoon.

8.8 ESMP disclosure

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