1.5 Million Natural Gas Connections Project in 11 Governorates

Environmental and Social Management Plan

Aga, Bilqas, Nabaroh, Mansoura Cities, Mit Elkorama and Gogar villages / Dakahliya, Governorate

Final Report

March 2018

EGAS

Egyptian Natural Gas Holding Company

Developed by

"Petrosafe"

Petroleum Safety & Environmental Services Company

EcoConServ Environmental Solutions

List of acronyms and abbreviations

AFD	Agence Française de Développement (French Agency for Development)
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
GPS	Global Positioning System
HH	Households
HSE	Health Safety and Environment
IFC	International Finance Corporation
LDC	Local Distribution Companies
LPG	Liquefied Petroleum Gas
mBar	milliBar
NG	Natural Gas
NGO	Non-Governmental Organizations
P&A	Property and Appliance Survey
PE	Poly Ethylene
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$ = 17.57 EGP. as of March, 2018

Exchange Rate: € = 21.69 EGP as of March 2018

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1. Introduction

1.1 Project Objectives

This ESMP has been prepared based on the Terms of Reference prepared by EGAS and cleared by the World Bank, additionally the ESMP follows national and 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 Aga city (within Aga Markaz), Bilqas city (within Bilqas Markaz), Nabaroh City (within Nabaroh Markaz), Mansoura City (within Mansoura Markaz), Mit Elkorama and Gogar villages (within Talkha 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 areas and the total number of households which will be covered in this ESMP are illustrated in table 1-1:

Table 1-1: Number of Areas and Potential clients

Governorate	Local Distribution Company	Areas	Potential clients
Dakahliya	Egypt Gas	Aga	9300
		Bilqas	25200
		Nabaroh	20800
		Mit Elkorama and Gogar	5600
		Mansoura	14100
TOTAL:		5	**75000**

The studied areas contain establishing two pressure reduction stations (PRS) in Aga and Bilqas and ESIA will be prepared for these areas. 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 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: List of Main Contributors

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

2. Project Description

2.1 Background

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

The city distribution network comprises the following components:

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

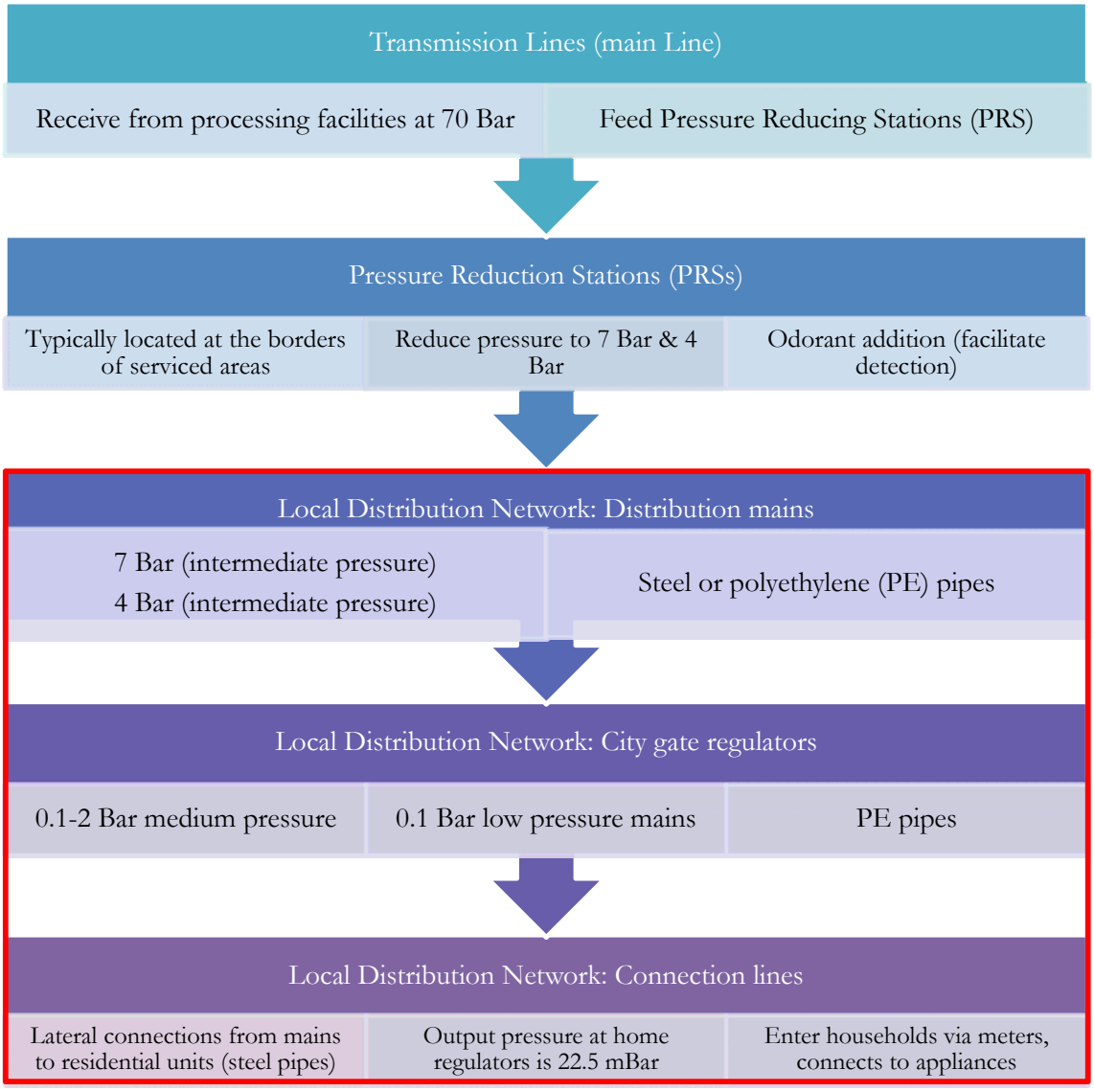

Figure 2-1: General components of the Aga, Bilqas, Nabaroh, Mansoura Mit Elkorama and Gogar distribution network (Surrounded by red frame)

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 75000 domestic customers in **Aga, Bilqas, Nabaroh, Mansoura, Mit Elkorama and Gogar districts, Dakahliya Governorate**. Egypt Gas Company will start the necessary installations needed to feed natural gas for the customers in this region, Egypt Gas Company will start the necessary installations needed to feed natural gas for the customers in this region. The project scope within Dakahliya Governorate's said districts will be as follows: -

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

Aga city belongs to Aga region "Markaz", It will be connected by polyethylene intermediate pressure feeding pipeline from Aga new PRS station (not included in ESMP and will be conducted ESIA).

2.2.1.1 Route

The proposed pipeline route will start from the intake Point on new Aga PRS station, which located in Mansoura – Met Ghamr road. The proposed pipeline then extends from new PRS station (not included in ESMP and will be conducted ESIA) in the south direction then directed in west direction in Aga –Senbellawen road till reaching the end point (Aga entrance) (Figures: 2-2 and 2-3).

Figure 2-2: The proposed Location of Aga new PRS and pipeline route feeding Aga area

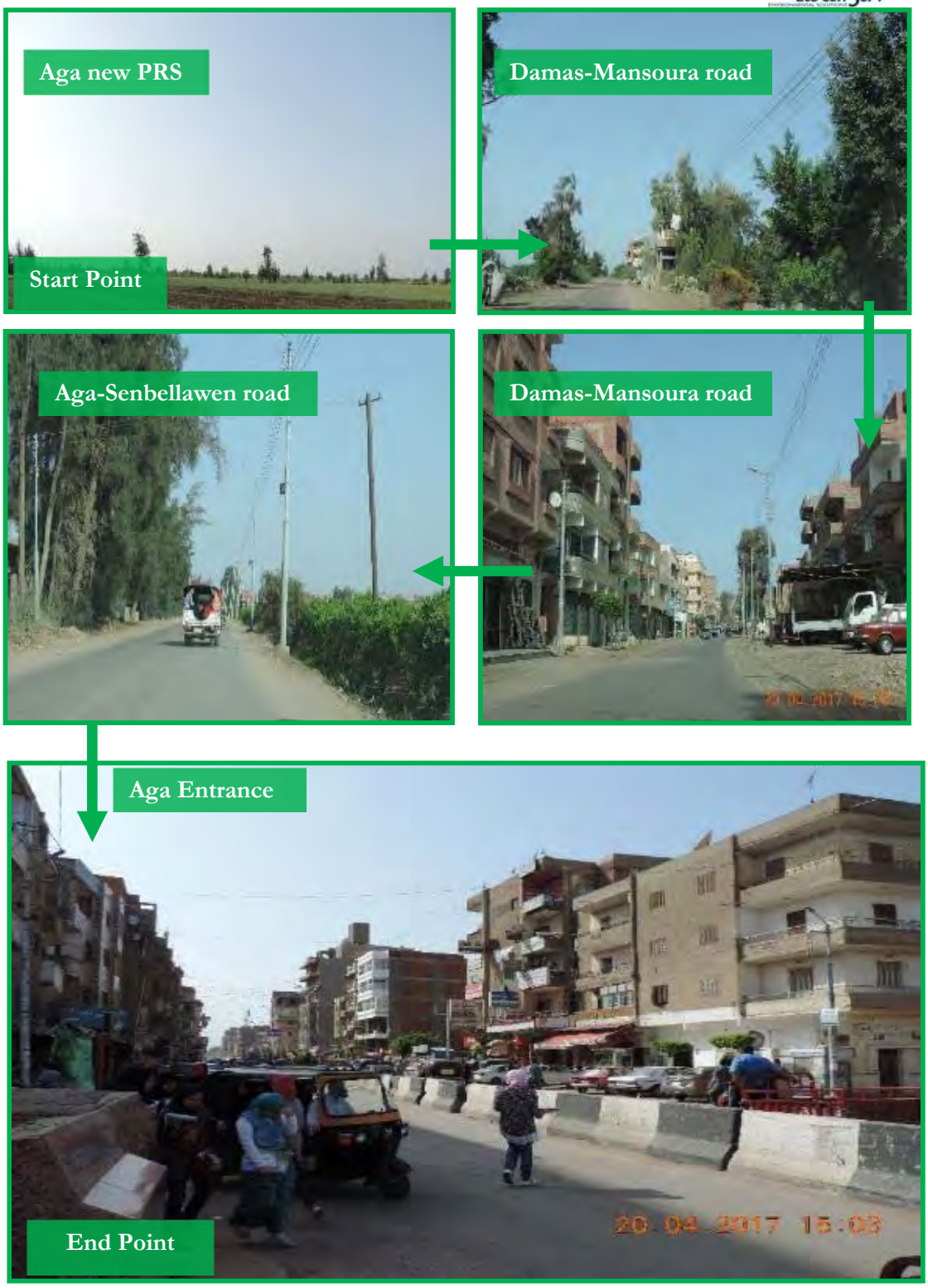

Figure 2-3: Pictures showing the proposed pipeline route feeding Aga City

2.2.2 Low-pressure Distribution-Network for Aga City:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of gas in service lines is 100 mbar. In such a system, a service regulator is not required on the individual service lines. Low pressure service lines are mainly constructed from medium density polyethylene pipes (MDPE) having a maximum operating pressure (MOP) below 100 mbar. PE80 network will be installed horizontally underground for 12 sectors within Aga City as shown in Figures 2-4 and 2-5 below.

Figure 2-4: Satellite map showing the proposed Distribution - Network feeding Aga City

Samples of Streets in different Sectors






Figure 2-5: Pictures showing Samples of streets in Sectors of Aga City.

2.2.3 Intermediate Pressure Network-Main feeding line (7 bar system) for Bilqas City:

Bilqas City belong to Bilqas Markaz, it will be connected with a polyethylene intermediate pressure feeding pipeline.

2.2.3.1 Route

The proposed pipeline route will not pass through any agriculture lands it will start from the intake Point on new Bilqas PRS station, which located in Sherbien-Bilqas road, then it will extends from new Bilqas PRS station (not included in ESMP and will be conducted ESIA) in the west direction in Sherbien-Bilqas road till reaching the end point (Bilqas entrance) as shown in Figures; 2-6 and 2-7 below.

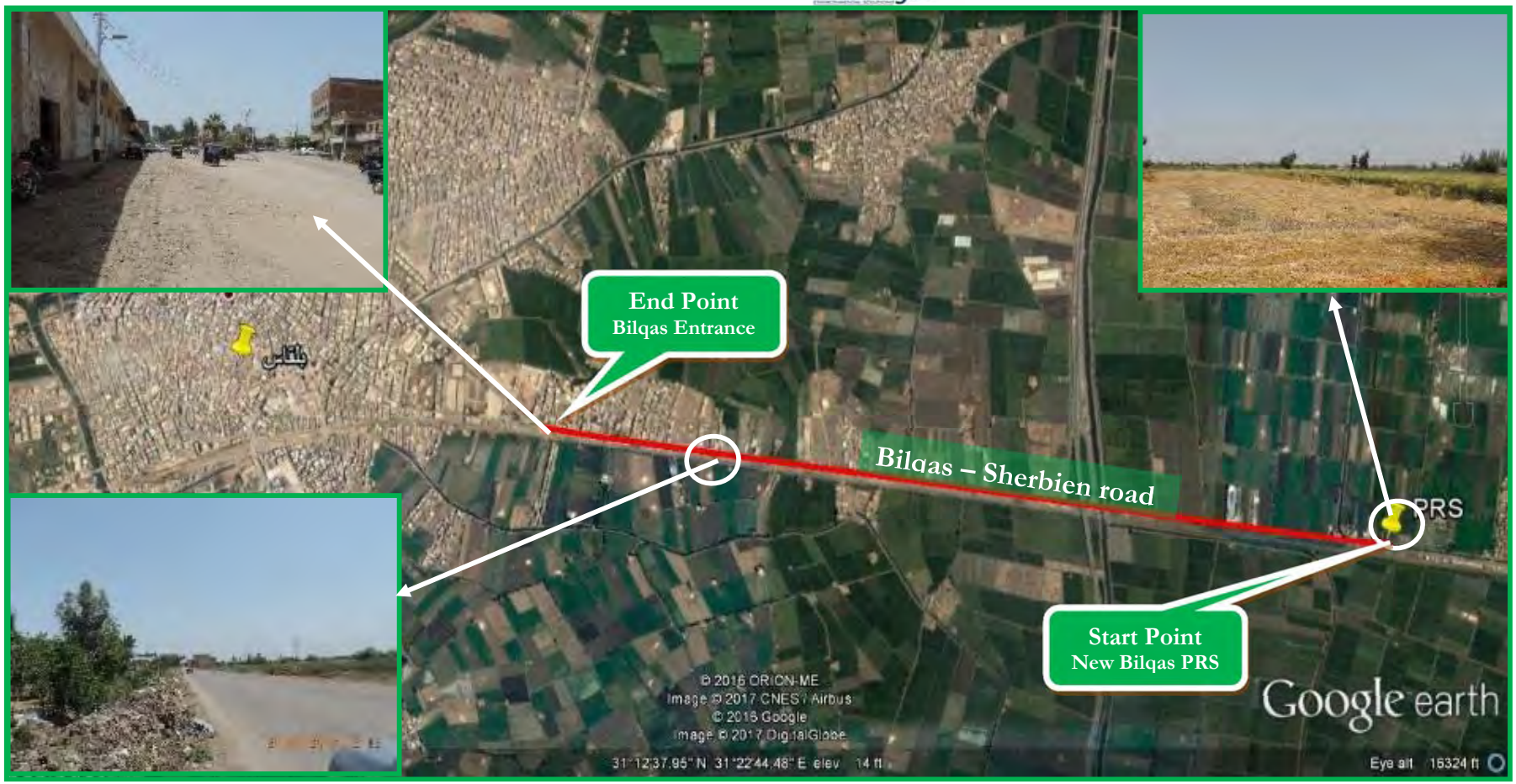

Figure 2-6: The proposed Location of Bilqas new PRS and pipeline route feeding Bilqas City

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Figure 2-7: Pictures showing the proposed pipeline route feeding Bilqas City

2.2.4 Low-pressure Distribution-Network for Bilqas City:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of gas in service lines is 100 mbar. In such a system, a service regulator is not required on the individual service lines. Low pressure service lines are mainly constructed from medium density polyethylene pipes (MDPE) having a maximum operating pressure (MOP) below 100 mbar. PE80 network will installed horizontally underground for 17 sectors within Bilqas as shown in Figures 2-8 and 2-9 below.

Figure 2-8: Satellite map showing the proposed distribution - network feeding Bilqas City

Samples of Streets in Bilqas City sectors






Figure 2-9: Pictures showing Samples of Streets in Sectors of Bilqas City.

2.2.5 Intermediate Pressure Network-Main feeding line (7 bar system) for Nabaroh City:

Nabaroh City belong to Nabaroh Markaz, it will be connected with a polyethylene intermediate pressure-feeding pipeline.

2.2.5.1 Route

The proposed pipeline route will start from the intake Point, which located on Talkha - Nabaroh road. Then extends to the west direction till reaching the end point (Nabaroh Entrance) as shown in Figures 2-10 and 2-11 below.

Figure 2-10: Satellite Map showing the proposed pipeline route feeding Nabaroh City

Figure 2-11: Pictures showing the proposed pipeline route feeding Nabaroh City

2.2.6 Low-pressure Distribution-Network Network for Nabaroh City:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of gas in service lines is 100 mbar. In such a system, a service regulator is not required on the individual service lines. Low pressure service lines are mainly constructed from medium density polyethylene pipes (MDPE) having a maximum operating pressure (MOP) below 100 mbar. PE80 network will be installed horizontally underground for 14 sectors within Nabaroh as shown in Figures: 2-12 and 2-13 below.

Figure 2-12: Satellite map showing the proposed distribution - network feeding Nabaroh City

Figure 2-13: Pictures showing Samples of Streets in Sectors of Nabaroh City.

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

Mit Elkorama, and Gogar Villages belongs to Talkha Markaz they are very adjacent to each other's; thus, they will be connected by the same polyethylene intermediate pressure feeding pipeline.

2.2.7.1 Route

The proposed pipeline route will start from the intake Point on an existing Intermediate Pressure gas pipeline which is located on the intersection of El Mahalla-Talkha road.

The proposed pipeline route then extends to the Southeast direction, the intersect with Damietta – Talkha road and Railway station then extended in the southeast direction till reaching the end point (Entrance of Mit Elkorama & Gogar) as shown in Figures 2-14 and 2-15.

Figure 2-14: Satellite Map showing the proposed Pipeline feeding Mit Elkorama, and Gogar Villages

Figure 2-15: Pictures showing the proposed pipeline route feeding Mit Elkorama, and Gogar Villages

2.2.8 Low-pressure Distribution-Network Network for Mit Elkorama, and Gogar Villages:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of gas in service lines is 100 mbar. In such a system, a service regulator is not required on the individual service lines. Low pressure service lines are mainly constructed from medium density polyethylene pipes (MDPE) having a maximum operating pressure (MOP) below 100 mbar. PE80 network will installed horizontally underground for 13 sectors within Mit Elkorama, and Gogar areas as shown in Figures 2-16 and 2-17 below.

Figure 2-16: Satellite map showing the proposed distribution - network feeding Mit Elkorama, and Gogar Villages

Figure 2-17: Pictures showing Samples of Streets in Sectors of Mit Elkorama, and Gogar Villages.

2.2.9 Intermediate Pressure Network-Main feeding line (7 bar system) for Mansoura City:

Mansoura belong to Mansoura Markaz, it will be connected with a polyethylene intermediate pressure-feeding pipeline.

2.2.9.1 Route

The proposed pipeline route will start from the intake Point on an existing Intermediate Gas Regulator which is located on Ahmed El-Husseiny Eid Street beside El Mansoura University.

The proposed pipeline route then extends to the west direction which intersect with El Mansoura-Sandoub main Road and the extends the entrance of Mit Khamis (End Point) as shown in Figures 2-18 and 2-19 below.

Figure 2-18: Satellite Map showing the proposed pipeline route feeding Mansoura City

Figure 2-19: Pictures showing the proposed pipeline route feeding Mansoura City

2.2.10 Low-pressure Distribution-Network Network for Mansoura City:

Low-pressure gas exiting city regulators distributed via a gas distribution piping system consisting of low-pressure service lines. The pressure of gas in service lines is 100 mbar. In such a system, a service regulator is not required on the individual service lines. Low pressure service lines are mainly constructed from medium density polyethylene pipes (MDPE) having a maximum operating pressure (MOP) below 100 mbar. PE80 network will installed horizontally underground for four sectors within Mansoura as shown in Figures 2-20 and 2-21 below.

Figure 2-20: Satellite map showing the proposed distribution - network feeding Mansoura City

Figure 2-21: Pictures showing Samples of Streets in Sectors of Mansoura City.

2.3 Project Execution Methodology

2.3.1 Project area selection criteria

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

A preliminary estimate was generated through a general survey, followed by a Property & Appliance (P&A) survey. **The general survey covered the following:**

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

The technical criteria can be summarized as follow:

- EGAS prepared a list of technical specification required to have the NG installed in the area:
- Areas that have access to all necessary public utilities especially land networks (electricity, water, sewage, telephone lines)
- Adobe and wooden houses are not eligible for NG connections
- 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.
- Areas adjacent to NG National Grid

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

- Buildings are to be located close to the local distribution network
- Buildings are to be built with concrete and red bricks not adobe or wood
- Buildings are to be legally permitted and has access to electricity
- The possibility of installing the riser pipes along the length of the building depending on the following priority (service stairwell, stairwell, façade)
- Availability of enough space for the erection of the scaffold and the existence of access door to the stairwells
- Easy access to the entrance point of vertical line in case of emergency
- Approval of the building administration to grant access to workers
- The un-plastered apartment might cause a problem as some people cover the pipelines by cement during the plastering. This made it very difficult to maintenance staff. Therefore, it was strongly recommended to install the NG to apartments after being fully plastered and painted.

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

- Obtain the latest aerial maps of the project areas from the Egyptian Survey Authority
- Identifying Global Positioning System (GPS) coordinates of the sites
- Data is entered into a central database and G.I.S system for review by a design team
- Design team finalizes pipe sizing, capacity & locations and routing. Based on the surveys described above, potential connections in Aga, Bilqas, Nabaroh, Mansoura, Mit Elkorama and Gogar are presented below: (also see Figures 2-4, 2-8, 2-12, 2-16 & 2-20)

Table 2-1: Number of Areas, sectors and Potential clients

Governorate	Local Distribution Company	Areas	Number of Sectors	Potential clients
Dakahliya	Egypt Gas	Aga	12	9300
		Bilqas	17	25200
		Nabaroh	14	20800
		Mit Elkorama and Gogar	13	5600
		Mansoura	4	14100
TOTAL:		5	60	**75000**

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

The construction activities of the network lines will involve drilling, pipeline placement, pipeline connection welding, and then surfacing. The construction activities will be located within the allocated site. **The following activities will take place during the construction of network:**

- Clearing and grading activities and Pipe transportation and storage
- Excavation and pipe laying
- Site preparation and excavation
- Pipe laying
- Backfill and road repair
- Leakage testing
- Construction works of household installation
- Commissioning
- The construction will be mainly in urban roads and local roads.
- No construction activities will take place in main roads.

2.4.1 Clearing and grading activities and Pipe transportation and storage

The first step of construction includes flagging the locations of approved access route of pipeline, temporary workshop for the crew, install fences surrounding the area of work, clean the land from any rubbish and /or remove 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.

2.4.2 Determining existing Infrastructure before excavation works

Before any excavation activities, the Egypt gas company 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.

2.4.3 Excavation

The most commonly used excavation technique is the Open cut technique. Alternatively, borings may be excavated using hydraulic drive, and finally Horizontal Directional Drilling (HDD) technique. HDD is only utilized in the case of railway crossings and major streets where traffic cannot be interrupted. In the case of HDD under railway crossings steel, a reinforced concrete sleeves will be installed to further protect the piping from fatigue. **It should be noted that there are no intersections with waterways of the Nile or its major branches in the studied areas.**

HDD is anticipated in **Mit Elkorama and Gogar** as it is required to cross a railway to reach it (Mit Elkorama and Gogar) as shown in Figure 2-22:

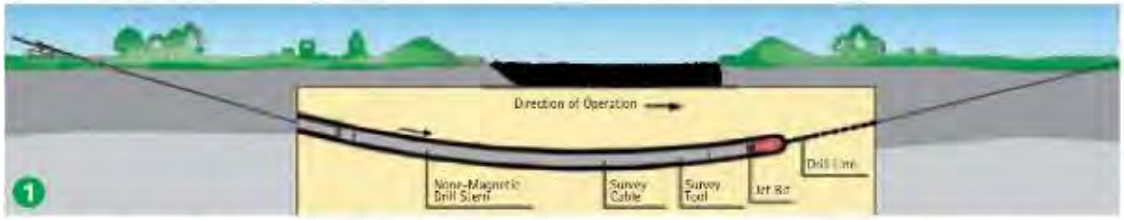
Figure 2-22: Pictures showing the proposed location HDD crossing in Mit Elkorama and Gogar railway crossing

HDD is a trenchless methodology that use high excavation depths (about 30-40 meters) and can be used for high pipeline length. HDD provides a number of benefits compared to the other traditional technologies. Auger boring drilling is used in one of the urban road crossing. The horizontal auger boring trenchless technique involves equipment like auger boring machine, auger, and cutting head. This technique also requires the excavation of a drilling pit and a receiving pit. The process starts by lowering the auger boring machine into the drilling pit, and then the augers installed inside the casing pipe are lowered into the pit and connected to the auger boring machine. The boring operation then starts by rotating the augers and the cutting head, and pushing the casing pipe gradually forward. This process continues till the casing pipe emerges from the receiving pit side.

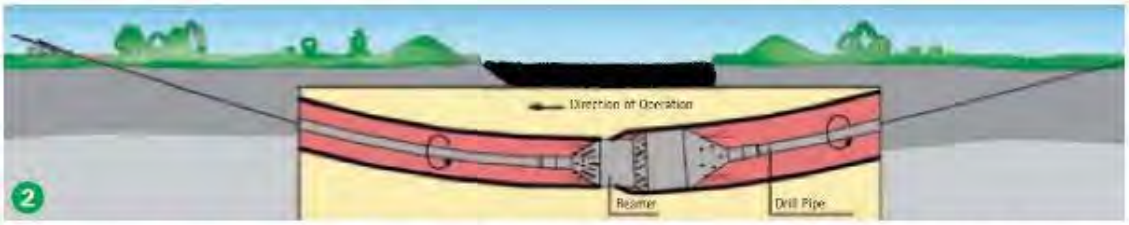
The boring process results in cuttings (spoil) which is carried through the augers and extracted from the entry side of the boring machine as shown in Figure 2-23:.

Horizontal Directional Drilling (HDD) Technique

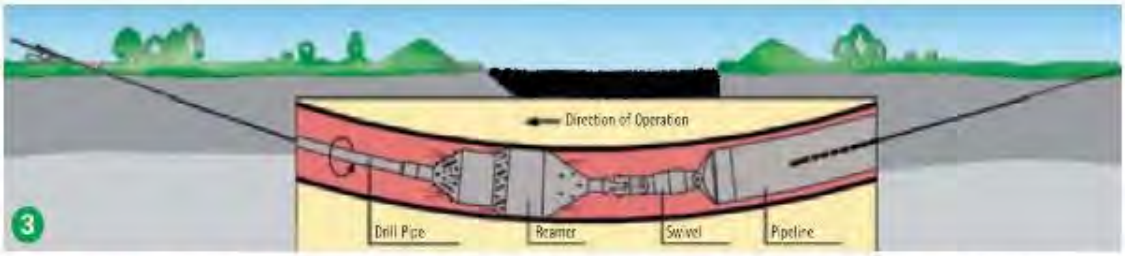
As simple as it is convincing. In the HDD method, pipelines are laid in three stages.



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 2-23: Pictures showing Horizontal Directional Drilling (HDD) Technique.

Open-cut excavation works start by removing the asphalt layer and the base stone layer using either a mechanical excavator (used in urban roads) or an air compressor jackhammer 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.

Typically, the trench (for PE100 7 bar network are orange pipes with diameter of 0.09 m to 0.25 m and for PE80 10 mmbar are yellow with diameter 0.25 m-0.03 m) is 0.4 - 0.6-meter-wide, and about 1.2-1.5-meter-deep, depending on pipe diameter.

The excavation products are placed on the sides of the trench by distance of 61 cm so it doesn't fall down inside the trench as shown in Figure (2-24). The followed safety procedures are presented in **Annex 2**

Figure 2-24: Pictures showing sample of typical trench for PE pipes by Egypt Gas

2.4.4 Types and Number of Equipment Used

The following table shows the types and numbers of equipment used:

Table 2-2: Types and Numbers of Equipment used

Serial	Equipment	
	Types	Numbers
1	Heavy Truck	1
2	Medium Truck	7
3	Light Truck	2
4	Pickup Truck	1
5	Mini Van	2
6	Compressors	4
7	Excavator	4
8	110 V Generator	7
9	220 V Generator	21
10	Welding machine	3
11	Cold cut machine	9
12	Hilti drill machine	32
13	Test Pump	18

3. Legislative and Regulatory Framework

3.1 Applicable Environmental and Social Legislation in Egypt

- Law 217/1980 for Natural Gas.
- Law 4 for Year 1994 for the environmental protection, amended by Law 9/2009 and law 105 for the year 2015 and its Executive Regulation(ER) No 338 for Year 1995 and the amended regulation No 1741 for Year 2005, amended with ministerial decree No 1095/2011, ministerial decree No 710/2012, ministerial decree No 964/2015, and ministerial decree No 26/2016
- Law 38/1967 for General Cleanliness
- Law 93/1962 for Wastewater
- Law 117/1983 for Protection of Antiquities
- Traffic planning and diversions
  - Traffic Law 66/1973, amended by Law 121/2008.
  - Law 140/1956 on the utilization and blockage of public roads.
  - Law 84/1968 concerning public roads.
- Work environment and operational health and safety
  - Articles 43 – 45 of Law 4/1994, air quality, noise, heat stress, and worker protection
  - Law 12/2003 on Labor and Workforce Safety

3.2 World Bank Safeguard Policies

Three policies are triggered for the project as a whole: Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12). However, OP/BP 4.12 will not be applicable to the land obtained in Dakahliya sites as the gas network will be established in the main urban streets and local roads without affecting any private assets. No pipelines will cross agriculture land in Aga, Bilqas, Nabaroh, Mansoura, Mit Elkorama and Gogar, accordingly no land acquisition or resettlement activities are anticipated. Particularly, as the network will pass through the main urban streets/roads and side roads without causing any damage to private assets or lands. In addition, it is not envisaged that the project will result in any physical or economic dislocation of people for the construction of low-pressure pipelines in Aga, Bilqas, Nabaroh, Mansoura, Mit Elkorama and Gogar. No pipelines will cross agriculture land in Aga, Bilqas, Nabaroh, Mansoura, Mit Elkorama and Gogar, accordingly no land acquisition or resettlement activities are anticipated and accordingly no compensation will be applied.

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

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which provide guidance to users on EHS issues in specific industry sectors. Gas distribution system – HSE Guideline (provided in **Annex-3** from the report) are applicable to the project. Gaps between requirements outlined by WBG guidelines and the Egyptian Law 4/1994 for Environment protection and the LDCs EHS guidelines have been analyzed. There are no significant differences between the requirements outlined by the WBG EHS GUIDELINE on GAS DISTRIBUTION SYSTEMS and the management and monitoring actions outlined by the ESIA. In

addition to the above-mentioned safeguards policies, the Directive and Procedure on Access to Information[1] will be followed by the Project.

3.3 Permits Required

- Railway Authority permit for crossing railways
- 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.

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

4. Environmental and Social Baseline

4.1 Description of the Environment

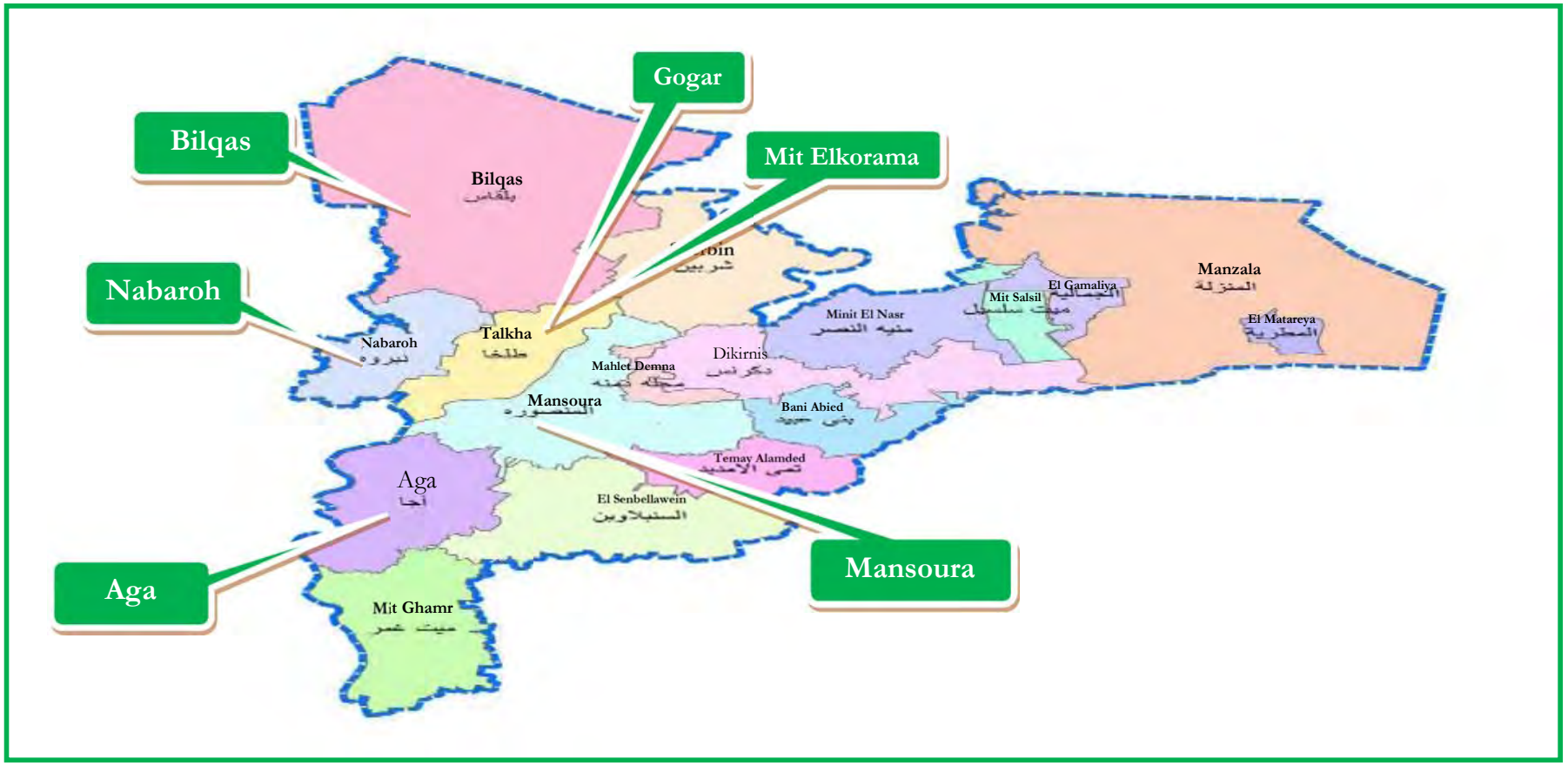


Figure 4-1: Distribution of cities in Dakahliya governorate and proposed gas connections districts location

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

- **Aga:**

  Aga city is located in Aga markaz about 110 km from Cairo, bordered from north by Nawasa El-Ghayt village and Mansoura-Mit Ghamr Road and from south by Izbet Dayris and from East by Izbet Nur Al Hummus and from west by Minyet Samanoud village. (Figure 4-2)

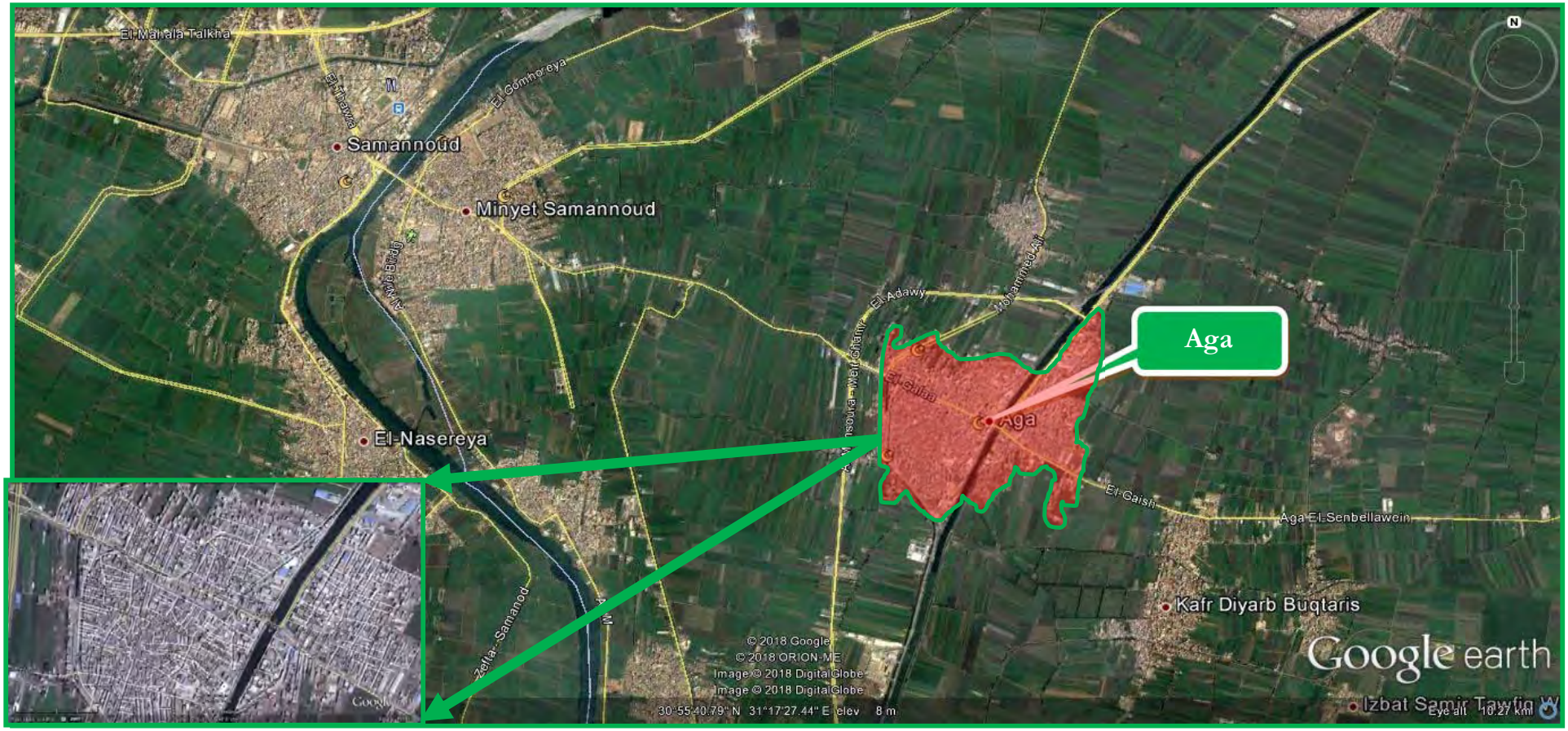


Figure 4-2: Satellite map showing Aga city and surrounding communities

- **Bilqas**

Bilqas city is located in Bilqas Markaz about 145 km from Cairo, bordered from north by Izbet An Nashrah and Izbet Abou Hegazy and from south by Izbet Abu Aridah and from east by Izbet Al Mahfuzah and from west by El Masara Village. (Figure 4-3)

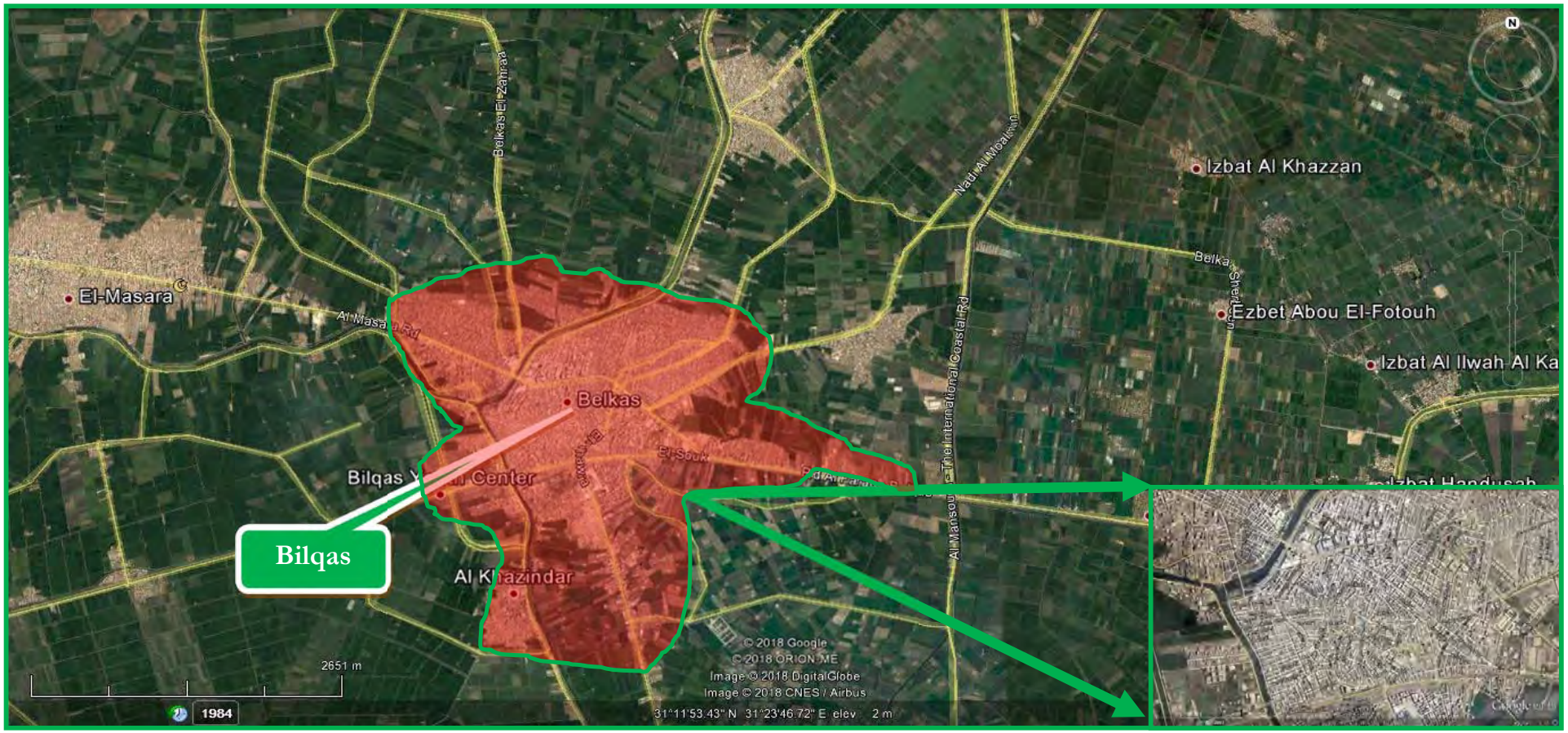


Figure 4-3: Satellite map showing Bilqas city and surrounding communities.

- **Nabaroh**

Nabaroh city is located in Nabaroh Markaz about 130 km from Cairo, bordered from north by Tayyibat Nisha village and from south by Kafr Aljnaynah Al Bahar and from east by Izbet Al Buhayrah and from west by Dirin village. (Figure 4-4)

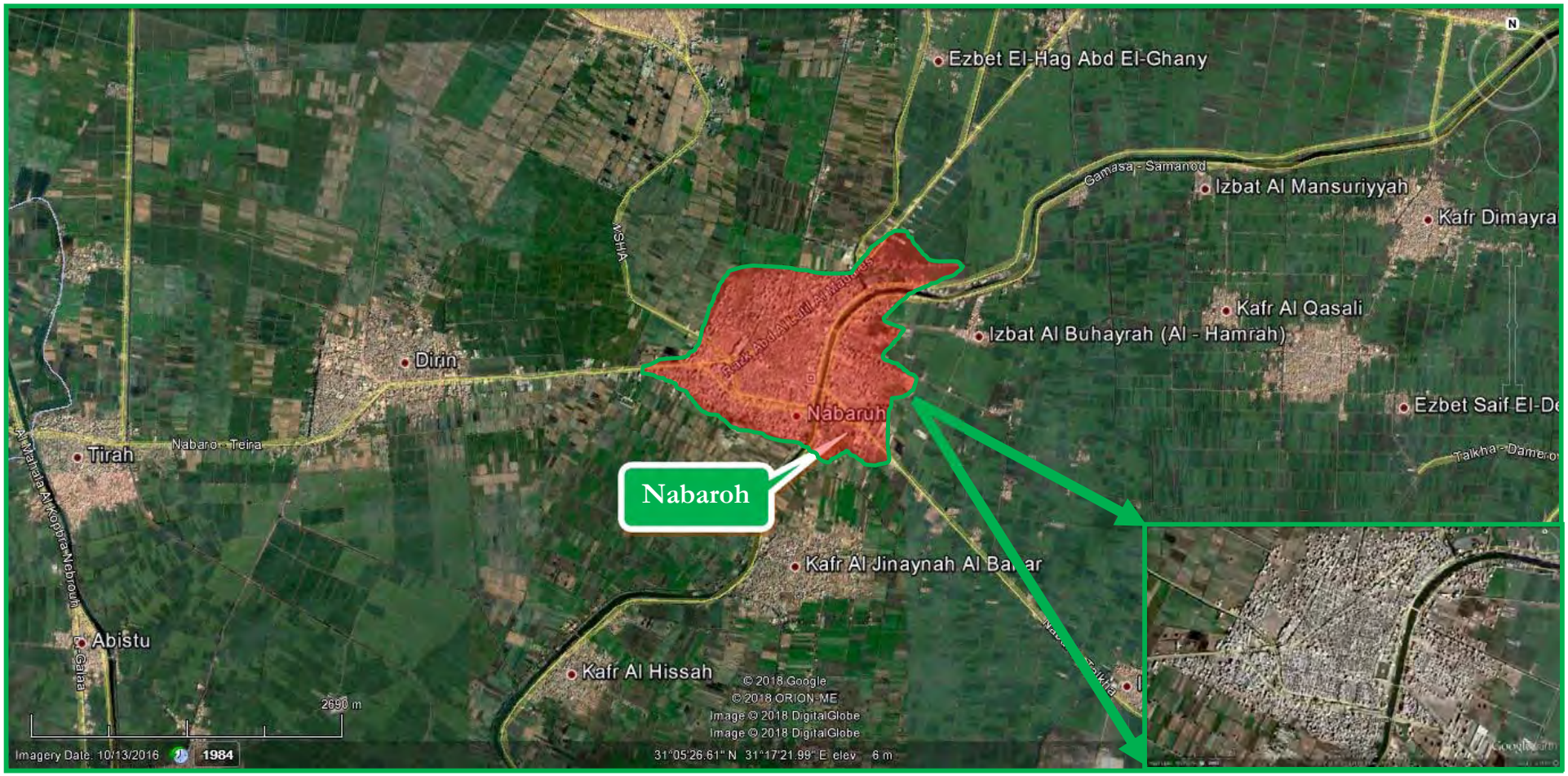


Figure 4-4: Satellite map showing Nabaroh city and surrounding communities

- **Mit Elkorama and Gogar**

Mit Elkorama and Gogar villages are located in Talkha markaz about 130 km from cairo, bordered from north by Izbet Sursuq and from south by Mit Nabit village and from east Mit Khamis village and from west Monshaat El-Badawy village. (Figure 4-5)

Figure 4-5: Satellite map showing Mit Elkorama and Gogar villages and surrounding communities

- **Mansoura (Sector 42-45, Mit Khamis village)**

Mansoura city (Sector 42-45, Mit Khamis village) is located in Mansoura Markaz about 125 km from Cairo, bordered from north by Izbet Sursuq , Talkha-Damitta road and from south by Nuqaytah, Mansoura-Mit Ghamr road and from east by Mansoura and from west Mit ElKorama ,Gogar villages. (Figure 4-6)

Figure 4-6: Satellite map showing Mansoura city (Sector 42-45, Mit Khamis 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.

The measurement location was chosen on the basis that it is beside a school and near a residential area beside a main road and close to the pipeline route. The GPS coordinates of the selected Ambient Air monitoring locations are shown in the table below.

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

Table 4-1: Location of Air and Noise measurements

Area	Latitude	Longitude
(Aga city) Aga's Preparatory school / Residential area	30° 56' 21.29" N	31° 17' 48.70" E
(Bilqas city) Bilqas high school	31° 12' 24.63" N	31° 21'3 8.67" E
(Nabaroh city) Nabaroh's School for Hotel Affairs and Tourism Services/ Residential area	31° 5' 34.84" N	31° 18' 15.25" E
(Mit Elkorama, Gogar villages) Gogar's Preparatory School / Residential area	31° 3' 17.67" N	31° 22' 48.91" E
(Mansoura city) Sandoub Industrial Secondary School	30° 39' 2.72" N	31° 2' 8.11" E

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

Results of ambient air quality measurements:

The concentrations of measured air pollutants in the studied areas 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, NOx, SOx and CO are unlikely to surpass permissible levels due to operation of construction equipment. Management and mitigation plans for ambient air pollution are further addressed in chapters 6 and 7.

During the construction phase, excavation and construction activities will likely cause dust levels to surpass permissible levels at the construction areas. As the excavation and construction are done on the same workday, therefore, the duration of permissible levels being surpassed will be intermittent for the duration of the workday i.e., 8-10 hours. Management and mitigation plans for dust concentration beyond permissible levels are further addressed in chapters 7.

Table 4-2: Aga, Bilqas, Nabaroh, Mansoura, Mit Elkorama and Gogar average air Quality Measurements

Area	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)	PM^{10} ($\mu g/m^3$)	T.S.P ($\mu g/m^3$)
Aga	19.55	26.375	45.925	14.0875	2.6875	69	107
Bilqas	2.0375	7.8	8.2	5.4375	2.7625	103	117
Nabaroh	18.3	25.625	45.15	14.7125	3.0375	79	109
Mansoura	16.3	24.5	40.8	13.9625	2.8875	77	110
Mit Elkorama& Gogar	18.425	24.4375	42.8625	13.25	3.1	79	126
Limits	150	350	150	350	30	150	230

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 4-3: Aga, Bilqas, Nabaroh, Mansoura, Mit Elkorama and Gogar Noise Measurements

Area	LAeq	National Limits	International Limits
Aga	55.69	60	70
Bilqas	50.00		
Nabaroh	56.24		
Mansoura	55.66		
Mit Elkorama& Gogar	57.6		

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

Results of noise measurements

The noise measurements in the studied areas 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 chapter 7.

4.1.3 Climate

4.1.3.1 Temperature

Table 4-4: Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura [2]

Area	Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Aga	Temp. (°C)	13.1	13.7	15.7	19.4	22.6	25.6	26.6	26.5	25.1	22.7	18.6	14.8
Bilqas		13.3	13.9	15.7	18.9	22	25.1	26.3	26.6	25	22.7	18.9	15.1
Nabaroh		13.3	13.9	15.8	19.2	22.4	25.4	26.5	26.5	25.1	22.8	18.9	15
Mit Elkorama, Gogar		13.3	13.9	15.8	19.2	22.4	25.4	26.5	26.5	25.1	22.8	18.9	15
Mansoura		12	13	15	19	23	25	27	27	24	23	20	15

4.1.3.2 Rainfall

Table 4-5: Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura [3]

Area	Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Aga	mm	13.8	9.3	6.8	3.5	2.1	0.1	0	0	0	2.9	7	10.2
Bilqas		23.8	14.8	12	5.1	1.9	0.1	0	0	0	6.5	11.2	17.7
Nabaroh		18.1	11.9	9.4	4.2	2	0.1	0	0	0	4.8	8.9	13.3
Mit Elkorama, Gogar		18.1	11.9	9.4	4.2	2	0.1	0	0	0	4.8	8.9	13.3
Mansoura		13	9	6	3	3	0	0	0	0	4	7	11

4.1.3.3 Relative humidity

Table 4-6: Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura [4]

Area	Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Aga	RH%	70.2	67.7	65.7	60	58.1	59.7	66.5	69.7	68	67.3	70.4	70.3
Bilqas		72	70.7	68.6	64.3	63.5	64.5	69.7	71.8	70.5	70.1	72.2	72.2
Nabaroh		70.7	68.8	66.7	61.9	60.7	62.1	67.7	70.3	68.9	68.4	70.9	70.9
Mit Elkorama, Gogar		70.7	68.8	66.7	61.9	60.7	62.1	67.7	70.3	68.9	68.4	70.9	70.9
Mansoura		80	79	76	70	63	65	73	76	75	75	78	84

[2] *Source: www.weatherbase.com*
[3] *Source: www.weatherbase.com & www. en.climate-data.org*
[4] *Source: www.weatherbase.com*

4.1.3.4 Wind

Table 4-7: Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura [5]

Area	Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Aga	Km/hr	10.8	12.2	13.3	13	12.6	11.9	10.8	9.7	10.1	10.4	9.7	10.1
Bilqas		11.9	13	14	13.7	13.3	12.2	11.5	10.4	10.4	10.8	10.4	11.2
Nabaroh		11.5	13	14	13.7	13.3	12.2	11.5	10.4	10.4	10.8	10.4	10.8
Mit Elkorama, Gogar		11.5	13	14	13.7	13.3	12.2	11.5	10.4	10.4	10.8	10.4	10.8

4.1.4 Water resources

4.1.4.1 Groundwater

Groundwater is unavailable in the 5 studied areas.

4.1.4.2 Surface water

There are no canals or drainages in the project areas. The areas are mainly rural to semi-urban with trees and palms. However, at the entrance of Mit Elkorama, Gogar and Nabaroh, there is waterways but will not be crossed by pipelines.

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 areas.

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

Flora

There had not been flora recorded in the studied areas Except some non- significant exotic species such as ***Arundopliniiat*** at Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura.

[5] ***Source:*** *www.weatherbase.com*

Arundo plinii and Casuarina equisetifolia in Aga	
	

Figure 4-7: Shows flora at Aga.

Fauna

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

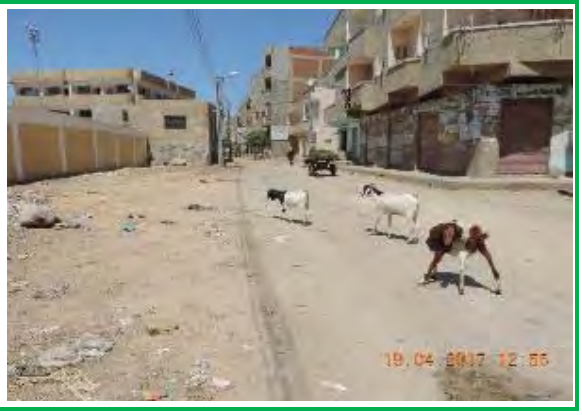
Bubulcus ibis at Mit Elkorama	**Domestic animals exist at Gogar**
	

Figure 4-8: Shows fauna at study areas

4.1.6 Waste Management:

Solid Waste:

The responsibility of service planning, delivery and monitoring in Al Dakahliya Governorate is delegated to Cleansing and Beatification Agency managed by Presidency of the City Council and local units.

In most cases, the proportion of waste collected in the capital cities of the selected Governorates exceed 70 - 80%, However, in other cities at the Marakez, the Figure is likely to be lower; - Few collection bins existed in the districts of AL-Dakahliya Governorate, then will be transferred by local units Trucks to the dumpsite (Sandoub Dumpsite for Aga city, Mit Elkorama, Gogar villages and Mansoura, Dirin Dumpsite for Nabaroh city and Egyptian Solid Waste Recycling Co. (ECARU) for Bilqas as follows:

Aga, Mit Elkorama, Gogar and Mansoura (Sandoub Dumpsite)	
Nabaroh (Dirin Dumpsite)	
Bilqas (Egyptian Solid Waste Recycling Co. (ECARU)	

Figure 4-9: Shows dumping area at Aga, Bilqas, Nabaroh, Mansoura Mit Elkorama and Gogar

Liquid Waste:

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

4.1.7 Potential Sensitive areas:

No ecological sensitive receptors have been observed along route of the main feed line and network extension except human receptors in residential areas such as specified in table 4-1. During the gas distribution network execution within the residential areas, the safety procedures of construction can be followed as following:

- Precaution signs,
- Security personnel

4.2 Socioeconomic Baseline

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

This section will highlight the following socioeconomic characteristics of the project areas including: 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, gender dimension of the current type of fuel, and physical cultural resources.

Project Area

Dakahliya is one of the oldest Governorates of Egypt. It is located in the northeastern part of the country in the Nile Delta, the capital is Mansoura. It is bounded by Gharbia and Kafr el-Sheikh governorates on the west, the Mediterranean on the north, Damietta on the northeast and Qalyobia on the south. The total area of the governorate reaches 3538 Km^2, equivalent to about 0.4% of the total area of the Republic.

The population density reaches 1.61 thousand inhabitants / km^2. The population of the governorate is estimated by about 6140592 (2016), representing about 6.80% of the total population of the Republic.

The project will be implemented in five villages of Dakahliya governorate; Aga, Bilqas, Nabaroh, Mansoura Mit Elkorama and Gogar. The following table illustrates the project areas.

Table 4-8 Project Areas[6]

Governorate	District (Markaz)	Village
Dakahliya	Aga	Aga
	Bilqas	Bilqas
	Nabaroh	Nabaroh
	Talkha	Mit Elkorama and Gogar
	Mansoura	Mansoura

Economic activity

Dakahliya Governorate is considered one of the major agricultural governorates in Egypt, where the cultivated area in it reaches 683 thousand feddans. It is famous for the cultivation of traditional crops such as: cotton, rice, wheat and maize. Furthermore, the government is considered among the areas rich in water potentialities, and fish wealth.

Industrial establishments spread all over the governorate. It is famous for a number of old and diverse industries, most important of which are: fertilizers; chemical industries; spinning, weaving and ready- made clothes; hydrogenation of oils and soap; particleboard and resins; hulling rice; mills; cotton ginning; dairy; and printing and publishing. This is in addition to small-scale and environmental industries that spread in all villages across the governorate. It also includes three industrial zones; southwest of Gamasa, Al- Asafra and Markaz Al-Mataria. The project will be implemented in five villages of Dakahliya governorate; Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura. The following table illustrates the project areas.

Table 4-9 types of crops[7]

Region (Markaz)	Cultivated Area (Feddan)	Crop Typs
Aga	169.04	Rice, wheat, Maiz, cotton and Alfalfa
Bilqas	1500	Rice, Wheat, Cotton and beet
Nabaroh	2512	Rice, wheat, Maiz, cotton ,Alfalfa and Saccharum
Mit Elkorama & Gogar	880	Rice, wheat
Mansoura	174.22	Rice, wheat, Maiz, Alfalfa

[6] ***Source: CAPMAS***
[7] ***Source: field visits observations***

4.2.1 Administrative affiliation

The total area of Dakahliya Governorate of 3538.23 km^2, divided into (16) administrative districts (Markaz) and (19) cities These cities include 120 village units, where 366 villages are affiliated to Markaz . Bilqas is the largest in area in the governorate, followed by Markaz Mansoura.

4.2.2 Urbanization Trends

Based on the observations during the site visits, the five sites; Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura can be classified as semi-urban and urban areas. The following table describes the urbanization features for each proposed site:

Table 4-10 Urbanization indicators for the project villages[8]

Governorate	Village	Urbanization Indicators	Buildings Density
Dakahliya	Aga	This large town is semi-urban area on the Cairo-Dakahliya high way. Agricultural lands represent 63% of Aga city. The local streets are dust and asphalt in a moderate condition, percentage of asphalted roads is medium as an indicator for urbanization. Commercial activities available Aga markaz is renowned for food processing industries such as vegetables and fruits packing, fruits jam and juices. Aga is also eminent in wood, glass and garments industries. It is also known for growing rice, wheat, maize, cotton, vegetables and fruits. **Semi urban**	**High**
	Bilqas	Bilqas is a town located near the city of Mansoura and the town of Gamasa. It is located in the north-western corner of the Dakahliya The local streets are asphalt in a moderate condition, percentage of asphalted roads is medium as an indicator for urbanization. Commercial activities available include Fruit and vegetable stores, as well as gold shops, textiles, restaurants, groceries, local cafes, medium-size industries, small workshops, and urban residential areas. Buildings are higher, 5+ floors. Bilqas is home to Coptic, ancient palaces and villas which were once owned by princes and merchants **Semi urban**	**High**
	Nabaroh	Nabaroh city, small semi-urbanized area, residential areas, commercial activities (Salted fish, commercial shops,) no factories or industrial zones. Buildings are higher, 5+ floors. The local streets are dust and asphalt in a moderate condition. **Semi urban**	**High**
Dakahliya	Mit Elkorama and Gogar	These are two small neighboring villages, overlocking agriculture lands, small semi-urbanized area, residential areas, small commercial activities (Detergent, groceries, Fodder shop), no factories or industrial zones. Most buildings are between 2-3 floors. Local streets are narrow, dusty and crowded. Typical features of the villages are mosques, schools, service buildings belonging to the government i.e. health unit, youth center, local	**Medium**

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

Governorate	Village	Urbanization Indicators	Buildings Density
		administration unit, and a few local shops. Most of the people in the villages engage in agriculture. **Villages**	
	Mansoura (Sector 42-45 in Mit khamis village)	Very small village, small semi-urbanized area, residential areas, small commercial activities (Cafeteria, groceries, local cafes), no factories or industrial zones. Buildings are higher, 5+ floors. The local streets are dust and asphalt in a moderate condition **Semi urban**	**High**

Aga City	
Masjid El-Kabier	Saint George Coptic Church
	
Bilqas City	
Masjid El-Taqwa	Saint Mary Coptic Church
	
Nabaroh City	
EL Hady Masjid	Saint Mary Coptic Church Church
	

Figure 4-10: Pictures showing some of Aga, Bilqas, Nabaroh city's Landmarks.

Mit Elkorama, and Gogar villages	
Railway Road	**Mit El korama primary school**
	
Mansoura city	
Masjid Ali Ibn Abi Taleb	**Mamdouh Osman School**
	

Figure 4-11: Pictures showing some of Mit Elkorama and Gogar villages and Mansoura city Landmarks.

Dwelling Characteristics:

Dakahliya Governorate is a rural governorate where around 70% of the total land area is agriculture land. New and most houses in the project areas are built using red brick. White stone is used. The houses are joined to one another in a continuous row. Concrete is used more in the construction of ceilings of houses, particularly in new houses. Other materials, such as wood, are used. There are very few old houses; usually one or two floors high which are built using mud bricks plastered with mud and straw. Only the suitable houses (according to the best gas connections codes and standards) will be connected.

Table 4-11 Dwelling indicators[9]

Governorate	Village	Urbanization Indicators
Dakahliya	Aga	Small Town. Housing density is medium. Buildings area 5-10 floors and more like cities.
	Bilqas	More urbanized town, Housing density is high, most buildings are 5-10 floors
	Nabaroh	Housing density is moderate. Most buildings are +5 floors.
	Mit Elkorama & Gogar	Small villages, Housing density is low. Most buildings are 2-4 floors.
	Mansoura (Sector 42-45 within mit khamis village)	small village, close to Mansoura. Mixed nature; residential and small commercial Housing density is moderate. Most buildings are +5 floors

+5 floors building in Bilqas

Aga Buildings, red bricks and small commercial shops

Nabaroh building, +5 floors, commercial shops (salted fish, groceries)

Mit Elkorama Agriculture area

Gogar Housing density is low. Most buildings are 2-4 floors.

Mansoura (Sector 42-45 , Mit Khamis village) semi urbanized and with +5 floors buildings.

Figure 4-12: Pictures showing some Dwelling indicators.

[9] *Source: field visits observations*

4.2.3 Road distribution network and traffic

The five areas are connected to other areas by asphalt roads. Local streets consist mainly of narrow, dirt and winding footpaths. The width of the main streets within the five areas are varies between 10-15 meters, while the width of the sub-streets varies between 3-5 meters except Mit Elkorama and Gogar villages road varies between 3-5 meters. The following table provide more details on streets status.

Table 4-12 Streets status and traffic in the project areas

Governorate	Village	Streets status	Traffic density
Dakahliya	Aga	**Local streets consist of:** • Main wide asphalted streets as thawra street, pot said street and 23 july street. • Side narrow, dirt and winding footpaths.	Medium traffic density.
	Bilqas	Main street is El Horeya street and El Thawra street, Local sub-streets consist mainly of narrow streets	High traffic density.
	Nabaroh	Main streets asphalt street, sub street consist mainly of narrow streets	Medium traffic density
	Mit Elkorama and Gogar	These villages can be accessed by Talkha-Damitta road. Local streets consist mainly of narrow, dirt and winding footpaths	Low traffic density.
	Mansoura (Sector 42-45 within mit khamis village)	Sector 42-45 belongs to Mit Khamis village which separated from Mansoura through Mansoura-Sandob road. Main streets asphalt street, sub street consist mainly of narrow, dirt and winding footpaths	Low traffic density.

The streets in Aga and Bilqas are congested with private vehicle, microbus station and Tuktuk , while in Nabaroh, Mit ElKorama, Gogar and Mansoura pickup truck, TukTuk, carriage pulled by donkeys, bicycles, motorcycles are the most means of transport.

Main asphalted street including motorcycle, tricycles	Groceries,building within Mit Elkorama
	
Entrance of Nabaroh	Mit Elkorama main street

Figure 4-13: main streets in Nabaroh and MitElKorama

Carriage and Tuktuk within Mit elkorama and Gogar	Means of Transportations witin Mansoura (sector 42-45,Mit Khamis)
	

Figure 4-14: main streets in Mit ElKorama and Gogar and Mansoura

4.2.4 Demographic Characteristics

Total population:

Total population and number of households, within the five areas presented in the table below:

Table 4-13 Distribution of population in project areas[10]

Governorate	Area	Population	Potential clients
Dakahliya	Aga	27000	9500
	Bilqas	141264	25200
	Nabaroh	69324	20800
	Mit Elkorama & Gogar	90000, 30000	5600
	Mansoura	439000	3500

Rate of natural increase:

The birth rate in Dakahliya is 25.8 per 1000 of population, the death rate is 6.5 and the rate of natural increase is 19.3 (CAPMAS Statistical Year Book 2016). The annual population growth rate in Dakahliya is 1.9. (Egypt HDR 2010)

[10] ***Source: villages local units, CAPMAS, Gas Misr***

4.2.5 Household size

A household is defined as "Family (and non-family) members who share residence and livelihood, and operate as one social and economic unit". The average family size in Dakahliya governorate is about 5.98 persons. The following table illustrates the average family size in the project areas.

Table 4-14 Average family size[11]

Governorate	Village	Family size
Dakahliya	Aga	5.06
	Bilqas	5.06
	Nabaroh	5.98
	Mit Elkorama & Gogar	5.98
	Mansoura	4.6

4.2.6 Access to basic services

Access to basic services, water supply, sanitation and electricity is one of the main pillars that determine the economic well-being of the community.

According to the frequent site visits to the project areas and the focus group discussions, the five areas found to have access to basic services, such as; electricity, sanitation, and potable water. Thus, it will be possible to install the NG to the project sites.

The following table contains the percentage of individuals who have access to basic services in the project areas.

Table 4-15 Access to basic services[12]

Governorate	Area	Percentage of persons having access to portable water	Percentage of persons using electricity for lighting	Percentage of persons having public sanitation network
Dakahliya	Aga	100%	100%	100%
	Bilqas	100%	100%	100%
	Nabaroh	95%	100%	95%
	Mit Elkorama & Gogar	95%	95%	95%
	Mansoura (Sectors 42-45)	100%	100%	100%

[11] ***Source: villages local units, CAPMAS***

[12] ***Source: villages local units, CAPMAS***

4.2.7 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 areas (Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura)

Education:

Dakahliya is one of the most highly educated governorates with a high proportion of educated people out of the total population. Perhaps the reason for this is due to the high population density, making the citizens of Dakahliya enroll their children in different education levels to enhance their chances in the future job market. The adult literacy rate (+15) is 65 where the national rate is 70.4% and combined basic and secondary enrollment rate is as high as 96.6% where the national rate is 77.6%. There are 24 students per each teacher (Egypt average is 23 students per teacher)[13].

Table 4-16 Education status in the project areas[14]

Governorate	Areas	Education status
Dakahliya	Aga	Unlike most of the Egypt's countryside that facing a serious shortage in the education facilities, Aga has reasonable number of educational authorities: 3 Technical Educational School, 4 School, 2 industrial educational School, 1 Commercial educational School, 3 Kindergarten and 1 institute of Al-Azhar
	Bilqas	Bilqas has reasonable number of educational facilities: 8 Kindergarten, 18 Primary schools, 9 Prep Schools, 2 Professional Preparatory, 5 high schools, 6 Industrial technical Schools, 3 Secondary Agricultural Schools, 6 Secondary Technical Industrial Schools and 3 Secondary Technical Agricultural Schools
	Nabaroh	Nabaroh has reasonable number of educational facilities: 7 Primary schools, 2 Prep Schools, 1 high schools, 1 Commercial Educational School, 1 Industrial Educational School, 1 Hotel Educational School and 1 Arabic Lines School.
	Mit Elkorama & Gogar	Mit Elkorama & Gogar has 8 schools: 5 Primary schools and 3 Prep Schools.
	Mansoura (sectors 42-45)	Mansoura (Sectors 42-45) has 1 prep School

[13] *Egypt Human Development Report 2010*

[14] *Source: field visits observations*

Unemployment and work status

Labor force (15+) is 34.6% of total population at the governorate level according to the Human Development Report 2010 Around 24.7% of the labor force are women. Percentage of labor force working in agriculture is 33.9%, industry 18.5%, services 47.6% Observations from field visits and social assessment show that the majority of population resides in Mit Elkorama & Gogar and Nabaroh are farmers, workers, teachers, craftsmen, and employees. In urban areas (i.e. Mansoura and Aga) there are more skilled workers i.e. carpenters, drivers, and workers. Thus, the Gas Connection company, should consider the current skills profile during local hiring. Observations and discussions indicates that the households can afford to pay NG installation costs where the availability of reasonable installment plan is highly desired.

The formal Statistics obtained from the Poverty Mapping Data 2013 regarding manpower reflected that the age of starting work is 15 years old.[15] 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 areas where agriculture work and sales activities are in place, there is a big number of underage laborers were noticed. As a conclusion, there is a 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.

4.2.8 Poverty index

Although the prevalence of poverty (poverty rate) is higher in rural areas and highest in rural Upper Egypt, poverty grew the most in urban areas in Egypt during 2009-2011 (by 39.1 percent in urban governorates, by 41.1 percent in urban Lower Egypt and by 38 percent in urban Upper Egypt) where considerable pockets of poverty exist. Around 20% of people in Dakahliya are considered poor (CAPMAS 2013). This makes the governorate in relatively positive position in terms of poverty ranking. Poverty percentage is estimated to be higher in Mit Elkorama & Gogar and Nabaroh since they are rural areas where poverty rates are usually higher due to lack of industrial, commercial activities, income sources and job opportunities. During the social assessment, the majority of households in the project areas expressed their willingness to be

[15] Based on Labor law number 12 of year 2003 and The Child Law (No. 12, 1996). There are certain critical obligations to recruit children below 15 years old. Article 98-103 of Labor law put limitations related to age, type of occupation, hazards work…etc.

connected to the NG and that they can afford to pay NG installation costs either in cash or in installments.

4.2.9 Income and expenditure

GDP refers to the total value of services produced using internal and external resources where the economic situation is one of the main pillars of human development. Dakahliya is ninth ranking among the governorates of Egypt for per capita GDP. Per capita GDP is around 9111 EGP where Port Said the highest is 10527 EGP[16]. The level of income is relatively low in Mit Elkorama & Gogar and a bit higher in other project areas. Main sources of income are agriculture, services, governmental occupation and transfers from workers in Gulf countries. Most of salaries are relatively low in rural areas, and bit higher in urban areas (i.e. Mansoura, Bilqas and Nabaroh). Social Assessment field visits estimates refers to the average income for adults in Mit Elkorama & Gogar is between 1499 EGP -2499 EGP per month; Bilqas, Aga, Nabaroh and Mansoura 1996 EGP-2998 EGP per month.

4.2.10 Fuel currently used in households

The highest proportion of fuel consumption in Dakahliya is in the rural areas. The majority of the samples surveyed in the project areas reported that, the main type of fuel used for cooking is the LPG cylinders. The source of aforementioned type is mainly the LPG vendors (Sareha). The second source is the LPG outlets. Field survey stated that, the average cost of LPG cylinders per household in rural areas (i.e. Nabaroh) is 30 EGP-45 EGP per month / 360 EGP-540 EGP per year. These number are higher in larger cities like Mansoura and Bilqas. This cost is relatively high cost comparing to local people income.

The average consumption of LPG cylinders for cooking per household ranges between 1 to 2 cylinders monthly. While during winter each household consumes between 2 to 4 cylinders monthly. With regards to the fuel used for water heating, the majorities of the samples surveyed in the project areas rely upon LPG cylinders, while very few percentages of the samples surveyed rely upon electricity.

4.2.11 Problems faced with the current household fuel

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

- High cost of LPG and price fluctuations especially during winter

[16] source: Human Development Report 2010

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

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

4.2.12 Perception towards the project

During the social assessment field work, the team recorded notable and tremendous public acceptance by the community towards the proposed project. The burdens and financial hardships experienced by the community people (especially women) in obtaining LPG cylinders (the current household fuel) created an actual need to install NG. It is obvious that the majority of the samples surveyed in the project areas (Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura) have positive perceptions about NG connections project. They reported that NG has many benefits:

- NG will save community people's efforts and money
- It is reliable, safe, and available
- It will limit the quarrels and fights that occur to obtain an LPG
- It will also limit vulnerability to LPG shortages
- It will save electricity that is used in electricity heater and reduce the cost of electricity bills

4.2.13 Gender dimension of the current type of fuel

Females are the main player when it comes to the domestic labor related to handling LPG. According to the interviews and the focus group discussions:

- Women in the project village are responsible for travelling to other villages in many cases to bring LPG cylinders. They are also responsible for carrying the LPG cylinders from the outlets and installing them to their stoves or water heaters, as the LPG outlets are located outside the village, which adds more pressure on women in terms of time, effort and money.
- There are LPG outlets and LPG vendors in the project locations; Mansoura, Aga, Bilqas, Nabaroh, and Mit Elkorama & Gogar.

4.2.14 Willingness and affordability to pay

For the planned NG connection project, the contracting fee for each client is estimated to be 2160 EGP. This includes the cost for up to two devices (cooker / heater). There is an option for a payment plan through an agreement with El-Ahly bank, as a facilitation for the clients. From the social assessment and the field visits discussion, it has been found that most people at the project areas are highly willing to convert to the NG. This is due to the high cost, difficulties of securing LPG cylinders and the associated risks issues. Community people are much in favor to host the project. However, it is crucial for the NG Company to provide clear information about the project in order to guarantee community 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. Eligible households are those households with average monthly electricity consumption, calculated over a period of 12 months, is in the range of 50kWh and 130 kWh/month. This initiative has been approved and is currently being applied to all project areas. The grant covers 50% of the installation costs.

4.2.15 Physical Cultural Resources

Low pressure Natural Gas installation pipework shall only take place in the semi-urbanized areas, no physical cultural resources are expected to be disturbed by project activities. In addition, one of the conditions for connecting natural gas to a given area is the presence of all other underground utilities in that area. This means that excavation will take place in streets that have already been excavated and include underground utilities. Mosques and Cemeteries are located within the four villages, but they are of no direct relevance to the project areas where the NG connections installed in.

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. Furthermore, the analysis of environmental and social impacts is important to detail an effective management and monitoring plan, which will minimize negative impacts and maximize positive ones. The evaluation of the potential impacts on various receptors is based on a significance ranking process described in the following subsection. Details are presented in **Annex 5**.

5.1 Impact Assessment Methodology

The impact assessment methodology adopted for this ESIA is a semi-quantitative "cause-effect" matrix modified from Leopold and Buroz´s Relevant Integrated Criteria. The Leopold matrix is two-dimensional, where the stages of the project (activities) are assessed in relation to the existing environmental characteristics and conditions that may be affected during the execution of those actions. The impact of each activity on each receptor was assessed according to magnitude on a scale of -10 to 10, where negative values indicate a negative influence on the receptor, and importance on a scale of 0 to 10, which encompasses the probability of occurrence, frequency of the impact etc. The numbering system is used as a relative measure, where more negative numbers correspond to impacts having a higher negative magnitude. Susceptible receptors and corresponding activity are deduced if magnitude and importance are of minor severity. Then the importance of each impact by activity is determined based on the Buroz relevant integrated criteria. The importance of each impact by activity is assessed by assigning a score for intensity (IN), extension (EX), momentum (MO), persistence (PE), reversibility (RV), recoverability (MC), synergy(SI), accumulation (AC), effect (EF) and frequency (PR) of the impact. The importance, I, is determined according to **$I = \pm (3IN + 2EX + MO + PE + RV + SI + AC + EF + PR + MC)$.** For both methods, the severity of the impact is defined as either irrelevant, minor, medium, or major. To assess the impacts of the project activities on environmental and social receptors, a semi quantitative approach based on the Leopold Impact Assessment Methodology with the Buroz Relevant Integrated Criteria was adopted.The table below presents the classification of impact ratings and respective importance of impact values.

Table 5-1 Impact Assessment Methodology

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

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

5.2 Impacts during Construction

5.2.1 Positive impacts

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

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

  The project is anticipated to result in creation of different job opportunities. Based on similar projects implemented recently by EGAS and the local distribution company, 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, According the information from Egypt Gas, the construction of the low pressure network in Dakahlia is anticipated to generate on average 60-70 worker, 3 engineers and 25 technicians. This number is flexible and might be changed in case of the need to work in all project sites in parallel.

- **Indirect benefits**

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

5.2.2 Negative Impacts

The process of environmental impact assessment during construction phase indicate that some receptors have irrelevant impacts in Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura; those receptors include Ecological (fauna or flora), weak structures, cultural sites and land use. The receptors which might be affected during the construction phase will be as follows:

5.2.2.1 Air Emissions

Environmental impacts

Construction of the network pipeline will include several activities such as excavation, land clearing, concrete foundations, transportation of construction material and equipment, burial of cables and pipes, etc.

Those activities in consequence are expected to emit air pollutants to the ambient air. Table (4-2) showing that the concentrations of measured air pollutants in the studied areas are below national and WB guidelines. As a result, we can conclude that ambient concentrations of gaseous pollutants, NOx, SOx and CO are unlikely to surpass permissible levels due to operation of construction equipment. Also, construction activities will be conducted for a short period. The following air pollutants are foreseeable for most of the construction activities:

- Particulate matter and suspended solids from excavation/backfilling operations
- Possible dispersion from stockpiles of waste or sand used for filling trenches.
- Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SOx, NOx, CO, VOCs, etc.
- Fugitive dust emissions (PM10, PM2.5)
- Traffic congestions resulting from road closure or slowing down of traffic due to excavation works.

5.2.2.2 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 in Nabaroh, Mit Elkorama and Gogar districts are likely to generate more dust due to the dusty status of those roads compared to asphalted streets in Aga, Bilqas and Mansoura districts.

5.2.2.3 Gaseous pollutants emissions

Machinery used during construction such as excavators, generators, boring machines, etc. are certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and WB permissible levels.

On urban roads, traffic congestion may lead to increased exhaust emissions. Traffic management with local authority will reduce the impact of works on road congestion and associated emissions. The emissions will be mostly limited to the construction phase and therefore are temporary.

Socioeconomic Impacts

Air impacts related to excavation works will differ from one village to another according to the population, time of excavation work, the nearby of excavation place to the places crowded with people such as: schools, markets, and microbus and TukTuks stations.

Air emissions impacts are expected to be temporary, local, and of **medium severity**.

5.2.2.4 Noise

Environmental impacts

Table (4-3) showing that noise levels in the studied areas are below national and WB guidelines. As a result, we can conclude that Noise levels unlikely to surpass permissible levels due to operation of construction equipment. However, the activities will be temporary and for short time.

Traffic interruption due to excavation can cause congestions, which can result in increased ambient average noise intensity levels

Socioeconomic Impacts

Noise impacts related to excavation works will differ from one village to another according to the population, time of excavation work, the nearby of excavation place to the places crowded with people such as: schools, markets, and microbus and TukTuk stations.

Noise impacts are expected to be temporary, local and of **minor severity**

5.2.2.5 Soil

The excavation activities will result in disturbance of the soil and geological characteristics. This will be more pronounced in the trench's area (around 0.2 to 2-meter depth) where excavation,

pipeline laying, and soil compaction as a result of heavy equipment take place. Soil disturbance at higher depths will also take place in case of applying HDD technologies in crossing the railway (at the entrance of Mit Elkorama village). In addition, potential soil contamination may take place as a result of spillage or leaks

The impact on soil considered **medium severity.**

5.2.2.6 Water

Surface water

There are no canals or drainages in the project areas. The areas are mainly rural to semi-urban with trees and palms. However, at the entrance of Mit Elkorama, Gogar and Nabaroh, there is waterways. Although It will not be crossed by pipelines, it may be susceptible to pollution resulting from uncontrolled dumping of wastes generated during construction.

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

5.2.2.7 Waste generation

Environmental Impact

Normal construction non-hazardous solid wastes including scrap concrete, steel, bricks, packaging waste, used drums, wood, scrap metal, and building rubble will be generated.

There is no permanently labor resident during the project duration. Human or domestic wastes generated by construction labor, including sewage and garbage collected from the labor location. Disposal of sewage and garbage generated from construction labor, if not transported to adequate sites, will be a continuation of the existing sanitation situation and contribute, although to a relatively low extent, to environmental deterioration. This kind of wastes has to be transported outside the site.

Solid hazardous wastes generated include empty containers, spent welding materials, solvents, paints or adhesives, and other hazardous wastes resulting from operation and maintenance of the equipment and vehicles, i.e. spent oils, spent lube, waste oil filters, batteries, etc. Among the hazardous wastes also are the wasted or faulted materials.

Adverse impacts on the environment from the possible improper disposal of the solid wastes and hazardous waste.

Socioeconomic impacts

Waste recycling/disposal sites will benefit from waste disposal contracts. If waste is not managed properly, it will result in health problems to the surrounding communities.

Therefore, impact considered **medium severity**

5.2.2.8 Traffic Flow (disruption of local and regional traffic)

Traffic flow is not expected to be disturbed by the workers due to the limited expected number of workers. However, it will be affected by the excavation works of the project which does not exceed one day or two days at most. It may result in some adverse impacts:

- Traffic congestion and loss of access due to the excavation and installation works will be vary from village to another according to the population and the services within each village.
    - In Aga, Bilqas and Mansoura districts, the traffic density is higher than other project sites but it is usually limited in the sub streets. However, some of the main streets have high traffic density. As well as, the sensitive receptors i.e. the main commercial areas, local markets, transportation stations and service areas. Therefore, there is a high traffic density at peak times.
    - In Nabaroh, Mit Elkorama and Gogar villages, the traffic density is limited.
- Traffic congestion may affect the drivers and vehicles in case of non-rehabilitation of streets after the project implementation. There should be clear traffic diversion plan for pedestrians, cars, TukTuk and microbus drivers.
- Reduction of Traffic Flow Mobilization of heavy machinery, asphalt breaking, excavation, placement of piping, and backfill activities are bound to limit traffic and accessibility during construction. This may entail narrowing major roads by longitudinal and/or lateral excavation or totally blocking narrow or side roads.
- In addition to reducing the lanes/space available for traffic, impacts may also entail limiting or prohibition of parking along the length of the works. Access to buildings and shop entrances may be limited or constricted in cases where excavations form obstacles for persons and cargo.
- Negative effects on the business of neighboring shopkeepers due to excavation close to such shops. The excavation activities could affect access to shops.

Traffic and access limitation effects are temporary, local, **Medium severity**

5.2.2.9 Occupational health and safety

General risks associated with construction sites are anticipated including 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

The noise intensity level resulting from jackhammers surpasses permissible level of 90 dB (A) for work place with up to 8-hour shifts. Therefore, the use of construction equipment constitutes an occupational and safety health risk on workers operating and in the vicinity of the equipment.

Vibrations

The use of jackhammers will results in the generation of hand-arm vibrations; the typical vibration value is of 9 m/S^2, which exceeds the ACGIH Threshold limit value of 5 m/S^2 (8 hour equivalent total value), but is below the exposure limit of 12 m/S^2 for a total daily duration of less than an hour. Typical drilling activities for excavation works are intermittent.

Electrical shocks and Working at heights

- Faulty equipment or exposed cables can cause risks of electrocution.
- Working at heights
- Household installations will require working at heights, which can result in falls and pose a safety hazard.

Occupational health and safety considered **medium severity**

5.2.2.10 Risk on Infrastructure and underground utilities

Environmental Impacts

Prior to excavation the LDC (Egypt gas) performs exploratory drills to investigate the presence of underground utilities that may have been installed without accurate documentation and maps for its routes and depths. The risk of damage to such utilities during excavations for natural gas pipeline installation is possible, but minimal. In the event that an underground utility is fractured, the most significant potential environmental impact will arise in case a sewerage pipe is broken and wastewater potentially accumulating in the trench. There is also the possibility of overflowing to the streets causing nuisance to the surrounding environment.

Socioeconomic impacts

Breaking a water supply pipe may result in cutting the supply to a number of residential units, which may lead residents to use other sources of water which may be either expensive or unsafe.

Damaging sanitary pipes, electricity underground cables and water pipelines result in severe disturbance to community people. The time needed to resolve problems with damaged utilities is

relatively short (no more than 4-8 days). Additionally, the contractor will be responsible of compensating for damaged pipes

Impacts on underground utilities are expected to be temporary, local, and of minor severity

5.2.2.11 Community health and safety

The excavation works within the project areas will affect the community health and safety:

- **Waste accumulation** illegal dumping and potential burning of construction waste, which will consist mainly of excavated soil and leftover PE pipes can pose health and safety threats to local community. Accumulation of waste in the construction areas might become a hub for insects and unfavorable smells which will negatively affect the surrounding communities. This is one of the potential unfavorable impacts.
- **Project infrastructure** excavation works will result in the presence of open trenches in areas accessible to local community (e.g., in front of building and shops.) The presence of open trenches can pose risks of accidental falls and injuries. Trenches are expected to be open during the work day, and no trenches will be left open after working hours. There was a fear that negligent workers may cause accidents harmful to themselves or to the community members, particularly children, especially close to the excavation sites. Therefore, awareness-raising sessions should be provided to workers and community members to promote safety and health while safety supervisors are hired to oversee excavation sites. These supervisors can be chosen from among community members by NGOs and will be largely responsible for children and their safety around the construction site. Concerning workers, they should be trained on the occupational health and safety measures and they should be strictly monitored. The measures in the environmental management framework should be followed by the contractors.

Community health and safety is temporary, local, **medium severity** for community health and safety

5.2.2.12 Temporary Labor Influx

- Generally speaking having workers in small cities might result in unfavorable impacts on the available resources (e.g. pressure on accommodation, food, health care and medication and potable source of water). It may also result in inconvenience to the local communities, particularly in the areas where communities are conservative or not accustomed to having outsiders. Given the fact that only limited number of workers exist in each of the location during working hours, portion of those workers are local workers and that the LDCs are imposing roles and code of conduct on the contractors to ensure

good behaviors and limit any potential conflict with the communities, it is very unlikely that impacts related to labor influx will be relevant in the project areas.

- Impact related to the labor influx during the construction phase is **irrelevant**

5.2.2.13 Child Labour:

As mentioned in the baseline, child labor is a common practice in the project communities in the project areas. Children below 18 works almost in all projects as they receive low salaries and they are less demanding. This risk should be carefully handled in the ESMP and restrict obligations and monitoring should be applied in the contractor obligations.

The impact of construction activities pertaining to child labor is of **low-medium severity.**

5.2.2.14 Street condition deterioration

Environmental Impact

Streets rehabilitation or restoration following pipeline network installation: is referred to by an Egyptian legal/institutional expression that signifies the responsibility to "restore to original condition". In the context of the project, it applies to the responsibility of the implementing company to provide the necessary resources to re-pave roads and streets to the original state after natural gas excavation and installation works. The current arrangement is that the implementing entity performs the backfilling of the excavated trenches and agrees on a restoration fee with the local government unit (district) to cover the balance of the restoration and pavement cost. The local unit uses the fee to include the restoration and re-pavement of the streets in its "pavements plan".

Socioeconomic impacts

Delays in street restoration may lead to varying degrees of damage to vehicles, loss of access and business, traffic congestions with associated delays and emissions, and a potentially significant public discontentment.

Although the restoration impact may be temporary, localized, and of **minor severity**, it is perceived by the public as **major inconvenience**.

5.2.2.15 Land

Land needed

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

The implementation companies will rent site storage areas in order to store the equipment and excavation tools, in addition, temporary equipment for workers' services. As well as, the companies will coordinate with the district in order to provision sanitation and potable water services.

Land acquisition is not expected. No impact

5.2.2.16 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.

Impact related to visual resources and landscaping is temporary, local and minor

5.3 Impacts during Operation

5.3.1 Positive impacts

- On a national level, reduced expenditure on imported LPG cylinders and subsidies
- As indicated in the Baseline Chapter, women are key players in the current domestic activities related to handling LPG and managing its shortage. Being the arty affected most from the shortfalls of the use of LPG, the NG project is expected to be of special and major benefits to women. This includes, but is not limited to, clean and continuous sources of fuel that is safe and does not require any physical effort and is very reasonable in the price of consumption fees. Time saving is among the benefits to women. The use of a reliable source of energy will allow women to accomplish the domestic activities in less time and this will potentially open a space for better utilization for the saved time.
- The NG connection will help the household achieve a higher level of privacy by eliminating the need for informal LPG distributers from entering private homes. Constantly available and reliable fuel for home use
- Significantly lower probability gas leakage and fire risk compared to LPG
- Improved safety due to low pressure (20mBar) compared to cylinders
- Beneficiaries to benefit from good customer service and emergency response by qualified personnel/technicians **as per presented in Annex 6**
- Elimination of insects and dirt typically associated with LPG cylinders
- Limiting the LPG cylinder 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 in Aga, Bilqas, Nabaroh, Mansoura Mit Elkorama and Gogar those receptors include waste management, noise, air emission, soil and Ecological (Fauna and flora). The receptors which might be affected during the operation phase will be as follows:

5.3.2.1 Community health and safety

In addition to a full array of safety and emergency precautions taken by EGAS and the implementing entities (Local Distribution Companies: 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. This may be due to a lack of awareness, illiteracy, or failures in piping or sealants. Low probability to affect the aesthetic appeal of the buildings, this is due to the installing of the pipelines on the walls of the building.

Concerns of the community people regarding the pipelines safety. The project should increase the community awareness about the emergency place and number.

Considering the low probability of occurrence and the lower density of natural gas (compared with current practice of LPG), impacts on community health and safety due to gas leaks is of **minor severity.**

5.3.2.2 Integrity of natural gas piping

Environmental impacts

- Low-probability events may impact the integrity and safety of the NG network and components during the years of the operation phase.
- Geological and geotechnical events: earthquakes may result in geotechnical instabilities that lead to network breakage or leakage in multiple locations simultaneously. The geological and geotechnical history of the area may also lead to possible events.
- Sabotage: pipelines and other components may be targeted for sabotage.

Socioeconomic impacts

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

Leak impacts may be permanent and highly severe; however, considering the extremely low

probability of occurrence, the impact is of **minor severity.**

5.3.2.3 Economic disturbance

For those who will pay in installments, this may be an added financial burden on the poor families. However, the AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG based on an eligibility criteria (section 4.2.14). This initiative has been approved and is currently being applied to all project areas.

- There could be a Minor negative economic impact on LPG cylinders distributors. (Governmental sector- private sector who have license to distribute LPG cylinders- non-official distributors). The LPG distributors will lose their income. However, their ability to move to other areas or change their business is high. Various previous NG projects have not influenced the informal LPG vendors. Based on the meetings conducted with the LPG cylinder distributors, they reported that the NG will not cover all areas. Inside the same areas covered by the NG not all of the units are technically eligible to be connected to the NG. Therefore, they will continue working in the same areas and in the uncovered areas.
- The surveyed LPG distributors have their vehicle in transporting the LPG cylinders. They reported that this vehicle might be used in transporting other goods. Such activity is also lucrative for them in case of not being able to distribute the LPG cylinders and such approach was adopted during the shortage of LPG cylinders occurred two years ago.

The probability of such impact is minor as LPG distributors manage to perform alternative job

5.3.2.4 Child labor

The LDC have never employed any children during the operation of the networks as they adhere to labor law. Additionally, maintenance and operation activities need highly professional technicians who graduated from secondary schools. They all are above 18 years old.

Child labor risk is assessed as irrelevant

Table 5-2 Impact Assessment

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

Impact	Description	Type	Significance
During Construction			
Air emissions	Air emissions (gases and particulates) during construction can exceed permissible limits and shall arise from: - Particulate matter and suspended solids from excavation/backfilling operations - Possible dispersion from stockpiles of waste or sand used for filling trenches. - Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SOx, NOx, CO, VOCs, etc. - Traffic congestions resulting from road closure or slowing down of traffic due to excavation works. Dust The impact of dust generation (particulate matter) will be limited to the working hours as excavation and backfilling are carried out within the same day. Excavation on dusty or rocky roads such as local roads and some urban roads are likely to generate more dust compared to asphalted streets due to the dusty status of those roads.	Negative	Medium
	Gaseous pollutants emissions Provided machinery used during construction is certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and WB permissible levels. On urban roads, traffic congestion may lead to increased exhaust emissions. Traffic management with local authority will reduce the impact of works on road congestion and associated emissions.	Negative	Medium
Noise	Construction activities of the gas distribution network will likely increase noise levels due to excavation and heavy machinery but not exceeding the WB/IFC guidelines and Law 4/1994-9/2009 standards for noise intensity. However, the activities will be temporary and for short time. Traffic interruption due to excavation can cause congestions, which can result in increased ambient average noise intensity levels.	Negative	Minor
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	Surface Water: Uncontrolled dumping of waste in canals can result in water pollution	Negative	Minor

Impact	Description	Type	Significance
Waste generation	Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination. Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. These wastes should be disposed in licensed sites by the local authority, which minimizes any aesthetic effects of such waste. Poor handling of Hazardous and non-hazardous materials may result in poor containment of induced leaks.	Negative	Medium
Reduction of Traffic Flow	- Traffic congestion and loss of access due to the excavation and installation works will be vary from village to another according to the population and the services within each village. - Affect the drivers and vehicles in case of non-rehabilitation of streets after the project implementation - Congestion and traffic disturbance for both pedestrians, cars as well as the livelihoods of taxi, TukTuk and microbus drivers, Thus, clear traffic diversion plan should be settled. - Reduction of Traffic Flow Mobilization of heavy machinery, asphalt breaking, excavation, placement of piping, and backfill activities are bound to limit traffic and accessibility during construction. This may entail narrowing major roads by longitudinal and/or lateral excavation or totally blocking narrow or side roads. - In addition to reducing the lanes/space available for traffic, impacts May also entail limiting or prohibition of parking along the length of the works. - Access to buildings and shop entrances may be limited or constricted in cases where excavations form obstacles for persons and cargo. - Negative effects on the business of neighboring shopkeepers due to excavation close to such shops. The excavation activities affect having access to the shops.	Negative	Medium
Risks on Occupational health and safety	- General risks associated with construction sites and anticipated include slips and falls; moving lorries and machinery; exposure to chemicals and other hazardous materials; exposure to electric shock and burns, exposure to high noise intensity levels. - Noise impacts on construction workers, technicians and engineers in direct vicinity of the excavation works and heavy machinery are considered more significant than those on residents. Traffic congestions, which could be caused by excavation works, may increase ambient average noise intensity levels.	Negative	Medium

Impact	Description	Type	Significance
Risk on Infrastructure and underground utilities	- Underground utilities and infrastructure pipelines (such as water, sewerage and telecommunication) have been installed years ago without accurate documentation and maps for its routes and depths. Therefore, the risk of damage to such utilities during excavations for natural gas pipeline installation is possible. - The most significant potential environmental impact will arise in case a sewerage pipe is broken and wastewater potentially accumulating in the trench. There is also the possibility of overflowing to the streets causing nuisance to the surrounding environment. - Breaking a water supply pipe may result in cutting the supply to a number of residential units, which may lead residents to use other sources of water which may be either expensive or unsafe. - Damaging sanitary pipelines, electricity and water supply result in severe disturbance to community people. Yet such problem takes short time (no more than 4-8 days). Additionally, the contractor will be responsible of compensating for damaged pipes.	Negative	Minor
Risk on Community health and safety	The excavation works within the project areas will affect the community health and safety by the following means: - Waste accumulation illegal dumping and potential burning of construction waste, which will consist mainly of excavated soil and leftover PE and carbon steel pipes can pose health and safety threats to local community. - Project infrastructure excavation works will result in the presence of open trenches in areas accessible to local community (e.g., in front of building and shops.) The presence of open trenches can pose risks of accidental falls and injuries. Trenches are expected to be open during the work day, with no trenches being left open after working hours. There was a fear that negligent workers may cause accidents harmful to themselves or to the community members, particularly children, especially close to the excavation sites. - Child labor and school dropout	Negative	Medium
Risk of Temporary Labor Influx	- Generally speaking having workers in small cities might result in unfavorable impact on the available resources, e.g. pressure on accommodation, food, health care and medication and potable source of water. Given the size of population in project sites and the availability of most of services; the limited number of workers will not result in any significant impact on the community resources	Negative	Negligible
Risk of Child labor	As mentioned in the baseline, child labor is a common practice in the project communities in Aga, Bilqas, Nabaroh, Mansoura Mit Elkorama and Gogar. Children below 18 works almost in all projects as they receive low salaries and they are less demanding. This risk should be carefully handled in the ESMP and restrict obligations and monitoring should be applied in the contractor obligations.	Negative	Medium

Impact	Description	Type	Significance
Street Condition Deterioration	Street condition deterioration Streets rehabilitation or restoration following pipeline network installation: is referred to by an Egyptian legal/institutional expression (رد الشيء لأصلة) that signifies the responsibility to "restore to original condition". In the context of the project, it applies to the responsibility of the implementing company to provide the necessary resources to re-pave roads and streets to the original state after natural gas excavation and installation works. The current arrangement is that the implementing entity performs the backfilling of the excavated trenches and agrees 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	Land needed Regard to the land needed, there will no land needed for the project. The implementation companies will be temporary need storage area which maybe small plots of land usually are rented land or rented shops that are rent for few days in order to store the equipment and excavation tools, in addition, temporary equipment for workers' services.	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
Operation			

Impact	Description	Type	Significance
Risk on Community health and safety	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.	Negative	Minor
Integrity of natural gas piping	- Low-probability events may impact the integrity and safety of the NG network and components during the years of the operation phase - Geological and geotechnical events: earthquakes may result in geotechnical instabilities that lead to network breakage or leakage in multiple locations simultaneously. - Sabotage: pipelines and other components may be targeted for sabotage. Adverse impact is expected in raising the fear of disruption of Gas supply	Negative	Minor
Risk of Economic disturbance	- For those who will pay in installments, this may be an added financial burden on the poor families(a grant for poor people are currently applied in all project areas). There could be a Minor negative economic impact on LPG cylinders distributors. (Governmental sector- private sector who have license to distribute LPG cylinders- non-official distributors). The LPG distributors will lose their income. However, their ability to move to other areas or change their business is high. Various previous NG projects have not influenced the informal LPG vendors. Based on the meetings conducted with the LPG cylinder distributors, they reported that the NG will not cover all areas. Inside the same areas covered by the NG not all of the units are technically eligible to be connected to the NG. Therefore, they will continue working in the same areas and in the uncovered areas. The surveyed LPG distributors have their vehicle in transporting the LPG cylinders. They reported that this vehicle might be used in transporting other goods. Such activity is also lucrative for them in case of not being able to distribute the LPG cylinders and such approach was adopted during the shortage of LPG cylinders occurred two years ago.	Negative	Minor

6. Analysis of Alternatives

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

The No-Project alternative is not favored as it simply deprives the Egyptian Public and Government of the social, economic, and environmental advantages.

6.1 Pipeline Installation Technology Alternatives

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

6.1.1 Trenchless Technologies

HDD[17] has some advantages compared to auger boring and open-cut technique as follows:

- Compared to the open-cut technology, it doesn't cause interruption to traffic flow.
- Compared to the open-cut technology, it causes fewer disturbances to the surface and sub-surface soil layers.
- Compared to the auger boring technology, it can be used for larger distances and wider range of pipeline diameters.
- Compared to the auger boring technology, it is a surface-launched process which doesn't require drive pits.
- Compared to the auger boring technology, it is a guided method, and accordingly can achieve high accuracy for the pipeline path.
- Can be employed for high depths, and accordingly can avoid any breakage accidents to the existing infrastructure lines/cables.

[17] **See figure number 2-22**

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

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

6.1.2 Open-Cut Method

This is the traditional method for pipeline installation. It is very simple technology which just depends on excavating the soil, laying the pipeline, and backfilling. However, it is technically not possible to be used in crossings with major waterways. It can be used in crossings with major roads and railways; however, this will cause huge interruption to traffic as this will necessitate either re-routing or reducing the number of lanes. This will lead to reduction in the average speed of the vehicles on the road, and may affect the areas devoted for parking. This may also increase the probability of having car accidents, in addition to negative socio-economic impacts as a result of interrupting the flow of people and goods. Open-cut method may be the only possible recommended solution in the 5 studied areas since the pipeline route passes through urban and local roads and does not cross any main road or railway, and this will not negatively affect the environment, and it will be a cheap and safe option

6.2 Routing

The preferred route was selected on parameters like:

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

6.3 Regulators

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

- Easier maintenance
- Less expensive
- More safe

6.4 Working time

As stated in the traffic baseline, some areas are overcrowded from 7 a.m. to 2 p.m. Therefore, it will be useful to apply flexible working time that can avoid working during rush hours. Additionally, in some residential areas, it will be extremely difficult to work during night. Working during morning can be applied in such areas. Moreover, in some areas, there is a weekly market. Such market should be avoided if possible. As a wrap up, the three alternatives related to working time are:

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

6.5 Installation Costs

The average natural gas connection installation cost is about 15590 EGP and consumers contribute a part of it because the balance is subsidized by the Government. A grant for poor people are currently applied in all project area in addition to offering a flexible payment schemes for the installation cost.

7. Environmental and Social Management & Monitoring Plan

7.1 Objectives of the ESM&MP

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

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

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

7.2 Mitigation Measures During Construction Phase

During construction activities, a 24-7 Hotline (**129**) is available for customers and the public to report leaks, damage, emergencies, and/or incidents related to gas connections, components, infrastructure, and activities (inside or outside households) and to request repairs/emergency response/assistance **as per presented in Annex 6**.

This includes possible damage to other underground utility lines (water, wastewater, electricity, phone, Internet) and to buildings and physical structures or cultural sites during excavation/construction activities. It also includes reporting issues resulting from construction activities such as excessive/prolonged noise, vibration, waste, traffic, accessibility, visual, and other community health and safety impacts.

7.2.1 Air Emissions

Air emissions of excavation machinery and diesel-powered electrical units should be within allowable legal limits. Because dust emissions from construction works include non-point sources such as excavation, direct emission levels cannot be measured. On the other hand, monitoring ambient total suspended particles or PM10 could be misleading because of the interference of other sources. Therefore, monitoring activities should ensure point sources, i.e., exhaust of excavation machinery, are within the standards stipulated by the Law. Mitigation measures must be documented. Documentation should consist of standard operating procedures and monitoring reports for emission tests and complaints.

7.2.2 Noise

Mitigation measures proposed to minimize Noise impact are detailed in the ESMP matrix below. Documentation should consist of standard operating procedures and monitoring reports for noise measurement tests and complaints.

7.2.3 Soil

Mitigation measures proposed to minimize Soil impact are detailed in the ESMP matrix below.

7.2.4 Mitigation measures of surface water

Mitigation measures proposed to minimize Surface water impact are detailed in the ESMP matrix below.

7.2.5 Waste

The local unit is responsible for the pick-up and disposal of solid waste. Construction waste such as soil waste is disposed of. Domestic waste is collected from domiciles and collection sites and disposed. Solid wastes generated during the construction phase are classified as either non-hazardous (which includes inert wastes) and hazardous wastes. It is worth mentioning Construction wastes will be generated only during a relatively short period.

Monitoring activities shall depend mainly upon observation of waste stockpiles of soil and construction waste to ensure the frequency of removal from site, and whether they contain hazardous components. Medical or healthcare wastes containing pathologic, contagious, or radioactive constituents as per the definitions of Ministry of Health decree 192 for the year 2001 should be collected, stored and transported separately from any other wastes. Several certified incinerators are available across Egyptian governorates in designated healthcare facilities. In the unlikely case of medical waste, arrangements should be made immediately with the local office of the ministry of health for safe handling and disposal.

7.2.6 Management of Traffic Impacts

Mitigation measures proposed to minimize traffic disruptions are detailed in the ESMP matrix below. Coordination between Egypt Gas/EGAS and the local traffic authority is imperative as the above-mentioned mitigation measures will be implemented by, or in coordination with, the local Traffic Department. Monitoring will be carried out by the local Traffic Department to make sure that flow reduction is within acceptable levels. Coordination should be established between the Traffic Department and the HSE Departments of the implementing gas companies (Local Distribution Companies- LDCs) to ensure compliance and adequate implementation of the identified mitigation measures. LDC HSE should record any comments by the Traffic Department regarding violation of excavation permits by the contractor.

7.2.7 Management of occupational health and safety (OH&S)

A comprehensive and practical occupational health and safety management system must be enforced. The OH&S measures are to comply with all relevant national legal requirements well as international Best Practice such as the IFC EHS General Guidelines. Practical and administrative measures should be taken by EGAS and the LDC to ensure adherence of site crews to OH&S procedures and measures. **Annex 2, Annex 6** presents OH&S for Egypt Gas. Avoiding unacceptable, and illegal, noise levels.

7.2.8 Management of Community health and safety

In addition to all the environmental and social management and monitoring measures in this section which aim for health and safety, awareness-raising actions and signs should be provided to workers and community members to promote safety and health, safety supervisors should be hired by the LDCs to oversee work sites and they will be largely responsible for children and their safety around the construction site. Egypt Gas and LDC should share with the community the timeline of the project especially when the LDC will be entering their street Mitigation measures proposed for minimizing community H&S impacts detailed in the ESMP matrix below.

7.2.9 Management of Temporary Labor influx

Mitigation measures proposed for minimizing temporary labor influx impacts detailed in the ESMP matrix below.

7.2.10 Management of Street Restoration after asphalt breaking

As mentioned in the impacts section of the study, restoration and re-pavement of streets post-construction and excavation is one of the impacts, which are highly perceived by the public. The implementing entity agrees a restoration fee with the local administration unit in charge of the area. The fee is used by the local unit to include the restoration in their re-pavement plans. In some cases, the restoration and re-pavement job is carried out by the Roads and bridges directorate who, in turn, schedule the re-pavements in their own plans. A key to minimize public discontentment and socioeconomic impacts of excavated streets is quick restoration and effective communication with regarding work and restoration schedules.

Mitigation measures proposed for restoration of excavated streets are detailed in the ESMP matrix below.

7.2.11 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. Well-designed and implemented GRMs can help project management significantly enhance operational efficiency in a variety of ways, including generating public awareness about the project and its objectives; deterring fraud and corruption; mitigating risk; providing project staff with practical suggestions/feedback that allows them to be more accountable, transparent, and responsive to beneficiaries; assessing the effectiveness of internal organizational processes; and increasing stakeholder involvement in the project. For task teams more specifically, an effective GRM can help catch problems before they become more serious or widespread, thereby preserving the project's funds and its reputation.

Effective grievance management helps 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.

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. Following are the various stages of grievances. The proposed mechanism is built on three tiers of grievances:

1-The level of site engineer of Egypt Gas in the 5 studied areas
2-On the level of LDC headquarter
3-On the level of EGAS

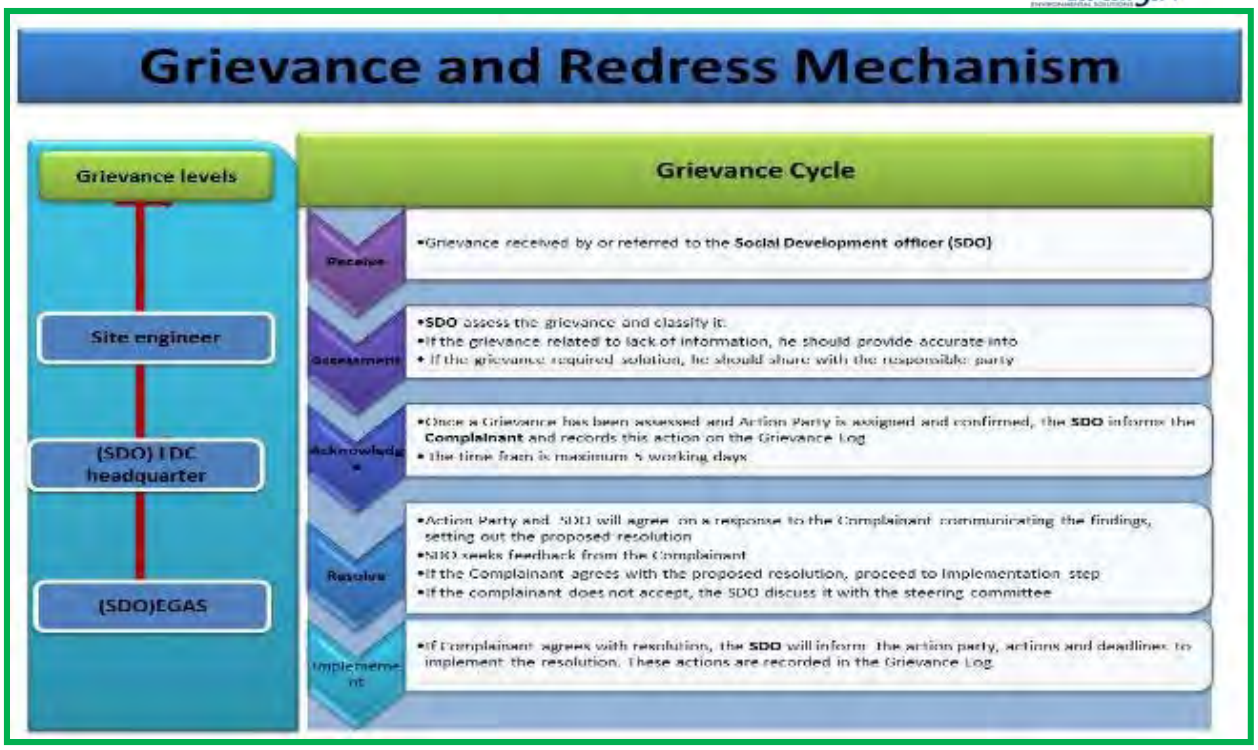


Figure 7-1 Proposed Grievance and Redress Mechanism

7.2.11.1 First tier of grievances

In order to ensure high level of responsiveness to the local communities, it is essential to ensure that a local grievance mechanism is functioning and that the communities are aware of it. Egypt Gas has assigned a Social Development Officer (SDO) (can be more than one) who will be working closely with the assigned SDO of EGAS. It is the responsibility of Egypt Gas SDO to ensure that the GRM system is widely known and well explained on the local level. Moreover, s/he will follow up on the complaint until a solution is reached. The turnaround time for the response/resolution should be 15 calendar days and the complainant should know that he/she should receive response by then.

The grievances should be presented to the following:

- The foreman working on the ground in the 5 studied areas,
- The project manager in the 5 studied areas,

The regional department of Egypt Gas in Dakahliya Governorate, it is worth noting that most of the previous experience of EGAS is suggesting that complaints are usually handled efficiently and resolved on the local level. However, the management of the complaints including level of responsiveness, providing feedback and the documentation of the complaints needs to be significantly strengthened. In case the problem is not solved, the complainant may reach out to the second level of grievance

7.2.11.2 Second tier of grievances:

If the aggrieved person is not satisfied with the decision of the first tier, they can present the case to Egypt Gas headquarters. Complaint form is attached in **Annex 2**. SDO where they should provide resolution within 15 calendar days, following is the second level of grievances:

- The Social Development Officer in Egypt Gas headquarters will handle technical, environmental and land acquisition complaints. Egypt Gas headquarters SDO should receive the unsolved problems. Thereafter, the SDO gets in contact with the petitioner for more information and forwards the complaint to the implementing entities for a solution.
- The SDO should follow the complaints and document how they were solved within 15 calendar days.

7.2.11.3 Third tier of grievances:

If the aggrieved person is not satisfied with the decision of the SDOs of Egypt Gas at Stage 2, they can present the case to EGAS SDO where they should provide resolution within 15 calendar days. The following section presents the third level of grievances:

- The Social Development Officer in EGAS will handle technical, environmental and land acquisition complaints. He should receive the unsolved problems. Thereafter, they get in contact with the petitioner for more information and forward the complaint to the implementing entities for a solution.
- The SDO should follow the complaints and document how they were solved within 15 calendar days.
- The SDO should update the complainant on the outcome of his/her complaint.

7.2.11.4 Grievance channels

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

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

- Trustworthy people, community leaders and NGOs/CDAs will be an appropriate channel to guide petitioner about the various tiers of grievances, particularly, in rural areas.

7.2.11.5 Response to grievances

Response to grievance will be through the following channels

- The response to grievances should be through an official recognized form to ensure proper delivery to the complainant. It is the responsibility of the SDOs to ensure that complainants were informed about the results of handling their complaints.
- Response to grievances should be handled in timely manner as mentioned above, thereby conveying a genuine interest in and understanding of the worries put forward by the community.
- EGAS and Egypt Gas should maintain record of complaints and results.

Table 7-1 Means of verification and indicators

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

7.2.11.6 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. The following indicators will be monitored.

7.2.11.7 Institutional Responsibility for the Grievances

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

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

7.3 Environmental and Social Management Matrix during CONSTRUCTION

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

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Local traffic and accessibility	**Traffic congestion** (and associated noise/air emissions)	Excavation during off-peak periods Time limited excavation permits granted by local unit & traffic department	Excavation contractors	– LDC + – Traffic department	Contractor has valid conditional permit + Field supervision	Contractor costs LDC management costs
		Announcements + Signage indicating location/duration of works prior to commencement of work	– LDC – Excavation contractors	– LDC HSE – Local Unit – Traffic department	Ensure inclusion in contract + Field supervision	
		Apply Horizontal Directional Drilling under critical intersections whenever possible to avoid heavy traffic delays	Contractor	LDC HSE	Field supervision	
		Traffic detours and diversion	Traffic Department	Traffic Department	Field supervision for detouring efficiency Complaints received from traffic department	Additional budget not required
		Road restructuring and closing of lanes			Fluidity of traffic flow	
Ambient air quality	**Increased emissions of dust and gaseous pollutants**	Controlled wetting and compaction of excavation/backfilling surrounding area	Excavation Contractor	LDC HSE	Contractual clauses + Field supervision	– Contractor costs – LDC management costs
		Isolation, covering, transportation in equipped vehicles and disposal of stockpiles			Contractual clauses + Field supervision	
		Compliance to legal limits of air emissions from all relevant equipment			Measure & document emissions of machinery by regular audits request emission measurements	

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
		– Availability of 24-7 hotline service (129) to all beneficiaries and the public for reporting possible leaks, damages or emergencies – Quick response to gas leaks by evacuation of the affected area – Repair or replacement of failed component	LDC	LDC HSE	Field Supervision	
Ambient noise levels Local community Workers	**Increased noise levels beyond WB/National permissible levels**	Ear muffs, ear plugs, certified noise PPE for workers	– LDC – Excavation Contractor	LDC HSE	Contractual clauses + Field supervision (audits)	– Contractor costs – LDC management costs
		Avoid noisy works at night whenever possible			Field supervision Complaints receipt from local administration	
Ground utilities' integrity Local community	**Damage to underground utilities resulting in water/wastewater leaks, telecommunication and electricity interruptions**	Coordination with departments of potable water, wastewater, electricity, and telecom authorities to obtain maps/ data on underground utilities, whenever available	Excavation Contractor	LDC HSE	Official coordination proceedings signed by representatives of utility authorities – Examination of site-specific reports and records – Field supervision	– Contractor management costs – LDC management costs
		If maps/data are unavailable: Perform limited trial pits or boreholes to explore and identify underground utility lines using non-intrusive equipment		LDC HSE Supervisor	– Contractual clauses + Field supervision	
		Preparation and analysis of accidental damage reports		LDC HSE	– Review periodic HSE reports	
		Repair and rehabilitation of damaged components		LDC HSE Local Government Unit Local Police	– Contractual clauses + Field supervision	

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Surface water	**Uncontrolled dumping of waste in canals can result in water pollution**	– Control all onsite wastewater streams and ensure appropriate collection, treatment and discharge. Prevent discharge of contaminants and wastewater streams to ground. – Adequate management and proper handling and storage of construction materials, oils and fuel to avoid spillages	• LDC Contractor	LDC HSE department	Field supervision (audits)	Contractor costs LDC management costs
Streets (physical status) local community and workers (health and safety)	**Hazardous waste accumulation**	– Temporary storage in areas with impervious floor – Safe handling using PPE and safety precautions – Transfer to LDC depots for temporary storage – Disposal at licensed Alexandria hazardous waste facilities (Nasreya or UNICO) – Hand-over selected oils and lubricants and their containers to Petrotrade for recycling	– LDC – Excavation Contractor	LDC HSE	Field supervision and review of certified waste handling, transportation, and disposal chain of custody	Indicative cost items included in contractor bid: Chemical analysis of hazardous waste Trucks from licensed handler Pre-treatment (if needed) Disposal cost at Nasreya Approximate cost of the above (to be revised upon project execution): 8000 EGP -10000 EGP per ton
		– Adequate management of asbestos and any possible hazardous waste	Water Authority + contractor		Field supervision + review of Water Authority manifests	– Contractor costs – LDC

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

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Local community	**Non-hazardous waste accumulation**	– Designate adequate areas on-site for temporary storage of backfill and non-hazardous waste – Segregate waste streams to the extent possible to facilitate re-use/recycling, if applicable – Reuse non-hazardous waste to the extent possible – Estimate size of fleet required to transport wastes. – Transfer waste to disposal facility East of the project area – if the sub-surface table is encountered, the trench should be dewatered and discharge the water into a drain or sewer manhole after sampling and analysis before selecting appropriate disposal method,	– LDC – Excavation Contractor	LDC HSE	– Contractual clauses – Monitoring of waste management plan – Field supervision	– Contractor costs – LDC management costs
Local community	**Destruction of streets and pavement**	– Arrange Restoration and re-pavement (رد الشئ لأصله) with local unit – Communication with local community on excavation and restoration schedules.	– LDC	EGAS	Field supervision Coordination with LGU as needed	Included in re-pavement budget agreed by LDC with local units or Roads and Bridges Directorate
Occupational health and safety	**Health and safety**	– The project will hire a qualified contractor/sub-contractor with the high health and safety standards. In	Excavation Contractor	LDC HSE	Field supervision	– Contractor costs – LDC

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
		addition, the ToR for the contractor and the ESMP will provide the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction. _ Standard protection by placing clear project signs. _ Time management for vehicles movement; especially avoiding the peak hours _ Standard protection for the workers especially working at elevated heights or trench. _ Regular inspection to compelling worker to used their PPE _ Training and licensing industrial vehicle operators of specialized vehicles. _ The contractor also should keep attendance worksheet and laborers ID in order to verify the age of workers _ Health insurance should be applicable to the contractor workers and workers contracted by a sub-contractor _ Full compliance to EGAS and LDC HSE requirements, manuals, and actions as per detailed manuals				management costs

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
		adopted by EGAS _ Ensure the provision of the appropriate personal protective Equipment and other equipment needed to ensure compliance to HSE manuals				
Labor conditions	**Child labor**	_The project will hire a qualified contractor/sub-contractor with the high health and safety standards. In addition, the ToR for the contractor and the ESIA will provide the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction. _Rigid obligations and penalties will be added to the contractor ToR in order to warrantee no child labor is occurred in the project _The ToR also will oblige the contractor to keep a copy of IDs of laborers in order to monitor the hired staff below 18 years old _The contractor also will be obliged to maintain daily attendance sheets in order to verify the attendance of workers in case of accidents and provide the injured persons with proper health insurance	LDC Excavation Contractor / subcontractor	LDC HSE	Field supervision and review of HSE report+ Field supervision (audits)	_ Contractor costs _ LDC management costs

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

Receptor	Impact	Mitigation measures	Responsibility		Means of supervision	Estimated Cost of mitigation / supervision
			Mitigation	Supervision		
Local community Health and safety	**Threat to Safety of users and houses (due to limited level of awareness and misconceptions)**	Prepare Citizen engagement and stakeholder plan Awareness raising campaigns should be tailored in cooperation with the community-based organizations Following are some mitigation procedures to be adopted: _Using caution tapes that help to keep people away of the site, _Informing residents and shopkeepers about the timeline of the project (street by street) in order for the residents to know when to avoid certain streets _Install wooden bars or decks over trenches to allow safe crossing _A worker should support old people to cross the digging areas, especially, on the wooden bars	During the construction LDC	EGAS (SDO) LDC	_ List of awareness activities applied _ Lists of participants _ Documentation with photos _ Awareness reports	_ 40838 EGP per awareness raising campaign _ 40838 EGP for brochure and leaflets to be distributed (material available by EGAS)

7.4 Environmental and Social Monitoring Matrix during CONSTRUCTION

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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Local traffic and accessibility	Reduction of traffic flow and accessibility to local community	Comments and notifications from Traffic Department	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports Complaints log	LDC management costs
Ambient air quality	Increased air emissions	HC, CO% ,opacity, TSP, PM10 and PM 2.5	LDC HSE	Once before construction + once every six months for each vehicle	Construction site	Measurements and reporting of dust and exhaust emissions of construction activities machinery Complaints log	LDC management costs
Ambient noise levels	Increased noise levels	Noise intensity, exposure durations and noise impacts	LDC HSE	weekly during site inspections	Construction site (residential area or near sensitive receptors such as hospitals)	Measurements of noise levels Complaints log	LDC management costs
		Complaints from residents	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs
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	– Streets quality after finishing digging – Number of complaints due to street damage	LDC, EGAS	Four times per year, each three months	Site and Desk work	Checklists and complaints log	No cost
	Threat to Safety of users and houses (due to limited level of awareness and misconception)	– Observation of water accumulations resulting from dewatering (if encountered)	LDC, EGAS	Quarterly monitoring	Office	Reports Photos Lists of participants	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Labor conditions	Occupational Health and Safety	Total number of complaints raised by workers Periodic Health report Periodic safety inspection report	LDC HSE	Biannual	Construction site	Documentation in H&S monthly reports Complaints log	No cost
	Child labor	Attendees lists with workers IDs Complaints and accidents reports	LDC HSE	Biannual	Construction site	Documentation in H&S monthly reports Complaints log	No cost

7.5 Mitigation Measures During Operation Phase

7.5.1 Hotline

As mentioned previously, odorant is added to odorless natural gas to facilitate leakage detection by smell/odor. a 24-7 Hotline (**129**) is available for customers and the public to report leaks, damage, emergencies, and/or incidents related to gas connections, components, infrastructure, and activities (inside or outside households) and to request repairs/emergency response/assistance **as presented in Annex 6**.

7.5.2 Community health and safety

Several measures are suggested to overcome obstacles to full understanding and adoption of safety measures by the clients in the social management plan. Examples include using drawings instead of written instructions to improve communication with illiterate customers, coordinating with women of local NGOs who are interested in cooperating with the project to explain safety precautions to women in the households to be connected, and constantly monitoring the performance of emergency response units.

The LDC must communicate clear instructions to clients in order to ensure that NG piping and components (both inside the household and outside) are not be altered, violated, or intruded upon in any way without written approval from, or implementation of the alteration by, the LDC.

7.5.3 Management of network integrity

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

7.5.4 Emergency Response

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

7.5.5 Management of financial disturbance

Residential gas connection installation costs are around 7000 EGP. Customers pay 2160 EGP of that cost in cash. The balance is subsidized by the government of Egypt. The 2160 EGP can be made either upfront or in installments over a period of time. Typically, households opt for flexible monthly payment plans facilitated by the LDCs and local banks. 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 provide the poor with a kind of grant to be able to install the NG based on an eligibility criteria (section 4.2.14). This initiative has been approved and is currently being applied to all project areas.

7.6 Environmental and Social Management Matrix during OPERATION

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

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Integrity of natural gas piping	**Network integrity**	_ Detailed review of the geotechnical history of the project area _ Random inspections and awareness campaigns to ensure that NG piping and components (both inside the household and outside) are not be altered, violated, or intruded upon in any way without written approval from, or implementation of the alteration by, the LDC. _ Availability of 24-7 hotline service (129) to all beneficiaries and the public for reporting possible leaks, damages or emergencies _ evacuation of the affected area _ Repair or replacement of failed component	Minor	LDC	LDC HSE.	- Map and local geotechnical report review - Site inspections - Awareness actions - Periodical drills	LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Economically disadvantaged Community members	**Financial burden on economically disadvantaged due to the installments**	- Petrotrade Co. should collect the installment immediately after the installation of NG - The installments should be collected on monthly basis in order not to add burden to the poor, as it will be easier for them to pay on monthly basis - The installment should not be high - LPG distributors should be informed about the NG potential areas in order to enable them to find alternative areas - They should be informed about the GRM in order to enable them to voice any hardship	Minor	Petrotrade (Company responsible for collecting the consumption fees and the installments	EGAS	Banks loans log Complaints raised by poor people due to the frequency of collecting the installments	No cost
Community health and safety	**Possibility of Gas leakage**	- Information should be provided to people in order to be fully aware about safety procedures - The hotline should be operating appropriately - People should be informed of the Emergency Numbers - People should be also informed about GRM telephone numbers The Egyptian Emergency Response Procedure. In addition, reference to the ERP is made in different sections of the report	Minor	LDC	LDC	Complaints raised due to Gas leakage	LDC management costs

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Labor conditions	**Occupational Health and Safety**	- Total number of complaints raised by workers - Periodic Health report - Periodic safety inspection report	Irrelevant	LDC HSE	LDC	-Safety supervisor should follow commitment of workers to use protective equipment -Inspection and recording of the performance -Reports about the workers and complaints	LDC management costs

7.7 Environmental and Social Monitoring Matrix during OPERATION

Table 7-5: Environmental and Social Monitoring Matrix during OPERATION

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
Integrity of natural gas piping	Network integrity	- Earthquakes or geotechnical settlements - Emergency response time and corrective actions during emergency drills - Reports of alteration or tampering with any gas components	LDC HSE	Bi-annual inspections and annual emergency response drills	Along the network and inside and outside households	- Inspection, leakage detection, running the drills	LDC management costs
Economically disadvantaged Community members	Financial burden on economically disadvantaged due to the installments	- Number of economically disadvantaged people who complained - Number of those who can't pay the installment	LDC and Petrotrade, EGAS	Quarterly	Desk work	- Complaints log - Bank reports - Petrotrade reports	No cost
Community health and safety	Impact on the informal LPG distributors	- Grievance received from the informal LPG distributors - Information shared with them	EGAS, LDC	Quarterly	Desk work	- Complaints log	No cost
	Possibility of Gas leakage	- Complaints raised by the community people - Number of leakage accidents reported/raised	LDC, EGAS	Quarterly	Site and Desk work	Complaints log LDC	No cost

7.8 Reporting of Mitigation and Monitoring Activities

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

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

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

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

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

7.9 Institutional Framework for ESM&MP Implementation

7.9.1 Environmental Management Structures

EGAS is the supervisory body. **Egypt Gas** is the implementing body. Being the implementing body of the natural gas network in project areas, **Egypt Gas** has a direct involvement with the environmental management and monitoring of the natural gas network. **Egypt Gas** has limited environmental and social background.
Therefore, an upgrade in their environmental and social capacity will be necessary. **EGAS** will be responsible for providing **Egypt Gas** staff with the needed information.
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.

7.9.2 Required Actions

- Involvement of environmental and social officers during the design, costing, tendering, and construction phases would be advantageous.
- Detailed HSE manuals covering each activity must be developed and institutionalized in 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.

Stakeholder Engagement and Public Consultation

8. Stakeholder Engagement and Public Consultation

The public consultation chapter aims to highlight the key consultation and community engagement activities that took place as part of the preparation of the ESIAs and their outcomes.

Public consultation activities have been implemented during the preparation of the framework and the site-specific studies. Following are the public consultation activities that have been implemented:

- Consultation activities (including site visits) were conducted on February 2017
- Public consultation session was conducted on 23rd of April 2017 in Mansoura city

8.1 Legal Framework for Consultation

The consultation activities used multiple tools and mechanisms (scoping, interviews, focus group discussions, public hearings/consultations) with various stakeholders and community people in the host communities were held for the proposed 1.5 million household NG connections project in compliance with the following legislations:

- WB policies and directives related to disclosure and public consultation, namely,
  - Directive and Procedure on Access to Information
  - World Bank Operational Policy (OP 4.01)
- Egyptian regulations related to the public consultation
  - Environmental law No 4/1994 modified by Law 9/2009 and 105/2015 and its executive regulation until the last amendment by ministerial decrees no. 1963/2017
- While WB safeguards and regulations state that a minimum of two large-scale, well-publicized public consultation sessions are a must for projects classified as category "A" projects like the one at hand, additional consultation efforts (for example through focus group discussions, in-depth meetings, and interviews) were implemented to reach the most affected and difficult to reach community members. Additionally, in order to obtain larger scale and more quantifiable information, the consultant should assess conducting surveys in the different sites.
- **In order to achieve that:**
  Community engagement plan has been developed for the different communities through three phases:
  - **Phase I:** Preparation of the framework study in 2013
  - **Phase II:** The site-specific studies
  - **Phase III:** The consultation activities in 2017

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

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

8.2 Consultation objectives

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

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

Communicating and implementing a viable community feedback mechanism. The consultation outcomes will be used in:

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

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

8.3 Defining the stakeholder

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

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

The abovementioned stakeholders were consulted using various tools (i.e. individual interviews, group meetings and public consultation). Most of them have attended the public consultation hearings conducted in 23 April 2017 in Marchelle hotel, Mansoura city, Dakahliya governorate.

8.4 Consultation Methodology and Activities

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

1- The study team visited the project area in order to define various stakeholders.
2- Community engagement plan has been developed for the different communities through three phases:
   - **Phase I:** Preparation of the framework study in March 2014
   - **Phase II:** The site-specific studies in 2016
   - **Phase III:** The consultation activities in April 2017

3- The study team divided the various engagement activities of the project to:
   - Scoping phase,
   - Data collection phase,
   - Consultation activities and final public consultation.

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

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

participants	Location	Number of participants (Male)	Number of participants (Female)	Methods	Date
Potential beneficiaries	Aga	5	2	FGD In depth	February 2017
	Bilqas	11	7		
	Nabaroh	8	4		
	Mit Elkorama & Gogar	5	3		
	Mansoura	12	6		
LPG vendors	Aga	3	-	Structured questionnaire	February 2017
	Bilqas	3	-		
	Nabaroh	2	-		
	Mit Elkorama & Gogar	2			
	Mansoura	4	-		
Governmental and NGOs	Aga	7	3	In depth	February 2017
	Bilqas	7	2		
	Nabaroh	5	2		
	Mit Elkorama & Gogar	6	3		
	Mansoura	8	6		
Community people	Aga	12	5	FGD In depth	February 2017
	Bilqas	11	6		
	Nabaroh	7	3		
	Mit Elkorama & Gogar	8	2		
	Mansoura	15	8		
Total		141	62		
Representatives from Egypt Gas		6	3	FGD Structured questionnaire	February 2017

8.5 Consultation processes

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

- Phase I: Preparation of the framework study 2013
- Phase II: Consultation activities and Final public consultation 2017

The results of the phases will be presented as follows:

Summary of phase I: Preparation of the framework study 2013 (see Annex 7)

The consultation session was conducted on December 2013

- Consultants (EcoConServ environmental and social) attended session

- Representatives of EGAS and Egypt Gas
- Representatives of EEAA accompanied the teams
- NGOs
- Media related expert was recruited to invite media people
- Community people

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

- The Consultation session was conducted in Dakahliya governorate on 23 April 2017
  - Consultants (Petrosafe environmental and social) attended meeting
  - Representatives of EGAS and Egypt Gas
  - Representatives of EEAA accompanied the teams
  - Administrative managers
  - Media related expert was recruited to invite media people
  - Community people
- Key comments and concerns raised during the Final Public Consultations

Table 8-2: Consultation session 2017

Subject	Questions and comments	Responses	Addressed in the ESMP study
NG benefits	Members of the community acknowledged the importance of NG and the benefits of having NG connection to their households.	- NG is of lower cost than LPG - It is reliable, safe, and available - It will put limitation to the quarrels and fights occur to obtain an LPG - It also will put limitation to the crisis of the LPG shortage - It will save electricity that is used in electricity heater and reduce the cost of electricity bill	See section 4.2.12 Perception towards the project and positive impacts during operation phase
Installation cost	The majority of the sample reported that, it is very expensive to pay the NG installation cost at once. They strongly recommended having installment mechanism.	The current NG installation cost is 2160 EGP. Therefore, there is a possibility to provide facilitation payments strategies through offering various installment schemes over a period of one year to seven years through a deal with some banks.	See section 4.2.14 Willingness and affordability to pay

Subject	Questions and comments	Responses	Addressed in the ESMP study
NG coverage	Areas that have not been connected to the NG	There are certain specifications to install the NG to any area. In case the area is suitable, the Government of Egypt tries to allocate financial resources to install the NG. Given the limited resources Egypt face, the installation plan might take some time	within Section 4.2.2
LPG problems	The community appreciate having the NG project as the LPG cause many problems: - The LPG cost a lot of money - Sometimes residents can't find it - It is difficult to bring the LPG upstairs especially if the resident is in the upper floors and no elevator is available - Sometimes the LPG is not completely full. It is half filled - LPG cylinder is a bomb in the house; it might explode in any minute.	The government of Egypt has an ambitious plan to connect the NG to 2.4 million households. This will solve LPG problems.	See section 4.2.11 Problems faced with the current household fuel
Coordination	Coordination with the local units in order to get information about the underground utilities	All LDCs coordinate with the Local Units, not only to obtain information but also to be able to get permissions for street cuts and crossings.	See Section 7.2 Environmental and Social Management Matrix During Construction
Street restoration	The streets not rehabilitated after the completion of the NG construction	The LDCs disburse the cost of street restoration to the local unit and road authority prior to construction phase. It took them long time to rehabilitate streets so that the streets left without being rehabilitated	See Section 7.2 Environmental and Social Management Matrix During Construction

Subject	Questions and comments	Responses	Addressed in the ESMP study
Role of community people	Community people can mobilize each other to install the NG. Additionally, they can provide guidance to the illiterate groups	The study recommended the participation of the community people in sharing information about NG project with the other people especially the illiterate groups Awareness raising campaigns should be tailored in cooperation with the community- based organizations	See Section 7.2 Environmental and Social Management Matrix During Construction
Impact on LPG vendors	The project might result in unfavorable impacts on the LPG vendors (Sareha).	The NG project will partially affected the vendors, but it will reduce the dangers of LPG cylinders which are considered bombs in houses	See The potential adverse impacts during the operation phase
Role of NGOs	NGOs can pay for the installation of the NG to poor households. Or they can pay the advance payment. Thereafter, the poor people can pay few amount of money as installment	This will be from the recommendations, but the project will be not obligated to achieve that	See section 4.2.14 Willingness and affordability to pay
Women hardship with LPG	Women suffer from the LPG as they are responsible of bringing it from the LPG outlet and carry it upstairs.	NG connection will save women effort related to changing LPG cylinders	See section 4.2.13 Gender dimension of the current type of fuel
Information desk	- It is recommended to have an information desk to share info with people about the project people can send their grievances to the information desk They also can submit a request for the installation of NG They should have answers to the technical and contracting aspects Information provided should be in a simple form	The study recommended sharing information about the project not only in the location of contracts or at homes, but also in various public places. It also recommended holding regular meetings to inform the citizens about the natural gas project	See Final public consultation Annex-8


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Figure 8-1: pictures from the public consultation in Dakahliya – April 2017

8.6 Summary of consultation outcomes

The consultation outcomes revealed that:

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

8.7 ESMP disclosure

As soon as the site-specific ESMPs gets clearance from the World Bank and approval from EEAA, a final report, in English and Arabic, will be published on the WB, EGAS and 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 ESMP and the website link for the full ESMP study

Annex 1: Contributors to the ESMP

Team Member	Role
1. Geo. Mohamed El-Ghazaly	Senior HSE Expert and Project Manager
2. Dr. Khaled Gamal	Senior EIA Expert and team leader (Petrosafe)
3. Dr. Zeinab Farghaly	Senior ESIA Expert (Project Quality Control)
4. Dr. Tarek Genena	Senior ESIA expert and team leader (EcoConServ)
5. Chem. Mohamed Saad Abdel Moein	Senior ESIA Specialist
6. Chem. Mohamed Abdel Moniem Aly	Senior ESIA Specialist
7. Chem. Mohamed Mahmoud Abdel Rady	ESIA Specialist
8. Mr. Mahmoud Sarhan	Senior SIA Expert
9. Mr. Mohamed Kamal	Senior SIA Specialist
10. Mr. Mohamed Ismail	Senior SIA Specialist
11. Dr. Nashwa Ammar	Senior SIA Specialist
12. Dr. Mahmoud Nour El-Din	Senior Environmental Measurements Expert
13. Chemist. Mohamed Mohsen	Senior Environmental Measurements Specialist
14. Chemist. Mohamed Magdy	Environmental Measurements Specialist
15. Eng. Mahmoud Abdel Aziz Nada	Social Engagement coordinator
16. Mr. Mohamed Mohamed Samy	Senior Logistics Coordinator

Acknowledgement

The Petrosafe and EcoConServ consultant teams would like to express their deep gratitude to the scores of support staff, drivers, NGOs, collaborators and organizations who logistically supported the completion of this project under tight time limitations.

Petrosafe and EcoConServ also acknowledge the invaluable knowledge and support provided by the technical, environmental, and social teams of EGAS and LDCs who accompanied the consultant teams.

Annex 2: HSE DOCUMENTATION

HSE Procedures Manual Table of Contents (Network)

Alcohols and Drugs

- It is forbidden for all employees / Contractors to have any type of alcohols or drugs while working.
- In addition, it is forbidden for all contractor, sub-contractor workers to have any type of alcohols or drugs while working.
- It is not allowed for any worker (EGAS, contractor, or sub-contractor) to enter the working site if he is found under the effect of alcohols or drugs.
- A periodic analysis is done for all drivers to be sure they are not under the effect of alcohols or drugs while driving.
- All personnel who do not obey the above statements will be punished according to local law of labor no. 12 for 2003.

Auxiliary Workshops

- Isles should be clean & free from any obstacles or materials & the workshop should be free from any litters or unused tools or equipment.
- Litters & unwanted materials should be put in special containers and get rid of it as quick as possible according to its hazardous level.
- The specified workers should do using or repairing equipment or machines.
- Switch off electricity after finishing work on machines.
- Workers carrying, lifting loads, or heavy weights should pay attention and ask for help in case of overloads & try to use any lifting device as much as possible.
- Do not clean or wash equipment or machines with benzene or any other quick flammable material, but if necessary use kerosene or solar and avoid clothes being wet by benzene or solar.
- It is forbidden to store quick flammable materials in opened containers or in any other places not specified for this purpose. Take all safety precautions.

Working on Lathes

- Use protective glass & avoid wearing rings, gloves, any hands accessories, large or tore clothes.
- Check that all gears & belts are covered before starting work.
- Fix the work piece properly before fixing the cutting tool.
- Remove the wrench after fixing the work piece in the table.
- Do not ever try to calibrate the cutting tool or to touch the work piece during lathe rotation.
- Do not leave any wrenches on the lathe during rotation.
- Changing the chuck should be done manually.
- Remove the chip by the correct brush & not by hands.

Mechanical Drill

- Do not ever hold the work piece by hand under the drill but use a suitable vice for drilling small work pieces & fix the work piece in the table for drilling huge work pieces.
- In case work piece gets out of the vice & rotates with the drill, do not try to stop it by hand but stop the machine immediately.
- Keep the chuck key & the wedge away from the drill before it starts to rotate.
- Do not keep the tools, the oilcan, and the brush behind the drill.
- Remove the chip by the brush & not by hand.
- Do not wear gloves & take them off before the drill is starting up.

Hand Tools

- Always check the tools & keep it in a good condition changing the spoilt ones & repairing others needed to be repaired.
- Tools should be used in its specified purposes only.
- Do not use short pieces to elongate wrenches; short pieces are only used with large wrenches designed for this.
- Screwed wrenches or wrenches with movable jaws should be completely & perfectly holding pipes & nuts & keep the pulling direction always the direction of the movable jaw.
- If you have to leave handy tools in high places, do not leave them on the ground or on walking isles in order not to fell on anyone below.
- After work, clean the tools repair the spoilt ones & keep them in a safe place in a safe way.

Grinding Stones

- R.P.M. should be written on the grinding stone.
- Trained & specialized workers only can work on grinding stones.
- Protective barrier should be fixed over the grinding stone.
- All workers should use the P.P.E.

Batteries Handling

- Wear your safety goggles
- Wear your (gloves – apron – safety shoes) for protection against acids.
- Any sparks, flames, and smoking are forbidden.
- Children are forbidden to be near batteries.
- Emergencies
    1- In case the acid is reached to the eyes, you must wash it with fresh water several times and see the doctor.
    2- In case the acid is reached to the skin, you must wash it with fresh water gently.
    3- In case of swallowing the acid, you must drink a lot of milk and water and see the doctor.
    4- In case of acid poisoning, go to hospital instantly.

Storage of Batteries

- Batteries must be kept standing vertical.
- Even there is a tightly closed cover but the static charges could be discharged if the battery is turned down.
- The overreaching of moisture is leading to quick discharge.
- The production date must be on the battery
- The storage of batteries must be organized to let which come first to be used first and vise versa.
- The stored batteries must be inspected 3 times in a year.

Colour Coding

A- According to international organizations of OH&S for specifying the colors used for warnings to risks in which to avoid, also all employees must know about these colors and the purpose, which used for.

B- Color Applications

1- *Red color* : the main color for specifying :

a- Fire extinguishers and firefighting equipment.

b- "Danger" written in red and put in dangerous areas, also labeled on barrels containing flammable liquids having a flash point equal to or less than 80 ft.

c- "Stop" written in red on electrical buttons or switches used for stopping machines in emergencies.

* Red lights are used on barricades and in construction areas.

2- *Orange color*: it is the main color for identifying the dangerous parts of machines that can make harm such as cutting, electric shocks, …..etc.

3- *Yellow color* : it is the main color for warning of physical hazards like crashing, falling, ….etc., it can be used only or use the yellow color as a slides from yellow and black with 2" thickness or yellow and black squares with 3" for making attention .

4- *Green color*: It represents the positions of first aid places and personal protective equipment.

* If the first aid facilities is large you can use a green cross "+" on a white background.

5- *Blue color*: It is used for warning signs while starting an operation or using or moving any equipment under maintenance.

6- *Violet color*: the main color used for warning of radiation hazards.

a- Violet and yellow colors are used for signs, labels, and ground marks for warning of radiation hazards like X-rays, α-rays, β-rays, γ-rays, and neutron, proton, deuteron, and meson rays.

7- *Black and white colors*: black & white combination is used as a traffic signs and signals; also, it is used as signals in storage.

8- You can use boosters with approved colors instead of paintings.

9- Classification of colors and signals :

1- The following symbols are used for color blinded persons :

a- Danger marks: red square in proper size.

b- Danger equipment: orange equal triangle in a proper size.

c- First aid and safety equipment: green cross "+" on a white background.

2- The physical hazards must be specified carefully and painted to warn all employees from arise risks.

Conversion of Facilities from LPG to Natural Gas

1- Review all internal installations and be sure of its conformance to technical specifications be sure that chimney and vents are installed for water heater if exists and be sure that chimney and vent are typical to its standard and the external part of chimney is installed.

2- Test the internal, external pipes and electrical appliances for electrical shortage.

3- Test the cookers for working with thermostat, also oven door is closing tightly or any another defects to inform the costumer to fix it before conversion.

4- Test operation of water heater by water & LPG and test chimney ability to release exhaust, also safety devices in heater must be tested.

5- Be sure that the place is naturally well ventilated before conversion and never use any electrical device for ventilation and has no ignition source at the work place.

6- Test leakage by pressure water gauge (U-gauge) over 20 mbar and under 20 mbar.

7- Close LPG cylinders tightly, uninstall cylinders from cookers and move it to another place from work place.

8- Conversion is done to appliances according to followed procedure for each type of appliances, after conversion you must test leakage one more time to be sure of all connections and appliances, also be sure, there is no electrical shortage after connecting electrical appliances with current.

9- Test the appliances for working with natural gas and hand over the appliances to costumer in very good conditions; also inform the costumer how to use the appliances safely and what he can do in case of leakage or emergencies.

10- Wear appropriate P.P.E to protect you from injury (safety shoes – gloves – overall)

Domestic Natural Gas Installations

On Site Work

1. Scraps & unwanted materials should be put in special containers and get rid of it as quick as possible .
2. Using or repairing equipment or machines should be done by the specified workers.
3. Switch off electricity after finishing work on machines.
4. Workers carrying or lifting heavy weights should pay attention and ask for help in case of overloads & try to use any lifting device as much as possible .
5. Do not clean or wash equipment or machines with gasoline or any other quick flammable material, but if necessary use kerosene or solar and avoid clothes being wet by kerosene or solar.
6. It is forbidden to store highly flammable materials in opened containers or in any other places not specified for this purpose.
7. Working on Screw Machines:
   a) Avoid wearing rings, gloves, any hands accessories, large or tore clothes & use protective glasses .
   b) Check that all gears & belts are covered by safeguards before starting work.
   c) Fix the work piece properly before fixing the screwing tool.
   d) Remove the wrench after fixing the work piece in the table.
   e) Do not ever try to calibrate the screwing tool or to touch the work piece during machine rotation.
   f) Do not leave any wrenches on the machine during rotation.
   g) Changing the chuck should be done manually.
   h) Remove the chip by the correct brush & not by hands.

Dealing with Gas Pipelines

At commissioning a gas pipeline there should be precautions taken for safety & firefighting & to protect these lines from corrosion, miss-operation & wrongs from others. In addition, there should be an emergency plan to be applied in case of any emergency.

1- Pipeline Inspection

Periodic inspection on pipelines using leakage equipment at steady intervals according to written & fixed regulations & programs including work procedures & reports declaring any changes along the pipeline with a width of 6m along on each side. Reports should include:

- Pipeline cathodic protection.
- Excavation works & equipment used in it.
- Construction & building works.
- Ignition sources.
- Destructive & explosive works using explosives.
- Gas leakage indications.
- Pipeline bare parts condition.
- Erosion in water path bridges, ways & railways.
- Condition of Pressure reduction stations & valves & their components.

Coordination with other authorities (Electricity – The other utilities – ways – Railway – Land owners) and anyone may do any works could affect pipeline safety and this could be achieved by sending annual letters reminding them of pipelines locations & regulations for them to follow if they intend to do any works in gas pipeline area.

Regulations Include

- Sending a memorandum from the authority intending to do the work (one-week at least prior starting work) to the owner of the gas pipeline.
- Presence of gas pipeline inspector during work.
- Indicating work path correctly before starting work.
- Entering isles should be available for pipeline repairing equipment.
- Any excavation by any mechanical equipment should be at least 3 meters away from pipeline path otherwise excavation should be manual for less than 3 meters away from pipeline.
- Never use explosives unless applying explosives expert regulations for gas pipeline safety.
- Do not use pile machines unless it is completely safe for the pipeline?
- Limitation of welding & any ignition sources except after checking absence of gas leakage.

2- Gas Pipelines Maintenance

It is important to take all precautions for gas pipelines safety to avoid any damage or corrosion to pipeline & this by maintaining its components & testing its working efficiency periodically & this could be done by:

- Proactive Maintenance of gas pipeline & its components.
- Periodic Maintenance of gas pipeline & its components according to specified procedure & to be done by specialized & qualified persons.

3- Gas Pipelines Maintenance Records

- Periodic inspection regulations – periodic maintenance of all pipeline components – proactive maintenance – emergency plan – Safety regulations – persons & authorities contacted on emergency cases – valves and vents locations & shortest ways to reach them.
- Periodic inspection reports - periodic & emergency maintenance reports – proactive maintenance reports – Repairing reports.

4- Emergency Plan

Should be written by the transmitting or distribution gas company showing the responsibility of every team or individual in case of any fracture or defect in the pipeline or in case of any leakage or emergency, the plan should also include the role of firefighting, police, civil defense & governmental authorities. The plan should also indicate how to act at the following:

- Gas leakage from a pipeline-crossing river Nile or any water path indicating the used equipment & the qualified laborers that can be used.
- Gas leakage.
- Gas pipeline fracture.
- Pipeline fire or flame.
- Training on the plan by applying periodic practical experiments & modifying it to avoid any disadvantages in it.
- Coordination between the company & the other companies working in the same field owning equipment that could be helpful at emergency cases.

Dealing with Chemicals

- Before dealing with any chemical, read its safety instructions to know its hazards & how to deal safely with it.
- Check the presence of a sticker on the package showing the components & how to deal safely with the chemical.
- Be sure that the package is perfectly closed.
- Determine the destination place before transporting the chemical packages.
- Supply tap water or washing water in place of handling.
- Use the P.P.E (rubber gloves – Helmet – glasses – Safety shoes - …….etc.) & avoid any flame source beside or near handling area.
- Use manual pumps in case of transporting flammable chemicals from one place to another, and in case of using electric pumps it should be explosion proof.
- During opening of the chemical packages, be careful not to be exposed to the vapors of the chemicals & close the packages perfectly if not using them.
- Filled packages should be separated from the empty ones.
- It is forbidden to use the empty chemical packages for any other purposes.
- Empty packages should be stored in the appropriate scrap area.
- Coordination should take place with society protection sector to get rid of the expired chemicals safely.
- When emptying a chemical package try not to leave any residuals inside as much as possible to eliminate the probability of the chemicals being spilled out of the empty packages.

Driving

- The car / vehicle must inspected daily and before starting engine as the following:
  - Inspection of cooling liquids
  - Engine oil levels.
  - Brakes oil levels.
  - Power steering oil levels (if available).
  - Clutch oil levels (if available).
  - Inspect all lights.
  - Inspect all tires and spare tyre.
  - Inspect all car tools.
  - Hydraulic oil levels (if available).
  - Inspection of hydraulic oil leakage (if available).
  - Inspection of fire extinguisher condition.
- Driver has to keep paying attention to the road in front of him.
- Driver should be patient & decent with others.
- Try not to use the horn as much as possible.
- Lights for turning (Left & right) should be started by an enough time before turning specially if it is raining or if the streets are slippery which makes it harder for other vehicles to stop or to turn away to avoid your vehicle.
- Driver has to allow other vehicles to pass beside him & avoid obstructing them.
- Driver has to avoid following other vehicles as well as not to stop just before or after any curve or turn on the road.
- Start using the brakes with enough time & distance before the place you want to stop the vehicle at to make stopping smooth & gradual.
- Slow down the speed at any strange condition or circumstances on the road or on expecting any danger.
- Always keep on driving within the speed limits of the road you are driving on & never exceed it.
- On night driving, driver should always turn on the ordinary front lights & try not to use the high front lights as much as possible so as not to disturb other vehicles moving in his direction or at the opposite direction.
- Driver should pay attention & drive slowly in case of driving unfamiliar vehicles or vehicles in bad condition.

- Driver should be smart enough to expect actions & reactions from others before it occurs.
- Avoid using brakes at road crossings except in emergency cases.
- Avoid any gear transmissions in turns or crossings & do it before getting into the turns or crossings.
- Speed should be decreased to a safe limit before reaching any turns by enough time & this enables the driver to accelerate during turning & after the situation is clear in front of him, & vice versa.
- Driver has to use & depend on the vehicle's interior mirror (his third eye).
- Concentration is very essential during driving & do not pay attention to anything but the road & never look at anything else such as an accident on the road while your vehicle is moving.
- Driver has to hold the steering wheel with both hands except when transmitting the gears or giving a turning flash, steering wheel should not be hold also from its center or just by the fingers.
- Driver should not rest his left leg on the clutch except during gear transmission only.
- Driver should always concentrate & do nothing but driving (such as to eat, drink, use the mobile phone, or to fix anything in front of him).
- Do not follow any person's sign to go on or to cross the road but be sure yourself from the road being clear & safe before crossing or going on.
- Do not ignore any sign from anybody meaning "Stop" or "Danger" and it is preferable to stop & see what is the problem instead of keeping going on & being a part of an accident or a problem.
- Avoid driving fast on slippery roads or if it is raining.
- Pay much attention to fogs on foggy days.
- Never drive without driving license or vehicle's license or with an invalid license of.

Excavation & Distribution Works

- Supplying & Wearing P.P.E for all workers.
- Supplying all necessary equipment for securing the site (lamps – warning marks – traffic cones – warning tapes …..etc)
- Co-ordination with traffic to secure working area
- Check the ground type (Sandy, muddy, rocky) before starting work.
- Use the appropriate equipment to the ground type.
- In case the depth of the excavation exceeds 6 feet, the following should be followed:
  - Put wooden supports at excavation sides or incline the excavation with an angle not exceeding 30º.
  - Remove the excavation products continuously to the appropriate places.
  - Excavation products should be put at least 1m away from the trench.
  - Supervisors should not stand very close to the trench sides.
  - All the company vehicles & equipment should always be opposite to the wind direction & in the exit direction.
  - Trench should be supported by wooden or steel supports to avoid excavation collapse due to violations in case of being beside roads for heavy trucks or railways.
  - Lighting lamps & warning marks especially at any road inclinations or deep turns should surround excavation.
  - In case of any probable hazards to any building excavation should be stopped & forbidden.
  - Wearing phosphoric jackets in case of night works.
  - During backfilling, be sure there are no individuals or equipment inside.
  - Be sure that the backfilling is clean sand free from stones or any sharp edged solids.
  - Put marker tapes after backfilling & replace any damaged tape at the same place.
  - Do not shift any cable inside except under supervision of the responsible utility.

Electric Works

- It is completely forbidden for the unspecialized workers to try to repair any connections, fuses, electrical devices or to touch wires or electrical devices & in case of any electrical hazards; Responsible persons should be informed immediately.
- Before working in any electrical devices or connections switch off electricity and make the necessary methods of warning to prevent any person from switching on electricity during work.
- Check the existence of earthing in the used electrical devices.
- Handling parts of the electrical tools & equipment should be insulated properly.
- Electrical wires & cables should be stored away from high temperature sources or places.
- Steady maintenance should be done for tools & electrical wires taking all the necessary precautions & testing these tools to ensure its safety.
- Do not throw electrical wires or any objects over wires or electrical equipment.
- Keep electrical wires away from temperature, water or oils.
- Do not use electrical tools in case of working in a medium of flammable gases unless it is fireproof.
- In case of any electrical injury, take the injured person away from electrical circuits by switching off electricity from the nearest key and if it is not possible to do so, the injured person could be pulled away from electrical circuits by using any insulated tool like a rope or a piece of dry cloth & begin making artificial breathing to him immediately.

Important Warning in Case of Fire

- Do not use water or the foamy substance in extinguishing equipment & electrical devices fires as it may shock its user, but only use :
  - CO_2 extinguisher - Dry chemical Powder extinguisher
- Use the suitable P.P.E. as electrical insulated gloves, insulated rubber carpets & electricity determining devices.
- Check the insulation of the electric switches board unless there is a document ensuring the insulation of the board.
- Use electrical shock safety belt during working at high altitudes.

External Installations

- Before binding scaffolds be sure that there is no unisolated electrical connections and if it exists you must inform the costumer to be sure that these connections are safe or to shut the power off during the work (binding / unbinding scaffolds – external bindings)
- Well supervision should be done on the scaffold & report any defect immediately.
- Use safety belt during working on scaffolds.
- Do not put any equipment, instruments or anything not in need on scaffold.
- Use scaffold stairs to move up & down and do not use the cross bars.
- Do not look down during going up or down.
- Use correct, suitable tools and to be in good condition.
- Check for safe electrical connections for the used tools and devices.
- Always keep working place clean & tidy after work.
- Wear appropriate P.P.E to protect you from injury (helmet – gloves – safety shoes – safety belt – overall)

Flue Works

- Flue should be installed by using (scaffold – bracket – ladder) or by any other secured way determined by the supervisor.
- Be sure of the safety (scaffold – bracket – ladder) before using it & report any defect immediately.
- Use correct, suitable tools & to be in a good condition.
- Check the drill & its electrical connections.
- Be sure the chimney opening is away from electric cables inside the apartment.
- Be sure the chimney opening is away from drainage & water pipes outside the apartment.
- Keep the place neat & tidy after work.
- Be sure of the fisher fixation from the upper floor to the chimney.
- Work should be immediately stopped in case of heavy wind or rain or any emergency case at the work site.
- Wear appropriate P.P.E. to protect you from injury (helmet – gloves – safety shoes – safety belts – dust glasses – overall suit).

Forklift

- Only trained and qualified personnel are allowed to operate the forklift, the supervisor specifies them.
- Inspect all alarms, siren before using the forklift; also, it must have a back alarm.
- Inspect brakes (foot brake – hand brake), mirrors and be sure there is no leakage of hydraulic oils.
- It is forbidden to lift any worker on forks to reach the upper shelves.
- In case of lifting worker by the forklift, the worker must be in a secured cage.
- If the materials lifted are affecting your vision, you must drive very slowly.
- Avoid sharp curves.
- Be sure the forklift is not overloaded.
- The distance between forks and ground must be not more than 20cm and not less than 10cm while lifting materials.
- Do not use forklift for persons transportation.
- You must take the doors height before passing through doors.
- Do not get your body outside the cabinet while driving.
- Do not leave the forklift with engine running and go somewhere else. If you had to go somewhere, and then stop the engine, put forks touched to ground, pull hand brakes and remove contact key before leaving.
- Wear your PPE (gloves – safety shoes – helmet – overall).

First Aids

1- The undesired persons must stay away from the patient.
2- Observe the breathing is not stopped.
3- Call the police immediately in case of injury.
4- Call the doctor immediately in case of injury.
5- Prepare all the needed staff for first aid like bandages,….etc.
6- You must cool down the patient from the nervous shock.
7- In case of complete unconsciousness – leave the patient until doctor is came, taking into account warming him. (The reason may be from poisonous food, brain bleeding, metal poisoning, or increased glucose in blood in case of diabetic patient or may be decreased glucose in blood after taking a large dose of insulin – you must observe the patient breathing).
8- inspect the patient physically and aid him as :
   a- Record the injury date , ask him if he can be asked , a physical inspection must be done accurately , and if he in a complete unconsciousness which doesn't represent the patient is dead or a life, he must be treated as a life till the opposite is verified .
   b- In bleeding cases, you must working on stopping that bleeding by all available methods.
   c- in case of bone brake – the patient is aided by temporary
   d- Take care with patient suffering from nervous shock, give him hot drinks and warm him.
   e- Transportation of the patient to the nearest hospital must be done.

Snake Bites

Symptoms

Blood accumulation in the infected organ – unclear vision – inflammation – diarrhea – swatting – headache – increased temperature – vomiting.

Cure

- You must know the type of biting animal to know how to treat the bite.
- Tight up the infected organ upper the bitted area but take care that tighten is not affecting the blood stream. The aim of that tighten is to decrease the poison entering the body until taking the proper medicine.
- Observe the patient until going to the hospital.

Call a clinic

You must ask help in case anyone is exposed to snake bite and you think it may be toxic, especially when the symptoms appeared, also you must know

the time factor is very important and call emergency for preparing poison treatment unit until the patient reaches it.

First aid

- Try to cool down the patient and make the infected organ down the heart to decrease the flow of poison to other parts of body.
- If you have a pipette like (soyer), you can use it as stated in the manufacturer instructions.
- Release any rings or accessories because infected organ may be swelled.
- If the infected organ is colored or swelled the snake often to be poisonous.
- Observe the patient biological indicators such as temperature, breathing, blood pressure ….etc.
- Call a doctor immediately.
- Fetch the dead snake if that would not risk you to injury and do not try to hunt a life snake. Be careful of snakehead it can bite even if it is dead until an hour from its dyeing.

Safety

- Even if most snakes are not of poisoning type you must avoid touching or playing with snakes.
- Several serious bites happened when the person himself is reacting with snakes on purpose.
- When you are coming to an area, which you know, that may have a snake you must wear a long shoes and pants.
- Avoid the snakes hiding places like trees branches, under rocks ….etc.
- A small knocking with a stick you can do before entering unknown area thus snakes will avoid you.

Note: not all types of snakebites need the antitoxins and do not take any antitoxin unless from the qualified clinic, also if you have the antitoxin take it with the patient to the doctor because antitoxin may be very harmful.

In case of snakebites or suspect snakebites, you must call 123 immediately or transport the patient to hospital.
Note: every site manager must search about nearest hospital that has the antitoxins of snakebites.

Followed Procedures in Case of Work Site Injury

- The work supervisory (engineer or foreman) fill the injury form and transport the patient to the nearest public hospital or nearest medication center specified by the company for making first aid if he can be transported and if not you must call an ambulance to transport him .
- The injury form must be sent to HSE department.
- HSE officer will make the work related injury documentations.
- The patient must go to the work related injuries center in the health insurance facility.
- A copy of work related injury document will be sent to police station for recording.
- The HSE department must be informed about the treatment finishing of the patient.

Housekeeping

- Most of the accidents & injuries result from uncleanliness & disorder at worksites despite they could be overcame by few efforts.
- Cleanliness & ordering means keeping materials, tools, devices & equipment clean & in good condition.
- Cleanliness & ordering is a daily responsibility of all the workers & is not done when there is available time to do it.
- Isles & passages should be always clean & free from any materials, tools or any equipment to avoid accidents.
- Work is not considered to be done completely except after cleaning & ordering tools & materials and the site is in good condition.
- Drills & sharp tools should be stored & kept in a suitable place as being a source of hazard.
- Any oil, water or any slippery stains should be removed & cleaned at once.
- Litters & work residuals should be collected & removed currently & do not accumulate them.
- Materials, tools & equipment belonging to work site should be stored & kept in a safe & suitable place and away from work area until being needed.
- Nails, wires or cables should be removed immediately from working area or to be well fixed so as not to be a source of any danger or injury.
- Materials that will be accumulated should be tied to prevent it from falling down.

Internal Installations

- Do not use unfixed, unstable ladder or a ladder without rubber fixures and be sure that the ladder is on a flat floor.
- Do not make any elongation with your body when you are on the ladder but move the ladder to the required place.
- Be sure that the hand tools are in good conditions and use only the appropriate tools with the correct method.
- Connect the drills to the power with the right method and be sure that the electrical connections and plugs are well to be used.
- Before drilling in walls be sure of the electrical wires places to avoid cutting these wires in walls.
- Wear appropriate P.P.E to protect you from injury (gloves – safety shoes – goggles – overall)

Lockout / Tagout Procedure

First, you must be sure of:

All locks and keys are numbered.

1- Keep the locks and keys in places easy to reach.

2- A spare key for each lock must be saved in specified places for emergency use only.

3- Lockout process must submit to work permit system in presence of work supervisor and safety officer and it will be as the following :

- *First Step : Preparation and Informing*
  - BEFORE starting any of maintenance processes you must be sure of power types
  - Used for that equipment and all resultant hazards arises from it and inform all
  - Workers about the shutdown of this equipment to start the lockout / tagout process.

- *Second Step: Equipment Shutdown*
  - Follow the work procedure or manufacturer's instructions for shutdown of this equipment taking into account that some equipment have a special procedure for shutdown like automated equipment.
  - Be sure all power sources are identified and turned off (some machines may have more than one source of energy so you must ensure that all sources are shutdown).

- *Third Step: Equipment Isolation*
  - Be sure of equipment isolation (turn off the main switches, valves and operation lines).
  - For complicated equipment, you must refer to manufacturer's instructions for all points of isolation like switches, valves …etc.

- *Fourth Step : Informing*
  - Each worker responsible for maintenance process must inform the worker responsible for the equipment shutdown – also workers on this equipment must have their own keys & locks of that equipment.

- If there is more than one person in the maintenance process then there must be a multi-stage shutdown devices which facilitate each worker to make his own lockout / tagout process to prevent any other worker to operate the machine accidentally while his colleagues are working on it .
- Release any pressure from springs or equalize the spin parts movements.
- Chain any keys, switches… etc. that may be moved while operation mode is on.

- *Fifth Step: Testing Equipment*
  - To be sure that all power sources are switched off and remaining power in the equipment is discharged you must keep people away from that area then test all operating switches to ensure that all power is shut-down and switches can't be moved to operating mode .
  - Be sure all equipment parts are secured like chains…etc.
  - Be sure all electrical circuits have a zero volt in potential.
  - When you are actually sure that all power sources are shutdown, locks and tags are in place, then it is safe to start the maintenance process.

Lifting & Loading Works

- Only specialized & qualified workers work on cranes & levers.
- Check & test cranes & levers before starting work.
- P.P.E should be used in all loading & downloading works as well as in transporting heavy equipment.
- Primary testing for cranes before usage is important.
- Loading & downloading works should be done at the presence of the responsible loading supervisor.
- Use safe methods for loading & downloading.
- Avoid being between the vehicles rear & any other near object & avoid downloading objects in the direction of the standing persons.
- The loading supervisor & report the check & keep it documented should do periodic check on levers at least monthly.
- Check lifting equipment before usage & declare the defected ones & change them.
- Maximum loading weight should be written & clear on the crane.
- Do not ever make the cranes, wires, chains or ropes overloaded.
- The crane driver should know exactly the weight of the load he is going to carry, and if not he should deal with it as more than the estimated weight.
- It is forbidden for anyone to pass or stand under the loaded weights, and the crane workers should not permit anyone to be over the crane or lying under the crane during work.
- Check the crane hook & that the load is in the Wright position before loading.
- At lifting, the hook should be at the vertical position above the C.G. of the load to be lifted so that it becomes stable, also check that the load is free from any obstacles.
- Pulling chains or ropes on the ground is forbidden.
- It is forbidden to hold chains or ropes when lifting loads & stand away from the lifted loads.
- Choose the correct locking stud to lock the chains.
- Protect chains, ropes & wires from the sharp edges & acute angles of the load by using soft wooden cushions.

- Do not use ropes in lifting solid loads with sharp edges.
- Do not let the ropes or wires touch any hot body.
- Do not ever knot wires or ropes when lifting to shorten the wire or rope or even to round the wire or rope around the hook of the crane.
- Do not use single woven rope between the hook & the load as it might surfeit from turning around itself during lifting.
- In case of using double or branched ropes or wires, choose wires or ropes with adequate lengths & that the load is equally distributed on the ropes or wires.
- When finishing the loading & unloading return all the tools & equipment to the stores.
- In case of crane movement take from any electric cables obstructing the crane.

Manual lifting

- Do engineer manual lifting and lowering out of the task and workplace.
- Well-trained workers should carry out lifting. If a worker is not used to lifting and vigorous exercises, he should not attempt to do difficult lifting or lowering tasks.
- Do think before acting
- Place material conveniently within reach. Have handling aids available
- Make sure sufficient place is cleared.
- Do get a good grip on the load.
- Test the weight before trying to move it. If it is too bulky or heavy, get a mechanical lifting aid or somebody else to help, or both.
- Do get the load close to the body .Place the feet close to the load. Stand in a stable position with the feet pointing in the direction of movement.
- Do not twist the back or bend sideways.
- Do not lift or lower awkwardly.
- Do hesitate to get mechanical help or help from another person.
- Do not lift with the arms extended.
- Do not continue lifting when the load is too heavy.

Team Lifting and Carrying

When two workers Carrey 1 object, they should:

- Workers should do test lifting before proceeding.
- They should adjust the load so that it rides level and so that each person carries an equal part of the load.
- When two people carry long sections of pipes or lumber, they should walk one behind the other. Shoulder pads will prevent cutting into their shoulders and will reduce fatigue.

When a Team of Workers Carrying the Object

The supervisor should make sure that proper tools are used and should provide direction for the work. Frequently, whistle or direct command can single "lift", "walk", and "set down". The key to safe carrying by gangs is to make every movement in unison.

Jacks

When a jack is used, workers should do the following**:**

- Check the capacity plate or other marking on the jack to make sure the jack can support the load. if the identified plate is missing, workers should determine the maximum capacity of the jack and paint it on the side

- Inspect jacks before and after each use. When a jack begins to leak, malfunction, or show any sign of wear or defects, it should be removed from service, tagged, repaired, and tested under load.
- Wear protective equipment especially protective footwear
- Furnish toweling to jack operators for removing oils from their hands and from the jack handles
- A heavy jack is best moved from one location to another on a dolly or special hand truck, if it has to be manually transported, it should have carrying handles.
- The operating handle should never be left in the socket while a jack is being carried because it might strike another worker
- Never throw or drop a jack upon the floor. Such treatment may crack or distort the metal.
- If the surface upon which the jack is placed workers should set the jack base on substantial hardwood blocking (at least twice the size of the jack), so that it will not turn over, shift or sink.
- Immediately wipe up spillage of any residual oil. To prevent the load from slipping, workers should avoid metal-to-metal contact between the jack head and the load. A hardwood shim should be placed between the jack head and the load.
- never use wood or metal extenders .Instead they should either obtain a larger jack or should place higher blocking

Hand Trucks:

Hand trucks fall into two categories: two-wheeled trucks and four-wheeled trucks .If used by workers who are not trained, trucks can be the source of the following accidents:

- Colliding with other trucks or obstructions
- Jamming hands and feet of operators between the trucks and other objects
- Running wheels of bridge plates or platforms

Trucks should be pushed not pulled as this may lessen the stress to the lower back They should not be loaded so high that operators cannot see where they are going. For extremely bulky items or pressurized items as gas cylinders, strap or chain the item to the truck.

Operators should place the load well forward so it will not slip, shift or fall keeping the center of gravity of the load as low as possible.

Personal Protective Equipment (PPE)

Purpose

The Personal Protective Equipment (PPE) program has been developed to provide employees and workers with the necessary information to identify work situations that require the use of PPE, the proper selection and use of PPE, and documentation of this information.

Identifying Potential Hazards in the Workplace: (Hazard Assessment)

OSHA requires that employers should identify and assess the risks to health and safety present in the workplace, so enabling the most appropriate means of reducing those risks to an acceptable level to be determined.

Training

Prior to conducting work requiring the use of personal protective equipment, employees must be trained to know:

- When PPE is necessary;
- What type is necessary;
- How it is to be worn;
- What its limitations are; and,
- Proper care, maintenance, useful life, and disposal.

Employers should provide appropriate PPE and training in its use to its employees. No charge can be made to employee for the provision of PPE that is used only at work.

Selection, Use and Maintenance of PPE:

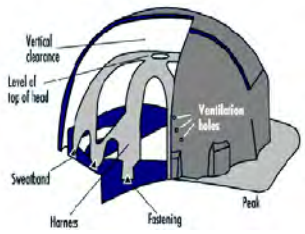
A- Head Protection:

Prevention of head injuries is an important factor in every safety program. Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object.

Head protection, in the form of protective hats, must do two things:

- Resist penetration;
- Absorb the shock of the blow.

This is accomplished by making the shell of the hat of a material hard enough to resist the blow, and by utilizing a shock-absorbing lining composed of headband and crown straps to keep the shell away from the wearer's skull.



Hazards on Head

Electrical hazards

Falling objects or collision

Selection:

Each type and class of head protector is intended to provide protection against specific hazardous conditions. An understanding of these conditions will help in selecting the right hat for the particular situation.

Protective hats are made in the following types and classes:

Type 1:

Helmets with full brim, not less than 1 and ¼ inches wide.

Type 2:

Brimless helmets with a peak extending forward from the crown.

Type 1 – Full Brim

Type 2 - Peak

For industrial purposes, three classes of helmets are recognized:

Class A

These helmets are for general service. They provide good impact protection but limited voltage protection. They are used mainly in mining, building construction, shipbuilding, and manufacturing.

Class B

Choose Class B helmets if your employees are engaged in electrical work they protect against falling objects and high-voltage shock and burns. (Electrical workers use them extensively.

Class C

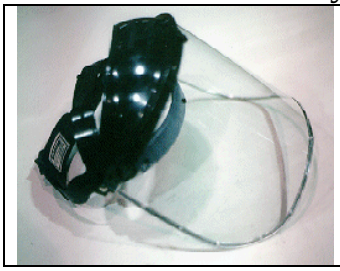
Designed for comfort, these light weight helmets offer limited protection. They protect workers from bumping against fixed objects but do not protect against falling objects or electric shock. (This class is usually manufactured from aluminum and offers no dielectric protection).

B: Eye and Face Protection

Suitable eye protectors must be provided where there is a potential for injury to the eyes for face from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially injurious light radiation or a combination of these.

Types of Eye and Face Protection:

- Safety Glasses
- Safety Goggles
- Face Shields
- Welding Goggles
- Laser Safety Glasses



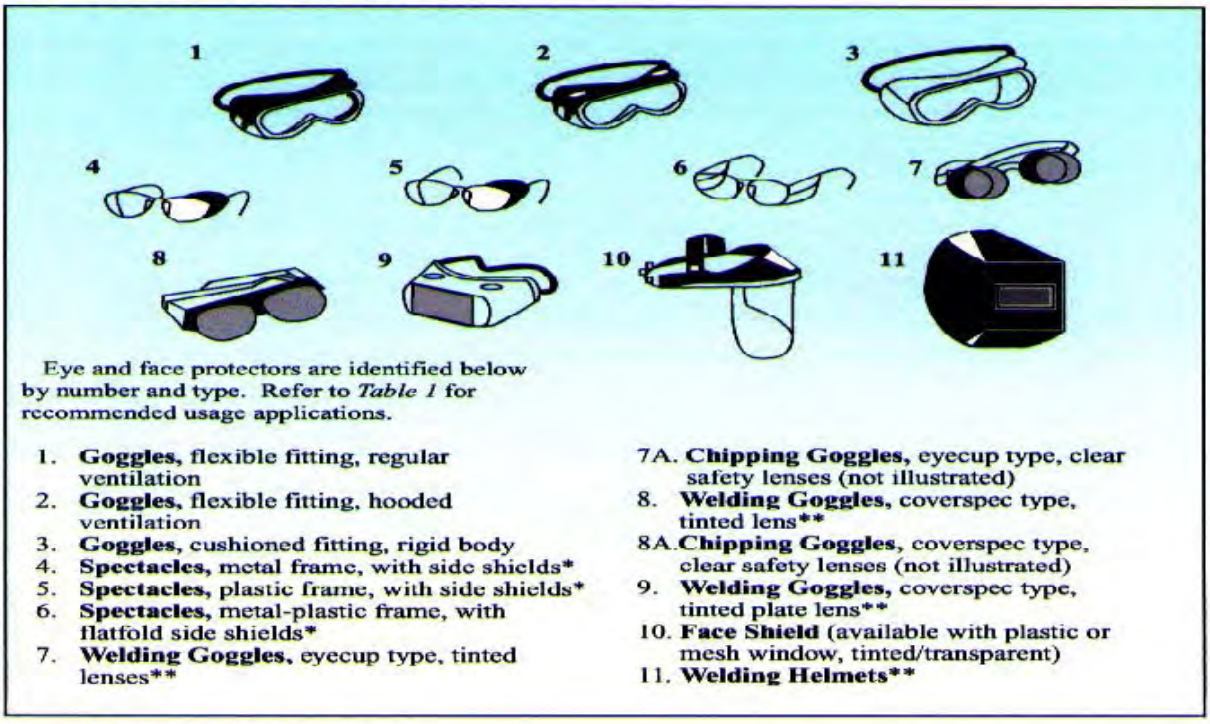
Selection:

Each eye, face, or face-and-eye protector is designed for a particular hazard. In selecting the protector, consideration should be given to the kind and degree of hazard, and protector should be selected on that basis.

Table 1. Eye and Face Protector Selection Guide:

Operation	Hazards	Recommended Protectors numbers refer to Fig 1
Acetylene-burning, acetylene-cutting, Acetylene-welding	Sparks, harmful rays, molten metal, flying particles.	7,8,9
Chemical handling	Splash, acid burns, fumes	2,10 (for severe exposure add 10 over 2)
Chipping	Flying particles	1,3,4,5,6,7A,8A
Electric (Arc) welding	Sparks, intense rays, molten metal	9,11 (11 in combination with 4,5,6 in tented lenses advisable)
Furnace operations	Glare, heat, molten metal	7,8,9 (for severe exposure add 10)
Grinding - light	Flying particles	1,3,4,5,6,10
Grinding - heavy	Flying particles	1,3,7A,8A (for severe exposure add 10)
Laboratory	Chemical splash, glass breaking	2 (10 when in combination with 4,5,6)
Machining	Flying particles	1,3,4,5,6,10
Molten metal	Heat, glare, sparks, splash	7,8 (10 in combination with 4,5,6 in tinted lenses)
Spot welding	Flying particles, sparks	1,3,4,5,6,10

Figure 1. Recommended Eye and Face Protectors



Source: 29 CFR 1926.102 (a)(5) Table E-1.
**These are also available without side shields for limited use requiring only frontal protection.*
*** See Table 2, Filter Lenses for Protection Against Radiant Energy.*

Table -2

Welding operations	Opacity
Alloy welding	2
Yellow copper welding	3 or 4
Light welding (till 1/8 inch)	4 or 5
Medium welding (1/8 – 1/2 inch)	5 or 6
Heavy welding (over 1/2 inch)	6 or 8
Light cutting (till 1 inch)	3 or 4
Medium cutting (1 – 6 inch)	4 or 5
Heavy cutting (over 6 inch)	5 or 6

Hearing Protection:

Hearing protectors shall be made available and shall be worn by all employees exposed to an 8-hour TWA of 85 dB or greater.

Hearing protection equipment:

Its purpose to reduce the noise level to be lower the noise limits allowed in work place.

Hearing protectors will always have an assigned **Noise Reduction Rating (NRR), which** should be printed on the packaging of each hearing protector.

NRR is the amount of decibels by which a given device will reduce noise exposure, by subtracting the NRR value from the noise exposure levels.

OSHA requires subtracting 7 from the NRR as a safety factor.

1. Ear Muffs

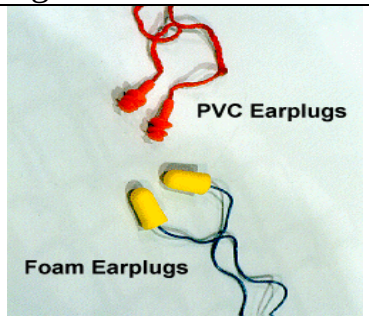
   It is covering the external ear, making a sound barrier and protect ear from high levels of noise where it can reduce it by 15 – 35 dB.

   It is used when noise in work place is 90 – 120 dB.

2. Ear Plugs

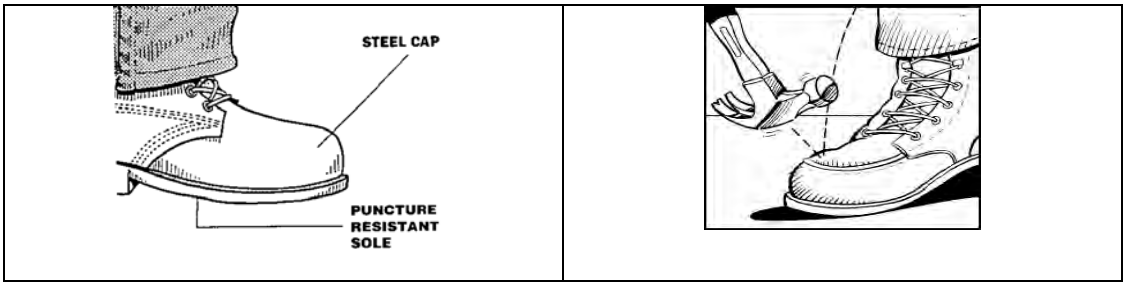
   Placed at ear canals and manufactured from plastic or rubber and can reduce the noise by 20-30 dB and used for places which have noise of 85 – 115 dB.

   In some places, which have a high level of noise, ex. 130 dB ear muffs can be used with ear plugs to reduce noise about 50 dB.



C: Foot Protection:

Statistics showed that most of the workers in selected occupations who suffered foot injuries were not wearing protective foot-ware.



For protection of feet and legs from falling or rolling objects, sharp objects, molten metal, hot surfaces, and wet slippery surfaces, workers should use appropriate foot guards, safety shoes, or boots.
Safety shoes should be sturdy and have an anti-resistant toe. In some shoes, metal insoles protect against puncture wounds.

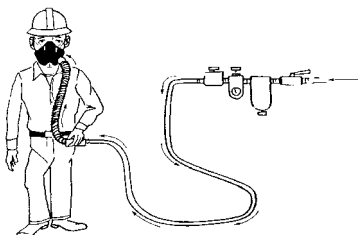
D- Respiratory Protection:

Respiratory protective devices fall into two classes:

1. Air Purifying Devices
2. Air Supplying Devices

Air-supplying Devices:

Air-supplying devices are the class of respirators that provide a respirable atmosphere to the wearer, independent of the ambient air ex. Self-contained breathing apparatus (SCBA)
Which provide complete respiratory protection against toxic gases and an oxygen deficiency. The wearer is independent of the surrounding atmosphere because he or she is breathing with a system that is portable and admits no outside air.



Air Purifying Devices:

The various types of air-purifying devices include:

- ☒ Mechanical-filter cartridge
- ☒ Chemical-cartridge
- ☒ Combination mechanical-filter/chemical-cartridge
- ☒ Gas Masks
- ☒ Powered Air-Purifying Respirators (PAPR)

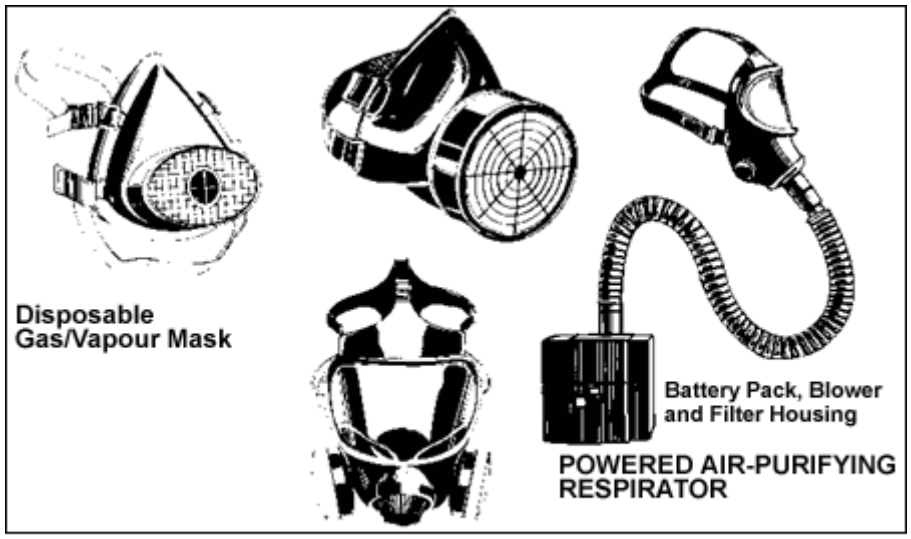
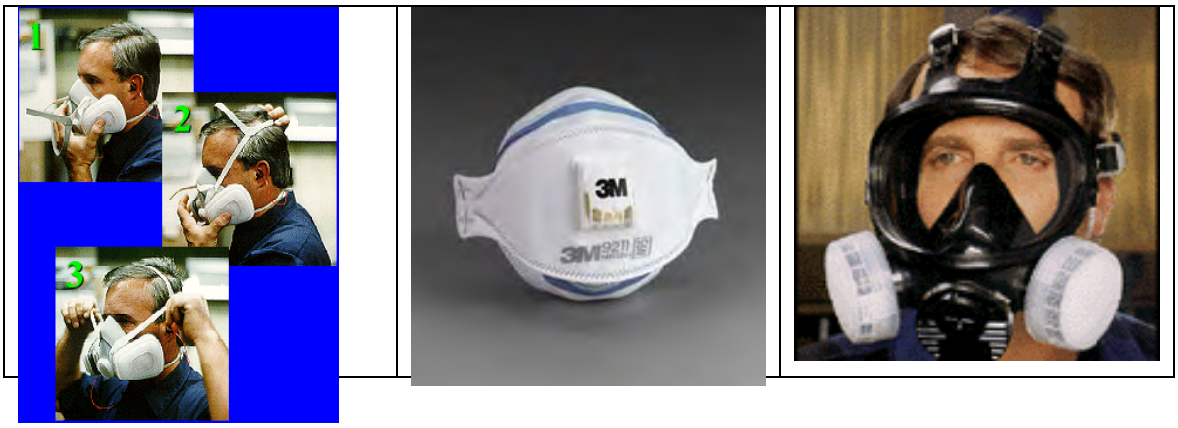


FIGURE 31
Air-Purifying Respirators



The air-purifying devices cleans the contaminated atmosphere. Chemicals can be used to remove specific gases and vapors and mechanical filters can remove particulate matters. This type of respirator is limited in its use to those environments where the air contaminant level is within the specified concentration limitation of the device. These devices do not protect against oxygen deficiency (percentage of oxygen by volume is less than 19.5 percent oxygen).

Proper Selection:

Respirators shall be selected based on hazards to which the worker is exposed. In selecting the correct respirator for a given circumstance, many factors must be taken into consideration:

- ☒ The nature of the hazard
- ☒ Location of the hazardous area
- ☒ Employee's health
- ☒ Work activity
- ☒ Respirator characteristics, capabilities, and limitations.

In order to make subsequent decisions, the nature of the hazard must be identified to ensure that an overexposure does not occur.

One very important factor to consider is oxygen deficiency. Air-purifying respirators can be used only at atmospheres containing greater than 19.5 percent oxygen.

Training and Fitting:

The user must be instructed and trained in the selection, use and maintenance of respirators. Every respirator user shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly.

Fit Testing:

Fit testing is done to find both a style and a size of respirator that fits the individual best and is most comfortable. There are two types of fit testing: Quantitative fit testing and qualitative fit testing.

Field Testing:

Once the fit test has been performed and a respirator selected, the user should perform "field tests" on his respirator each time before entering the toxic atmosphere. These consist of both a negative-pressure test and a positive-pressure test.

These tests apply to respirators with either a cartridge, canister, or filter.

Negative-Pressure Test:

In this test, the user closes off the inlet of the canister, cartridge(s), or filter(s) by covering with palm(s) or squeezing the breathing tube; inhales gently so that the face-piece collapses slightly; and holds the breath for about 10 seconds. If the face-piece remains slightly collapsed and no inward leakage is detected, the respirator is probably tight enough.

Positive-Pressure Test:

The positive-pressure test is conducted by closing off the exhalation valve and exhaling gently into the face-piece. The fit is considered satisfactory if slight positive pressure can be built up inside the face-piece without any evidence of outward leakage.

Medical considerations:

The workers who must use respirators according to job nature must make a medical examination to eliminate individuals who are suffering from (chronic respiratory system diseases – cardiac diseases – difficult breathing diseases – hearing weakness).

Doctor specify the individuals who can use respirators and others who cannot according to the medical examination.

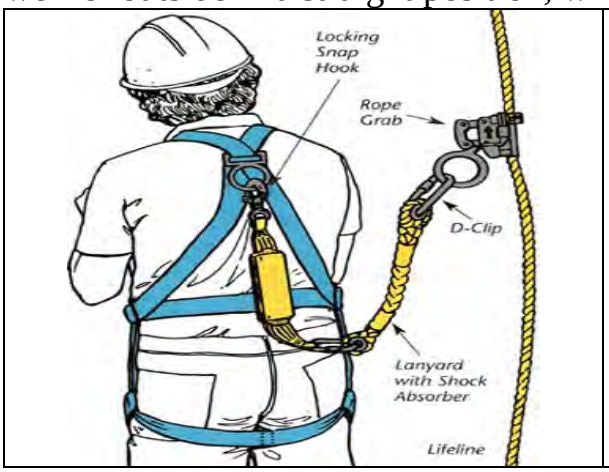
Cleaning and storage of respirators:

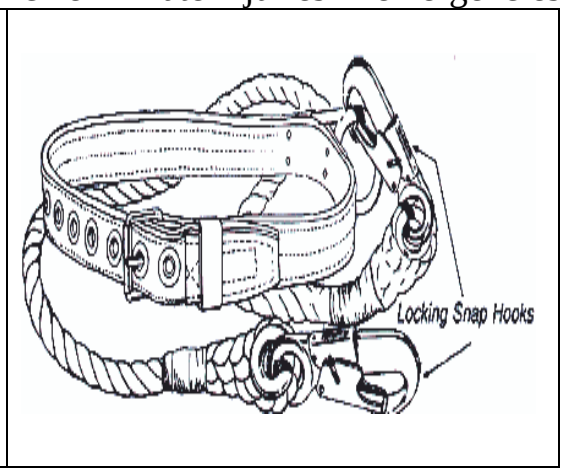
- Disassembly the respirator parts and wash it with detergents, hot water and brush then wash the parts with cold water, after that leave the parts to be dried in a clean and dry place.
- Do not use organic solvents in washing because it can damage the plastic parts.
- Be sure it is washed well with water and no traces of soap exists because it may make irritation to the user.
- Storage of respirators is done in a clean place for saving from dirt and dusts.
- After washing respirators, keep them in sealable plastic bags.

E- Safety belts and lifeline

They are used while working at heights for workers safety, also now using the parachute belts instead of regular belts.

In case of confined spaces working, use a safety harness and lifeline for getting the worker outside in a straight position, which eliminate injuries in emergencies.





F- Hand Protection:

Employees are required to use appropriate hand protection when their hands are exposed to hazards such as:

- Absorption of harmful substances.
- Severe cuts or lacerations.
- Severe abrasions.
- Punctures.
- Chemical burns.
- Thermal burns.
- Harmful temperature extremes (cold/heat).

Kinds of Protective Gloves:

Gloves made from a wide variety of materials are designed for virtually every workplace hazard. They may be divided into groups as the following:

1- Metal Mesh, Leather, or Canvas Gloves:

Sturdy gloves made from metal mesh, leather, or canvas provide protection against cuts, burns, and sustained heat.

2- Chemical-and Liquid-Resistance Gloves:

Gloves made of rubber (latex, nitrile, or butyl), plastic, or synthetic rubber-like material such as neoprene protect workers from burns, irritation, and dermatitis caused by contact with oils, greases, solvents, and other chemicals. The use of rubber gloves also reduces the risk of exposure to blood and other potentially infectious substances. Some common gloves used for chemical protection are described below. (In addition, table 4 rates various gloves as protectors against specific chemicals.)

3- Heat Resistance Gloves:

These gloves provide protection against heat like steam pipes and hot glassware in laboratories or welding operations.

G- Body Protection:

Overalls and aprons are used at working near machines or in workshops.

Plastic safety suits and coats are used for body protection against chemicals like acids and bases.

Purging with Natural Gas for Domestic

1- Prepare and check the required materials and tools and inform the supervisor if you have any tools that have defects.

2- Be sure there is a fire extinguisher with every work group and inspected daily (body, gauge …etc) and inform safety department for any remarks.

3- An inspection for external installations must be done to be sure there is no defects and all installations are safe & in good condition.

4- Make a pressure test for external installations by mercury gauge at a pressure equal to 1.5 times of working pressure (150 mbar at least) and take reading after 5 minutes in a stable temperature conditions , then observe that the pressure still steady for another 5 minutes at least .

5- After success of pressure test , an inspection for all internal installations to be sure of its physical conditions & it's conformance to the technical specification and continue any works in flat (main valves installations – cement work – painting pipes) .

6- In case of installing main valve in any flat, make a pressure test once more for all external installations to be sure there is no leakage.

7- After success of the second pressure test, start the first stage of purging external installations with natural gas and be sure that there is no ignition source at the place.

8- Open the ground line valve to confirm the existence of natural gas in the natural gas line and measure it's percentage by gas measuring device, then close valve tightly.

9- Connect the natural gas line with the external installations while the valve is closed then open the valve and test the connections for leakage.

10- At the second stage of purging , go upstairs at the top of the building to observe any impurities in pipes while purging the air from pipes with natural gas , before this stage be sure that the work place is naturally ventilated and don't use any electrical ventilation equipment also be sure there is no ignition source in work place .

11- Close the main valve and bind the cap linear, test it with soap while valve is opened then close valve tightly and ventilate the work place for 10 minutes.

12- Wear appropriate P.P.E to protect you from injury (safety shoes – overall – gloves)

Painting Works (Paints – Solvents – Removals)

- Store in a separate place away from any chemical or oxidized substances.
- The store should be dry & well ventilated & the thinner should be keep away from any thermal source or the direct sun light.
- Material should be treated as any flammable material in a way that smoking or presence of any flame source is forbidden.
- In case of using electrical equipment in storage or transportation, they should be fulfilling the technical specifications in dealing with flammable materials.
- Materials should be kept in packages originally, of the same material you are going to keep.
- Do not use any unsafe method to get the chemical out of the package.
- Do not eat or drink in place of chemical handling.
- Keep away from any source of heat, spark or open flame during working with chemical.
  - **In case of Injury Due to Dealing with Chemicals**
    - Respiratory system cases
      - Patient should be taken to a well-ventilated place.
      - In case, respiratory system stops start making artificial respiration.
      - In case of unconsciousness, contact the doctor for consultancy.
    - Skin injury cases
      - Take off clothes contaminated with chemicals.
      - Wash the skin with soap & water.
      - Contact doctor in case of injury continuity.
    - Eye injury cases
      - Take off medical contact lenses if found.
      - Wash the eyes with clean water for ten minutes.
      - Contact doctor in case of non-improvement.
- Use PPE (Respiratory mask – protective glasses) especially if the painting splash is heavy.
- In case of presence of opened flame, painting is forbidden.
- Do not store painting boxes or packages in place of work, but bring the needed only from the stores.
- Do not eat in place of work & painting workers have to wash their hands with soap properly before eating.
- Do not paint vehicles inside the garage.

Polyethylene Pipes Transportation

- The protective packaging and aids to handling, such as pallets and securing straps as supplied should be kept intact.
- Vehicles should have a flatbed free from nails or other projections, which might cause damage to pipe or fittings by abrasion.
- Care should be taken to avoid positioning pipes and fittings near, or adjacent to exhaust systems and other heat sources. Other materials should not be placed on top of pipes and fittings.
- Only non-metallic ropes or wide band webbing should be used to secure loads. Chains must not be used.
- Polyethylene pipes have a smooth surface and become slippery in wet and frosty weather. Particular attention should be given to the effective securing of loads under these conditions.
- Bulk supplies of individual coils should preferably be transported in caged vehicles with rope netting to ensure that the load is secure.
- Straight pipes should be fully supported and pound together and pipes must not rest on the sockets of couplered pipes.
- Care should be taken to avoid contamination of, and damage to, pipes and fitting when delivered to site with other materials.
- Where 'pup' fittings for butt fusion are transported, the weight of the fittings should not be transferred to any of the joints.

Polyethylene Pipes Handling

Handling Coiled Pipes:

- Coils either of pipe strapped or on pallets are easily handled by forklift truck.
- Where individual coils are too heavy for manual lifting, either nylon belt type slings or a forklift truck with suitably protected boom attachments should be used. They should not be rolled off the edge of loading platforms or trailers.
- Outer and intermediate bands secure complete coils and individual layers are independently secured. These should not be removed until the pipe is required for actual use. The band securing the outer end of the pipe should be removed first and the movement of the free end carefully controlled. This should be followed by those securing successive layers, and only those bands necessary to release the length of pipe immediately required should be cut and removed. After sufficient pipe has been cut from the coil, the protective end cap must be replaced on the remainder.
- Assistance may be required when removing bands from the larger sized coils and care should be taken not to damage the pipe during their removal.
- Uncoiling should not be done in such a way that the pipe leaves the coil in spiral form, as it can then be extremely difficult to straighten without damage by excess bending. In addition, a potentially dangerous condition is created unnecessarily.

Handling of Bundled Pipes:

- When lifting by crane, non-metallic wide band slings or ropes should be used, and for pipe lengths greater than 6m, load spreading beams of a length at least equivalent to one quarter of the length of the pipe or bundle-pack. Chains or hooks should not be used. Care should be taken to avoid damage to pipes and pipe ends during lifting, particularly those pipes with couplers.
- Some bending should be allowed for in the middle of the lift when loading and unloading pipes, and because of this, the lifting points should always be as far apart as possible.
- Standard bundle-packs 6 meters long may be handled by forklift truck and due allowance made for the flexible nature of the pipes in the positioning of the forks and the raising of the load.
- Bundle-packs greater than 6 meters long should be handled by a loader or by a crane using a spreader beam and suitable slings. Individual pipes may be handled in the same way. Off-loading on site may be made easier by using skid timbers and rope slings.

Handling of Fittings:

- Hooks should not be used to lift fittings, which are generally supplied in cardboard boxes or polyethylene bags.
- Special care should be taken in the handling of 'pup' fittings for butt fusion, to ensure that the weight of the fittings is not transferred to the fabricated joint.

Purging

The inert gas used in purging media must have the following characteristics:

a) Inflammable.

b) Not support combustion

c) Contain less than 2% oxygen.

Inert gases most commonly used for purging are Carbon Dioxide, nitrogen, or mixtures of the two.

Notes must be considered in Purging Operation:

- Using blank behind valve to isolate the part of the pipeline, which will be purged from the part that will be in service.
- The inert gas must be adequate and efficient.
- Devoid of purge, gas from moisture or other constituents, which might contaminate the material, protected.
- The vapors from enclosures being shall be vented to a safe point outside of enclosures and away from ignition sources.
- After the completion of purging operation and the procedure of work which had been prepared and reaching to the end point, a test must be done to the air around the place of purging to ensure that there is no gases or condensate or leakage or any circumstances can lead to any chemical reaction can form combustible substances or self-ignition.

Vent Pipes

These pipes used to vent the gases present in the equipment to a point at which a dilution for these gases without any harm for the labors.

Therefore, it is advised that the lowest height for this joining is 3m from the surface of the earth or from the nearest platform, also, the size of the vents is an important factor in identifying the speed of gas vented, and for safety the speed of the gas out from these vents at least (3- 4m/s) and to consider that the total of area of the vent points is less than the points entering purging media.

Ignition Sources

Ignition sources must be removed from the area near the purging operations and it may control the ignition sources, which is open flame, electric spark, and hot surfaces and welding operations...etc. but the static electricity is an ignition source, which cannot be controlled. So, the pipeline should be earthed.

Storing

- Industrial safety person should ensure the presence & condition of adequate number of fire extinguishing equipment.
- Smoking is completely forbidden in the stores.
- Storing places should be always clean & tidy & free from any litters, papers.
- Do not use benzene in cleaning or in removing grease but use un-volatile cleaning liquids.
- Flammable materials should be stored separately.
- Periodically check barrels & packets against any leakage or holes.
- Correct methods of handling, loading & putting materials should be followed & checked by supervisors.
- On lifting loads manually, take the correct position of legs, chest & back & to bend the knees with the chest upright as much as possible & making the load as close as possible to the body to transfer the load to the muscles of the legs & the knees.
- Be sure the load to be lifted is within the limit that can be lifted or ask for others help or use any mechanical lifting method.
- Long loads or pipes should be lifted by two persons on the same shoulder of each person & to be in one direction & with homogeneous footsteps.
- Use the P.P.E.
- Materials, equipment & spare parts should be stored in an organized & safe way & avoid putting them in high rows or columns to prevent falling down or collapsing.
- Heavy materials & equipment should be stored properly & near to the ground.
- Avoid materials being extended out more than the depth of the storing shelves.
- Use proper ladders to go up to put, load or unload high materials & do not go up over material rows.
- It is forbidden to pass or stay under the crane or the lifted loads during loading & unloading especially of heavy materials or equipment.
- Switch off electricity after work is finished.
- Any unsafe work conditions or cases should be declared & told to the responsible authorities & persons.

Storing Tyres & Rubber Materials

- Storage should take place in a closed area for protection against :
    A. Temperature & humidity.
    B. Direct & indirect sunlight.
    C. Ultra violet rays in intensive artificial light.
    D. Light of mercury lamps
- Storing place should be well ventilated & avoid high humidity which decreases the condition of the tyre & its efficiency during service.
- Store temperature is preferably to be between 10ºC & 20ºC.
- Store should be clean & free from petroleum solvents, grease, oils that decrease the tire condition.
- Issued tires should be the earliest stored tires.
- Tires to be stored in a way that enables issuing the older stocks before the newer ones.
- Storage is preferably to be vertical in wooden ballets.
- Avoid horizontal storage; & if happened due to limited space to be with a maximum of 6 tires over each other & to be completely rotated every two months to change its order in Storage.
- In case the cycle of storing & issuing is fast (less than 1 year), no need to take strict or expensive precautions, in many cases it is just the temporary maintenance by spreading talc powder over the tires & the rubber materials.

Storing & Handling of Acids

- Acids should be stored in a sealed or shielded store & away from sun heat & from any other flammable materials.
- Acid name should be written clearly on barrels.
- Use the P.P.E.

Storing Acid Glass Bottles:

- Always leave an empty space for safety inside every glass bottle (½ Gallon)
- Stoppers of the glass bottles should be fitted in a way to allow reliefing the acids' vapors.
- Glass bottles should be stored in a cool & well-ventilated place.
- Do not store full glass bottles beside or near any flammable materials.
- Glass bottles' Stoppers should be made of anti-corrosion & anti flammable material.
- At loading glass, bottles in a hot weather wash them with water & ventilate the stoppers.
- Do not store more than ten glass bottles in one place & to be stored in the form of one or two rows maximum & avoid storing in square shape & leave a passage between rows that allows moving safely.
- Try to store glass bottles on shelves with openings under which there is a path to discharge any acid leakage from the glass bottles.

Storing Flammable Liquids

Lighting

It is preferable not to use electric connections or preparations inside the stores & to depend for lighting on natural daylight or on electric lamps directed on the stores from outside so that its lights could penetrate through fireproof glass openings, and if necessary, any electric preparations should be of flameproof type.

Ventilation

Preferable to be natural by making suitable openings in the stores covered with metallic wires of narrow lattice.

Flame Causes Prevention

- Do not allow smoking or using uncovered flame or any other thermal sources inside the stores or outside the stores by a minimum distance of 6 meters all around.
- Be careful in moving or handling any metallic items inside the stores & for protection against static charges, packets & tubes should be tied with electric conductors or to be earthed.

Liquid Packets

- Should be protected from any mechanical impacts & to be kept upright in its proper position.
- Do not leave any packets opened & always keep them properly closed.
- Try not to exceed two rows in storing the packets.

Escaping in Case of Fire

- There should be enough isles between the stored packets & to be always clear, clean & free from any obstacles as well as the emergency exits.
- Stores should be kept opened as long as there are is person inside.

Recommendations

- Do not allow unspecialized persons to enter the stores.
- Marks should be written & put clearly declaring (Danger – Flammable liquids – Forbidden to get close – No smoking).

Storage of Polyethylene Pipes

Storage General Principles

- Generally, the greater the degree of firmness and flatness of the ground, the higher pipes can be stored, if care is taken to avoid distortion of the lower layers.
- Direct contact with the ground should always be avoided by the use of cages, pallets and timber frames.
- Pallets should be made either of wood or compressed cardboard, neither of which will damage polyethylene.
- Pipes are bundled together on a jig in the factory ensuring that the wooden timber frame supports are in the same position on every bundle. This allows them to be stored 3 high, timber to timber, as their weights are supported by the timbers and not by the pipe.

Storage of Pipes and Fittings:

- All material should be inspected at the time of delivery. Any damage should be noted and the supply source advised immediately.
- Pipes and fittings should be used in the order of delivery to ensure the correct rotation of the stock. Polyethylene pipes are date stamped at the time of manufacture, and checks should be made to ensure they are being rotated on an 'oldest out first' basis.
- Couplered pipe should be stacked in layers with sockets protruding at alternate ends.
- Individual pipe lengths should be stored with the bottom layer fully supported on an even surface.
- On stores, coils should be stacked on pallets never more than ten high for 20mm, 25mm and 32mm diameters and six high for 63mm and 90 mm diameters. On site, both bundle-packs and coils should be stored no more than too high.
- Polyethylene fittings should be stored under cover, preferably on racking, and the manufacturers' protective wrappings or cartons kept intact for as long as possible.
- Pipes and fittings stored externally and likely to be exposed to periods of prolonged sunlight should be covered.
- Pipes and fittings should be stored away from exhaust outlets and other high temperature sources. Care should also be taken to avoid contact with lubricating and hydraulic oils and other aggressive chemicals such as certain gas conditioning fluids and chemical solvents.

Storage of Fusion Tools

- Special tools for jointing pipes and fittings should be stored separately and securely until they are to be used.

Storing & Handling of Barrels

- Put the barrels properly in a horizontal manner as much as possible.
- Separate barrels according to its type & put suitable barriers to prevent sliding.
- Check the cleanliness of containers used in discharging oils & grease.
- Do not throw barrels from heights & be careful when sliding a barrel in order not to change its direction.
- At lifting barrels, make the knees bended & the back to be upright.
- Be careful that fingers are not trapped between barrels.
- Use wooden sheets for sliding the barrels from heights & be sure that sheets are in a good condition, properly fixed & its length is suitable.
- It is forbidden for persons to get down using these sheets.

Using of Hand Tools

a) Inspect all the tools periodically & keep them always clean & in good condition .
b) Unsafe tools should be excluded.
c) Handy tools should not be thrown from one person to the other.
d) Handy tools should be kept away from oils & grease to avoid slipping in workers' hands.
e) After cleaning the tools by the cleaning liquid, the worker has to wash his hands with water & soap.
f) Do not carry tools or put in clothes' pockets during moving upwards or downwards on a ladder.
g) Avoid working (except if must) in areas in which handy tools are used in higher planes over the workers' heads (use safety helmet).
h) Tools with wooden hands should be rounded & free from breaks & scratches to be holded safely.
i) Workers should use the P.P.E.

Using of Ladders

- Check the rubber fixtures and pay attention.
- Ladder stairs should be free from grease or oil.
- Continuous inspection of the ladders to ensure absence of any defects.
- Inspecting the ladder in case of falling down to be sure there are no defects in the standing bars.
- Ladders on vehicles should be fixed in a way to minimize impacts & friction during transportation.
- Ladders should be stored in a well-ventilated place & away from any radioactive source or any high temperature source like ovens or steam pipes or boilers.
- In case of horizontal storage of ladders put suitable supports to prevent collapsing or falling.
- Well fixation of the ladder to prevent any slipping.
- Avoid leaving ladders in front of doors or windows.
- Use suitable barriers around ladder in case of using it in isles or vehicles ways.
- Do not put ladders over any unstable bases to obtain extra height.
- Do not ever assemble short ladders to obtain a long one.
- Carefully move ladders in places with electric circuits.
- Always look in front of you during moving up or down on ladders (face faces the ladder).
- Hands should be free during moving up or down on ladders and in case of using any tools or equipment use ropes to get it up or down.
- Shoes should be free from any grease or oil or any slipping substances during using ladders.
- Avoid using the upper stairs of the ladder as an ordinary stair.
- Carefully adjust & lock the extended ladders before usage and do not try to adjust it during work and try to make the distance between the ladder & its mounting wall ¼ the required height from the ladder.
- Use the ladder stairs for its purposes & not as supports.
- In case of using the long ladder, somebody should be standing at the bottom of the ladder while the technician is working at the top.

Using of Fire Extinguishers

Industrial Safety Responsibilities

- Co-ordination & Co-operation with different sections to know the sight demand from the suitable extinguishing equipment.
- Maintenance & ordering of the fire extinguishers to facilitate its use in emergency cases.
- Checking that all workers are trained how to use fire extinguishers with their different types.
- Fixing fire extinguishers against the walls by special holders.
- Supplying suitable warning devices.
- Inspecting fire extinguishers periodically refilling the empty & repairing the defected ones immediately.
- Informing workers of fire hazards & checking the safety of the sight at the end of each working day.
- In case of using any fire extinguisher, industrial safety should be informed at once with a written report indicating fire circumstances or the reason of the fire extinguisher being used.

Precautions against Fire

- Supplying a suitable manual or automatic warning device to fasten evacuating the place from workers in case of fire or any danger.
- Supplying good communication between the different work sections at sight as wells as between the management & the public firefighting locations to call them in case of any fire or any sudden danger.
- Never doing any works that result in existing a flame or high temperature in any flammable buildings like wood or plastic unless their walls & ceilings are lined with thermal insulating materials.
- Operations resulting in existing a flame or high temperature should take place in separate places away from working or storing places of flammable or explosive materials in addition to supplying suitable extinguishing device.
- Flammable or explosive materials such as fuels or burning materials should be kept in suitable stores & preferably to be lower than ground level & to have strong, tough and hard walls & ceilings and to be anti-explosion and thermally insulated, well ventilated to allow lowering the temperature inside the store as

well as to decrease the concentration of gases & vapors that could be dangerous for either human health or from being flammable or even for both reasons.

- Classification of materials inside the stores & its proper organization & supplying suitable methods to load it & to transport or move it & prevention of mixing chemical materials that can react with each other & avoid it being spilled on the ground.
- Well organization of materials inside the store to avoid falling, breaking or spilling of materials or their containers.
- Electric key switches of stores of flammable materials should be located outside the store & if necessary to be inside the store, then it should be anti-spark type (oil key switch).
- Choose the suitable method to get rid of the work residuals or litters whether it is solid, liquid or gaseous to avoid any probability of fire, explosion or any health hazards to anyone of the workers.
- Earthing of any electrical devices or any materials may contain any static charges is necessary.
- Do not use shoes with nails from below or to hammer with any metallic instruments that could lead to spark inside places that may contain any flammable or explosive vapors or gases.
- Water pipes, gas pipes or electric cables should be buried underground & to be covered properly to protect them against fracture, fire or being spoilt in addition to the electric switch keys to be placed outside working area for the easy control of switching off electricity or shutting down gas or water.
- Lighting should have separate electric cables than cables of machines & equipment in order to be capable of switching off electricity without cutting off lights to facilitate the exit of workers in case of any emergency.
- Presence of adequate isles between machines & in the stores to facilitate the movement of persons & materials and to facilitate exit of persons on any emergency case as well as reaching firefighting equipment to any place.
- Presence of adequate entering & exit doors free from any obstacles & at the ground level and to put clear marks showing the leading ways to the nearest exits in case of any fire or emergency at workplace.
- Presence of reserve ladders for workers at higher floors to use them in getting down in case of any fire in the building or in the main stairs.

Vehicles & Equipment Extinguishers

- Industrial Safety has to determine type & capacity of extinguishers required for every vehicle or equipment.
- Stores have to issue extinguishers to vehicles & equipment drivers as a personal compact responsibility.
- Co-ordination between stores, industrial safety, workshop & repairs to follow up the company demands from various types & capacities of vehicles & equipment fire extinguishers.
- Vehicle or equipment's driver has to check the presence & good condition of extinguisher when being delivered his vehicle or equipment.
- The driver has to introduce a written report to the industrial safety in case of using a fire extinguisher indicating the reason for which it was used.
- Industrial safety has to refill used extinguishers taking the followed regulations.
- In case of losing an extinguisher, the driver has to introduce a written report indicating the reason of losing the extinguisher to the industrial safety who has to replace him with another extinguisher immediately.
- Training of the drivers is the responsibility of the industrial safety to show them how to use fire extinguishers in the vehicle or equipment.
- Periodical inspection on vehicles & equipment is done by the industrial safety to check the condition of fire extinguishers.
- Adequate stock of fire extinguishers with various types & capacities used by the company and indicated by the industrial safety is the responsibility of the stores to cover the demands of the new vehicles & equipment.
- Stores has to inform the industrial safety of the movement of fire extinguishers updatable.

Working on Scaffolds

- Well supervision should be done on the scaffold & report any defect immediately.
- Daily supervision in case of working on the scaffold for more than one day.
- Use safety belt during working on scaffolds.
- Do not put any equipment, instruments or anything not in need on scaffold.
- Use scaffold stairs to move up & down and not the cross bars.
- Do not look down during going up or down.
- Use correct, suitable tools and to be in good condition.
- Do not make extensions to increase still son lengths.
- Check for safe electrical connections for the used tools and devices.
- Do not remove chip during working with screwing machines.
- Remove chip using suitable brushes & not by hands.
- Always keep working place neat & tidy after work.
- Work should be immediately stopped in case of heavy wind or rain or any emergency case at the work site.
- Wear appropriate P.P.E to protect you from injury (helmet – gloves – safety shoes – safety belt).
- Check the suitability of the ground in the place for the scaffolds to be installed.
- Install scaffolds 30 cm away from the pipe location.
- Check all parts of the scaffold & remove any defected parts.
- Be sure of installing all cross bars, standing bars and that all the safety locking benz are in good condition.
- Make the scaffold away from electric cables & ducts by an adequate distance.
- Combine the scaffolds with the building every 3 floors by using clamps.
- Be sure of fitting the stairs & standing bars with a minimum of 2 on each floor.
- Put one safety floor on the last working floor.
- Do not ever throw any of the scaffolds components during installing or reinstalling.

- Work should be immediately stopped in case of heavy wind or rain or any emergency case at the work site.
- Do not move scaffold from any place to another except after reinstalling & installing at the new place.
- All components of the scaffold should be well-locked & secured during transportation on vehicles & without any exceeding edges on the vehicle.
- Work should be done under the supervision of the qualified supervisor or anyone qualified replacing him.
- All workers should use P.P.E (helmet – safety belt – safety shoes – gloves – overall suit).

Bracket Installations

- Check the suitability of the ground inside the customer's apartment.
- Check all parts of the bracket & remove any defected parts.
- Check installing 2 clamps and 2 standing bars.

Working on Roads / Open Areas

- Put warning signs and signals along sides of the excavation for protection of workers, people, and vehicles.
- Put all traffic signs required for the job.
- In case of night working, you must put all warning flashers & phosphorescence signs.
- You must put all required bridges for vehicles in case of excavation is crossed with the road.
- Put the needed human brides specially beside schools and hospitals
- Put all the required barriers and signs around the excavation if it is in open area.
- All warning signs and signals must put in places that are clear for the public and traffic.

Welding

- Avoid welding or flame cutting in any area, rooms or stores containing any flammable materials.
- Distance between cylinders of gases used for welding or flame-cutting places should be 5 meters or more.
- Chains or belts to prevent falling down should fix vertical cylinders.
- The specialized persons of the company should do repairing of regulators defects & cylinder valves only.
- Used hoses should be at least 5 meters long & should be installed by clipses so that it would be fixed properly.
- Hoses should be stored properly to avoid knotting or ignition from near heat sources.
- Proper ones should change defected hoses immediately.
- Check the correct working pressure of the flame hose.
- Welder should not lift hoses on his shoulder during welding so that his clothes do not absorb oxygen or any gases from leakage locations & catch fire.
- Welder should not keep matches in his pockets.
- Leave adequate distance (not less than 15 meters) around welding location free from any papers, clothes, litters or any empty or full gas cylinders.
- Welder should use welding mask with special glasses to protect his eyes from ultra violet rays.
- It is forbidden for any vehicles or cranes or any heavy equipment to pass over gas hoses or electric cables.
- Avoid welding or cutting in barrels, tanks or gas cylinders with unknown contents.
- On welding or cutting pipes or tanks containing any flammable contents, it should be emptied from these contents & consulting the concerned persons before starting welding or cutting.
- On welding or cutting in boiler areas, gas shut down should be done & check absence of leakage before starting work.
- On working in closed workshops on a table or a vice, do not flame hose beside the work piece to avoid catching fire.

- Welder clothes & gloves should be completely free from any grease, oils, benzene or kerosene or any flammable materials or fluids.
- Inform the safety persons & check work place if it is outside the workshop, in this case a work permit could be done also.

Electric Arc Welding

- Perform steps 1, 12, 13, 14 & 19
- Check the electric cable from any cuts or uninsulated parts, also check the plug.
- Welding hose should be insulated properly, and during stop or rest periods it should be left on an insulated holder so that it will not touch the work piece.
- Stop welding during raining.
- If working at high places & at stop or rest periods, welding hose should not be thrown down except after switching off electricity.
- Periodically, pass by welding or cutting location after work finishes.

Work Permit

What is work permits?

Work permit is not just a permit to do dangerous works; its essential part of the system, which identify how can the job, is done safely.

Work permit is a document, which gives the right for worker to do his job, taking into account all risks, precautions, equipment that are exist, and how to do his job safely.

The getting of work permit does not also mean the process is safe, it must mention that well trained personnel are controlling all hazards by means of control measures and precautions.

The work permit is based on written procedure used to control special types of works that have potential hazards and it is a communication method between sites, workers, supervisors, and management.

Instructions for the permit issuance:

General:

a- Specify the responsibilities of supervision personnel for every process and precautions to take into account.

b- There must be a clear instructions and training for using and issuance of work permits.

c- The system of work permit must be followed up.

* The following points have to be clear stated in permits:

1- Specify the department or sector responsible for the job, type of job, and location of the job.

2- Specify type and nature of job to all related personnel with clarification of all related hazards.

3- Illustration of all control measures required to protect from possible hazards and risks.

4- Be sure that worker is qualified for the job also be sure that a continuous supervision is applied and qualified person reviews all precautions.

5- Illustration of various work procedures on site and temporary work stopping procedures.

6- Illustration of the followed procedures for elongation of working period's more than one shift also be sure that all procedures that guarantee that the job is safe are fully illustrated.

Permit preparation

1- it's very important that all activities related to the job to be taken into account to avoid any risks obtained from the job , that is done by one who is responsible for the job (site manager) who monitor the issuance of permits till job is finished .

In addition, it is important in some cases to participate more than one in the responsibility, each in his field and site manager has the all authority for supervision for all responsible personnel.

2- The permit requires a good planning from all related personnel, where they must be informed about the work places that may be affected by the work and taking all precautions to avoid any effect could be happened to any of work activities. Also giving the time required to identify all risks, control measures, and preparation of site for work, the supposed technical method to achieve that is the procedure of: "Job Hazard Analysis ".

3- The most important stage of permit issuance is the risk assessment which done by permit maker with work supervisor also may be other specialists participate in the risk assessment , the following have to be done at the assessment:

a- Get the detailed information about the process to be done from supervisor with taking into account all alternatives that can achieve the work safely, like timing, method of work… Etc.

b- Taking into account all risks that may arise from handling materials and working by equipment.

c- Evaluation of difficulties and expected effects on working environment also expected hazards that affect the work.

* Types of Works

Types of works include works such as maintenance, repairing, inspection, testing, construction, re-construction, machines disassembly, modification and cleaning.

* Activities Interference

The main aim is to verify that no hazardous interference between activities that may contain risks for people or equipment.

* Permit Validity

It is important to specify the validity of work permit to the work permit system under control also it's favorable to eliminate permit at the end of the working shift and issue a new one if the job is continued for more than one shift .

* Isolation

It is an essential part of safely working system; also, each company makes its own isolation procedures based on working activities and associated risks.

* Precautions

You must know the nature and type of job for defining the required precautions, which will be, wrote and reviewed in its form and each supervisor must be sure that all precautions are implemented.

* Gas Test

A test for gas leakage must be done on sites, which contain flammable or toxic gases or expected decreasing / increasing of oxygen.
The results of the test must be recorded in the permit.

* Approval (signature)

The number of work permit approval personnel are specified according to nature and type of work and permit, as a minimum requirement the permit issuance person and the work supervisor must sign on the permit and any other person who participated in the permit issuance and if the responsibility is changed to other personnel, he must sign on the permit.

* **Process**

- permit using

The permit must be communicated to all related parties or personnel and copies of permit must sent to these related parties.

- Permit validity

The permit issue personnel must re-evaluate the conditions of work that he issued for the permit at the first time and be sure that conditions are not changed – (it is common that this evaluation is done at the end of each work shift).

- Changing Shifts

The points of changing shifts are considered very critical for work permit and any fault of information transfer is a reason for many accidents. In addition, information transfer methods are:

a- Work permit logbook.
b- Files of permits.
c- Signs and information boards.
d- Computer screen.

- Emergency Procedures

The permit must contain the followed procedures in case of emergencies like limitations of some activities …etc. and re-evaluate the job, which the permit is issued for, to ensure that conditions are not changed by existing emergency.

- Permit Monitoring

The monitoring must not be stopped to ensure not all the conditions are changed along with the process progress.

- Finishing job in permit

When the job is finished, the permit copies are collected and sent back to the issuance parties, which will sign on the permit with the supervisor stating that the job is finished; also other related parties are informed.

- Site Inspection

The permit party's representative must make a site inspection after the job to ensure that it is leaved in good conditions.

- Coming back to operation mode

There must be some procedures for equipment to come back to operating mode like:

a- The work on machines is finished.
b- The facilities and equipment are leaved in safe and good conditions.
c- All isolation and outreaches procedures are terminated.
d- The responsible personnel must accept officially the existing conditions of the facility and equipment.

- Records

The permits must recorded in a specified logbook.

Working in Confined Spaces

Description of confined spaces, which need to work permit

1- Manholes
2- Petroleum tanks
3- Tunnels
4- Ground tanks
5- Pipelines
6- Digging for depth more than 2 m…..etc.

Confined space entry

Entry into any confined space cannot proceed unless:

- All other options have been ruled out.
- A responsible person issues permit with authorization.
- Permit is communicated to all affected personnel and posted as required.
- All persons involved are competent to do the work.
- All sources of energy affecting the space have been isolated.
- Testing of atmosphere is conducted, verified and repeated as often as defined by the risk assessment.
- Stand-by person is stationed.
- Unauthorized entry is prevented.

Workshops

- Smoking is completely forbidden.
- Isles should be clean & free from any obstacles & oils should be removed daily.
- Litters should be put in special baskets or containers & to get rid of it continuously & as quick as possible.
- It is forbidden for anyone to work on machines except the specified workers.
- Do not clean or wash equipment or machines with benzene or any other quick flammable material, but if necessary use kerosene or solar and avoid clothes being wet by benzene or solar.
- It is forbidden to store quick flammable materials in opened containers or in any other places not specified for this purpose.
- Switch off electricity after work finishes & check the safety of wires & connections.
- Use the suitable PPE for every job to protect the worker.
- Check the safety & condition of the handy tools & equipment used in repairs.
- Avoid oil spilling on the ground during changing oils for vehicles & machines.
- Expired oils should be collected in barrels.
- Expired filters should be collected in barrels with special color.
- Switch off electricity & do the daily cleaning after work time.

Washing by Solvents

- The workers handling diesel or hydrocarbon solvents must read the using instructions on cans before use.
- Washing by diesel must be done in its specified place and the washing residuals are collected into separated barrels.
- Do not spill diesel or hydrocarbon solvents into sewages.
- Use the proper PPE (rubber gloves – safety goggles – safety shoes …etc).
- Do not use diesel in compressed form for spraying to avoid fire and inhalation risks.
- Wash by diesel in a well-ventilated area.
- Smoking or other hot works are forbidden in washing by diesel area.
- The residual barrels are moved to collecting place for disposal and be sure the barrels are closed tightly.
- Labels must be put on the solvents residual barrels.
- Keep the washing area and collecting barrels area clean to avoid slipping and environmental contamination.

Waste Management

1- Purpose

Making a system to collect, classify and dispose of wastes.

2- Range

All wastes that produced by working in all activities of the company.

3- Responsibility

Responsibility of every working site manager.

4- Forms

Security person at the exit area and storing places of the company records waste trucks.

5- Definitions

5.1- Dangerous wastes

It is all types of wastes that effect on working site and Surrounding environment safety (used oils – residual paints – residual thinner – odorant drums – residual kerosene – batteries – printing inks empty cans ,…etc.)

5.2- Liquid wastes

It is including the cooling liquids of screwing & lathing Machines

5.3- Solid wastes

It is including (scrap – wood – paper – residual steel residual pipes – used tires – residual digging & civil works – organic substances ,…….etc)

6- Steps

a- Dangerous wastes

It has collected in convenient containers & prepared by convenient method.

The responsible person collects the dangerous waste containers to a specified place until its disposal.

- Dangerous wastes are disposed according to the following:
  - Used oils are sent to company storing place and disposed by selling.
  - Batteries are sent to company storing place and disposed by selling.
  - A waste contractor disposes empty cans of (paints – thinner – kerosene.
  - Residual kerosene is reused in pipes washing works.
  - Cans of printing inks are disposed by sending it back to the supplier.

b- Liquid wastes

- Collected in convenient containers and marked then sent to company storing place prepared to be disposed by selling.

c- Solid wastes

- The wastes of (residual pipes – scrap – wood – tires – empty drums – residual steel) are sent to company storing place and disposed by selling.
- The wastes of human activities, administrative buildings and activities are collected by a contractor and disposed by government.
- Gas odorant empty drums are chemically treated and collected in company storing place, prepared to dispose it.

Annex 3: IFC GUIDELINE

Environmental, Health, and Safety Guidelines for Gas Distribution Systems

Introduction

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)[1]. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the **General EHS Guidelines** document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. A complete list of industry-sector guidelines can be found at: www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment. .

[1] Defined as the exercise of professional skill, diligence, prudence and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

Applicability

The EHS Guidelines for Gas Distribution Systems include information relevant to the distribution of low pressure natural gas from the city gate to residential, commercial, and industrial users. Annex A provides a summary of industry sector activities.

This document is organized according to the following sections:

Section 1.0 — Industry-Specific Impacts and Management
Section 2.0 — Performance Indicators and Monitoring
Section 3.0 — References
Annex A — General Description of Industry Activities

1.0 Industry-Specific Impacts and Management

This section provides a summary of EHS issues associated with gas distribution systems that occur during the construction and operations phases, along with recommendations for their management. Recommendations for the management of EHS issues common to most large industrial facilities during the decommissioning phase are provided in the **General EHS Guidelines**.

1.1 Environment

Distribution pipeline construction impacts greatly depend on the location of proposed pipeline installation. In already developed urban areas, environmental impacts are considerably different than in suburban or mixed use areas. Common impacts may include noise and vibration caused by the operation of earth moving and excavation equipment, and materials transport and delivery; dust emissions generated by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind; mobile emissions from exhaust of diesel engines for earth moving equipment; and hazardous materials and waste handling, including oil spills associated with heavy equipment operation and fueling activities. In newly developed areas, impacts may also include soil erosion resulting from excavated areas prior to the reestablishment of vegetation. In urban areas, impacts may include noise, traffic interruption, disposal of contaminated soil, and presence of archeological artifacts.

Recommendations for prevention and control of construction related impacts are addressed in the **General EHS Guidelines**.

Environmental issues that may occur during gas distribution projects include the following:

- Habitat Alteration
- Air Emissions

Habitat Alteration

Habitat alteration is only considered a relevant potential impact during construction of gas distribution pipeline systems in newly developed rural or periurban areas. These impacts may be associated with excavation, trenching, pipe laying, backfilling, and the establishment of infrastructure such as regulating stations, which may create temporary or permanent terrestrial habitat alteration depending on the characteristics of existing vegetation and topographic features along the proposed right of way. The potential for impacts depends on the level of existing development, and will likely be less of an issue in urbanized areas or along existing utility rights-of-way corridors.

Depending on the level of existing urbanization in the proposed project area, examples of habitat alteration from these activities may include landscape fragmentation; loss of wildlife habitat, including for nesting; and establishment of non-native invasive plant species. In addition, construction of distribution pipelines crossing aquatic habitats that may disrupt watercourses and wetlands, and require the removal of riparian vegetation. Sediment and erosion from construction activities and storm water runoff may increase turbidity of surface watercourses.

To prevent and control impacts to terrestrial habitats, distribution pipeline rights-of-way and regulating stations should be sited to avoid critical habitat through use of existing utility and transport corridors, whenever possible. To prevent and control impacts to aquatic habitats, distribution pipeline rights-of-way should be sited to avoid critical aquatic habitat such as watercourses, wetlands, and riparian areas, as well as fish spawning habitat, and critical fish over-wintering habitat, whenever possible. Use of guided / directional drilling for distribution pipeline installation

should be considered where feasible to reduce impacts to both terrestrial and aquatic habitats.

Air Emissions

Gas distribution systems may generate gas leaks as a result of normal operations, equipment venting for maintenance, and aging.[2] Gas leakage, principally consisting of methane (CH_4), a greenhouse gas, may result from corrosion[3] and degradation of pipelines and related components over time and from fugitive emissions from pipelines and regulating stations.

Recommended measures to prevent and control air emissions due to leaks include:

- Gas pipelines and pipeline components, in addition to general installation and pipe joining techniques such as welding, should meet international standards for structural integrity and operational performance;[4]
- Corrosion prevention of buried ferrous metal pipelines should be undertaken using coating or cathodic protection techniques.[5] For underground applications, the use of polyethylene pipe[6], which is not subject to corrosion, should be considered as an alternative to ferrous metal pipeline materials;
- Testing of pipelines and pipeline components for pressure specifications and presence of leaks should be undertaken prior to commissioning. The system should be gas tight when tested at a higher pressure than the normal maximum operation gas pressure;
- Leak and corrosion detection programs should be undertaken, including use of appropriate leak detection assessment techniques and equipment.[7] Maintenance programs to repair and replace infrastructure should be undertaken as indicated by detection results. Typical urban testing sites include atmospheres in confined spaces of utility infrastructure (e.g. sewer and water system manholes), as well as at openings in pavement and on streets and walkways. Areas of gas infrastructure subject to forces from heavy load traffic or physical land shifts should also be periodically monitored for leaks and ruptures;
- Comparisons of purchased and delivered gas amounts should be periodically examined for discrepancies and unaccounted for gas which may be an indicator of excessive system leakage;
- Regulating stations and vaults, both above and below ground, may contain equipment (e.g. safety valves, filters) that may emit fugitive emissions of gas. Pipelines, valves, and other component infrastructure should be regularly maintained, and ventilation and gas detection / alarm equipment installed in station buildings or vaults.

[2] The methane emission from the gas distribution sector is 26 percent of the total methane emissions in the US natural gas industry sector. United States Environment Protection Agency (US EPA) (1999).
[3] Steel and other ferrous metals used for gas pipelines may be subject to corrosion, a reaction between external and internal surfaces of the pipe and its surroundings in both below and above ground settings. Corrosion weakens the structural integrity of the pipe and may lead to leakage. The characteristics of the physical environment of the pipeline including soil resistivity, moisture, and presence of contaminants may encourage corrosive activity. US Department of Transportation, Office of Pipeline Safety (2002).
[4] For example, US 49 CFR Part 192—Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards subparts A to H, and European (EN) Standards: EN 12007-1:2000: Gas Supply Systems. Pipelines for maximum operating pressure up to and including 16 bar. General functional recommendations.
[5] Cathodic protection is a procedure by which an underground metallic pipe is protected against corrosion. There are two basic methods of cathodic protection: use of galvanic anode and impressed current systems. Galvanic systems rely on a sacrificial metal, such as zinc, to protect the pipe. For impressed current systems, a direct current is impressed onto the pipe by means of a rectifier, and corrosion is reduced where sufficient current flows onto the pipe. Testing of the electrical current for cathodic protection should be undertaken regularly. US Department of Transportation, Office of Pipeline Safety (2002).
[6] An example of the performance specifications for polyethylene gas pipe is the ASTM D 2513 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings or Standard EN 1555 Plastics Piping Systems.
[7] Leaks are indicated by the presence of gas odor and hissing sounds. Additional indicators may include changes in vegetation, insect activity, and the presence of fungal growths surrounding pipelines and components. Examples of leak detection equipment include specialized soap solutions, in addition to combustible gas indicators (CGI), flame ionization detectors (FI), and sonic detectors that use sound levels to locate leaks. US Department of Transportation, Office of Pipeline Safety (2002).

1.2 Occupational Health and Safety

Occupational health and safety (OHS) issues in the construction phase include potential exposures to dust, noise, physical strain, and trenching excavation hazards. Recommendations for the management of construction phase hazards are addressed in more detail in the **General EHS Guidelines.** Occupational health and safety hazards associated with the construction and operation of gas distribution systems may also include:

- Occupational exposure to gas leaks and explosions
- Confined spaces
- Electrocution

Additional recommendations for operational phase OHS issues also applicable to gas distribution activities are also addressed in the **General EHS Guidelines**.

Occupational exposure to gas leaks and explosions

Excavation, construction, and repair of gas distribution systems may result in accidental pipeline rupture or leakage and consequent exposure of workers to harmful gases and an explosive gas atmosphere. In addition, excavation by non-gas utility personnel may result in accidental ruptures and exposure of untrained workers to explosion hazards. Recommended techniques to prevent and control exposure to gases and explosive atmospheres caused by accidental gas line ruptures and / or leaks include:

- Training of employees and contractor personnel in safety procedures, together with provision of appropriate tools and equipment;
- Identification and location of existing gas and other buried utility infrastructure prior to excavation for installation or repair of gas pipelines. Installation of visual marking of gas lines as part of installation, and updating as necessary on an ongoing basis;
- Removal of sources of ignition prior to gas venting for maintenance and repair activities. Purging of gas from pipeline or pipe components prior to welding or cutting activities;
- Installation of gas lines and components using sufficient separation distance and appropriate pipe protection layering to minimize potential interference with other underground infrastructure. Separation of plastic pipes from sources of heat;
- Odorization of gas to facilitate detection of gas leakage;[8]
- Training of gas utility workers in procedures for emergency preparedness and response involving appropriate public authorities, in addition to emergency shutdown and pressure reduction in the pipeline system. Further recommendations for emergency preparedness and response are addressed in the **General EHS Guidelines**.

Confined spaces

Accumulation of natural gas in a confined space is a potentially fatal condition. Entry by workers into confined spaces and the associated potential for accidents may vary among gas distribution project phases and facilities. Specific and unique areas for confined space entry may include excavation trenches during construction and regulating stations and vaults, both above and below ground, which may also contain equipment (e.g. safety valves, filters) that may emit fugitive emissions of gas and create a potential for oxygen deficient and explosive atmospheres. Gas distribution companies should develop and implement confined space entry procedures as described the **General EHS Guidelines**, and including the following:

[8] A combustible gas in a distribution line must contain a natural odorant or be odorized so that at a concentration in air of one-fifth of the lower explosive limit, the gas is readily detectable by a person with a normal sense of smell. See US 49 CFR Part 192.

- Requiring work permits for all confined space entries;
- Installation of appropriate access controls for unauthorized personnel including signage to alert workers to the hazards of confined spaces;
- Use of ventilation and oxygen / explosive level detection and alarm equipment prior to access.

Electrocution

Excavation, construction, and repair of gas distribution systems may result in workers' exposure to existing aboveground or underground utilities, including aerial or buried electric transmission lines. Identification and location of all relevant existing underground utilities should be undertaken prior to any construction and excavation activities.

1.3 Community Health and Safety

Community health and safety hazards associated with the construction and operation of gas distribution systems include public exposure to gas leaks and explosions. Additional recommendations for community health and safety issues common to most industry sectors are addressed in the **General EHS Guidelines**.

Public exposure to gas leaks and explosions

The presence of gas distribution systems within populated areas may expose the public to hazards from gas leaks and explosions. Gas leakage may result from accidental rupture of pipelines during installation and repair or from contact during excavation unrelated to the gas system. Gas utility operators should inform and advise affected communities, schools, businesses / commercial facilities, and residents about the potential hazards presented by gas infrastructure. Gas distribution system operators should establish an emergency preparedness and response plan and communicate this plan to the public as necessary.

As part of the plan, gas system operators should implement a telephone notification system to respond to reports of leaks or questions of general safety from the affected community and other interested parties. Operators should also provide a pipe location service to assist outside contractors and the general public to determine the location of gas infrastructure prior to construction works proximate to gas pipelines.

Improper operation of natural gas fuelled appliances and equipment may expose the user and the public to gas leakage and explosion hazards. Gas distribution system operators should make information available to customers (e.g. through flyers and internet-based information) regarding the safe operation of gas fueled appliances and equipment. This information should address issues of proper and safe use of gas-fired appliances, which in the case of residential use, may include the following issues:

- Proper location, installation, and maintenance of appliances and equipment such as natural gas fired heating units. For example, installation in areas with adequate ventilation to ensure dispersion of residual carbon monoxide. Poor combustion in a natural gas fired appliance or piece of equipment may expose the user and the public to carbon monoxide exposure, especially in confined spaces;
- Recognition of potential hazards or operating problems. For example, recognition of the hazards of poor ventilation or identification of gas surges requiring action by the gas utility (identifiable when flame color in natural gas burning appliances is orange or yellow rather than blue), and how to respond to possible accumulation of gas vapors when odor is detected with instructions on proper response procedures. These procedures may include avoiding

sources of ignition (e.g. electrical switches, lighters), ventilating area of gas accumulation, and calling the emergency contact number of the local gas utility from a safe location.

2.0 Performance Indicators and Monitoring

2.1 Environment

Emissions and Effluent Guidelines

Although there are no significant point source emissions or effluents for the gas distribution sector, fugitive emissions (from city gate and regulating stations, underground piping, and third party damage) from gas distribution systems constitute a significant portion of the overall atmospheric losses from the natural gas transmission and distribution industry. Gas distribution system operators should conduct volume reconciliation programs as an indicator of leakages by comparing delivered gas amounts against sales to customers.[9] Operators should also implement inspection and maintenance programs to maintain and upgrade infrastructure and minimize fugitive gas emissions.

Environmental Monitoring

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the particular project.

Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Additional guidance on applicable sampling and analytical methods for emissions and effluents is provided in the **General EHS Guidelines**.

2.2 Occupational Health and Safety

Occupational Health and Safety Guidelines

Occupational health and safety performance should be evaluated against internationally published exposure guidelines, of which examples include the Threshold Limit Value (TLV®) occupational exposure guidelines and Biological Exposure Indices (BEIs®) published by American Conference of Governmental Industrial Hygienists (ACGIH),[10] the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety (NIOSH),[11] Permissible Exposure Limits (PELs) published by the Occupational Safety and Health Administration of the United States (OSHA),[12] Indicative Occupational Exposure Limit Values published by European Union member states,[13] or other similar sources.

Accident and Fatality Rates

Projects should try to reduce the number of accidents among project workers (whether directly employed or subcontracted) to

[9] Supervisory Control and Data Acquisition (SCADA) systems may be another useful means of monitoring system volume flows, especially in new system installations.

[10] Available at: http://www.acgih.org/TLV/ and http://www.acgih.org/store/
[11] Available at: http://www.cdc.gov/niosh/npg/
[12] Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992
[13] Available at: http://europe.osha.eu.int/good_practice/risks/ds/oel/

a rate of zero, especially accidents that could result in lost work time, different levels of disability, or even fatalities. Facility rates may be benchmarked against the performance of facilities in this sector in developed countries through consultation with published sources (e.g. US Bureau of Labor Statistics and UK Health and Safety Executive)[14].

Occupational Health and Safety Monitoring

The working environment should be monitored for occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals[15] as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents. Additional guidance on occupational health and safety monitoring programs is provided in the **General EHS Guidelines**.

[14] Available at: http://www.bls.gov/iif/ and http://www.hse.gov.uk/statistics/index.htm
[15] Accredited professionals may include Certified Industrial Hygienists, Registered Occupational Hygienists, or Certified Safety Professionals or their equivalent.

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Annex A: General Description of Industry Activities

Gas distribution systems deliver natural gas to residential, commercial, and industrial clients for use in appliances, heating applications, and industrial process equipment. The distribution system typically begins at the 'city gate' where natural gas from high pressure transmission pipelines (typically at 50 to 70 bar[16]) is depressurized, metered and odorized (to facilitate leak detection). City gates are secure, above ground facilities, typically less than 1 ha in area and containing equipment belonging to both the transmission and distribution companies. Once metered and odorized, gas is fed into distribution mains and service lines for delivery of low pressure gas to end users through underground, small diameter steel or plastic pipe systems. Pressure is further lowered, often in stages, for delivery to the customer.

Gas supplied to distribution systems is normally referred to as "pipeline quality natural gas", which has been processed to remove water vapor and other contaminants and has predictable burning characteristics and heat content. Processed natural gas typically contains 75 to 90+ percent methane, 3 to 4 percent nitrogen, and 2 percent carbon dioxide, but these fractions may vary in different countries. In exceptional cases, gas distribution systems may need to include additional processing if supplied gas is not of pipeline quality, such as gas produced locally from landfills, biomass, or manure.

Gas distribution systems are often a mix of new construction and old infrastructure that may contain legacy issues such as old gas meters that contain mercury, obsolete gas processing facilities, and plants that were used for manufacture of synthetic gas. Special attention should be paid to leak management when old and new infrastructure is combined or when the source of gas is changed.

The construction and installation of natural gas distribution pipeline systems involves planning and design for the right-of-way, including use of existing utility corridors (e.g. co-location with sewer, water, telecommunication, and power systems) where possible. Establishment of the right-of-way may involve clearing of vegetation and grading of surfaces. Pipe is laid following trenching activities using a backhoe, and, where appropriate, the use of directional drilling to minimize land disturbance. Guided drilling may be particularly useful when crossing under roadways, waterways or wetland habitats. Trenches are then backfilled and the right-of-way is restored using existing vegetation. Distribution pipes are typically of steel or plastic materials. Various coating and cathodic protection techniques are employed to protect steel piping from corrosive reactions, both above and below ground.

Gas distribution systems typically involve the use of regulating stations to adjust the pressure of gas throughout the distribution network. These installations are typically located above ground and occupy approximately 20 m^2 of land area. Regulating stations are located after the 'city gate' and may operate in a sequential fashion to reduce gas pressure during distribution to end users. Final pressure adjustment is undertaken at the individual residential customer (to about 0.1 bar), and at commercial, and industrial meters (to from 1 to 15 bar).

Activities by the gas distribution system during operation and maintenance include overall systems operation and monitoring of infrastructure components, such as valves, regulating stations, and pipes through flow meter data analysis and onsite inspection. Operators regularly undertake inspections for gas leaks, corrosion, and overall system integrity. Ongoing connection of new subscribers within the distribution market is a regular operational activity, and is typically undertaken while the distribution pipes are pressurized, so as not to interrupt service

[16] 1 bar is approximately 1 atmosphere, or 14.5 lb/in^2.

to other customers. Repair activities involve all parts of the distribution system and typical tasks include repair and replacement of pipes and valves, in particular after accidental damage due to excavation near pipeline infrastructure.

Gas distribution operators are also typically responsible for training their employees, and ensuring that contractors are trained, in the procedures and actions necessary for effective emergency response to leaks, ruptures, and other incidents caused by the operators themselves, third parties, or natural hazards. Effective emergency response requires that gas distribution operators integrate with local government and municipal authorities, in addition to residential, commercial and industrial partners to ensure coordinated actions in the event of an emergency.

Decommissioning of distribution lines typically involves the closure and securing of valves to impede flow of gas to the customer and disconnection and sealing of the distribution mains and service line piping after purging of residual gas. Above ground structures such as regulating stations may be removed. Below ground pipelines, vaults and other components may be removed or left in place depending on site specific considerations.

Annex 4: NOISE AND AIR MEASUREMENTS

Annex-4 Air Quality and Noise Measurements

Ambient Air Quality and noise Measurements Report

Gas pipeline network in Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura within Dakahliya Governorate

Petrosafe

- **Introduction**

Air quality and noise monitoring has been carried out as part of the baseline description for the Environmental and Social Impact Assessment of the proposed transmission line route gas project located in Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura within Dakahliya governorate, since the rout is passing nearby sensitive receptors in study areas. The location was set as suitable location for ambient air quality and noise level monitoring.

Air quality monitoring has been undertaken for the pollutants of primary concerns (NO_2, SO_2, T.S.P and PM_{10}), in order to better characterize the baseline air quality as part of the environmental impact assessment required where a one-hour average measurements were conducted for carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), Total Suspended Particulates (T.S.P) and particulate matter (PM_{10}) for one specific sensitive location in the front of the gas route, where the air quality complies with the national guidelines for all the analysed parameters. The site-specific air quality measurements were conducted using Standard ambient air quality monitoring instruments under the supervision of experienced specialists. Noise levels were conducted as per the international standard using type 1 precision noise level meter.

- **Objectives**

The overall objectives of this monitoring round are to:

Assess/confirm compliance of the air quality in the baseline environment with relevant national guidelines;

Identify any non-compliance issues, if any; and

Provide general conclusions based on analysis results.

- **Scope of Work**

The scope of work of the present monitoring includes the sampling and analysis of active air and noise in the surrounding area as to distinguish whether air quality is impacted by the project activities or not.

The measurement will be conducted in the herein location within the boundaries of the sensitive object.

- **Sampling strategy**

The selection of the active air measurement location is based on the prevailing wind direction; site Topography, the future layout of the proposed project components and the location of the nearest sensitive receptors with respect to the project plots. Moreover, the selection is based on the guidelines stated in the American Society for Testing Materials (ASTM) reference method[1].

The following ambient air pollutants where the target parameters to be measured during the monitoring program:

- Total Suspended Particulate (TSP)
- Thoracic particulate (PM_{10})
- Nitrogen dioxide NO_2.
- Sulfur dioxide SO_2.
- Carbon monoxide CO.

Moreover, location of the measurements is shown in the figure below

- **Location**

The GPS coordinates of the as Ambient Air (**AA**) measurement location

Table 04-1 Geographical coordinates of the study areas

Location	Latitude	Longitude
(Aga) Aga's Preparatory school / Residential area	30° 56' 21.29" N	31° 17' 48.70" E
(Bilqas) Bilqas high school	31° 12' 24.63" N	31° 21'3 8.67" E
(Nabaroh) Nabaroh's School for Hotel Affairs and Tourism Services/ Residential area	31° 5' 34.84" N	31° 18' 15.25" E
(Mit Elkorama, Gogar) Gogar's Preparatory School / Residential area	31° 3' 17.67" N	31° 22' 48.91" E
(Mansoura) Sandoub's Secondary Technical Girls School/ Residential area	30° 39' 2.72" N	31° 2' 8.11" E

[1] D1357-95 (Reapproved2000) Standard Practice for Planning the Sampling of the Ambient Air

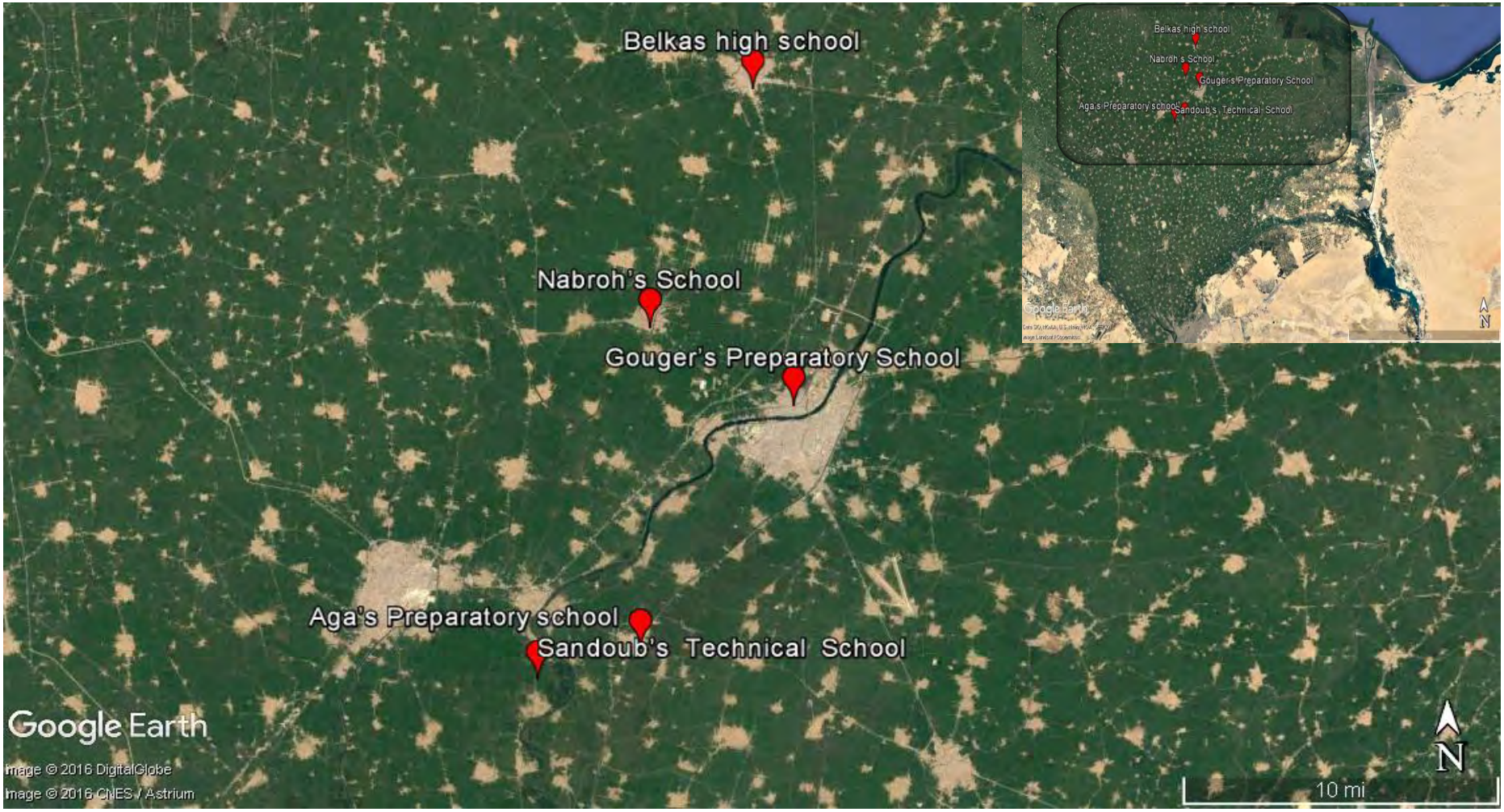


Figure 04-1 Satellite map shows study areas (Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura) within Dakahliya governorate

- **Legislation and regulatory framework**

National and International Legislation

The results of ambient air quality measurements were compared to the national limits set in Annex 5 of the Executive Regulation (D1095/2011) and the guideline values of world health organization (WHO) for the ambient air quality.

Table 04-2 to Table 04-4 lists the corresponding applicable national and international permissible limits.

Table 04-2 Applicable national permissible limits for ambient air quality levels for urban area

Pollutant	Average Period	Egyptian Standards ($\mu g.m^{-3}$)	Egyptian Standards (ppm)
Sulphur dioxide (SO_2)	1 hour	350	0.1337
	24 hours	150	0.0573
	Annual	60	0.0229
Carbon monoxide	1 hour	30,000	26
	8 hours	10,000	9
Nitrogen dioxide (NO_2)	1 hour	350	0.2
	24 hours	150	0.08
	Annual	60	0.032
Total suspended particulate T.S.P	24 hours	230	---------
	Annual	125	---------
Thoracic particles (PM_{10})	24 hours	150	---------
	Annual	100	---------
$PM_{2.5}$	24 hours	100	---------
	Annual	70	---------

Table 04-3 Applicable National and International Permissible Limits for Ambient Noise Levels

Location	LAeq (dBA) National Permissible Limits (Annex 7 Decree 710/2012)		LAeq (dBA) International Permissible Limits (IFC – EHS General Guidelines)	
	During Day (7 am to 10 pm)	During Night (10 pm to 7 am)	During Day (7 am to 10 pm)	During Night (10 pm to 7 am)
Residential	60 [2]	55 [2]	70 [3]	70 [3]

Table 04-4 WHO Ambient Air Quality Guidelines 4,5

Pollutant	Average Period	Guideline value (µg.m^{-3})
Sulphur dioxide (SO_2)	24 hours	125 (interim target 1) 50 (Interim target 2) 20 (guideline)
	10 minutes	500
Nitrogen dioxide (NO_2)	1 hour	200
	1 year	40
Thoracic particles (PM_{10})	24 hrs	150 (interim target 1) 100 (interim target 2) 75 (interim target 3) 50 (guideline)
	1 year	70 (interim target 1) 50 (interim target 2) 30 (interim target 3) 20 (guideline)
Ozone	8 hours daily maximum	160 (interim target 1) 100 (guideline)

[2] National permissible limits for ambient noise levels for areas on roads 12 m wide or more or light industrial areas including other activities

[3] IFC permissible limits for ambient noise levels for industrial or commercial receptors

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

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

- **Methodology**

  - **Ambient air quality**

Ambient Air Quality Monitoring equipment is an integrated system of which includes several analyzers with data recording devises. A typical system would include gas analyzers for ambient air analysis, data recording, and signal transmission instrumentation.

  - **Ambient air pollutants**

The most common gaseous air pollutants (also known as "criteria pollutants") are carbon monoxide, sulfur oxides, and nitrogen oxides. These pollutants can be harmful to health and the environment, and cause property damage. To acquire baseline information on background levels of Thoracic Particulates, the team conducted for one-hour active sampling using a dust sampler. The sampler measures the respirable fraction of airborne dust (of particle size 0.1 to 10 µm) with a measuring range of 0.001 to 400 mg/m^3 and an accuracy of ± 5 % of the reading. The levels measured and recorded would serve as baseline values for reference during future monitoring activities.

- **Ambient air quality monitoring system specifications**
  - **General Features**

- Standard methods of measurement which means:
- SO_2 analyzer: ISO 10498 equivalent to(U.S.A EPA Reference method – EQSA-0486-60) – UV Fluorescence
- NOx analyzer: ISO 7996 equivalent to(U.S.A EPA Reference method – RFNA-1289-74) – Chemiluminescence
- CO analyzer: ISO 4224 equivalent to U.S.A EPA Reference method – RFCA-0981-54) – IR GFC
- PM_{10} sampler: Plow volume sampler equivalent to(EPA method, Appendix J-Reference method FR)
- T.S.P low volume sampler equivalent to(EPA method, Appendix J-Reference method FR)

- **Ambient Particulate Matter PM_{10} sampler**

  - Approval and Certification: U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service
  - Measuring Method: Sequential Particulate sampler
  - Sampling on filter membranes, which can be used for further Chemical analyses as required by current regulations and standards.
  - Active flow Control Flow range: 0-10 LPM
  - Nominal flow: 5LPM Sampler
  - Dimensions: 10" x 12" x 7" Sampler
  - Weight: 9.8LBS (fully configured) Transport Case: 19.75" x 12" x 18"
  - The analyzer should be equipped with batteries in order to avoid possible data losses due to power failures.
  - Source: Beta Ray Source with appropriate activity
  - Ranges: 0-500 µg/ m^3 (2.3 m^3/ h operating flow rate); 0-1,000 µg/ m^3 (1 m3/ h operating flow rate)
  - Lower Detectable Limit: ≤ 1.5 µg/ m3 (24 hour cycle time, 2.3 m3/ h operating flow rate)
  - Precision: ≤ 0.4 µg/ m^3 (24 hour cycle time, 2.3 m^3/ h operating flow rate)
  - Correlation Coefficient R > 0.98

- **Sulphur Dioxide SO_2 Analyzer** (Thermo Scientific SO_2 Analyzer model 43i-USA)

  - Approval and Certification : U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service
  - Measuring Method : UV Fluorescence Technology
  - Ranges.: Auto ranging feature, Multiple Ranges to cover from 0 to 10 ppm (especially from 0 to 1 ppm)
  - Zero Noise: ≤ 0.5 ppb
  - Lower Detectable Limit: ≤ 1 ppb
  - Zero drift (daily): ≤ 1 ppb
  - Span drift (daily): ≤ 1% of full scale
  - Response time: fast, ≤ 100 seconds

- Precision: ≤ 0.5% of reading
- Linearity: ≤ ± 1% of full scale
- Operating temperature: not exceed 40 °C

- **Nitrogen Monoxide, Nitrogen Dioxide and Nitrogen Oxides NO, NO_2 & NO_X Analyzer** (Thermo Scientific NOx Analyzer - Model 42i- USA)

  - Approval and Certification: U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service
  - Measuring Method.: Chemiluminescence Technology
  - Ranges.: Auto ranging feature, Multiple Ranges to cover from 0 to 20 ppm (especially from 0 to 1 ppm)
  - Zero Noise: ≤ 0.2 ppb
  - Lower Detectable Limit: ≤ 0.4 ppb
  - Zero drift (daily): < 0.5 ppb
  - Span drift (daily): < 0.5% of full scale
  - Response time: fast, ≤ 100 seconds
  - ◆ Precision: ≤ 0.5% of reading
  - Linearity: ≤ ± 1% of full scale
  - Operating temperature: not exceed 40 °C

- **Carbon Monoxide CO Analyzer** (Thermo Scientific Carbon Monoxide CO Analyzer model 48i-USA)

  - Approval and Certification: U.S.EPA (USA), UBA/ TUV (Germany), / Sira Certification Service
  - Measuring Method: Non Destructive Infra-Red Gas Filter Correlation (IRGFC) Technology
  - Ranges: Auto ranging feature, Multiple Ranges to cover from 0 to 200 ppm (especially from 0 to 50 ppm)
  - Zero Noise: ≤ 0.02 ppm
  - Lower Detectable Limit: ≤ 0.04 ppm
  - Zero drift (daily): ≤ 0.1 ppm

- Span drift (daily): < 0.5% of reading
- Response time: fast, ≤ 100 seconds
- Precision: ≤ 0.5% of reading
- Linearity: ≤ ± 1% of full scale
- Operating temperature: not exceed 40 °C

- **Noise Measurement Methodology**

The methodology adopted was to record ambient noise levels for one hour, as per the national and international standards, in the current location at the proposed transmission line route. The following devices were used during the first round of noise level measurements:

- Two B & K 2238 Mediator, Integrating Sound Level Meters, Type I (precision grade), compliant with IEC 1672 Class 1 standard;
- B & K 4198 Outdoor Weatherproof Microphone Kit;
- GPS unit (Garmin MONTANA 650); and
- Digital Camera.

Noise monitoring measurements included recording the following parameters using a Type 1 precision grade hand-held sound-level meters:

- Equivalent continuous noise level (LAeq)
- 95th percentile noise level (LA95)
- 90th percentile noise level (LA90)
- 50th percentile noise level (LA50)
- 10th percentile noise level (LA10)
- Peak sound pressure level (LCpeak)

The following equation[6] is the main equation used to calculated day night equivalent sound pressure level:

$$L_{den} = 10\log\frac{1}{n}\sum_{i=1}^{n}10^{0.1(L_i+D_i)}$$ **Where** L_{den} = Day Night Equivalent, L_i = The hourly L_{eq}, D_i = the addition for the different periods of the day, n = number of measured hours.

[6]The equation used to obtain the average noise level of a designated time interval based on weighted readings according to "Long-term Leq errors expected and how long to measure (Uncertainity & Noise Monitoring)", Dietrich Kuehner, Forum Acusticum 2005 Budapest.

The sound level meters were calibrated before sound measurements to ensure reliability and precision. GPS coordinates and meteorological conditions were recorded using hand-held kits at all locations prior to the start of noise measurements. It is anticipated that most of these locations would remain the same for the purpose of pre-construction, construction, performance guarantee tests and operation monitoring. Table (3-1) shows the locations of the different noise measurement locations; furthermore, table (3-1) lists the GPS coordinates of measurement locations, measurement dates, location description and a selection of photos at each location.

- **Results**

The following tables present the results for ambient air quality measurements conducted at all the four monitoring locations.
The objectives of the ambient air quality Monitoring activities conducted at the proposed site are:

- To verify compliance with authorized discharge limits and any other regulatory requirements concerning the impact on the public and the environment due to the normal operation of a practice or a source within a practice;
- To establish air quality baseline which will assist in the estimation of the site impact on the local physical, biological and social environment ;
- To check the conditions of operation and the adequacy of controls on discharges from the source and to provide a warning of unusual or unforeseen conditions and, where appropriate, to trigger a special environmental monitoring program.

The air qualities at the current site of the project site in all locations are exhibiting acceptable levels of classic air pollutants in fact the levels are way below the national guidelines. Generation and dispersion of dust from increased vehicle traffic, especially during the daily activities, may reduce visibility, relative to baseline levels, and, together with combustion engine emissions, may affect ambient air quality. Concentration of dust particles, both total suspended particulate and repairable particulate matter and other pollutants from open burning, emissions from equipment and machinery used in transportation, the nearby plant operations and emissions from vehicles used to transport workers also contribute to air pollution. These impacts may affect the human environment and, typically, arise during the ordinary daily activities and, to a much lesser extent, during the operation phase, requiring monitoring and assessment of the natural and man-made air pollutants.
One-hour average results for 8 hours continuous measurements are shown in Table 3-5 for all the measured parameters

Table 4-5 Daily average Ambient Air (µg/m3) at Aga area (Aga's Preparatory School)

Time	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)	PM_{10} ($\mu g/m^3$)	T.S.P ($\mu g/m^3$)
10:AM	23.1	24.8	47.9	13.2	1.4	69	107
11:00	14.9	17.7	32.6	16.3	3.3		
12:00	19.2	25.1	44.3	13.1	3.2		
13:00	18.5	29.1	47.6	15.8	2.9		
14:00	20.3	32.8	53.1	16.7	2.4		
15:00	30.7	46.8	77.5	12.5	2.6		
16:00	13.5	19.2	32.7	11.5	3.3		
17:00	16.2	15.5	31.7	13.6	2.4		
Limits		350	150	350	30 (mg/m3)	150	230

Table 04-6 Daily average Ambient Air (µg/m3) at Bilqas area (Bilqas High School).

Time	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)	PM_{10} ($\mu g/m^3$)	T.S.P ($\mu g/m^3$)
10:00	2.1	9.5	8.9	6.8	2.1	103	117
11:00	2.2	9.1	10.6	7.4	3.2		
12:00	2.2	8.2	8.5	5.7	2.8		
13:00	2	8.2	8.4	5.4	3		
14:00	2.2	7.5	9	5.9	3.1		
15:00	2.1	7.2	7.2	4.2	3		
16:00	1.8	6.4	7	4.2	2.8		
17:00	1.7	6.3	6	3.9	2.1		
Limits	150	200	150	350	30 (mg/m3)	150	230

Table 4-7 Daily average Ambient Air (µg/m3) at Nabaroh area (Nabaroh's School for Hotel Affairs and Tourism Services).

Time	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)	PM_{10} ($\mu g/m^3$)	T.S.P ($\mu g/m^3$)
10:00	21.1	24.8	45.9	14.2	2.4	79	109
11:00	13.9	16.7	30.4	13.3	3.6		
12:00	15.2	25.1	40.3	12.1	3.2		
13:00	15.5	28.1	43.6	12.8	3.5		
14:00	19.3	34.8	54.1	16.7	2.3		
15:00	37.7	41.8	79.5	18.5	3.7		
16:00	11.5	16.2	37.7	16.5	3.1		
17:00	12.2	17.5	29.7	13.6	2.5		
Limits		350	150	350	30 (mg/m3)	150	230

Table 04-8 Daily average Ambient Air (µg/m3) at Mit Elkorama/Gogar area (Goger's Preparatory School)

Time	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)	PM_{10} ($\mu g/m^3$)	T.S.P ($\mu g/m^3$)
10:00	20.7	20.4	41.1	10.5	2.9	79	126
11:00	15.9	19.7	35.6	16.3	3.5		
12:00	17.2	22.8	40	11.1	3.6		
13:00	18.5	23.1	41.6	12.8	3.8		
14:00	18.3	37.2	55.5	13.7	2.9		
15:00	30.5	44.3	74.8	10.5	3.1		
16:00	13.5	14.2	27.7	18.5	2.8		
17:00	12.8	13.8	26.6	12.6	2.2		
Limits	150	350	150	350	30 (mg/m3)	150	230

Table 4-9 Daily average Ambient Air (µg/m3) at Mansoura area (Sandoub's Secondary Technical Girls School)

Time	NO (µg/m3)	NO2 (µg/m3)	NOx (µg/m3)	SO2 (µg/m3)	CO (mg/m3)	PM10 (µg/m3)	T.S.P (µg/m3)
10:00	20.1	22.8	42.9	12.2	2.3	77	110
11:00	11.1	16.7	27.8	13.3	3.1		
12:00	11.2	25.1	36.3	17.1	3.5		
13:00	14.3	25.1	39.4	11.8	3.1		
14:00	11.3	32.8	44.1	11.7	2.7		
15:00	36.7	43.8	80.5	16.5	3.1		
16:00	12.5	17.2	29.7	15.5	2.6		
17:00	13.2	12.5	25.7	13.6	2.7		
Limits	150	350	150	350	30 (mg/m3)	150	230

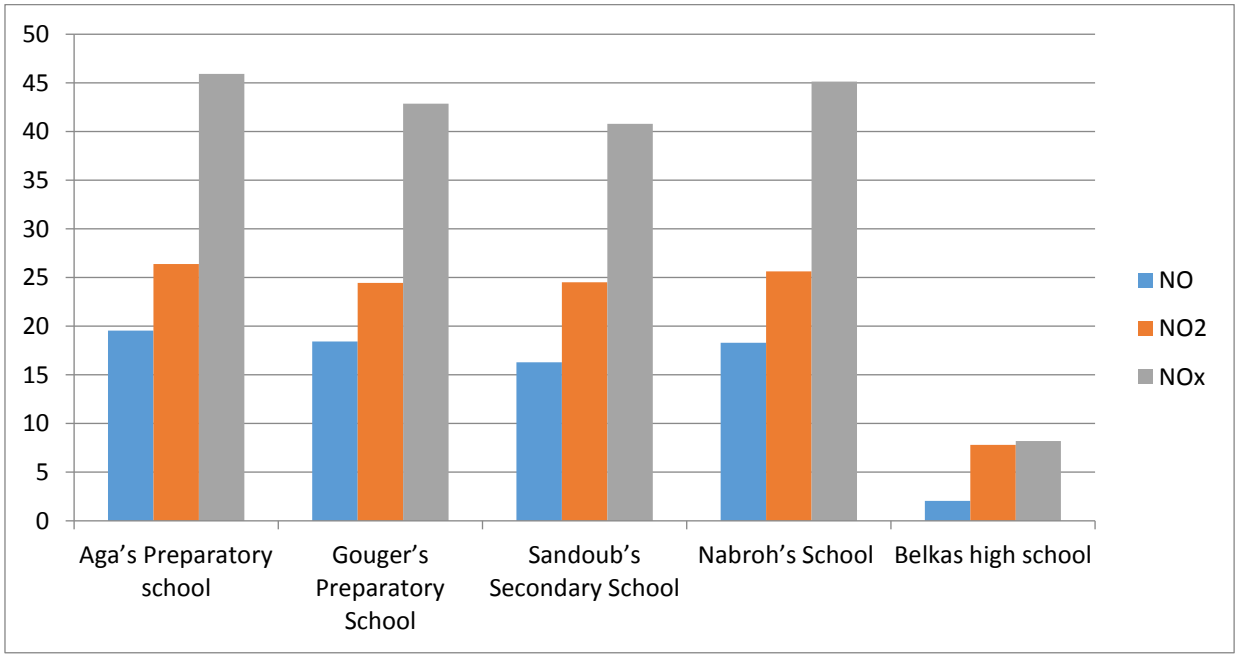


Figure 04-2 NOx variation in the four locations

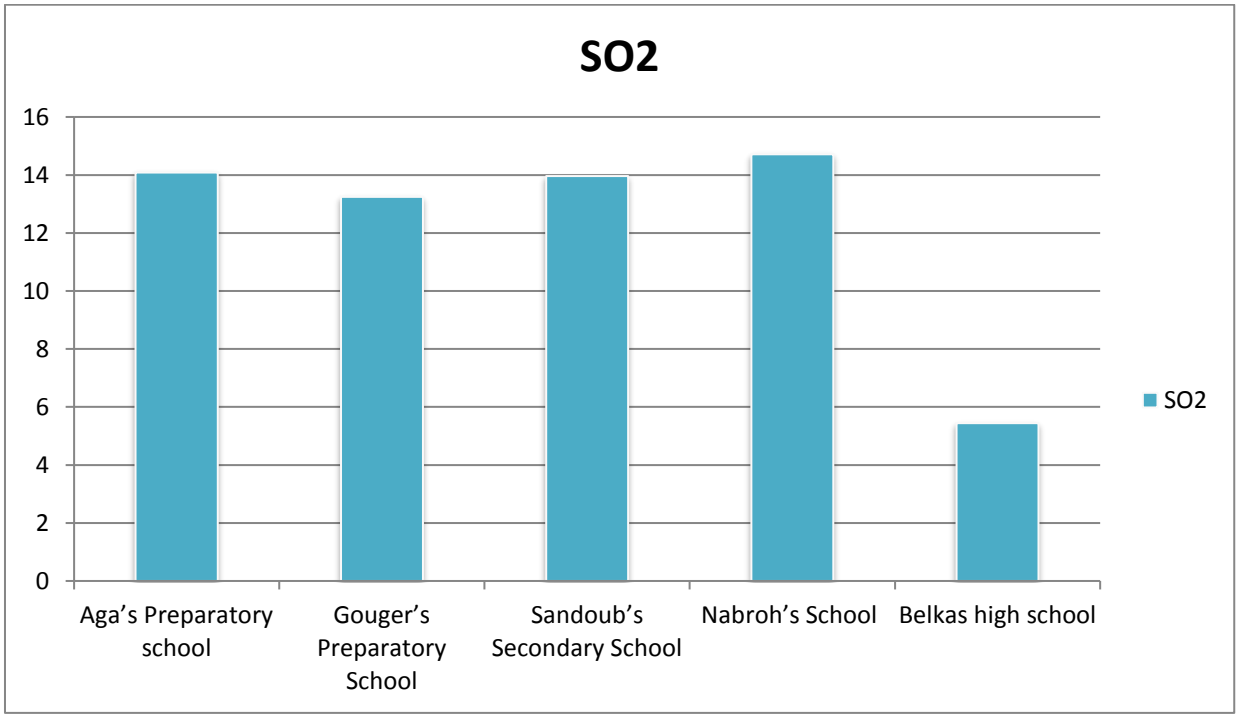


Figure 04-3 SO2 variation in the four locations

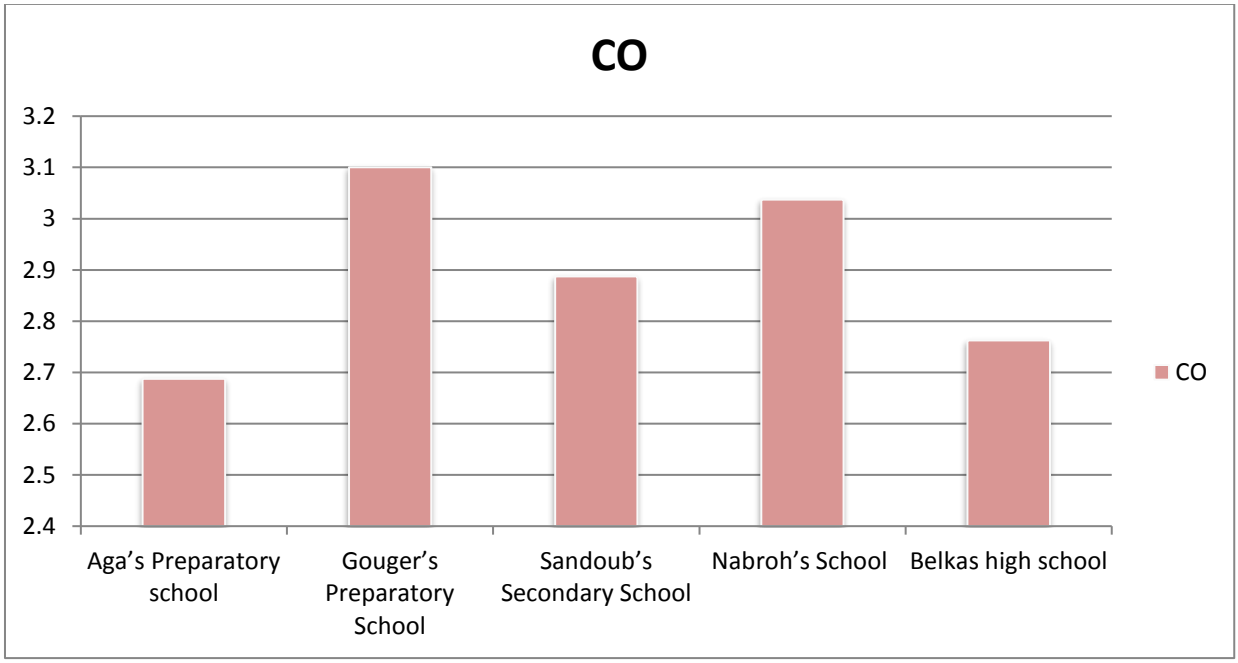


Figure 04-4 Co variation in the five locations

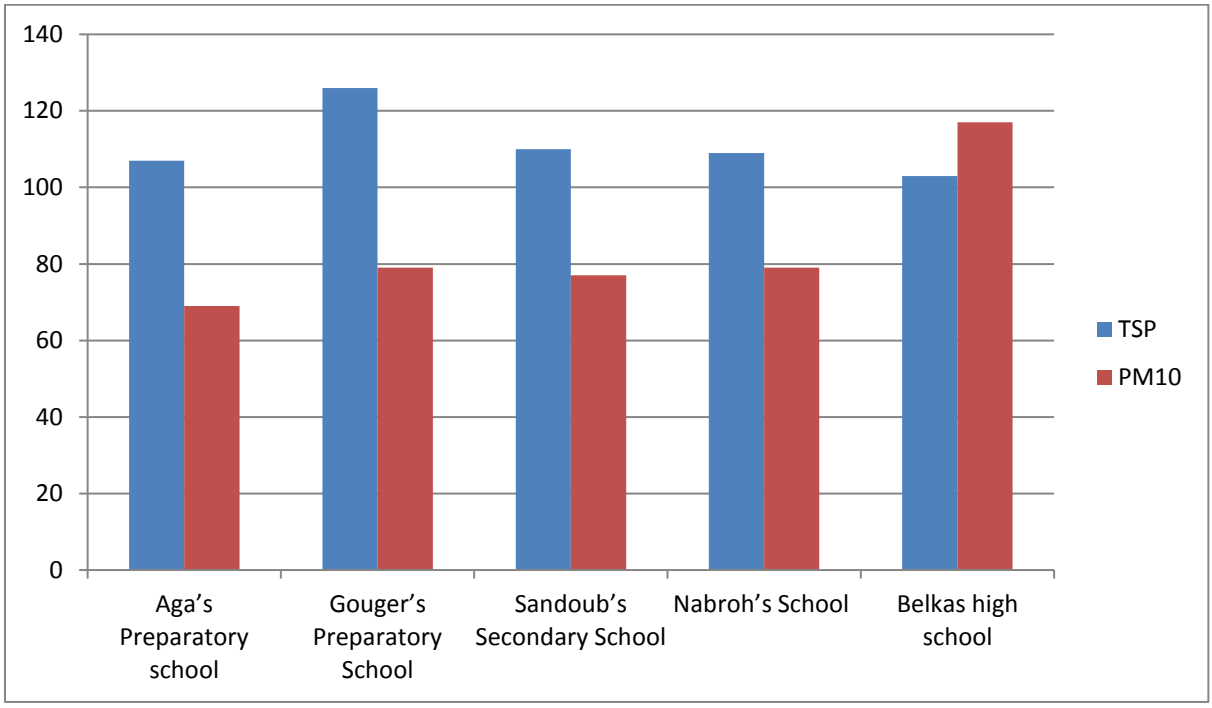


Figure 04-5 TSP& PM10 variation in the five locations

- **Analysis of air quality Results**

In general, there are two main factors affecting the ambient air concentration of a certain pollutant emitted from a certain source or sources in a selected area:

- The intensity of the emissions (e.g. concentration and flow rate) from the source or sources.
- The uncontrollable atmospheric dispersion conditions, which include but not limited to (wind speed, wind direction, temperature, humidity, rainfall, atmospheric turbulence, solar radiation intensity and atmospheric pressure).

All the recorded rests showed compliance with the national and international guidelines for ambient air quality moreover, most of the data recorded were way below the guidelines, which indicates that the ambient air quality in those areas are matching with guidelines of emissions released from industrial sources.

- **Noise levels Results**

Table 4-10 Presents the results of one-hour average ambient noise measurements and their corresponding national and international permissible limits.

Table 04-10 Ambient Noise Levels Readings at the proposed four locations

Area	Time	Sound Level Equivalent & Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA)	
		LAeq	LA10	LA50	LA90	LA95	LCpeak	National	International
(Aga) Aga's Preparatory school / Residential area	10:00	**60.7**	50.52	46.05	39.93	37.27	116.97	**70**	70
	11:00	**61.3**	49.06	34.62	28.4	27.83	121.52		
	12:00	**51.7**	56.87	47.47	39.7	37.8	104.96		
	13:00	**57.6**	57.38	49	41.11	39.06	105.77		
	14:00	**52.9**	52.54	41.9	36.13	34.77	93.7		
	15:00	**53.1**	54.52	42.65	35.86	34.17	105.57		
	16:00	**58.8**	60.94	53.44	45.95	43.89	104.93		
	17:00	**49.4**	58.67	49.75	38.61	36.17	99.24		
(Bilqas) Bilqas high school	50.4	**58.22**	47.05	34.93	34.27	106.77	50.4	**70**	70
	49.36	**47.66**	38.62	29.4	29.83	111.52	49.36		
	50.17	**58.37**	49.47	37.7	39.8	100.96	50.17		
	50.77	**54.68**	48	43.11	37.06	125.77	50.77		
	50.89	**53.59**	43.9	32.13	36.77	99.7	50.89		
	51.75	**50.55**	45.65	36.86	35.17	109.77	51.75		
	51.49	**63.96**	58.44	44.95	48.89	114.99	51.49		
	45.2	**53.23**	47.75	39.61	39.17	98.22	45.2		
(Nabaroh) Nabaroh's School for Hotel Affairs and Tourism Services/ Residential area	10:00	**60.9**	50.52	46.05	39.93	37.27	116.97	**70**	70
	11:00	**61.9**	49.06	34.62	28.4	27.83	121.52		
	12:00	**58.7**	56.87	47.47	39.7	37.8	104.96		
	13:00	**60.6**	57.38	49	41.11	39.06	105.77		
	14:00	**54.9**	52.54	41.9	36.13	34.77	93.7		
	15:00	**51.1**	54.52	42.65	35.86	34.17	105.57		
	16:00	**51.9**	60.94	53.44	45.95	43.89	104.93		
	17:00	**49.9**	58.67	49.75	38.61	36.17	99.24		
(Mit Elkorama, Gogar) Gogar's Preparatory School / Residential area	10:00	**56.5**	50.52	46.05	39.93	37.27	116.97	**70**	70
	11:00	**68.5**	49.06	34.62	28.4	27.83	121.52		
	12:00	**53.7**	56.87	47.47	39.7	37.8	104.96		
	13:00	**62.8**	57.38	49	41.11	39.06	105.77		
	14:00	**53.5**	52.54	41.9	36.13	34.77	93.7		
	15:00	**58.4**	54.52	42.65	35.86	34.17	105.57		
	16:00	**58.9**	60.94	53.44	45.95	43.89	104.93		
	17:00	**48.5**	58.67	49.75	38.61	36.17	99.24		

(Mansoura) Sandoub's Secondary Technical Girls School/ Residential area	10:00	**45.5**	50.52	46.05	39.93	37.27	116.97	**70**	70
	11:00	**67.8**	49.06	34.62	28.4	27.83	121.52		
	12:00	**58.7**	56.87	47.47	39.7	37.8	104.96		
	13:00	**49.9**	57.38	49	41.11	39.06	105.77		
	14:00	**58.8**	52.54	41.9	36.13	34.77	93.7		
	15:00	**66.3**	54.52	42.65	35.86	34.17	105.57		
	16:00	**48.9**	60.94	53.44	45.95	43.89	104.93		
	17:00	49.4	**58.67**	**49.75**	**38.61**	**36.17**	**99.24**		

The results of ambient noise measurements were compared to the national and international permissible limits.

- **Conclusion**

Based on the environmental monitoring and measurements, that performed for the noise measurements. The results showed compliance with all the national and international guidelines.

- **FUTURE RECOMMENDATION**

It is recommended that monitoring should continue for all the regulated parameters, in order to verify/assure compliance.

- **References**

- EU directive 2008 50 EC -ANNEX I Data quality objectives for ambient air quality assessment
- D1357-95 (Reapproved2000) Standard Practice for Planning the Sampling of the Ambient Air
- Egyptian Law 4/1994 Amended by law 9/2009 and Decree 1741/2005, amended by decree 1095 /2011 Annex 6 (amendments to executive regulations of Law 4).

Appendix I - Selection of Photos from the Air Quality Monitoring activities

Aga	Bilqas
	
Nabarouh	**Mit Elkorama, Gogar**
	
Mansoura	
	

Figure 04-6 Ambient air quality monitoring system at Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura

Appendix II - Selection of Photos from the noise Monitoring activities

Aga	Bilqas
	
Nabaroh	**Mit Elkorama, Gogar**
	
Mansoura	
	

Figure 04-7 Noise Monitoring activities at Aga, Bilqas, Nabaroh, Mit Elkorama, Gogar and Mansoura

Annex 5: IMPACT ASSESSMENT

The impact of each activity on each receptor was assessed according to magnitude on a scale of -10 to 10, where negative values indicate a negative influence on the receptor, and importance on a scale of 0 to 10, which encompasses the probability of occurrence, frequency of the impact etc. The numbering system is used as a relative measure, where more negative numbers correspond to impacts having a higher negative magnitude. Susceptible receptors and corresponding activity are deduced and addressed if both magnitude and importance are of minor severity. **As per the following table:**

			Project Phases																														Assessment			
			Construction																														Operation		Construction		Operation	
Receptor Category	Component	Activities / Receptor	Transport of equipment/ machinery- truck driving		Temporary storage/unloading of equipment and materials		Site preparation: Area delineation & Fencing		Working in outdoor environment		Excavation: intermediate pressure network		Pipe laying (PE100)		Welding PE100		Backfilling		Excavation: low pressure PE80 connections		Pipe laying: low pressure connections		welding PE80		Backfilling		Household installation- carbon steel pipe threading		Household installations and working at heights		Appliance conversion		Leakage testing: pneumatic		Waste Generation		Gas network processing		Magnitude	Importance	Magnitude	Importance
			M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I	M	I				
PHYSICAL	Soil	Soil Degradation					-3	2			-2	2							-2	2																	-7	6	0	0
		Soil Pollution			-2	1	-1	1							-1	1							-1	1									-5	5	-10	1	-10	9	-10	1
		Landscape			-2	2	-3	5			-2	5					3	5	-2	5					3	5											-3	27	0	0
	Air	Emission of Gases	-2	2			-2	2			-3	2	-1	2	-4	4			-3	1	-1	2	-4	4			-2	2							-2	3			-24	24	0	0
		Emission of dust	-4	3			-4	3			-6	6	-1	2			-6	4	-6	6	-1	2			-6	4									-3	3			-37	33	0	0
	Water	Surface water pollution																																	-3	3			-3	3	0	0
	Noise	Background noise level	-2	2	-2	3	-4	1			-6	6	-4	4	-2	4	-4	2	-6	3	-4	4	-2	4	-4	2	-4	4			-1	1							-45	40	0	0
BIOLOGICAL	Flora	Trees and plants	-1	1			-2	1																											-2	2			-5	4	0	0
	Fauna	Dogs, Cats, Pigeons	-1	1	-1	2	-2	1			-2	3	-2	1			-2	1	-2	3	-2	1			-2	1									2	2			-14	16	0	0
SOCIO-ECONOMIC		OHS Workers	-2	2	-3	4	-2	1	-6	6	-5	4	-6	2	-7	2	-4	4	-5	4	-6	2	-7	2	-4	4	-8	8	-8	8	-3	2	-8	4	-2	1			-86	52	0	0
		Infrastructure and underground utilities									-5	4							-3	4																	-2	2	-8	8	-2	2
		Traffic	-3	2			-2	1			-6	2					-3	1	-6	1					-3	1													-23	8	0	0
		Community Health , Safety & Security	-2	2	-1	1	-1	2			-5	5	-2	2	-2	3	-4	2	-5	5	-2	2	-2	3	-4	2	-1	1	-6	4	-1	2	-4	2	-5	2	-4	2	-47	36	-4	2
Total			-17	15	-11	13	-26	20	-6	6	-42	39	-16	13	-16	14	-20	19	-40	34	-16	13	-16	14	-20	19	-15	15	-14	12	-5	5	-12	6	-20	21	-16	5	-312	266	-16	5
Average			-2	2	-2	2	-2	2	-6	6	-4	4	-3	2	-3	3	-3	3	-4	3	-3	2	-3	3	-3	3	-4	4	-7	6	-2	2	-6	3	-3	3	-5	2	-24	20	-1	0

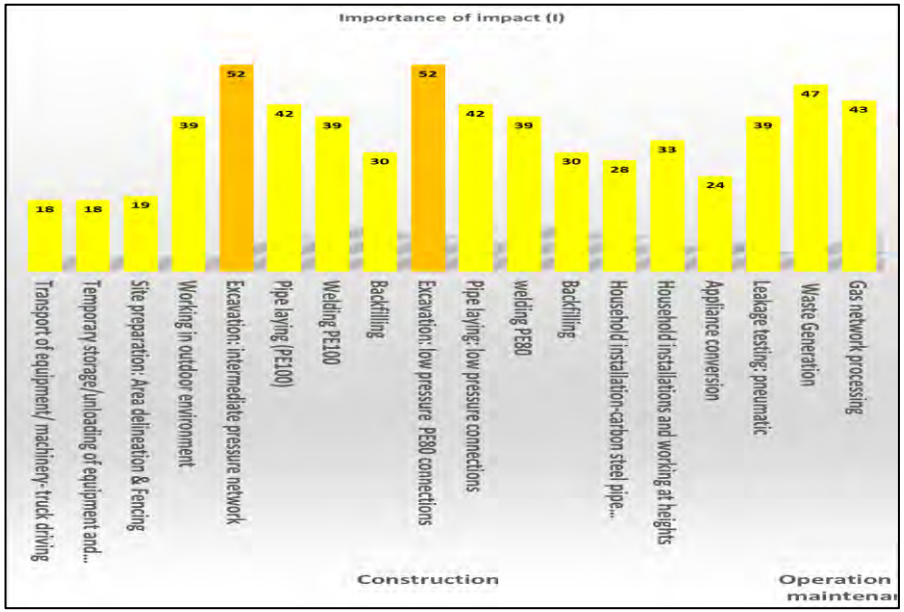
Further, the **Buroz** Relevant Integrated Criteria and is used to determine the total importance, I, of the impact for each activity on all receptors and of the project overall.
On the basis of the value of the importance of impact, I, obtained, the severity of the impact of an activity is assessed.

Criterium	Definition	Scoring Scale
Intensity (IN)	Degree of destruction of activity on receptor	1 (lowest)-12 (highest)
Extension (EX)	Theoretical area of influence of the impact	1 (localized) – 8 (widespread)
Momentum (MO)	Period of time for manifestation of the impact	4 (immediate: <1 year) – 2 (medium: 1-5 years)- 1 (long term: > 5 years)
Persistence (PE)	Duration of the effect of the impact	1 (fleeting, < 1 year), 2 (temporary, 1-5 years), 4 (permanent, >5 years)
Reversibility (RV)	Possibility of returning to pre-activity initial conditions by rebuilding or natural means	1 (short term, < 1 year)- 2 (medium term, 1-5 years) – 4 (long term, > 5 years or irreversible)
Recoverability (MC)	Possibility of reconstruction with corrective measures	1 -2 (full and immediate recovery)- 4 (partial recovery and medium term)- 8 (unrecoverable)
Synergy (SI)	Reinforcement ability of manifested effects	1(No synergy of actions on a receptor) -2 (moderate synergism)-4 (high synergy)
Accumulation (Ac)	Progressive increase of the effect	1 (no cumulative effect)-4(cumulative effect)
Effect (EF)	Directionality of impact-the cause (action)-effect (impact)	4 (direct)- 1 (indirect)
Frequency (PR)	Regularity of manifestation of the effect	4 (continuous) – 2 (irregular)-1 (periodic)
Importance of Impact (I)	**I = ± (3×IN + 2×EX + MO+ PE + RV + SI + AC + EF + PR + MC)**	

The table below is based on the Buroz's Relevant Integrated Criteria:

	Construction																	Operation and maintenance
Activities / Receptor	Transport of equipment/ machinery- truck driving	Temporary storage/unloading of equipment and materials	Site preparation: Area delineation & Fencing	Working in outdoor environment	Excavation: intermediate pressure network	Pipe laying (PE100)	Welding PE100	Backfilling	Excavation: low pressure PE80 connections	Pipe laying: low pressure connections	welding PE80	Backfilling	Household installation-carbon steel pipe threading	Household installations and working at heights	Appliance conversion	Leakage testing: pneumatic	Waste Generation	Gas network processing
Type of impact																	-	
Intensity (IN)/12	3	3	3	7	9	7	6	5	9	7	6	5	5	7	5	6	6	7
Extension (EX)/8	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	4	1	4
Momentum (MO)/4	3	4	3	0	4	0	0	0	4	0	0	0	0	0	0	0	4	4
Persistence (PE)/5	1	3	2	1	4	4	4	1	4	4	4	1	2	1	1	1	4	1
Reversibility (RV)/4	1	1	1	1	4	4	4	1	4	4	4	1	1	1	1	1	1	1
Sinergy (SI)/4	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	4	2
Acumulation (AC)/4	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	4	1
Effect (EF)/4	1	1	1	4	4	4	4	4	4	4	4	4	1	1	1	4	4	3
Frequency (PR)/4	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1
Recoverability (MC)/8	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1
Importance of impact (I)	**26**	**26**	**27**	**39**	**52**	**42**	**39**	**30**	**52**	**42**	**39**	**30**	**28**	**33**	**27**	**39**	**47**	**43**
Sub-Average (I)	**36.4**																	**43.0**
Total-Average (I)	**39.7**																	

None/ irrelevant	0	25
Minor Severity	26	50
Medium Severity	51	75
Major Severity	76	300



Annex 6: EMERGENCY PLAN

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Emergency Response Plan Main Elements

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Dealing with Emergency Notification Procedures

01- Reset of Gas Flow in Natural Gas Axial Regulators	
Emergency Control Center	
1	Receiving Notification Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Recording the event in emergency logbook.
Emergency Team	
1	Gradually Shut-off all valves (Inlet / Outlet Valves) with complete closing
2	Fixing flame trap in a suitable place at one of regulator outlet valves
3	Fixing a manometer 120 mbar on a measuring point for the regulator outlet
4	Closing of the 0.5-inch valve below the outlet valve
5	Screwing of regulator's active spring to the end point
6	Screwing of regulator's monitor spring to the end point
7	Screwing of regulator's relief spring to the end point
8	Screwing of regulator's slum-shut spring to the end point
9	Opening flame trap outlet valve
10	Opening the 0.5-inch active relief valve
11	Opening the gas inlet valve gradually and insure gas flow
12	Screwing of regulator's monitor spring and follow-up pressure on manometer to reach the pressure needed to shut-off
13	Unplugging the slam-shut spring until it closed to reach closing set, this is the closing pressure, and repeat this process to make sure the lock at the desired pressure

14	Unplugging the monitor spring and follow-up manometer reading until it reaches the pressure required for the relief spring
15	Unplugged the relief spring and using of water / soap solution on relief opening until the gas comes out, so that is the pressure of the relief
16	Unplugged the monitor spring until reaching the required pressure for the monitor
17	Opening the 0.5-inch valve below the outlet valve
18	Unplugged the active spring to reach the required operating pressure
19	Opening the regulator's outlet valve gradually to flow the gas into the network
20	Checking any gas leak on all regulator part

02- Inspecting 1000 m^3 / hour Natural Gas Axial Regulator's Filter	
Emergency Control Center	
1	Receiving Notification Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Recording the event in emergency logbook
Emergency Team	
1	Monitor meter reading for the pressure differences on the filter
2	In case of pressure differences reading this will need the following steps:
2/1	Gradually close the inlet valve
2/2	Gradually close the outlet valve
2/3	Close the 1-inch active, monitor and slam-shut valves
2/4	Fixing flame trap on the venting valve
2/5	Burge the gas inside the regulator
2/6	Open the filter gate and remove the filter
2/7	Clean the filter or replace it if needed
2/8	Return the filter to its place
2/9	Inspect the filter's gate gasket and replace it if needed
2/10	Close the filter's gate
2/11	Gradually open the inlet valve to purge the air partially
2/12	Close the venting valve
2/13	Gradually close the 0.5-inch valve on outlet
2/14	Gradually open the inlet valve (full open)
2/15	Gradually open the outlet valve (full open)
3	Testing all parts that opened using water / soap solution

03- In Case of High Pressure Pipeline Crack / Leak	
Emergency Control Center	
1	Receiving Notification Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties (Rescue Police and Civil Protection) if needed.
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
2	Shut-off Natural Gas for Top Customers
3	Raising area PRMS outlet Pressure
4	Raising pressure for high-pressure regulators to reach the maximum pressure capacity over the emergency event area.
Emergency Team	
1	Review of pipeline isolation maps and isolate of the valves before and after release part.
2	Preparing area for excavation to inspect the buried pipeline and secure the area by using:
2/1	Barricading
2/2	Warning signs
2/3	Fire extinguishers distribution
3	Providing temporary isolation (by using release isolators)
4	Notify the maintenance team for fixing the cracked part
5	Monitoring of the high-pressure network to take the necessary action for re-feeding gas.

04- In Case of High Pressure Pipeline Gas Leak With Fire	
Emergency Control Center	
1	Receiving Notification Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties - Rescue Police and Civil Protection
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
2	Shut-off Natural Gas for Top Customers
3	Raising area PRMS outlet Pressure
4	Raising pressure for high-pressure regulators to reach the maximum pressure capacity over the emergency event area.
Emergency Team	
1	Partial isolation for area valves to control the fire.
2	Fighting the fire with Civil Protection team
3	Preparing area for excavation to inspect the buried pipeline and secure the area by using:
3/1	Barricading
3/2	Warning signs
3/3	Fire extinguishers distribution
4	Providing temporary isolation (by using release isolators)
5	Notify the maintenance team for fixing the cracked part
6	Monitoring of the high-pressure network to take the necessary action for re-feeding gas.

05- In Case of Medium Pressure Pipeline Crack / Leak	
Emergency Control Center	
1	Receiving Notification Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties (Rescue Police and Civil Protection) if needed.
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
2	Raising pressure for low pressure regulators feeding the network to reach 105 mbar
Emergency Team	
1	Review of pipeline isolation maps and isolate of the valves before and after release part.
2	Preparing area for excavation to inspect the buried pipeline and secure the area by using:
2/1	Barricading
2/2	Warning signs
2/3	Fire extinguishers distribution
3	Providing temporary isolation (by using release isolators)
4	Notify the maintenance team for fixing the cracked part
5	Monitoring of the medium-pressure network to take the necessary action for re-feeding gas

06- In Case of Medium Pressure Pipeline Leak With Fire	
Emergency Control Center	
1	Receiving Notification Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties - Rescue Police and Civil Protection
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
Emergency Team	
1	Partial isolation for area valves to control the fire.
2	Fighting the fire with Civil Protection team
3	Preparing area for excavation to inspect the buried pipeline and secure the area by using:
3/1	Barricading
3/2	Warning signs
3/3	Fire extinguishers distribution
4	Providing temporary isolation (by using release isolators)
5	Notify the maintenance team for fixing the cracked part
6	Monitoring of the medium-pressure network to take the necessary action for re-feeding gas

07- In Case of Low Pressure Pipeline Crack / Leak		
Emergency Control Center		
1	Receiving Notification Carry-out the emergency call chart and:	
2	- Notify and directed the emergency team to the event place.	
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.	
4	- Notify the concerned parties (Rescue Police and Civil Protection) if needed.	
5	- Recording the event in emergency logbook.	
Shift / Emergency Engineers arrange and communicate for		
1	Communication with Top Management for Main Line Gas Isolation "If Needed"	
Emergency Team		
1	Determining the leak point or crack by using the GascoSeeker in case of not determined by any one	
	Review of pipeline isolation maps and isolate of the valves before and after release part.	
2	Preparing area for excavation to inspect the buried pipeline and secure the area by using:	
	2/1	Barricading
	2/2	Warning signs
	2/3	Fire extinguishers distribution
3	Providing temporary isolation by using hand or mechanical squeezers to stop the gas leak	
4	Notify the maintenance team for fixing the cracked part	
5	Monitoring of the medium-pressure network to take the necessary action for re-feeding gas	

08- In Case of Low Pressure Single Pipeline Crack / Leak	
Emergency Control Center	
1	Receiving Notification Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties (Rescue Police and Civil Protection) if needed.
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
Emergency Team	
1	Determining the leak point or crack by using the GascoSeeker in case of not determined by any one
2	Review of pipeline isolation maps and isolate of the valves before and after release part.
3	Preparing area for excavation to inspect the buried pipeline and prepare axial rout with secure the area by using:
3/1	Barricading
3/2	Warning signs
3/3	Fire extinguishers distribution
4	Providing temporary isolation by using hand or mechanical squeezers to stop the gas leak
5	Isolating the natural gas feeding from the housing) incase of gas Interruption the emergency team will isolate the land branches from the buildings and return back after finalizing the maintenance)
6	Notify the maintenance team for fixing the cracked part
7	Monitoring of the medium-pressure network to take the necessary action for re-feeding gas

09- In Case of Service Branch Crack / Leak	
Emergency Control Center	
1	Receiving Notification Warning notifier to be away from the crack or leak place and avoid any naked flame near or around the area
	Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties (Rescue Police and Civil Protection) if needed.
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
Emergency Team	
1	Protecting and secure the area from any source of ignition and calm and reassure the public
2	Securing the case and notifying the population by temporary shut-off the gas feeding
3	Fixing the crack or the case shall continue to be secured and communication shall be transferred to the responsible department to complete repair work
4	Assessing situation to determine the event responsibility (Misleading or not)
5	Giving warning to the population to take the necessary action to avoid reoccur as a dangerous situation
6	A report of the incident shall be made after a case recorded to take necessary legal actions

10- In Case of Fixtures Crack Inside the House	
Emergency Control Center	
1	Receiving Notification Warning notifier to be away from the crack or leak place and avoid any naked flame near or around the area
	Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties (Rescue Police and Civil Protection) if needed.
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
Emergency Team	
1	Protecting and secure the area from any source of ignition and calm and reassure the public
2	Securing the case and notifying the population by temporary shut-off the gas feeding
3	Fixing the crack or the case shall continue to be secured and communication shall be transferred to the responsible department to complete repair work
4	Assessing situation to determine the event responsibility (Misleading or not)
5	Giving warning to the population to take the necessary action to avoid reoccur as a dangerous situation
6	A report of the incident shall be made after a case recorded to take necessary legal actions

11- In Case of Fixtures Crack (Internal / External / Device Connection)	
Emergency Control Center	
1	Receiving Notification Inform the reporter by: shut-off the internal main valve open the windows not to turn on or off any lights no naked flame
	Carry-out the emergency call chart and:
2	- Notify and directed the emergency team to the event place.
3	- Notify area shift and emergency engineers for evaluating the event and follow-up situation.
4	- Notify the concerned parties (Rescue Police and Civil Protection) if needed.
5	- Recording the event in emergency logbook.
Shift / Emergency Engineers arrange and communicate for	
1	Communication with Top Management for Main Line Gas Isolation "If Needed"
Emergency Team	
1	Protecting and secure the house from any source of ignition and ask for the source of the gas smell (in / or outside)
2	Detecting the gas and determining the source from all connections
3	Using the GascoSeeker to determine the higher gas ratio
4	Determining the source and fixing it the retest the connections
5	In case of not determining the gas leak, the team secure the place, started to detect the gas in each unit, and notifying the Emergency Control Room to call the maintenance team to review all gas connection started from the main gas pipeline
6	If the gas ratio exceeding 1 % the maintenance team will shut-off the gas from the hall building
7	If there is no gas leak detected, maintenance team return the gas flow again

Emergency Report Form

Date		***Time***		***Type***	
Address					
Injuries					

Name	P.R No.	Age	Dept.	Job Title	Exp.	Duration in The Comp.

Equipment / Materials Damaged			
Injury Type		***Origin Injured***	
Accident Description			
Equipment Related to Accident			
Natural Conditions Prevailing in Accident / Injury			

Temperature		Wind Status		Light		Noise	

Accident Reasons	Unsafe Acts		Unsafe Conditions	

PPE	Not available		Wrong Use		Not Used	

Accident Witnesses

Name	P.R No.	Age	Job Title	Department

Team Leader Opinion (Accident / Injury)
Job Supervisor Opinion (Accident / Injury)
HSE Opinion (Accident / Injury)
Actions Taken /Needed to Prevent Re-occurrence

Report No:
Copy To:
Attachments:

Prepared By	
Name	Signature

Annex 7: STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION (11 -GOVERNORATES 2013)

The public consultation chapter aims to highlight the key consultation and community engagement activities and their outcomes, in addition to outlining the key aspects to be addressed when holding the consultation activities of the (11) site-specific ESIAs upon final project detailing.

Throughout the various consultation and engagement activities, the work teams experienced and recorded remarkable and overwhelming public acceptance, even eagerness, by the community and the governmental stakeholders towards the proposed project. The indignity and financial hardships experienced by scores of Egyptian families (especially women) in obtaining LPG cylinders (the current household fuel) was revealed through testimonies all over the country. Aside from a limited number of concerns regarding street rehabilitation after construction works and options of installation fee payment; the glaring message from governmental and community consultations was to commence implementation ASAP (with repeated requests to expand coverage beyond what is planned for the project).

Consultation activities (scoping, interviews, focus group discussions, public hearings/consultations) with various stakeholders and community people in the host communities were held for the proposed 1.1 million household NG connections project in compliance with:

- WB policies related to disclosure and public consultation, namely,
  - World Bank Procedure (BP 17.50)
  - World Bank Operational Policy (OP 4.01)
- Egyptian regulations related to the public consultation
  - Law 4/1994 modified by Law 9/2009

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Objectives of various consultation activities are summarized as follows:

1- Define potential project stakeholders and suggest their possible project roles
2- Disseminate comprehensive information about the project to enable stakeholders to identify their concerns, needs, and recommendations.
3- Document stakeholder feedback and enhance the ESIAF accordingly
4- Identify the most effective outreach channels that support continuous dialogue with the community
5- Discuss potential resettlement plans and impacts of involuntary resettlement

Defining the stakeholder

Given the fact that the project exact routes and project details have not been finalized at this stage, stakeholder identification was based on analysis of geographical, legal, institutional, and operational scope of the project. The following table represents the stakeholders contacted and engaged for the consultation events:

Table 1 Main stakeholders identified for the Framework

Stakeholder	Role/ concern
Local Governmental entities	
Governorates	The main role of the governorates is the provision of support to the project through mobilizing people to gain information about the project. Media is known to shed light on activities of the governorate entities
Local Governmental units (District authorities and village authorities)	- Permissions for the lands needed for PRS should be prepared by the governorate and approved by the LGU. - Rehabilitation of roads, which is one of the major issues raised by the community, will be performed by the LGU.
Other governmental entities	
Information Centers on the governorate level	Provide NG companies with underground utilities and infrastructure maps.
Governmental Authorities	Various authorities in the governorate will support the project through permissions for excavation works, maintenance, health related issues, etc.
The Social Fund for Development	Offers loans in LPG distribution startups.
Egyptian Environmental Affair Agency (HQ and RBOs)	Responsible for reviewing and approving ESIAs, and monitoring implementation of the Environmental Management Plan
Security Department	Secure the construction sites and prevent people from in- flushing into it
Ministry of Health	Providing health facilities to the project workers
Ministry of Tourism	Relevant to project implementation in Touristic Governorates such as Aswan, Qena, Matrouh, and Alexandria.
Ministry of Antiquities	Very important to issue permissions for excavations and accompany the working teams, particularly, in Sohag and Aswan which are rich in monuments.
Media	
Television and radio representatives	Inform the community about the project and its impacts and support dissemination of ESIA studies
Press people	
Websites editors	
NGOs working on environmental and social related aspects	
NGOs on the central level	Play an active role in any awareness-raising related to the project May provide financial support to the poorer customers
NGOs on district level	
Specific union of NGOs	
Universities and Educational institutes	
Faculty of Engineering	Review and enrich the ESIA 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
Other	
Private companies	Mainly potential tenderers for construction works
Traders	Provide workers with food and amenities.
Contractors	From the project adjacent areas, may be affected.
Community people	
Community leaders	Main cornerstone in mobilizing the communities.
Heads of tribes	In Marsa Matrouh city, provide security to the pipelines. Their approval to allow the project to cross their lands should be obtained during the early stage of the project.
Potential beneficiaries	Potentially benefit from the project

Stakeholder	Role/ concern
Potential Project Affected Persons (PAPs)	Farmers whose lands may be traversed by project components. LPG distributors(formal and informal), LPG storage workers.
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
Town Gas	Local distribution company (LDC) who will implement, operate, and manage the ESMP
Butagasco	May be affected due to the installation of the NG
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 them 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.

Consultation Methodology and Activities

3441 community members were engaged directly. Consultations were conducted on various levels to outreach all levels of stakeholders.

Public scoping sessions

- Giza and Qalubia Governorates on November 24th of 2013 in Flamenco Hotel.
- Upper Egypt Governorates on November 26th 2013 in Maraga City Hall, Sohag.
- Delta governorates on November 28th 2013 in Menufia University Hotel.

الشركة المصرية القابضة للغازات الطبيعية (إيجاس)

جلسات الاستماع ومناقشة عامة (أولى)

لدراسة تقييم التأثيرات البيئية والاجتماعية لمشروع توصيل الغاز الطبيعي في ١١ محافظة

في إطار خطة الشركة المصرية القابضة للغازات الطبيعية خلال الثلاث سنوات القادمة والتي تعد جزءا متكاملا من استراتيجية الدولة في التوسع في توصيل الغاز الطبيعي للوحدات السكنية لعدد ١,١ مليون عميل في محافظات (الإسكندرية / الجيزة / مرسى مطروح / القليوبية / الدقهلية / الغربية / المنوفية / سوهاج / قنا / أسوان / الإسماعيلية). فإنه يسعد الشركة المصرية القابضة للغازات الطبيعية (إيجاس) بالتعاون مع شركة اكوكنسرف لعمل البيئية دعوة ممثلي المجتمع المدني والجهات والأفراد المعنيين بموضوعات التنمية المستدامة والبيئة للمشاركة وإبداء الرأي بشأن المشروع وتأثيراته البيئية والاجتماعية المحتملة وذلك طبقا للمواعيد التالية:

المحافظة	التاريخ	الوقت	المكان
الجيزة	الأحد ٢٤ نوفمبر ٢٠١٣	الساعة ١٠ صباحا	فندق فلامنكو ٢ شارع الجزيرة الوسطى بالزمالك
سوهاج	الثلاثاء ٢٦ نوفمبر ٢٠١٣	الساعة ١٠ صباحا	قاعة مجلس مدينة المراغة
المنوفية	الخميس ٢٨ نوفمبر ٢٠١٣	الساعة ١٠ صباحا	فندق جامعة المنوفية بجوار كلية الزراعة

وفي حالة الرغبة في الحصول على نسخة من مسودة ملخص الدراسة البيئية يرجاء زيارة الموقع الالكتروني للشركة القابضة للغازات الطبيعية www.egas.com.eg أو الحضور لمقر الشركة ٨٥ طريق النصر - مدينة نصر

وإننا لنتطلع لمشاركة سيادتكم في هذه الجلسة

المزيد من المعلومات يرجاء الاتصال بالمكتب الاستشاري - اكوكنسرف

فاكس: ٠٢-٢٧٢٦٥٢٩٧ تليفون: ٠٢-٢٧٢٦٤٨١٨ / ٠٢-٢٧٢٥٩٠٧٨

بريد إلكتروني genena@ecoconserv.com

Photo 1: Advertisement published in El Ahram related to the 3 scoping sessions

Participants profile

Participants of the scoping session consultation events represented different categories of stakeholders from the targeted areas. In total, 251 persons attended those sessions, of which 198 were males and 53 were females. The males represented (78.9) % of the total participants, while females represented only (21.1%) This is relatively a high presentation of females comparing to similar projects implemented in the same Governorates.

Diversity in age and educational backgrounds was reflected in participants" contributions and enriched the session with a wide range of opinions. The visits paid to introduce the project to the community were an appropriate aperitif that drove the community people to be more willing to get information about the project. The diversity between literate and illiterates, workers and unemployed enriched the discussion to a

great extent. A variety of organizations as well as representatives from governmental and community based authorities, institutes, and entities also took part in these scoping session meetings.

- 35.5% from governmental entities
- 17.7% from government environment sector
- NGOs (4.6% in Giza , 15.9% in Menufia and 20.3% in Sohag)
- Five TV, press and Radio reporters attended the 3 scoping meetings.
- Community people (technicians, service sales laborers and teachers)

Summary of discussions

All participants expressed their eagerness for commencement of project implementation without further delay and many participants demanded the extension of the project to additional areas. Following is a summary of all discussions conducted.

Subject	Questions and comments	Responses
LPG cylinder problems	Speeding up the environmental and social studies and permissions so as to launch the construction phase as soon as possible	• EcoConServ is preparing the ESIAF study required to obtain EEAA approval. • EGAS is working on obtaining other required permissions
Recommendation to enhance the project performance	• EGAS should obtain detailed information about all project areas and develop a report about each area • The installation of NG should be obligatory not optional • EGAS should share infrastructure maps developed for the project with the Local Governmental units • The selection of project areas should be revisited • All towns and cities should be connected	• The exact streets will be defined at a later stage. Thereafter, an ESIAF will be prepared for each governorate • EGAS cannot oblige anyone to have NG installed • All available information will be shared with the Local Governmental Units • Project areas were selected based on certain criteria as presented • This project is one of a series of projects that aim at connecting all houses to NG
Scope of social study	It is important to meet with informal LPG distributors and house guards in the project areas	• This task is within the scope of ESIAF study
Awareness activities and NGOs roles	Will the project undertake any awareness activities? Local NGOs should be integrated in these activities	• Awareness activities are among the recommendations of the ESIAF study
Street rehabilitation	• It is crucial to study the impacts on streets and the restoration process • Street restoration should not be the responsibility of Local Governmental units	• All impacts will be fully investigated • Restoration alternatives are 1.Restoration will be fully undertaken by NG companies (Town Gas – Egypt Gas)or 2.NG companies will pay local governmental units to carry out restoration works
Considering alternative sources of energy	In addition to NG, EGAS should consider also making use of solar energy and biogas	• This particular project is limited to NG. However, solar and wind energy projects are being implemented by the New and Renewable Energy Authority on the national level

Subject	Questions and comments	Responses
NG installations for houses constructed with no official permits	It is crucial not to install the NG to illegally constructed houses.	• One of the requirements for installing NG is the provision of an electricity bill. Houses constructed without the necessary permits do not have access to „state electricity" and will not be able to provide the required bills.
NG installation to areas with no sewage system	Areas with no access to a sewage system should not be deprived of NG as well. This is not fair.	• NG should be the last facility to be installed. This is mainly due to safety requirements
Vulnerable groups working in LPG distribution	EGAS should consider meeting the poor and marginalized groups working in LPG distribution	• Vulnerable groups are an essential component of this study. Due attention will be given to them. They will be investigated during the ESIAF
Poor people	EGAS should provide a subsidy enabling the poor to install NG	• The NG connection is already subsidized by the state. Thus, it is recommended that other entities step in to provide additional support to the poor
Visual intrusion	The pipelines damage the entrance of houses and diminish the aesthetic value of buildings	• We try to follow the maximum safety procedures while at the same time minimizing damage to houses. Plans to minimize visual intrusion have been developed

Data collection activities

- 44 mini group meetings were conducted in 29 project areas, attended by 263 members of community and governmental entities.
- 36 individual meetings were conducted in the 11 governorates with governmental stakeholders. In addition, 16 individual meetings were conducted with the LPG distributors.
- 1904 Households were consulted in various project areas.
- Dual meetings were conduct held with 20 persons in Marsa Matrouh city as households will be provided NG for the first time governorate-wide.
- A leaflet about the project was prepared and uploaded to the website. Thereafter, 1000 leaflet were printed and distributed during the site visits[8]:
  1- Brief description of the project
  2- Potential impacts of the project
  3- Total number of installations

Participants profile

In addition to the above mentioned, mini meetings and individual interviews were conducted in the 11 governorates. The community people on the district level were interviewed. As well as, the health centers' service providers, the LPG distributors, NGOs and Governmental entities. Participants were of a variety of age categories. Young people were motivated to attend the meetings held in their own premises. Females were strongly represented at 26.9% of the participants. Consultations with women took place in homes, LPG storerooms, and NGOs. Some consultation activities were conducted informally. A casual ambiance was adopted during consultations to encourage people to spell out their concerns freely.

[8] Details are presented in the SIA document (submitted to WB and EGAS in parallel to this report).

Photo 2: Woman interviewed in the NGO

Photo 3: Consultation on the street

Summary of discussions

The discussion addressed/documented the following:

1- Options of poorer customers to receive additional financial support
2- Physical and financial burdens of LPG cylinders and dilemmas during shortage
3- Corruption related to LPG distributors
4- Credible information due to the misconceptions related to NG safety
5- Feasibility of connecting NG to rural areas and remote ones
6- Importance to integrate community based organizations in awareness activities
7- Monitoring and maintenance of the grid
8- NG job opportunities for areas adjacent the project
9- Cooperation with the LGU throughout the life of the project

Final public consultations

Consultation activities were conducted in the 11 Governorates during the last 10 days of December 2013. Parallel teams implemented the consultation activities.

- Four consultants from EcoConServ (two environmental and two social)
- Eight representatives of EGAS, Town Gas and Egypt Gas
- Four representatives of EEAA accompanied the teams over the 11 governorates
- 2 administrative managers and numerous drivers

Table 2: 11 Consultation activities conducted during the final consultation phase

Governorate	Date	Venue
Aswan	21st of December 2013	Governorate Hall (Arous El Neil)
Menufia	21st of December 2013	Governorate Hall
Qena	23rd of December 2013	Girls Club Hall in Qena city
Giza	23rd of December 2013	Army Hotel Hall
Matrouh	25th of December 2013	Nile centre for Media
Sohag	25th of December 2013	Local Popular Council
Alexandria	26th of December 2013	Mercure Hotel
Daqahlia	29th of December 2013	Marshal Hotel
Gharbeia	29th of December 2013	Panorama Hotel
Qalubia	30th of December 2013	Egypt Public Library in Benha
Ismailia	30th of December 2013	Media Compound in El Sheikh Zaid

The list of invitees was developed by EEAA regional branches, environmental offices of the governorates, NGOs, governmental media centers, and various government employees, in cooperation with the Consultant. Invitees were informed of the date and location of the Public Consultation at least two weeks ahead. Participants were invited through:

1- Invitations sent by EGAS via mails, Faxes and e-mails.
2- Telephone communication by EGAS and the Consultant.
3- An advertisement was published in El Ahram El Mesay followed by a second advertisement published in Aswan Newspaper and El Esboua Newspaper.
4- Aswan Newspaper presented a news clip about the project prior to the event.
5- A simplified Fact-sheet/brochure in Arabic (500 copies) distributed:: i) Governorates that the project will be implemented in, ii) general description of the project, iii) Potential long and short term impacts of the project .

Photo 4: One of the developed posters

Hearings/consultations were held in adequately situated and equipped venues affiliated to NGOs, Media centers, Governorate, and hotels. In Sohag, Qena, and Aswan microbuses were rented to move people from the remote areas to the public consultation venues.

Participants profile

971 participants attended the 11 final consultation events. Participants reflected different categories of stakeholders from the project targeted areas. Female participation was targeted throughout advertising and invitation process. The highest representation of women was noted in Ismailia Governorate (60.8%) while the least representation of females were found in Matrouh. Taking the unique cultural traits of Matrouh into account, additional mini meetings were conducted with the females on the governmental employees and residents levels. Matrouh as invitations extended to heads of tribe and the NGOs working on the tribal levels.

Overall, special attention was paid to involving young groups and females as they are most affected by the physical hardships of obtaining the LPG cylinders. The physically-challenged were represented in consultation activities through NGOs working with them.

- NGOs represented 14.9% of the participants among which 70.0% of them work on the solid waste management and street afforestation
- 42.0% of the participants represented governmental entities (Local Governmental Units, Road Authority, the Urban planning, etc.)
- Governmental environmental sector represented 15.8% of the total participants (EEAA regional branches, governorate EMU and local environmental units)
- 38.8% of the total participants held administrative jobs
- 26.5% specialists (Lawyers, professors, businessmen, chemists, etc.)
- 23.8% of the total participants were of top managerial positions (government) and heads of municipalities
- Technicians and specialists represented 6.8%
- 2.0% were students.

Summary of discussions

All consultation events started with a summary of the project and the Natural Gas in Egypt. Using PowerPoint and multimedia, representatives of EGAS, Town Gas and Egypt Gas presented detailed information about all project activities.

Using PowerPoint and multimedia, EcoConServ experts presented the ESIAF to the community people. Simple wording was used whenever possible by the environmental and social expert in order to be comprehended by the members of community. The resettlement policy framework was presented as an important element of the final public consultation.

Photo 5: A tribe leader in Matrouh Gov.

Photo 6: Participants in Daqahlia Governorate

Photo 7: Posters in Sohag Governorate.

Photo 8: Consultation event in Sohag Governorate

During breaks, Media interviewed EGAS representatives, government officials, community members, and the consultants. The main issues raised during these interviews were as follow:

1- General information about the Natural Gas
2- Positive and negative impacts of the NG
3- The rules and regulations of EEAA
4- The role of stakeholders and community participation

Each session ended with an open discussion lasting for a couple of hours.

Table -3: Key comments and concerns raised during the Final Public Consultations

Subject	Questions and comments	Responses
Damaging underground utilities and infrastructure during digging	Will the implementing agencies avoid damaging the underground utilities/facilities and infrastructure?	All necessary procedures should be carried out to avoid damaging underground utilities/facilities and infrastructure. In case any facilities are damaged, they will be restored

Subject	Questions and comments	Responses
Collaboration with governmental entities and information centers	Many governmental entities (Local Governmental Units, Information centers, Road Authority, Water resource, Mayors…etc.) are willing to cooperate with the project to facilitate work. Will this be possible?	It is crucial to collaborate with these entities in order to obtain information, maps and permissions
Role of community based organization and tribe leaders	It is recommended to cooperate with members of civil society in order to increase awareness	Civil Society members play a major role in carrying out awareness raising activities as well as securing the financial aid to poor people
Role of the Army	EGAS should consult and contribute with the army in the frontier governorates	Their approvals and permissions are key to implementing project activities
Reduction the installation cost	It is recommended to: 1. Take the LPG cylinder as an advance payment for the NG. Thereafter, the poor pay by installment 2. Cooperate with the Ministry of Social Solidarity to reduce the installation cost for poor 3. Mobilize the local community and the NGOs to provide support to poor	It is difficult to adopt these recommendations
People living with disabilities	At least 5% of jobs provided by EGAS should be filled by people with disabilities	This recommendation will be taken into consideration
Appropriate time for construction	Matrouh, Alexandria and Ismailia are touristic areas. Thus EGAS should avoid working there during summer time	This recommendation will be taken into consideration
Restoration of streets	All attendees voiced their concern about damaging the streets without restoring them after the completion of installation activities due to the bad performance of the Local Governmental Unit (corruption)	Two alternatives of street rehabilitation were investigated: - Restoration will be fully undertaken by NG companies (Town Gas – Egypt Gas)or - NG companies will pay local governmental units to carry out restoration works
Some devices cannot be operated by the NG	We use a baking stove. This will not be operated by the NG. What should we do?	The baking stove can" t be connected to the NG for safety purposes
Awareness activities	Awareness activities should cover the following: Contact person in the site (foreman) GRM personnel Hotline for damage and maintenance Website and SMS	This recommendation will be taken into consideration
Job opportunities	The jobs provided by this project should be made available to the local community	It is more economically viable to provide jobs to the local community

Subject	Questions and comments	Responses
Remote areas and suburbs	NG should be installed to remote areas and the suburbs	They will be concerned in later stage
Capacity building	EGAS should raise the capacity of community members in order to enable them to work in the project	This will be investigated and implemented whenever possible
Paying by installment	Does the proposed system for paying by installment contain any interest?	The bank should have their interest rate
Criteria to select certain areas to install the NG	What are the criteria to select the project areas	There are numerous selection criteria based on economic aspects and technical consideration
Safety measures	What are the safety measures followed by the NG companies	We apply the maximum standards of safety (British standards)

Second Public Consultation Disclosure Activities

The importance of the project for the government and the community was reflected in remarkable media coverage. Media covered events and interviewed participants:

1- **Newspapers: El Youm 7, El Masry El Youm, El Watan**
2- **News websites: El Ahram, El Borsa website, El Shrouk, Aswat Mesria, El Mashad, Misr El Youm**
3- **Aswan governorate website, ONA news**
4- **Tibah and Canal National TV channels**

GOVERNORATE OF DAKAHLYA

Marchall Hotel - Sunday, 29 December 2013

Serial	Name	job title / company	E-mail	Telephone	Signature
1	Sahar Elsingari	Urban planning		01012500805	
2	Amani Khalid Elnadari	Social affair department	Aelnadry-1@hotmail.com	0100143169	
3	Gamal Zaki ElShiemi	Irrigation department		01119002153	
4	Mohamed Salam Hamid	East irrigation department		1061146677	
5	Ahmed Mohamed Sabhoun	West irrigation department		01006728246	
6	Ch.Abdo Mohamadien	Environment impact assessment director		01004275711	
7	Eslam ElWazier	envirionment researcher		01006774061	
8	Nasr Atef	envirionment researcher		01064790944	
9	Magada ElRefaai	Elmansour university	Egypt7000year@yahoo.com	01063860019	
10	Ahmed Mohamed Ahmed Amin	Network engineer – information center	Eng-ahmedamin2010@yahoo.com	01092172160	
11	Khalid Elsaid Mohamed	West security council		01000590397	
12	Esam Mohamed Khalil	Chemical –water authority		01124442595	
13	Mamdouh salah Sayed	Environment affair director		01067308129	
14	Mohamed Fawzy magd	Environment inspector			
15	Mahmoud mahmoud AboTalieb	Aga deputy mayor		01060537766	
16	Wesam Hamza Mohamed	Field worker – information center			
17	Zeinab Mohamed Hafez	Social consultant – EcoConServ		01066127117	
18	Mohamed Helmi Elbasuini	GASMisr company		01006692511	
19	Mohandesa Elnabi Hassanin	Environment affair – east district		01116664188	
20	Fouad Saad	Public relation manger – East district		01273917119	
21	Mohamed hussien Elmahdi	Projects manger –East district		01004806503	

Serial	Name	job title / company	E-mail	Telephone	Signature
22	Ebrahim Helmi Mohamed	Irrigation inspector		01006930020	
23	Adel Osman	Utility director		01028026074	
24	Atef Elkanani	Environment		01097160376	
25	Ali Salab	Technician		01063064379	
26	Elsayed Sobhi Elsawi	Follow up director		01004777850	
27	Houida Ebrahim Abdelfatah	Environment inspector		01093053108	
28	Fekria Mahmoud Zahran	Information & environment manager			
29	Amr AbdelMonsief	Evaluation manger		01001485990	
30	Eman Mahmoud ahmed	Environment protection unit	enasr@hotmail.com	01005040723	
31	Marwa senousi Mohamed	Technical Social affair department		01272726211	
32	Dina saad Ali Elgamal	Technical Social affair department		01223436660	
33	Adel Ebrahim Elagami	Information center		01003081112 /0502247885	
34	Mohamed Elsayed				
35	Hamada Mohamed	Driver		01020525116	
36	Adel Mohamed Mohamed bahr	Radio		01010375751	
37	Hesham Mohamed Rabi	Director		01001087689	
38	Arafat Arafat ahmed	Driver			
39	Mohamed Ahmed Ali	Driver		0100314954	
40	Ali abdelmegid Meshali	Chemical		01007300593	
41	Hadir Mohamed Mazied	Chemical		01007234458	
42	Faten Elsayed Mohameden	Environment inspector		01091155140	
43	Ebrahim abdelAziz Ayad	Enviropnemt unit – talkha		01004889621	
44	Mohamed Magawri Ebrahim	Governorate relation - EGAS		0106588481	
45	Mohamed AbdelMoemen Elnagar	Public relation – Talka municipality	Elnagar8677@yahoo.com	01002526324	

Serial	Name	job title / company	E-mail	Telephone	Signature
46	Ayman Mohamed Abdalla	Safety specialist – GASMisr	Hse-eg@hotmail.com	01008955856	
47	Ahmed Abdelmouti Eldieb			01092702129	
48	Mohamed Sami Mohamed	Quality department	Msf-97@yahoo.com	01006344041	
49	Hamdi nazeim abdelgelil	Electricity distribution company	Magdy.nazeem@yahoo.com		
50	Ataya saad Abdelhafez	Environment manager		01066668743	
51	Emad Eldin Hamed Ebrahim	EcoConServ		0100672235	
52	Fakhri Abdelkhaliq	Future technology association	nagwadmasy@yahoo.com	01061804901	
53	Nagwa Mustafa Mahmoud	Law university agent	drredaali@hotmail.com	01001766214	
54	Reda abdelSalam	Urban planning manger		0196713177	
55	Zeinab Mohamed saleh	Environment impact assessment	mamh@mans.edu.eg	01096775813	
56	Mervat Mohamed abo ElKhaier			01227443096	

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لنتائج دراسة تقييم التأثيرات البيئية والاجتماعية لمشروع توصيل الغاز الطبيعي في ١١ محافظة

فندق مارشال – الدقهلية

استمارة تسجيل الحضور

٢٩ ديسمبر ٢٠١٣

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل	التليفون	التوقيع
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٢٠	وسام حمزه				وسام حمزه
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استمارة تسجيل الحضور

٢٩ ديسمبر ٢٠١٣

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل	التليفون	التوقيع
٣١	هويدا ابراهيم عبد الفتاح	مفتش شئون بيئية بالمحافظة		٠١٠٩٢٠٥٢١٠٨	هويدا ابراهيم
٣٢	نكرية محمود زهران	مدير الاعلام بالثقافة البيئية			نكرية زهران
٣٣	عمرو عبد [illegible]	مدير ادارة متابعة [illegible]		٠١٠٠١٤٨٥٩٩٠	[illegible]
٣٤	ايناس محمود احمد	رئيس قسم حماية البيئة [illegible]	enas[illegible]@hotmail.com.eg	٠١٠٠٥٤٠٧٢٣	ايناس محمود
٣٥	مروة سنوسي محمد	المكتب الفني [illegible]		٠١٢٧٢٧٣٦٢١١	مروة سنوسي
٣٦	دينا محمد على الجمل	المكتب الفني للشئون الاجتماعية [illegible]		٠١٢٢٣٤٣٦٦٦٠	دينا
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فندق مارشال - الدقهلية

استمارة تسجيل الحضور

٢٩ ديسمبر ٢٠١٣

١	م. بكر السبزى	وكيل الادارة العامة للتخطيط العمرانى		٠١٠١٤٥٠٨٠٥	[signature]
٢	م/ امانى خالد البنادرى	رئيس وزارة الشئون الاجتماعية	[illegible]@hot[illegible]	٠١٠٠١٤٤١٦٩	[signature]
٣	م/ جمال زكى الشيمى	رئيس [illegible]		٠١١١٩٠٠٤١٥٢	[signature]
٤	م/ محمد سليمان حامد	مدير [illegible]		٠١٠٦١١٤٦٦٧٧	[signature]
٥	م/ احمد محمد شوكت	مدير عام [illegible]		٠١٠٦٣٣٤٨٥٤٣	[signature]
٦	د/ حمدى محمد	مدير ادارة تقييم الاثر البيئى		٠١٠٠٤٤٧٥٧١١	[signature]
٧	م/ [illegible] الوزير	[illegible]		٠١٠٠٦٧٧٧٤٠٦١	[signature]
٨	م/ [illegible]	[illegible]		٠١٠٦٤٧٩٠٩٤٢	[signature]
٩	د/ [illegible] الرفاعى	جامعة المنصورة - تدريس عام	egypt7000year@yahoo.com	01063860019	[signature]
١٠	م/ احمد [illegible]	مهندس نظم بمركز المعلومات	Eng_ahmesamin2010@yaho[illegible]	٠١٠٩٤١٧٤١٦٠	[signature]
١١	[illegible]	مجلس امناء [illegible]		[illegible]٩٠٢٩٧	[signature]
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فندق مارشال – الدقهلية

استمارة تسجيل الحضور

٢٩ ديسمبر ٢٠١٣

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل	التليفون	التوقيع
١	محمد عبد المنعم [illegible]	مدير العلاقات العامة بمجلس مدينة طلخا	elnagar8677@yahoo.com	٠١٠٠٥٠٢٦٣٠٤	[illegible]
٢	أيمن محمد عبد [illegible]	مسئول السلامة بشركة غاز مصر	hse_eg at hotmail.com	01008955836	[illegible]
٣	أ/ حمدي علي [illegible]				
٤	أ/ حمدي عبد العاطي العربي				
٥	م/ أحمد [illegible]	إدارة الجودة [illegible]	msf_97@yahoo.com	٠١٠٩٥٧٠٢١٢٩	[illegible]
٦	م/ مجدي نظيم عبد الجليل	شركة شمال الدلتا لتوزيع الكهرباء	magdy.nazeem@yahoo.com	٠١٠٦٢٤٤٠٤١	[illegible]
٧	م/ عاطف [illegible]	مدير [illegible] مركز طلخا		٠١٠٦٦٦[illegible]	[illegible]
٨	م/ [illegible]	[illegible]		٠١٠٠٦٧٤٤٢٨٥٠	[illegible]
٩	[illegible]	EcoConServ	fabdelkhalik@ecoconserv	01061804901	[illegible]
١٠	مجدي مصطفى محمود [illegible]	الإنشاء و[illegible] للإنشاء والتعمير	magwadmasy@yahoo.com	٠١٠٧٦٦٢١٤	[illegible]
١١					
١٢	د/ رهام [illegible]	وكيل كلية الحقوق [illegible]	[illegible]@hotmail	٠١٠٩٦٦٧١٣١٣٧٣	[illegible]
١٣	م/ زينب محمد صالح	مدير عام الإدارة العامة للتخطيط العمراني بالدقهلية		٠١٠٩٦٧٧٥٨١٢	[illegible]
١٤	د/ [illegible] محمد أبو الخير	جامعة المنصورة مركز [illegible] الأشرالين	6mamh@mans.edu.eg	01227443096	[illegible]
١٥					

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فندق مارشال – الدقهلية

استمارة تسجيل الحضور

٢٩ ديسمبر ٢٠١٣

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل	التليفون	التوقيع
٤٦					
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جلسة الاستماع والمناقشة العامة

لنتائج دراسة تقييم التاثيرات البيئية والاجتماعية لمشروع توصيل الغاز الطبيعي فى ١١ محافظة

فندق مارشال – الدقهلية

استمارة تسجيل الحضور

٢٩ ديسمبر ٢٠١٣

مسلسل	الاسم	الوظيفة/ الجهة التابع لها	الايميل	التليفون	التوقيع
١٦	السيد [illegible] العطار	مدير إدارة المتابعة [illegible]		٠١٠٠٤٧٧٧٨٥٠	
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Annex 8: STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATION (GOVERNORATE OF DAKAHLIYA - 2017)

Annex 8: Stakeholder Engagement and Public Consultation (Governorate of Dakahliya 2017)

Brief Description

The public consultation for this ESMP aims to presenting the project to the community, official bodies, representatives of civil society and related parties, communicating and consulting with them to introduce the NG project, its objectives, its effects, components and stages, and to identify the perspectives of different parties. Environmental and social aspects, as well as the following:

- Availability of information during the lifetime of the project through the on-site customer service office, providing adequate and clear information
- Community following up where the citizen is pursuing various activities and inform the community development officer about any irregularities in order to take appropriate corrective action
- Encourage community, advocacy and advocacy to deliver natural gas and stimulate the community to support the poor.
- Designing a grievance handling mechanism that is easy to use and includes clear and accurate levels and responsibilities in terms of timing, as well as commitment to publish them at the local level.
- Communicate with local communities, including people affected by the project, to raise awareness of the project and implement the schedule.

Legal Framework

Public hearing activities for the natural gas delivery project for some areas in Monofeya Governorate (scope identification, interviews, focus group discussions, public hearings / consultations) were carried out with the various stakeholders and members of the host communities of the proposed project in accordance with the following laws and standards:

- WB policies and directives related to disclosure and public consultation, namely:
  - Directive and Procedure on Access to Information
  - Operational Policy OP 4.01 - Environmental Assessment.
  - The Bank's procedures for reporting projects
- Egyptian regulations related to public hearing : Under the Egyptian Environment Law No. 4/1994 and its amendments No. 9/2009, amended by Ministerial Decisions 1095/2011 and 710/2012, Resolution No. 964/2015, a number of institutional bodies (representing EEAA and its regional branches, Governmental organizations concerned, the governorate where the project is located, local councils, affected groups, institutions and population) should be represented in the consultative process prior to approval of the proposed projects requiring environmental impact assessment and other parties such as NGOs and universities.

Public Consultation Methodology

As part of the implementation of the ESMP study, a team of Petrosafe implemented multiple levels of survey tools for the collection of various data as well as conducting field visits to the target sites in Dakahliya Governorate (Aga, Bilqas, Nabaroh, Mit Elkorama & Gogar and Mansoura sectors 42-45) in Feb 2017. The study team was able to collect sufficient information on the potential impacts of the project through consultation with governmental and non-governmental bodies, the local community, households, some vulnerable groups. During the visits, meetings were held with local unit officials, NGOs, health units, mayors and community leaders as well as Egypt Gas team. The consultation process was documented through photography as well as taking notes and reporting. Key social assessment methods used include observation, interviews, and surveys.

Assessment of the Consultation

In the following the results of the public consultation in Dakahliya is described by outlining the comments and assessing their relevance for the ESMP.

Public consultation presentations and open discussion

As part of the implementation of the ESMP project for some of the targeted areas in Dakahliya Governorate, a community consultation session was held to present the project and the results of the study to interested and decision-makers. The process of community consultation is a key part of the process of evaluating the positive and negative impacts of the project and All phases of the project. The meeting was announced in a newspaper - on 5th April 2017

Session Management and Documentation:

1. The main objective of the community consultation session is to present the NG project plan for the target areas in Dakahliya Governorate. Explain the results of the ESMP study to the project and discuss it with government officials, key stakeholders, potential clients, civil society representatives and citizens.
2. A file containing a copy of the summary of the ESMP study for the project was prepared and distributed to the attendees at the beginning of the meeting.
3. The meeting was prepared and managed by Petrosafe in coordination with the Egyptian Natural Gas Holding Company (EGAS) and Egypt Gas Company
4. The attendance was documented by signing a statement at the entrance to the hall (attached)
5. All the proceedings of the session were filmed with photographs and videos to document the discussions
6. All discussions and observations were recorded and presented in the report

Agenda

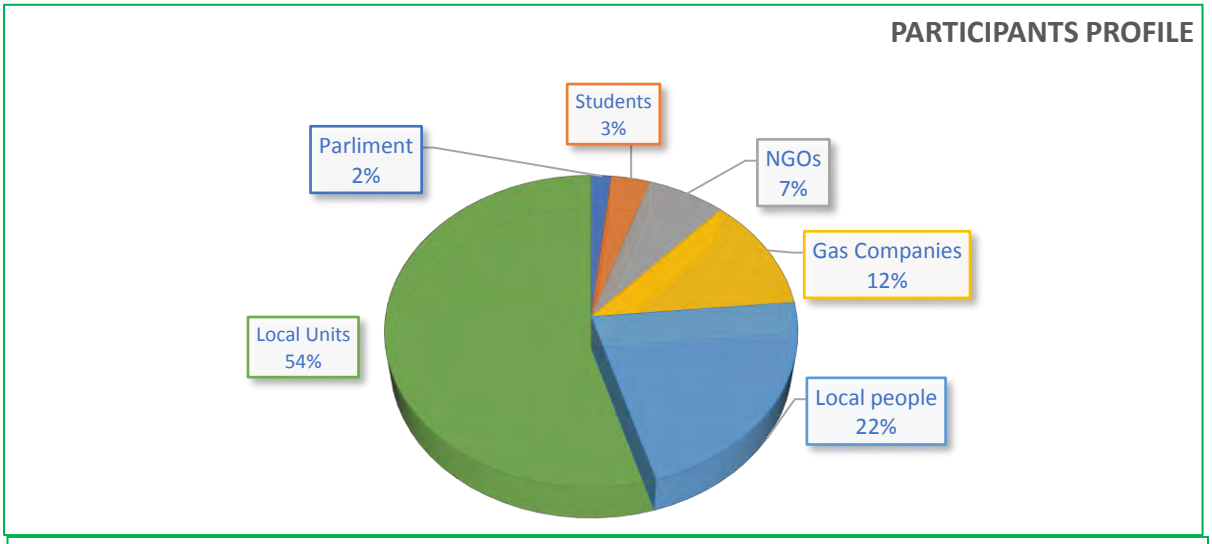
The community consultation session started at 11:00 am in Marshal Eljazera Hotel, Mansoura city and ended at 1:00 pm

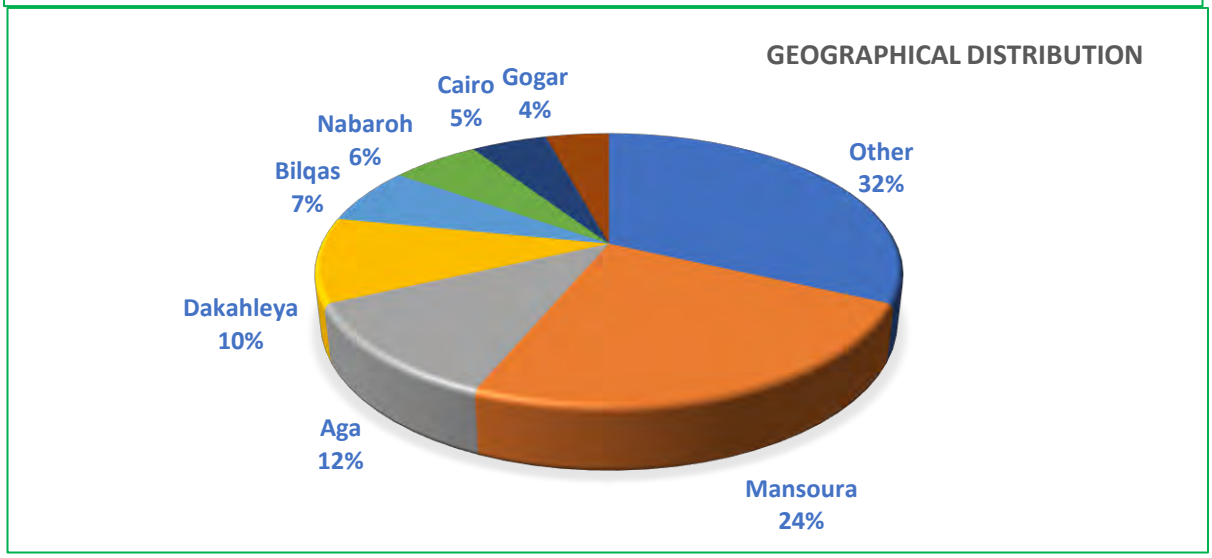
Speech	Summary
Eng. Mohamed Ghazaly Director of Safety & Environmental Department, Petrosafe	Welcoming the attendees and overview of the event agenda
Eng. Mostafa Farouk Dakahliya Area General Manager Egypt Gas company	Welcoming the honorable attendance and an introduction to the project of natural gas for 11 governorates
Dakahliya Governor Speech Delivered By Eng. Adel Shalabi Manager of Infrastructure Department	Project delivery of gas to Dakahliya governorate will served the citizen, provide a new source of energy and reduces the cost of the current cost of LPG. Dakahliya Governorate has overcome all obstacles in order to accelerate the implementation of the project in cooperation with EGAS, specifically during the selection processes or change the paths of gas lines as well as any other requirements Welcoming of the honorable audience
Eng. Ayman abed El Hafez Assistant CEO Petrosafe	Thanking the Governor of Dakahliya D. Ahmed Sharawy then introduction about Petrosafe company and areas of work and services which support oil and gas sector in Egypt
Eng. Ahmed Farag EGAS world bank Project Manager	Presentation about the company and the project of connecting 1.5 customers in 11 governorates. The organizational structure of the Ministry of Petroleum& Mineral Resources. Mo re than 7 million customers for gas companies. Implementation through five companies around Country
Eng. Waleed Abed Al Naby **Eng. Mohamed Ibrahim** **EGAS**	Presentation about the Gas line route and the implementation stages of the project in the governorate of Dakahliya (power point presentation)
Dr. Mahmoud Sarhan **Petrosafe Social consultant**	Presentation about the social impact study for the NG project in Dakahliya
Dr. Khaled Al Sahy **Petrosafe Environmental Department Manager**	Presentation of the EIA study for the natural gas project in Dakahliya then thanked the attendees, summarized the results and concluded the meeting

Participants Profile

Various social groups have attended the consultation meeting including; parliamentarians, citizens, farmers, students, businessmen, government officials and journalists.

- Total of 119 persons attended the consultation event; 13% of which are females
- 77% were residents affiliated local governmental units within the Markaz that will host the project.
- Participants include 2 parliament members, one journalist, 4 students, and 65 governmental employees and local people.
- 14 people working in EGAS and Egypt Gas attended the session. They provide detailed and clear information about the NG and its associated activities.





Phase One: Community Consultation (On-site) February 2017

Discussions during the period of community consultation in the targeted areas (Aga, Bilqas, Nabaroh, Mit Elkorama & Gogar and Mansoura)

No	The Question	The Answers
1	Fear of citizens being exposed to fraud by impersonating a representative of the Egypt Gas Company and collecting money as a value for contracting	It was agreed with local unit managers to provide premises within the local units to issue contracts and to provide awareness and information about the project
2	About the possibility of reduction or installment of the contracting cost which is relatively high for some citizens	There is a contract with the National Bank of Egypt to pay the contracting cost which is about 2160 pounds for up to 7 years, and on the long term natural gas is considered an economic energy source, since the cylinder gas current price is expected to increase. As it should be taken into account that risk of accidents resulting from natural gas installation is lower than the transportation, storage and installation of the gas cylinders
3	About project execution and implementation procedures	Egypt Gas will specify timeline to the implementation of the whole project including the street pipe line network and the internal home networks. Also Egypt Gas will provide the project information through the publications for the local community
4	How to get enough information about the project.	A recommendation was given to Egypt Gas to place a large Banner in the project location that show the project plan and place the company information and emergency numbers on all the company cars

No	The Question	The Answers
5	About the possibility of connecting the illegal buildings with the Natural Gas, which do not have a license or outside the urban area	The main reference for Egypt Gas Company approval to consider the residential unit legally and technically qualified to install Natural Gas is the existence of an official electricity bill for the residential unit. For unlicensed units that have performed electricity work, an electricity bill must be submitted from the company with a copy of the rental or ownership contract
6	The main complaint during all community meetings is the negative impact on traffic liquidity during the drilling operations and the non-return of the streets to their origin after the completion of the project	The policy of Egypt Gas Company during the construction phase is that there is no drilling work after the end of the working day, thus significantly reducing the problems of traffic liquidity. Concerning the "return to the origin" issue, it is the responsibility of the local units, sometimes occurs a delay in paving because of the existence of a paving plan in the local units for the street as a whole, not only where the drilling was carried out.
7	About the situation of residential units and buildings not technically qualified for Natural gas installation	There are no exceptions or complacency with respect to the technical requirements that have been set in this regard, that is for lives preservation, buildings safety, and the security of the society as a whole.
8	About the situation in the case of connecting an uninhabited residential unit	In case of the owner desire to connect an uninhabited residential unit, it is required to provide the equipment's (stove / heater) before completing the connection.
8	About the project provides job opportunities for the local community	The community benefits from the presence of the company staff during the project period by activating the trade, rent in the region. For non-trained daily labor, the project or subcontractors may employ temporary employment as needed, but are considered temporary short term employment

Phase Two: Community Consultation Session in Dakahliya governorate (April 23rd 2017)

The open discussion with the participants is summarized in form of a table, which presents the comments and the respective answers to that comment from the side of the Egypt Gas and EGAS Company and the consultants.

No.	Question	Answers
1	**Mr. Bassam Fulayfel** **Member** of **Parliament for Talkha Department** Giving thanks to the project stakeholders Dakahliya has overlapping villages, that required many field visits to communicate with the simple farmer to encourage them to replace the LPG with natural gas. The second point is while the project implementation the cost about 2200 EGP, and then once the company leave the area the price of the cost become more than 5,000 EGP, this is too much for the normal citizen so if that amount can be reduced to serve the people.	**Reply by Eng. Ahmed Farag EGAS Company** **First:** Before the implementation of the project, a feasibility study was carried out with social and economic aspects, and population density is taken into consideration It is unreasonable for the company to invest millions of pounds to serve tens of citizens while it can serve thousands or hundreds of citizens. the same investment cost. **Second:** because of the sensitivity of the Gas Project that we are dealing with we avoid to work within any area does not have the complete infrastructure facility before delivery of gas. **Third**: the implementation phase of the project will continue before and during delivery, but after delivery its turns to customer service, and you must know that there is material support submitted by the government, and the contribution of the Holding Company for gas during the implementation of the project and these financial contributions are no longer available after the implementation face, the raise the cost of delivering the gas. Also, due to the delay of some citizens in the payment cause the project to stop in some villages and moving to other villages,

No.	Question	Answers
		where there is a minimum number of customers until the start of implementation. **Fourth**: the cost of transportation is different from one location to another depending on the length of pipes, cost ranging between 6800 and 7000 EGP for the customer, the Holding Company for Natural Gas contributes EGP 1000 pounds, and the government pay the rest of the cost. **Fifth:** about funding, some banks contribute, other banks refuse due to the lack of collateral required by the bank, it is expected to enter Nasser Social Bank in financing without interest.
2	**MR. Abdo Mohammadayn** **EEAA, Impact Assessment Department Manager** Thank the company and the project and emphasized the need to adhere to the recommendations of the environmental impact assessment study	**Response from** the **Eng. Mostafa Farouk** **General manager** of **Dakahliya area – "Egypt Gas"** We give the confirmation on the commitment of Egypt Gas to consider the social and environment assessment recommendations.
3	**A citizen from Belqas** Thank the project company, the Governor and the attendance Question: who made the selection of villages that included in the project implementation the governorate or the Council?	**Reply from Eng. Ahmed Farag, EGAS** Thanks for coming and participating in the meeting. The company has three criteria for site selection for the project implementation 1. The social aspect: priority limited income and poor areas, and high populated areas. 2. Technical aspects: determined on the basis of the proximity of the location of the network,

No.	Question	Answers
		and its conformity to the standards of the company. 3. Economic aspect: economic feasibility, delivery of the areas that provide the high reduce of LPG as a result of the transformation of natural gas.
4	**Mr. Mohamed from Bilqas** Thanks the company to organize the meeting with an emphasis on cooperation between the government and local community in the implementation of the project where we made great efforts and we managed to postpone the paving of the Belqas streets for more than one year to implement the project **Second** , the delivery fee is it fixed or not, is it Cash or in installments?	**Replay from** the **Eng. Mostafa Farouk** **General manager** of **Dakahleya area – "Egypt Gas"** Coordination is being made to restore "streets to its original status" in coordination with the local authorities where the company will pay the cost to the roads department to make the task of return the road to its original status. The cost for the housing unit include two devises if the client wants more he will pay the additional cost. Installment cost is available through the National Bank. Thanks to the representatives of the governorate and waiting for more cooperation in the coming stages.
	Mr. Elhamy Agena **Member** of **Parliament** I'm so annoyed from the Gas company because the project start date has delayed and this put me in a very embarrassing situation in front of the citizens who elected me in villages of Basanterah and Maasarah since I said to them many times that the gas project will start soon and this had never happened. Installation costs are reasonable due to support from the Government. It is important now to	**Reply from Eng. Ahmed Farag, EGAS** Thanks to Mr. Elhamy Agena for raising such an important point. The delay of this implementation due to the need to finalize the social and environmental studied and public consultation process before starting the implementation. In addition, the negotiation with land owners to acquire pieces of lands for the PRS stations consumed a lot of time. Department of Roads has also raised price for roads restoration from EGP 80 to 350 which was one of the challenges too.

No.	Question	Answers
	proceed in the project to Aga, Bilqas and Nabaroh.	
	Dr Hisham Raby, EEAA It is important to coordinate with relevant authorities throughout the project time especially with regard to restoration of streets	**Reply from Eng. Ahmed Farag, EGAS** **Eng. Khaled El Sahy, Petrosafe** This point has been discussed earlier during the discussion. According to WB policies, EGAS must coordinate and consulate with local authorities.

Photos of event participants, consultation meeting, Mansoura April 23rd 2017


23.04.2017 10:02


23.04.2017 10:39


23.04.2017 11:51


23.04.2017 11:33

Main results for discussions

- Attention to the project and great community welcoming because of the urgent need for the project
- Emphasize the high degree of safety of natural gas and remove any fears of its use
- Community acceptance of the expected costs of implementation due to the high cost of the LPG cylinders
- Need for transparency in all details of the project
- Demand to engage the local community in planning and implementation
- Attention to the delivery of natural gas to the villages which located on the current route of implementation and not included in the current implementation plan
- Importance of "return the streets to its origin" after the completion of the project
- The necessity of having installments for the contracting fees
- Attention to the impact on business and the small shops
- Proper disposal of drilling outputs and various project residues
- Taking care of facilities and infrastructure and don't cause any damages

Summary of Consultation Outcomes

The majority of consulted groups expressed their willingness to install the NG to their areas. Aside from the overwhelming acceptance, few concerns were raised during the consultation process. Traffic congestion and street rehabilitation were the main concerns raised. NG Safety measures were raised as a main concern. Sharing of information in full cooperation with the community stakeholders and NGOs was strongly recommended by most of the consulted groups.

Site specific consultation efforts included all concerned stakeholders – be they persons/households affected by the project activities, civil society organizations representing the interest of the community, or regulatory and governmental bodies who will play a role in facilitating or regulating the implementation of site-specific project activities.

While WB safeguards and regulations state that a minimum of two large-scale, well- publicized public consultation sessions are a must for projects classified as category „A" projects like the one at hand, additional consultation activities (for example through focus group discussions, in-depth meetings, and interviews) were implemented to reach the most vulnerable and hard to reach community members. Additionally, in order to obtain larger scale and more quantifiable information, the consultant has conducted surveys in the different project sites.

SSESIA Disclosure

The site specific ESIA after being approved by the World Bank and EEAA, the final report will be disclosed on the WB website, EGAS and Egypt Gas websites. An executive summary in Arabic will be disclosed in EGAS and Egypt Gas websites. A copy of Dakahliya Site specific reports will be disclosed in EEAA and in the Governorate level

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جلسة التشاور المجتمعي الخاصة بدراسة تقييم الأثر البيئي
لمشروع توصيل الغاز للمنازل بمحافظة الدقهلية
يوم الأحد الموافق ٢٠١٦/٠٤/٢٣

رقم	الاسم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع

بتروميف

وزارة البترول والثروة المعدنية

الشركة المصرية القابضة للغازات الطبيعية "إيجاس"

THE WORLD BANK

EGAS

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يوم الأحد الموافق ٢٠١٧/٠٤/٢٣

رقم	الاســـــم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
١	سعد السيد عبد العال القصبي	شيخ بالمديرية الأوقاف		المنصورة/طلخا		٠١٠٦٠٢٠٨٩٩٢٧٤	سعد السيد عبد العال القصبي
	منال حقي الهنداوي	رئيس مدينة أجا				٠١١٥٤٠٤٠٨١١	[illegible]
	أيمن إبراهيم السيد	مدير إدارة الجمعيات	مديرية التضامن	جمصه		٠١٠٦٤٢٦٨٥٢١٩	أيمن
	وائل أحمد عبد العزيز	وكيل مديرية التضامن الاجتماعي	مديرية التضامن الاجتماعي بالدقهلية	المنصورة		٠١٠٠٦٨٧٠٦٠٩	وائل
	[illegible] أحمد	مدير عام التخطيط	ديوان عام المحافظة	المطرية		٠١٠٩٥٥٥٦١١٣٠	[illegible]

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إيجاس
EGAS

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رقم	الاســـم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
	احمد عزت عبدالعظيم	[illegible] دي جري أجا	[illegible] دي جري أجا	أجا		٠١٠١٢٧-٧٢٠	[illegible]
	نجوى الدماطي	الاتحاد الإقليمي للجمعيات ممثل الدقهلية	الاتحاد الإقليمي للجمعيات	الدقهلية	nagwadmaty@yahoo.com	٠١٠١٧٦٦٢١٤	[illegible]
	رشا [illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
	فرج محمد [illegible]	مدير عام بالتضامن	مديرية التضامن الاجتماعي [illegible]	الدقهلية		٠١٠٣٣٥٨٩١٠٩	[illegible]
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	[illegible]	عضو مجلس النواب	مجلس النواب	بلقاس		01005119988	[illegible]

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رقم	الاسم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
					Khaled.Mohamed@petrosafe.com.eg		

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رقم	الاســـم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
	م. [illegible] فاروق	مدير منطقة الدقهلية شركة غاز مصر			mfarouk72 @yahoo.com	01006056249	
	كريمة [illegible]	رئيس وحدة [illegible]				1106233574	
	م/ [illegible] السعيد	مدير ادارة التنفيذ شركة غاز مصر			aelsaeed25 @yahoo.com	01002139084	
	حامد الغزالي [illegible]	مدير عام	قطاعات	[illegible]		٠١٠٠٥٣٥٠٩٤٧	حامد الغزالي
	السيد حسن حسن المتولي	أمن مركز [illegible]	بتروسيف	شارع الجلاء المنصورة		٠١٠٠٦١٤٤٤٨٤	
	شوقي السيد محمد [illegible]	مدير عام [illegible]	[illegible]	[illegible]		٠١٠٠٦٤٠١٦٥٤	
	عبد السلام [illegible]	[illegible]	[illegible]	[illegible]	magdi@Hotmail [illegible]	٠١٠٩٢٩٤٤٠٧٥	
	[illegible]	مدير ادارة البيئة ببلقاس	مركز بلقاس	بلقاس		٠١٩٩٣١٩٥٤٦٠	

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وزارة البترول والثروة المعدنية
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أسماء السادة الحاضرين
جلسة التشاور المجتمعي الخاصة بدراسة تقييم الأثر البيني لمشروع توصيل الغاز للمنازل بمحافظة الدقهلية
يوم الأحد الموافق ٢٠١٧/٠٤/٢٣

رقم	الاسم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
١							
٢						٠١٢٨١٢٥٠٤٩٧	
٣				الدقهلية			
٤				الدقهلية			
٥				المطرية			
٦				المنصورة			
٧				المنصورة			

أسماء السادة الحاضرين
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لمشروع توصيل الغاز للمنازل بمحافظة الدقهلية
يوم الأحد الموافق ٢٠١٦/٠٤/٢٣

رقم	الاسم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
					messam@egas.com.eg		

بتروسيف

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جلسة التشاور المجتمعي الخاصة بدراسة تقييم الأثر البيئي
لمشروع توصيل الغاز للمنازل بمحافظة الدقهلية
يوم الأحد الموافق ٢٠١٦/٠٤/٢٣

رقم	الاسم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع

وزارة البترول والثروة المعدنية

الشركة المصرية القابضة للغازات الطبيعية "إيجاس"

اسماء السادة الحاضرين

جلسة التشاور المجتمعي الخاصة بدراسة تقييم الأثر البيئي لمشروع توصيل الغاز للمنازل بمحافظة الدقهلية

يوم الأحد الموافق ٢٠١٧/٠٤/٢٣

رقم	الاســـم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
	د/ أميرة خالد رشاد	مدير إدارة المنصورة الصحية	مديرية الشئون الصحية بالدقهلية	المنصورة		٠١٠٠٤٦٨٨٤٩٧	
	بسام قنديل	عضو مجلس النواب	دائرة طلخا ونبروه			٠١٠٠١٠٨٦٢٤٦	
	محمد محمد زكي سلامة	مدير عام الإدارة الزراعية				٠١٠٦١١٣٠٤١٩٨	
	حاتم الحسيني	رئيس مركز ومدينة	[illegible] نبروه			٠١٢٨٤٦٢٠٧٥٤	
	وليد محمد عبد الغني	رئيس قسم	غاز مصر	القاهرة		١٢٢٠٠٠٠٧٢٧	
	محمد عبد السلام معاذ	أخصائي في شركة بترو وتريد	بترو وتريد	الدقهلية		٠١٠٢٠٩٤٢٧٠١	
	[illegible]	[illegible]	[illegible]	الدقهلية		٠١٠٦٤٩٦١٨٨٥٠	

بتروسيف

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أسماء السادة الحاضرين
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لمشروع توصيل الغاز للمنازل بمحافظة الدقهلية
يوم الأحد الموافق ٢٠١٦/٠٤/٢٣

رقم	الاســـم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
١	عبده محمد [illegible]	مدير تقييم البيئة بالقطاع	محافظة الدقهلية	المنصورة		٠١٠٠٤٩٧٥٠٣١١	[signature]
	محمد صلاح محمد [illegible]	رئيس الوحدة المحلية [illegible]	[illegible]	[illegible]	abdosalah.yossef@yahoo.com	٠١٠١٩٤٢٣٨٣١	[signature]
	[illegible]	رئيس الوحدة المحلية [illegible]	[illegible]	[illegible]		٠١٠٠٤٠٠٤٤٧٦	[signature]
	محمد ابراهيم	مدير قسم	شركة غاز مصر	الدقهلية		٠١٠٤٦٠٥٠١١	[signature]
	عمرو [illegible]	موظف بالكهرباء	مرفق [illegible]	أجا		٠١١٤١٧٤٣٦٩٨٤	[signature]
	[illegible]	رئيس [illegible]	أجا	أجا		٠١٠٩٦٩٩٨٨٤	[signature]
	علاء [illegible]	رئيس مدينة [illegible]	المنصورة	المنصورة		٠١٠٩٧٧٩٤٤٥٥	[signature]
	علي [illegible]	[illegible]	أجا	أجا		٠١١٤٩٨٧٧٤٩٧٦	[signature]

بتروسيف

وزارة البترول والثروة المعدنية
الشركة المصرية القابضة للغازات الطبيعية "إيجاس"

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يوم الأحد الموافق ٢٠١٧/٠٤/٢٣

رقم	الاسم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
١							
٢							
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٦							
٧							

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يوم الأحد الموافق ٢٠١٦/٠٤/٢٣

رقم	الاسم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع

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لمشروع توصيل الغاز للمنازل بمحافظة الدقهلية
يوم الأحد الموافق ٢٠١٦/٠٤/٢٣

رقم	الاســـم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
	فاطمة عبدالفتاح	رئيس وحدة كوم الدربي	كوم الدربي	المنصورة		٠١٠٩٦٠١٢٥٢٠	[signature]
	د/ هويدا [illegible]	جهاز شئون البيئة	جهاز شئون البيئة	المنصورة		٠١٠٠٥٢٢٨٨٠١	[signature]
	م/ عبدالحميد [illegible]	مدير عام الطرق	مديرية الطرق	المنصورة		٠١٠٠١٧٦٠٧٥٤	[signature]
	م/ السيد سعد [illegible]	مدير عام المشروعات	مديرية الطرق	المنصورة		٠١١٩٩٧٩٩٤٠	[signature]
	مروة عزيز	مدير مركز المعلومات	[illegible]	اجا		٠١٠٤١٢٩٤٥٠١	[signature]
	عبدالسميع إبراهيم عطا	[illegible]				٠١٠٠٤٤٣٠٧١٧	[signature]
	شعبان [illegible]		مدير العلاقات العامة	رئاسة مركز اجا		٠١٠٠٦٨١٤٠٧٩	[signature]

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وزارة البترول والثروة المعدنية
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يوم الأحد الموافق ٢٠١٧/٠٤/٢٣

رقم	الاســـم	الوظيفة	الجهة	المنطقة	البريد الإلكتروني	رقم التليفون	التوقيع
	هيام حسنى عبدالمجيد	مسئول العلاقات العامة	الوحدة المحلية	برج نور الحمص		٠١٠١١٥٢٩٠٦٤	هيام
	السيد محمود السيد	حاصل على ليسانس تجارة	أجا	أجا		١٠٩٧٦٨٦١١١	السيد
	كاى ويصا	إستشارى إجتماعى	WB	كاهره	cwissa@worldbank.org	-	كاى
	احمد فرج	مدير المشروع (المحلى)	إيجاس	القاهرة		01226669097	[illegible]
	م. [illegible]	رئيس [illegible]	[illegible]	[illegible]		١١٠٠١٩٩٢٦٥٢	[illegible]
	صلاح [illegible]	رئيس الوحدة [illegible]	الوحدة المحلية [illegible]	[illegible]		٠١٠٢٤٥٢٩٥٧٧	[illegible]

ANNEX 9: EQUIPMENT USED AND EMISSION MEASUREMENTS

1										1			قلاب
4												4	كمبوروسر
8												8	شاكوش
7			4	1								2	١١٠ مولد
21		2	5								7	7	٢٢٠ مولد
11			4	1								6	كمبيوتر لحام
2			2										٢٥٠ اسكويز
16			14	2									١٨٠ اسكويز
3			2	1									ماكينة لحام
3			1	1								1	مقصلة
2												2	دكاك
13		3	6	2								2	٢٤ ستيلسون
13		4	7	1								1	١٨ ستيلسون
10											10		ماكينة قلاوظ
9											9		ماكينة قطعية
32									5		25	2	هيلتى دريل
32			4					1			25	2	منجله
13			4								9		سلم فردتين
18								4			10	4	تست بامب
19			4		1			4			10		مقياس زنبق
260											260		سقالات
45											45		سقالات SP
60			6								54		شنطة تركيبات
16			4				12						شنطة تحويلات
8									8				شنطة مداخن

7	السادات

2			2										سوزوكى
2			2										سنجل
1		1											دبل
2												2	لونج

نموذج قياس الضوضاء

المنطقة : [illegible]   التاريخ ٢٩ / ٢ / ٢٠١٧

م	المكان	سنة الصنع	نتائج القياس (ديسيبل)	الحد القانوني: المعدات المصنعة قبل ٢٠١١	الحد القانوني: المعدات المصنعة بدء من ٢٠١١	حالة المطابقة	ملاحظات
١ -	جرعة ٢٠١ محرك [illegible]		٨٦,٨	٩٠	٨٥	مطابق [illegible]	
٢ -	جرعة ٢٠١ محرك [illegible]		٨٥,٥	٩٠	٨٥	مطابق [illegible]	
٣ -	جرعة ٢٠ [illegible]		٨٤,٢	٩٠	٨٥	〃 〃 〃	
٤ -	جرعة ٢٠ [illegible]		٨٦,٢	٩٠	٨٥	〃 〃 〃	
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		

الاسم : [illegible]

التوقيع : [illegible]

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نموذج قياس ...

testo 0632.0307

المنطقة ١١٠ ...

الأمن الصناعي

المحلة + المنصورة

شركة غاز مصر

نموذج قياس العادم
(المعدات التى تعمل بالديزل)

التاريخ ١٣/ ٣/ ٢٠١٧

منطقة السادات (شبكات)

م	نوع المعدة	رقم المعدة	سنة الصنع	المكان	نتائج القياس (يتم القياس عند أقصى تعجيل) Bacharach	نتائج القياس Opacity (درجة اعتام) %	الحد المقبول للمعدات ما قبل ٢٠٠٣ طبقا لمتطلبات الشركة Bacharach	الحد المقبول للمعدات ما قبل ٢٠٠٣ Opacity (درجة اعتام) %	الحد المقبول للمعدات بدءا من عام ٢٠٠٣ طبقا لمتطلبات الشركة Bacharach	الحد المقبول للمعدات بدءا من عام ٢٠٠٣ Opacity (درجة اعتام) %	حالة المطابقة	ملاحظات
١	كمبروسر	C33	غير واضح	السادات	٣	٩,٦	٨	% ٢٥,٦	٧	% ٢٢,٤	مطابق	
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		
							٨	% ٢٥,٦	٧	% ٢٢,٤		

• الحد القانوني طبقا لقانون البيئة رقم ٤ لسنة ١٩٩٤م و لائحته التنفيذية الصادرة بقرار رئيس مجلس الوزراء رقم ٣٣٨ لسنة ١٩٩٥م و المعدلة بالقرار رقم ١٠٩٥ لسنة ٢٠١١م هو ٣٠% درجة اعتام للمركبات المصنعة قبل عام ٢٠٠٣ و ٢٥% درجة اعتام للمركبات المصنعة اعتباراً من عام ٢٠٠٣م.

• التحويل من Bacharach إلى opacity (درجة الإعتام) : ١ Bacharach = ٣,٢ % درجة إعتام

نظراً لأن أعلى قياس متاح للجهاز المستخدم (٩ Bacharach) فإنه تم إعتبار القياس رقم (٨) هو الحد الأعلى للقياس المقبول

الاسم / محمد حسن محمد

التوقيع /

F(30-5)

sound meter 840029 - sper scientific I . 22731

نموذج قياس الضوضاء

المنطقة : السادات (الموقع)　　التاريخ ١٣ / ٣ / ٢٠١٧

م	المكان	سنة الصنع	نتائج القياس (ديسيبل)	الحد القانوني: المعدات المصنعة قبل ٢٠١١	الحد القانوني: المعدات المصنعة بعد من ٢٠١١	حالة المطابقة	ملاحظات
-	توكيلات السادات	بعد عام	٩٠	٩٠	٨٥	مطابق طبقا لمدة التعرض	ماكينة [illegible]
	محمود إبراهيم	٢٠١١	٨٩	٩٠	٨٥		رقم ٤١٣٥٤١٢٦
	فوزي		٨٤	٩٠	٨٥	مطابق طبقا	مولد رقم ٤١٤٠٤
			٨٨	٩٠	٨٥	لمدة التعرض	مولد رقم ٤١٣٩
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		
				٩٠	٨٥		

الاسم : [illegible]

التوقيع : [illegible]

TECHNICAL SPECIFICATION

PE Pipe Cutter 32 mm, 63-125 mm, 180-250 mm and PE Pipe Cutter 315 mm

1. Scope:

1.1 This specification covers the minimum requirements for design, manufacture, inspection, testing, and supply of Pipe cutting tools to be used in natural gas transmission and distribution systems for Egypt Gas Co.

PE Pipe Cutter 32 mm
PE Pipe Cutter 63-125 mm
PE Pipe Cutter 180-250 mm
PE Pipe Cutter 315 mm

2 General

2.1 Pipe cutting tools shall be capable of correct operation at ambient temperatures between −5 °C and 60 °C, with pipes and fitting spigot outlets at extremes of diameter and ovality tolerances specified in GIS/PL2-1, GIS/PL2-2, GIS/PL2-5 and GIS/PL2-8.

2.2 Pipe cutting tools shall be capable of withstanding a single drop test, in accordance with Procedure 1 of BS EN 60068-2-32 from a height of 1 m without subsequent malfunction.

2.3 The supplier shall specify the composition of the component material to be used for any cutting tools and shall demonstrate that it is suitable for the intended application.

2.4 Pipe cutting tools shall be capable of simple and easy operation. Tools and equipment shall not cause damage or cause distortion to the pipes or fittings. Outside diameter/bore dimensions and ovalities shall conform to GIS/PL2-2and GIS/PL2-8.

2.5 Pipe cutting tools should be constructed from corrosion-resistant materials, or be otherwise suitably protected. Particular consideration should be given to shafts and fastenings.

2.6 Pipe cutting tools shall be capable of being installed and operated within trench conditions.

2.7 pipe cutting tools shall be suitable for use with PE pipes SDR 11 and SDR 17.6.

3. Design

3.1 The design of pipe cutting tools shall require only minimum maintenance of cutter blades, and replacement shall be incapable of incorrect positioning.

3.2 Pipe cutting tools shall be capable of being set up and removed in a trench.

3.3 The pipe cutting tool shall not damage or deform the pipe remote from the actual cutting action.

3.4 Test shall be according with GIS/PL2-5.

3.5 PE Pipe Cutter should meet the requirements of GIS / PL2-5.

TECHNICAL SPECIFICATION

Alignment Clamp 250 mm

1. Scope:

1.1This specification covers the minimum requirements for design, manufacture, inspection, testing, and supply of Alignment clamp 250 mm to be used in natural gas transmission and distribution systems for Egypt Gas Co.

2. General

2.1 Alignment clamp used for jointing 250mm electro fusion couplers hinged with pins for ease of pipe positioning in trench

2.2 Alignment clamp 250 mm shall be capable of correct operation at ambient temperatures between −5 °C and 60 °C, with pipes and fitting spigot outlets at extremes of diameter and ovality tolerances specified in GIS/PL2-4, GIS/PL2-8 and GIS/PL2-2.

2.3 Alignment clamp 250 mm shall be capable of withstanding a single drop test, in accordance with Procedure 1 of BS EN 60068-2-32 from a height of 1 m without subsequent malfunction.

2.4 The supplier shall specify the composition of the component material to be used for any Alignment clamp and shall demonstrate that it is suitable for the intended application.

2.5 Alignment clamp 250 mm shall be capable to meet the requirements of GIS/PL2-2, GIS/PL2-4, GIS/PL2-6 and GIS/PL2-8.

2.6 Alignment clamp 250 mm should be constructed from corrosion-resistant materials, or be otherwise suitably protected. Particular consideration should be given to shafts and fastenings.

2.7 Alignment clamp 250 mm shall be capable of being installed and operated within trench conditions.

3. Design

3.1 Alignment clamp shall be designed to stop axial and rotational movement and aid alignment of adjoining pipes during the jointing/cooling process, but shall not preclude free movement of the electro fusion fitting.

3.2 Alignment Clamp should meet the requirements of GIS / PL2-5

3.3 Alignment Clamp with is belt not accepted.

TECHNICAL SPECIFICATION

Multi kit Clamp (90mm-180 mm)

1. Scope:

1.1This specification covers the minimum requirements for design, manufacture, inspection, testing, and supply of Multi kit clamp (90mm-180 mm) to be used in natural gas transmission and distribution systems for Egypt Gas Co.

2. General

2.1 Multi kit clamp (90mm-180 mm) shall be designed to strain the PE pipe from 90 mm to 180 mm prior to carrying out the electro fusion jointing process on PE pipe work in accordance with GIS/PL2-5 with accessories sets (180*125 mm) and (125*90 mm) .

2.2 Multi kit clamp (90mm-180 mm) shall be capable of correct operation at ambient temperatures between −5 °C and 60 °C, with pipes and fitting spigot outlets at extremes of diameter and ovality tolerances specified in GIS/PL2-4, and GIS/PL2-8.

2.3 Multi kit clamp (90mm-180 mm) shall be capable of withstanding a single drop test, in accordance with Procedure 1 of BS EN 60068-2-32 from a height of 1 m without subsequent malfunction.

2.4 The supplier shall specify the composition of the component material to be used for any Multi kit clamp (90mm-180 mm) and shall demonstrate that it is suitable for the intended application...

2.5 Multi kit clamp (90mm-180 mm) shall be capable to meet the requirements of GIS/PL2-2, GIS/PL2-4, GIS/PL2-6 and GIS/PL2-8.

2.6 Multi kit clamp (90mm-180 mm) shall be constructed from corrosion-resistant materials, or be otherwise suitably protected. Particular consideration should be given to shafts and fastenings.

2.7 Multi clamp (90mm-180 mm) shall be capable of being installed and operated within trench conditions

3. Design

3.1 Multi kit clamp (90mm-180 mm) shall be designed to stop axial and rotational movement and aid alignment of adjoining pipes during the jointing/cooling process, but shall not preclude free movement of the electro fusion fitting.

3.2 Multi kit clamp (90mm-180 mm) should meet the requirements of GIS / PL2-5

3.3 Multi kit clamp (90mm-180 mm) Main set shall be metal.

TECHNICAL SPECIFICATION

Window Clamp 63 mm

1. Scope

1.1This specification covers the minimum requirements for design, manufacture, inspection, testing, and supply of Window clamp 63 mm to be used in natural gas transmission and distribution systems for Egypt Gas Co.

2. General

2.1 Window clamp 63 mm used for jointing 63mm electro fusion couplers for ease of pipe positioning in trench

2.2 Window clamp 63 mm shall be capable of correct operation at ambient temperatures between −5 °C and 60 °C, with pipes and fitting spigot outlets at extremes of diameter and ovality tolerances specified in GIS/PL2-4, and GIS/PL2-8.

2.3 Window clamp 63 mm shall be capable of withstanding a single drop test, in accordance with Procedure 1 of BS EN 60068-2-32 from a height of 1 m without subsequent malfunction.

2.4 The supplier shall specify the composition of the component material to be used for any Window clamp 63 mm and shall demonstrate that it is suitable for the intended application.

2.5 Window clamp 63 mm shall be capable to meet the requirements of GIS/PL2-2, GIS/PL2-4, GIS/PL2-6 and GIS/PL2-8.

2.6 Window clamp 63 mm should be constructed from corrosion-resistant materials, or be otherwise suitably protected. Particular consideration should be given to shafts and fastenings.

2.7 Window clamp 63 mm shall be capable of being installed and operated within trench conditions.

3. Design

3.1 Window clamp 63 mm shall be designed to stop axial and rotational movement and aid alignment of adjoining pipes during the jointing/cooling process, but shall not preclude free movement of the electro fusion fitting.

3.2 Window clamp 63 mm should meet the requirements of GIS / PL2-5

3.3 Non metal Window clamp 63 mm is not accepted.

TECHNICAL SPECIFICATION

Strap Loader 63-400

1. Scope

1.1This specification covers the minimum requirements for design, manufacture, inspection, testing, and supply of Strap Loader 63-400 mm to be used in natural gas transmission and distribution systems for Egypt Gas Co.

2. General

2.1 The Strap loader 63- 400 mm is designed for the installation of top loading electro – fusion branch saddles and tapping tees.

2.2 The Strap loader 63-400 mm shall be capable to meet the requirements of GIS/PL2-2, GIS/PL2-4, GIS/PL2-6 and GIS/PL2-8.

2.3 The Strap loader shall be capable of installation and removal in a cross main trench.

2.4 The Strap loader 63-400 mm shall be capable of withstanding a single drop test, in accordance with Procedure 1 of BS EN 60068-2-32 from a height of 1 m without subsequent malfunction.

2.5 The supplier shall specify the composition of the component material to be used for any The Strap loader 63-400 mm and shall demonstrate that it is suitable for the intended application.

2.6 The Strap Loader 63-400 should be constructed from corrosion-resistant materials, or be otherwise suitably protected. Particular consideration should be given to shafts and fastenings.

2.7 The Strap Loader 63-400 mm shall be capable of being installed and operated within trench conditions.

3. Design

3.1 The Strap Loader tool shall be so designed that, when used with either straight pipe or coiled pipe, the load on the fitting shall follow the centre line of the stack, down through the centre line of the pipe, and be not less than 95 % of the indicated value.

3.2 A method of indicating that the correct load is achieved shall be permanently provided on the tool. The application of the correct load shall be easily detected by the operator.

3.3 Any screw action shall not apply a turning motion to the fitting.

3.4 The strap Loader tool shall meet the requirements of GIS/PL2-5

3.5 Strap loading tool shall be suitable for use with PE pipes SDR 11 and SDR 17.6.

TECHNICAL SPECIFICATION

Barometer

1. **Pressure media:** compatible with non. Corrosive gages
2. **Presser Range:** up to 2 bar absolute
3. **Display overload:** instrument capable of nominal 110% full scale (F.S), error code will flash
4. **Resolution:** 0.01 mbar
5. **Temperature range:** operating (-10 °C to 50 °C)
6. **Power supply:**
    - Alkaline **AA** batteries
    - Rechargeable **Ni cad** batteries & external power adaptor / charger
7. **Carrying case**
8. **Operating, calibration & service manuals**
    a. Note: the supplier shall guarantee repair & service for at least (five years) starting from date of supplying
    b. Test certificate
9. **Test certificate**

TECHNICAL SPECIFICATION

Mercury Gauge

1. **Type**: Solid acrylic vertical manometer
2. **Pressure Range**: 0 to 500 mbar
3. **Resolution:** 2 mbar
4. **Scale length:** 510 mm
5. **Width:** 54 mm
6. **Indicating liquid:** metallic mercury
7. **Connector**: 6mm i.d. push on
8. **backing board**
9. **carrying case**
10. **Test certificate**

TECHNICAL SPECIFICATION

BUTT FUSION MACHINES

Item		specification	Units
Input supply	220V Units	195-260	Vac
Diameter range	Gator 250	63~250	mm
	Gator 315	125-315	
	Gator 400	180-400	
SDR range	Typical	7.25, 7.4, 9, 11, 13, 17, 17.6, 26, 32 plus Capability for special SDR	
Operating temperature	Range	0 ~ +45	°C
Storage temperature	Range	-15 ~ +50	°C
Environmental protection		IP54	
Sequence details	Trim	Automatic	
	Check (Slippage)	Automatic	
	Check (Alignment)	Manual visual inspection	
	Bead-up phase	Automatic	
	Soak phase	Automatic	
	Heater removal	Automatic	
	Pressure build-up	Automatic	
	Fusion phase	Automatic	
	Cooling phase	Automatic	
Heater removal time		< 3	Seconds
Database	Capacity	> 600	Records
	Retrieval	Data Socket	
	Lifetime	>10	Years
	Fusion data	Active	
	Traceability	Active	
Printer		Available	
Fast Data Transfer		Available	
Welding standard	Gas BG standard		
	Water standard		

Document Required

- Operating manual
- Full schematic diagrams
- Full circuit and wiring diagrams
- Calibration manual
- Electronic manual describe the operation of each Ic
- Any password needed for every level of encryption required to maintain the machine
- Full list of tools required to maintain and calibrate the machine
  The supplier shall send a confirmation that he will supply any required spare parts during 5 years at least starting from the date of delivery
- The supplier shall send a warranty certificate for each machine
- All document shall be hard and soft copy in English language

Special requirement

Technical and commercial offer shall include

- Spare parts that is sufficient to repair the machine (chassis, trimmer, etc.) for 3 years.
- Complete 3 sets of calibration tools
- Each machine shall be complete with 2 combatable generators

TECHNICAL SPECIFICATION

Electro fusion Control Box

1. SCOPE:

1.1 All control box shall be made in accordance with the British Gas specifications GBE/ECE1 or equivalent, if the control box is made in accordance to another specification. So a copy of this specification shall be sent.

1.2 Control box must be able to joint to all electro fusion fittings approved to British Gas specification PS / PL2 PART 4.

1.3 All documentations shall be in English language.

2. TECHNICAL SPECIFICATIONS:

2.1 **Operating mode:** manual

2.2 **Input voltage:** 230 ± 20% **volts**

50 ±20% **Hz**

2.3 **Output voltage:** 39.5 volts ± *0.5* volts AC RMS

2.4 **Operating Temp.:** 0 °C to *+45°C*

2.5 **Timer range:** >3000 sec

2.6 **Input Protection:** Circuit Breaker

2.7 **Display:** Back-Light LCD

2.8 **Interface Language:** English

2.9 **Input cable length:** 5 meter

2.10 **Output cable length:** 3 meter

2.11 **Degree of protection:** *1P45*

2.12 The control box shall be equipped with Emergency Stop Push Button

2.13 Output power shall be sufficient to fuse all fittings up to 315 mm

3. DESIGNAND CONSTRUCION:

3.1 Control box, frame and associated input & output cables shall not be heavier than 30 kg.

3.2 The control box should be designed to allow ease of operation, calibration and maintenance.

3.3 The control box shall be designed and constructed in such a manner to afford protection against electric shock in accordance with BS *2754.*

3.4 The control box enclosure shall be in accordance with BS 5420 1P54 with the socket - outlet exposed.

3.5 The input cable shall be flexible 3-core with overall screening.

3.6 The input cable / insulation shall be PVC to BS 6746, type Til with a PVC sheath to type TM1 and flexible conductors to BS 6360.

3.7 Input cable shall be permanently attached to the control box.

3.8 The input cable supply source end shall terminate at a 3-pin 220V, 32 A plug.

3.9 The output cable / insulation shall be PVC to BS 6746, type TIl with a PVC sheath to type TM1 and flexible conductors to BS 6360.

3.10 Overload protection shall be fitted to the input side of the control unit in an accessible position.

3.11 The control box shall be designed to operate from a nominal earthed 220V, 50Hz sinusoidal supply.

Special requirement

Technical and commercial offer shall include

4.1) Complete spare parts for repair the control boxes for 3 years

4.2) 3 complete sets of calibration tools

PORTABLE AIR COMPRESSOR SPECIFICATIONS

1) COMPRESSOR:

- Oil injected rotary screw compressor.
- Single–stage.
- Nominal effective working pressure (rated operating Pressure not less than (7 Bar).
- Minimum effective pressure not less than (4Bar).
- Free air delivery not less than 392 cfm
- Cooling and lubricating by injected oil.

2) ENGINE:

Compressor driven by:

- Four stroke diesel engine.
- 4-Cylinders in-line engine.
- Output according to SAEJ 1995 at normal shaft speed 113 BHP.
- Mechanical direct injection fuel system.
- With turbocharger "after/intercooler".
- Fuel consumption at full load not more than 17.5 Kg/hr
- Emission Tier level: Tier2 or Tier3.

3) FRAME AND AXLE:

- Heavy – duty frame prefer galvanize iron sheet
- Provide easy opining and easy access for serviceability and maintenance.

"Prefer separated parts for easy handling during maintenance operations"

- Adjustable drawbar with parking brake and safety chain.

- With lifting eye provide easy and safety hoisting.

4) SAFETY DEVICES:

- All safety devices needed for safe operation like "thermal Shutdown switch, receiver safety valve, low engine oil Pressure, high coolant temperature ….etc".

5) CONTROL PANEL:

- The control panel grouping with "working pressure gauge – compressor outlet tempreture gauge – engine oil pressure indicator - coolant temperature indicator- hour meter – battery charge indicator.

6) GENERAL REQUIRMENTS:

- All technical specifications for all components.
- All drawings, catalogues for operation, maintenance, Spare parts, circuits and diagrams must be supplied in English language.
- Warranty certificate for not less than one year from first operate.
- Training in your premises for ten persons as will as training for operation and maintenance for the com-presser.
- Availability of spare parts.
- After sales service center.
- Must be local agent for compressor.

PORTABLE AIR COMPRESSOR SPECIFICATIONS

1) COMPRESSOR:

- Oil injected rotary screw compressor.
- Single–stage.
- Nominal effective working pressure (rated operating Pressure not less than (14 Bar).
- Minimum effective pressure not less than (4Bar).
- Free air delivery not less than 335 cfm
- Cooling and lubricating by injected oil.

2) ENGINE:

Compressor driven by:

- Four stroke diesel engine.
- 4-Cylinders in-line engine.
- Output according to SAEJ 1995 at normal shaft speed 141 BHP.
- Mechanical direct injection fuel system.
- With turbocharger "after/intercooler".
- Fuel consumption at full load not more than 21.5 Kg/hr
- Emission Tier level: Tier2 or Tier3.

3) FRAME AND AXLE:

- Heavy – duty frame prefer galvanize iron sheet
- Provide easy opining and easy access for serviceability and maintenance.

"Prefer separated parts for easy handling during maintenance operations"

- Adjustable drawbar with parking brake and safety chain.

- With lifting eye provide easy and safety hoisting.

4) SAFETY DEVICES:

- All safety devices needed for safe operation like "thermal Shutdown switch, receiver safety valve, low engine oil Pressure, high coolant temperature ….etc".

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- All technical specifications for all components.
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- Warranty certificate for not less than one year from first operate.
- Training in your premises for ten persons as will as training for operation and maintenance for the com-presser.
- Availability of spare parts.
- After sales service center.
- Must be local agent for compressor.

specifications of rotary hammer

Rated input power	850 W
Dust removal module	TE DRS - Y (optionnal)
Rotation speed gear 1 under no load	700 ~ 800 rpm
Single impact energy	3 ~ 4 J
Weight according to EPTA Procedure 01/2003	4 ~ 5 Kg
Full hammering frequency	not less than 4000 impacts / minute
Working mode	Hammer drilling , Drilling only
Prefer Hammer drilling with active vibration reduction (AVR)	
Quick release chuck	
Warranty	2 years
spare parts & after sales services	Availability of spare parts
	After sales service center
Must be local agent	

specification of combihammer

Rated input power	not less than 1500 w
Dust removal module	TE DRS - Y (optionnal)
Max Rated speed	not less than 300 rpm
Single impact energy	11 ~ 12 J
Weight according to EPTA Procedure 01/2003	not more than 8.3 Kg
Full hammering frequency	not Less than 2700 impacts / minute
Working mode	Hammer drilling , Drilling only , Chisel-ling,Chisel setting
Chiselling function	yes
Chiselling intensity	No chiselling , Corrective chiselling in masonre / brick , Corrective chiselling in concrete , Penetrations / openings in concrete
service indicator	yes
Prefer Hammer drilling with active vibration reduction	
Warranty	2 years
spare parts & after sales services	Availability of spare parts
	After sales service center
Must be local agent	

specification of pipe vice M/C

Pipe Capacity		Weight Kg
Inch	mm	
⅛ - 6	10 - 168	Less than 25

Warranty : NOT LESS ONE YEAR

spare parts & after sales services	Availability of spare parts
	After sales service center
Must be local agent	

specification of bending M/C (Electro-hydraulic)

capacity inch	**pump force KN**	**Motor**	weight kg
3/8 ~ 2	80 ~ 90	220V -- 1.4 kw	100 ~ 110

Tip-up wing benders

Warranty : NOT LESS ONE YEAR

spare parts & after sales services	Availability of spare parts
	After sales service center
Must be local agent	

specification of generator

AC frequency	50 HZ
AC output voltage	220 V
MAX. AC output	5.5 KVA
Rated AC output	5.0 KVA
AVR	with capacitor NOT cartage
DC output	12 V - 8.3 A
Electric starter	yes
starting system	Recoil
operating time at rated	8h
Effictive fuel tank capacity	24 liters
Dimensions (L x W x H)	680**x**530x570 mm
Dry mass	84.0Kg
warranty	Not Less One Year
spare parts & after sales services	Availability of spare parts
	After sales service center
Must be local agent	

specification of Fusion generator

AC frequency	50 HZ
AC output voltage can be selected	110 or 230 V by using external switch
Net power / speed	8 - 9 Kw / 3600 RPM
AVR	with capacitor NOT cartage
Engine type	;
Displacement	389 cm^3
engine oil capacity	1 - 1.5 L
Effictive fuel tank capacity	15 - 20 liters
Dimensions (L x W x H)	380**x**460x450 mm
Dry mass	30 - 32Kg
Electric starter	yes
warranty	Not Less One Year
spare parts & after sales services	Availability of spare parts
	After sales service center
Must be local agent	

specification of threading M/C 1/4"~2"

_ Threading machine for stanless steel and steel gas pipes

_ Threading capacity **¼" ~ 2"**

_ Weigt **not more than 44 Kg**

_ Spindle speed **40 (rpm) (No Load)**

_ Motor **220 Volt 750 WATT 50/60HZ**

_ Dimensions **not more than (L) 550mm x (w) 450 x (H) 350mm**

_ Standard Accessories **Manual Die - Head: 1/2" ~ 2"**

Dies : BE 1/2" ~ 3/4" BE 1"~ 2"

Threading oil White 4L (1Can)

* spare parts & after sales services

- Availability of spare parts
- After sales service center

* Must be local agent

*warranty : Not Less One Year

Technical specification of welding generator

Rated welding output	**600 A , 40 VOLT DC , 40% DUTY CYCLE**
Amperage range	**45 - 600 A**
MAX. Open-circuit voltage DC	**95 V**
Auxiliary power rating	**single-phase , 3 kVA/KW , 25A , 120V AC , 60 Hz**
Engine	**diesel engine air-cooled 40 HP**
Fuel capacity	**23 gal (87 L)**
Sypplier and origin	**Europe - USA - japan**
warranty	**Not Less One Year**

*** Must be local agent for welding generator**

*** spare parts & after sales services**

- Availability of spare parts
- After sales service center