











1.5 Million Natural Gas Connections Project in 11 Governorates

Environmental and Social Impact Assessment
Aga-PRS

Dakahliya Governorate

Final Report

EGAS

Egyptian Natural Gas Holding Company

November 2018

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)
ALARP	Stands for "As Low As Reasonably Practicable", and is a term often used in the milieu of safety-critical and safety-involved systems. The ALARP principle is that the residual risk shall be as low as reasonably practicable.
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$ = 17.96 EGP as of November, 2018

Exchange Rate: € = 20.5 EGP as of November 2018

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0. Executive Summary

The objective of the proposed project is to construct a Pressure Reduction Station (PRS) at Aga district, Dakhliya Governorate in order to install the NG to a wider segment of clients. The PRS for Aga will be designed to reduce an inlet pressure of 25-70 bar to an outlet pressure of 7 bar at a flow rate of 5,000 m^3/h. Flow rate can be increased to 10,000 m^3/h in the future according to demand increase.

The ESIA is undertaken to assess and propose mitigations for environmental and social impacts of the PRS. Impacts of NG exploration, extraction, refining, and transmission are outside the scope of this ESIA. Impacts of distribution networks for different areas are addressed in separate Environmental and Social Management Programs (ESMPs). Off-takes from the national network and high pressure (HP) pipeline "70 bar system" already exist within the purchased PRS land.

The local distribution company responsible for project implementation in Aga is **Egypt Gas**

In order to install the PRS, there was a need to one plot of land of 2414 m^2 obtained in accordance to willing buyer willing seller approach provides the sale contract of the land.

EGAS and LDCs follow a set of agreed upon procedures for the process of permanent Land take for the construction of PRSs **Annex-2**. The procedure covers cases of land acquisition of State Owned Lands or privately owned Lands on willing Buyer Willing Seller basis. It is the priority of EGAS as an asset holder, to acquire State Owned Lands that are free of any uses (both formal and informal EGAS never resorts to the land expropriation decrees in PRSs selection, particularly because of the flexibility of the PRSs locations.

In cases of unavailability or in case the available land is technically unacceptable, private land is usually used as a second a resort. Land alternatives are examined and the optimum technical and socio-economic scenario of land is selected. Consultation activities are conducted through the project cycle including with the individuals who offer to sell their land, dissemination of project information at the early stages of the project during the frameworks preparation followed by consultation activities with the Project affected persons (e.g. cases of farmers whose land are temporary affected from the high pressure pipelines passing their land) and during land acquisition with land owners. **Annex-3** summarizes the land acquisition process of Aga PRS Land

The PRS is located at Qarmout Al Bahw village, Aga on Mansoura – Met Ghamr Road, about 523 m North Qarmout Al Bahw village post office, about 925 m south of Al Sabkha village, 6567 m North East Aga city and 8835 m south Mansoura city.

The Off-take site is located inside the PRS location where the hot tap operation will take place on the existing HP pipeline, which passes through the location area (there is no new HP pipeline installation works). The nearest residential building is located approximately 200 m southeast of the Off-take site.

The project will be regulated by both the World Bank and Egyptian regulations pertaining to environmental and occupational health and safety. Long list of laws was presented in chapter 3 of this report.

Qarmout Al Bahw village located in Aga Markaz and affiliated to Dakahliya Governorate, which is located in the middle of the Nile delta in Egypt, which located 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, the average annual temperature in Aga is 26.7 °C, July is the warmest month. At 12.3 °C on average, January is the coldest month of the year, the variation in annual temperature is around 14.4 °C. Average annual precipitation varies 12 mm between the driest month and the wettest month. The wind speed in Aga area is characterized by a calm to moderate. The highest average wind speed occurs during spring in March and April.

Aga PRS is located about 7 km east Nile Damietta Branch. The River Nile Branch represents the main freshwater stream that extends northwards for about 236 km on the Eastern boundary of the Nile Delta from Egypt's Delta Barrage Damietta. The branch has an average width of 180 m and a depth between 2 to 4 m. Mit AL Amel drain is located at the east of the PRS location

The air quality at the proposed site of the proposed PRS is exhibiting permissible limits of classic air pollutants in fact the levels are way below the national and international guidelines. The project site relies upon two sources of water, namely, the Nile water carried to the Governorate by a pipeline and rain water that is harvested during winter season.

With respect to flora of significance, none were encountered in the proposed project area, where PRS site are constructed. The current PRS area is free of significant vegetation. Planned off-take from national grid to the gas route shall not come into contact with flora and the uncultivated vegetation cover alongside the desert as the off-take located within the proposed PRS location.

Aga district is a city located in Dakahliya Governorate. MSW collection points, used as open transfer systems, where waste is collected and then transferred to the Sandoup controlled-landfill, located approximately 25 km from the PRS location.

The PRS in Aga is located in an area characterized as agricultural land. Aga district is one of the semi-urban areas in Dakahliya Governorate. The district hosts many industrial activities. Consequently, the traffic tends to be dense.

The total population of Aga district are estimated at 27000 people in 2015. While in the PRS proposed location (Qarmut Al Bahw village) are estimated at 1939 people.

According to CAPMAS poverty mapping data of 2013, almost all of individuals in Aga district use electricity for lighting. The PRS will be connected to the National electricity grid.

The village of Qarmut Al Bahw (PRS location) uses a neighbor health care unit which belongs to EL-Baho freayk village. The project will result in various positive impacts pertaining to job opportunities and potential supplies. However, it may result some potential negative impacts. Following is a summary table listing the impacts of relevance to the project:

Table 0-1: Impacts of relevance to the project

Potential Negative Impact	Impact significance
During Construction:	
Impact on soil	Medium
Air emissions	Medium
Noise	Medium
Occupational Health and safety	Medium
Waste generation	Medium
Traffic	Minor
Subsurface contamination	Minor
Community health and safety	Minor
Impacts related to lands	Minor
Child labor	Minor
Labor Influx	Minor
During operation:	
Occupational Health and safety	Medium
Hazardous material and waste management	Medium
Noise	Minor

A long list of mitigation and monitoring missions was presented in this report in chapter-7 PRS-related consultation activities in Aga district included wide range of concerned stakeholders. This included but not limited to individuals/households affected by the project activities, civil society organizations representing the interest of the community, and governmental bodies who will play a role in facilitating or regulating the implementation of site-specific project activities.

The PAPs expressed their eagerness to host the project as the natural gas will reduce their agony with the LPG cylinders. Surprisingly, there was no single comment raised about the safety of the PRS and no one of the consulted groups raised any concern related to the PRS. The land owner expressed his satisfaction with the value of PRS land. The PRS did not raise any concerns among the community in the vicinity areas.

1. Introduction

1.1 Project Objectives

The objective of the proposed project is to construct Pressure Reduction Station (PRS) at Aga area in order to install the NG to wider segment of clients. The PRS for Aga will be designed to reduce an inlet pressure of 25-70 bar to an outlet pressure of 7 bar at a flow rate of 5,000 m^3/h. Flow rate can be increased to 10,000 m^3/h in the future according to demand increase.

1.2 Environmental and Social Impact Assessment (ESIA)

The ESIA is undertaken to assess and propose mitigations for environmental and social impacts of the PRS. Impacts of NG exploration, extraction, refining, and transmission are outside the scope of this ESIA. Impacts of distribution networks for different areas are addressed in separate Environmental and Social Management Programs (ESMPs). The Off-take from the national network is planned to be within the purchased PRS land.

The ESIA objectives includes:

- Describing project components and activities of relevance to the environmental and social impacts assessments.
- Presenting project alternatives and the no project alternative.
- Identifying and addressing relevant national and international legal requirements and guidelines
- Describing baseline environmental and social conditions
- 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

The local distribution company responsible for project implementation in Aga district is Egypt Gas.

1.3 Contributors

The ESIA 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 names of the Petrosafe and Ecoconserv experts who have participated in the preparation of the ESIA study listed in Annex-1 attached to this report.

Table 1-1: List of Main Contributors

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

2. Project Description

2.1 Background

Natural Gas (NG) is processed and injected into the high-pressure lines of the national Grid (70 Bar) for transmission. Upon branching from the main lines to regional distribution networks, the pressure of the NG is lowered to 7 Bar at the PRS. An odorant is added to the NG at PRSs feeding distribution networks to residential areas[1] in order to facilitate detection in the event of leaks. In addition to excavation, key activities of the construction phase also include installation of mechanical equipment.

The diagram below **Figure (2-1)** presents the components of a city's distribution network. The component covered in this ESIA is lined in red. Other components are addressed in a separate ESMP:

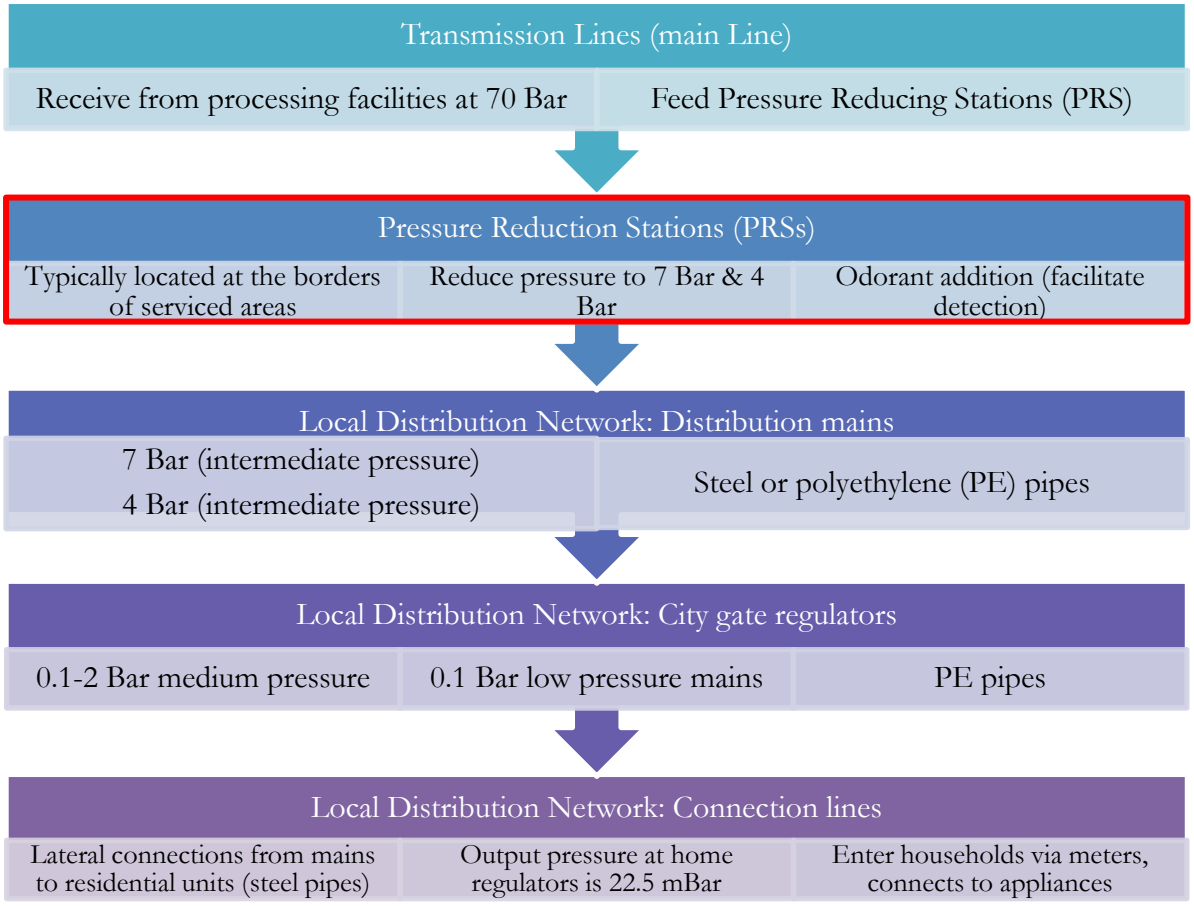

Figure 2-1: General components of the city's distribution network

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

2.2 Project Work Packages

2.2.1 Pressure Reduction Station (PRS)

A PRS consists of the following components: an inlet unit (isolated cathodic system), a liquid separation unit, a filtration unit and equipment for automatically reducing and regulating the pressure (active regulator and monitor regulator). In addition, auxiliary devices include safety valves (Slam Shut), relief valves, an odorizing unit and ventilation equipment as shown in **Figure 2-2**.

Utilities existing in a PRS include a control room, a firefighting system (firefighting water tank, firefighting valve), staff bathroom, a storage area and entrance room located adjacent to the entrance gate.

The PRS for Aga will be designed to reduce an inlet pressure of 25-70 bar to an outlet pressure of 7 bar at a flow rate of 5,000 m^3/h. Flow rate can be increased to 10,000 m^3/h in the future according to demand increase in order to feed Aga area.

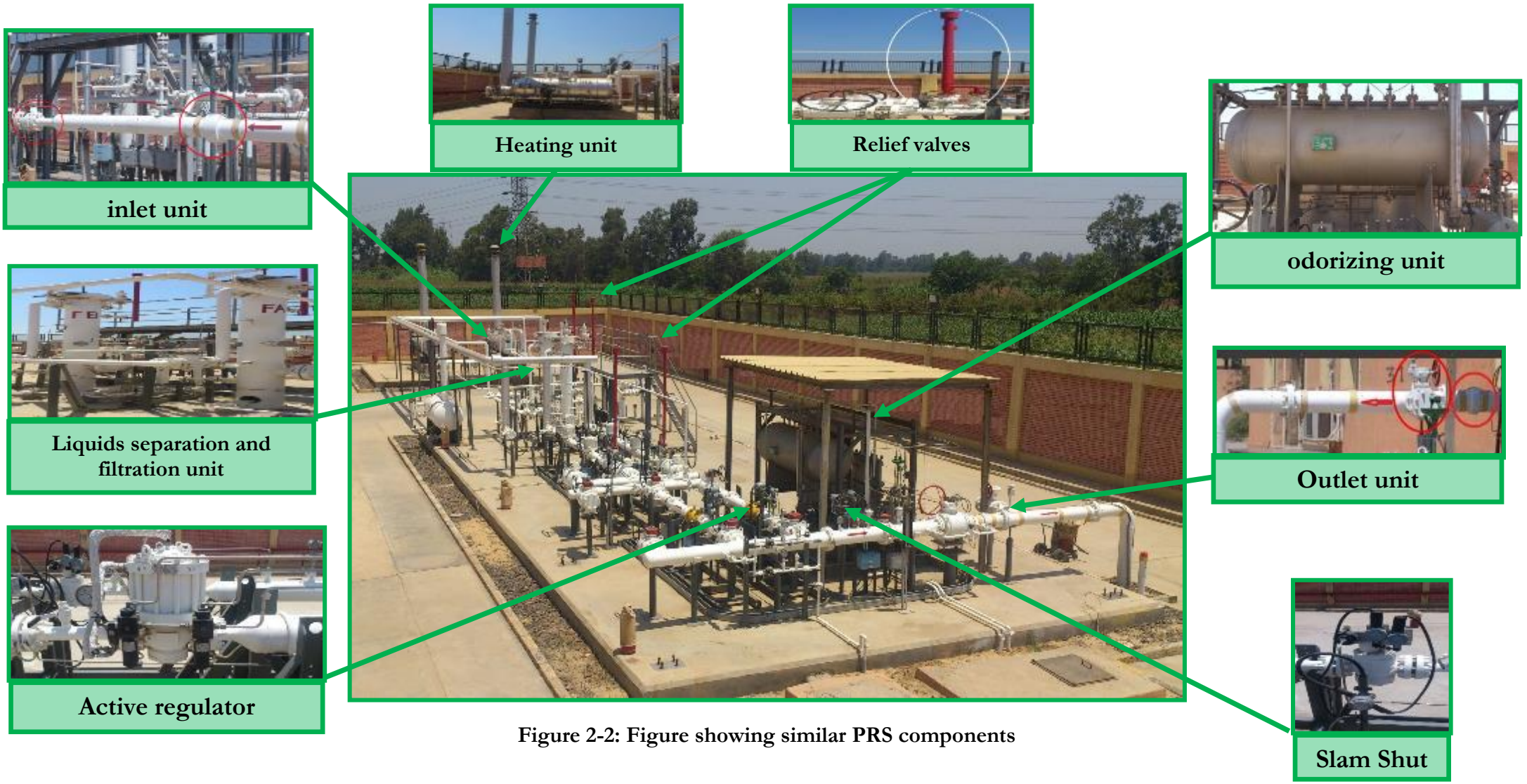

Figure 2-2: Figure showing similar PRS components

2.3 Project location

2.3.1 Pressure Reduction Station (PRS)

The PRS is located at Qarmut Al Bahw village, Aga on Mansoura – Met Ghamr Road, about 523 m North Qarmut Al Bahw village post office, about 925 m south of Al Sabkha village, 6567 m North East Aga city and 8835 m south Mansoura city.

The Off-take site is located inside the PRS location (within the borders of the PRS) where the hot tap operation will take place on the existing HP pipeline which passes through the location area (there is no new HP pipeline installation works). there is a condensate pipeline passing underneath the PRS which risks are studied in the QRA and its recommendations mentioned in **Section 7.4.** The nearest residential building is located approximately 200 m south east of the Off-take site as shown in **Figure 2-3, Figure2-4 and Figure 2-5.**

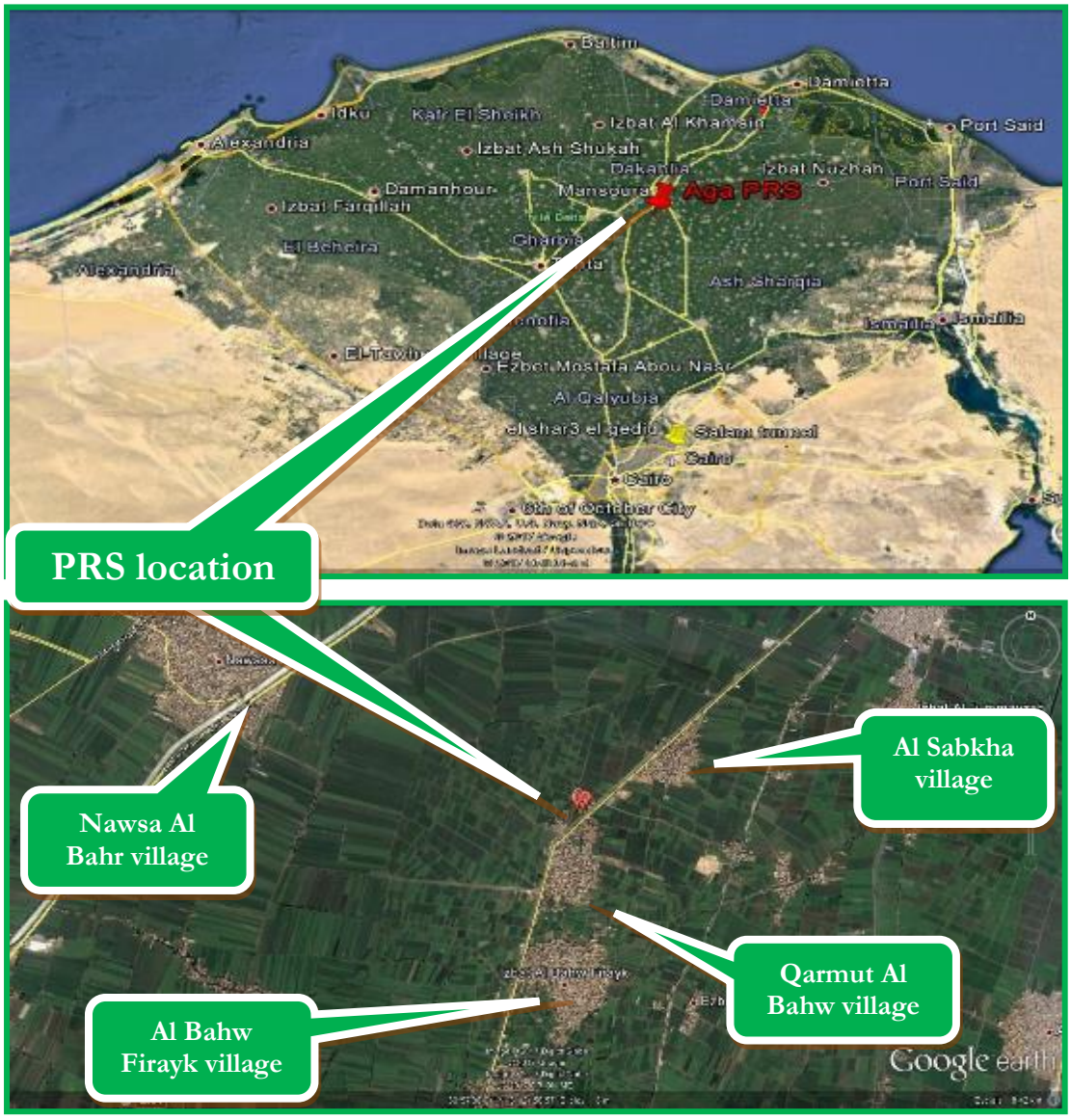

Figure 2-3: a satellite map showing the proposed Location of Aga new PRS and nearest residential areas.

Figure 2-4: The proposed Location of Aga new PRS feeding Aga area

Figure 2-5: Pictures showing the proposed PRS access roads

2.4 Off-take and HP pipeline

As previously mentioned, the Off-take from the national gird and the HP pipeline (70 bar system) already exist. The Off- take is the point on the HP national grid pipeline where a branch of the pipeline is constructed to connect a new PRS to the national grid. At the Off-take location, valve rooms/valve ditching is constructed so as to control the flow of the natural gas through the pipeline (branch). These valves work like gateways for the Aga area. The natural gas composition of the national network is mainly Methane (80%) and traces of ethane, propane, Iso-butane, Nitrogen…etc. . The Off-take located inside the PRS location. The nearest residential area is Qarmut Al Bahw village which located approximately 200 m south east of the Off-take site.

2.5 Project Execution Methodology

2.5.1 General survey

- 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 national grid pipelines, gas networks.
- Identifying the location of the new PRS location and new off-take location.
- Identify the route of inlet connection "70 bar system"

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

Once the final location of project components is finalized, a final design of the Off-take and PRS is utilized to estimate the materials and equipment needed to implement the project. Procurement of the materials includes local and international components. The main international purchases may include critical components and PRSs, regulators, and metering stations.

2.5.3 Construction works of PRS

Pressure Reduction Station area:

PRS siting was performed according to international best-practice and guided by minimizing the possible negative impacts on the project's surroundings; the safety of neighboring areas from possible gas release accidents; and noise associated with the operation of reducers. The PRS will be surrounded by a wall for safety and security purposes (including reducing noise impacts of the PRS reducers on the surrounding receptors). Currently, there are scattered buildings in the agricultural land surrounding the PRS. The closest buildings are around 200 m south east of the proposed PRS location, **(Figure 2-5).** In the event that buildings are constructed in the area surrounding the PRS, the Institute of Gas Engineers Safety Recommendations requires the following buffer zones:

- PRS should have free areas from each side to allow for emergency vehicle access.
- The nearest residential building to the proposed PRS is far about 200 m.

2.5.4 Land acquisition for PRS

As a new PRS will be constructed in Aga, there was a necessity to select the technically and socially acceptable land with a total area of 2610 m^2 (approximately 14.9 Qirate). Selection process starts by searching for land nearest or closer to the off take of the high-pressure pipeline (70 bar pipeline).

Due to the unavailability of state owned lands, EGAS/Egypt Gas followed EGAS procedure for acquiring land for the construction of the PRS on Willing Buyer – Willing Seller basis and no involuntary land acquisition took place. (for further elaboration on EGAS procedure for land acquisition see **Annex-2**)

More than three alternatives of privately owned lands were inspected. The agreed land was technically and socially acceptable, as it lies on top of the HP pipeline and entails no further land acquisition compared to the other two alternatives that require purchasing more land.

The selected land is cultivated by its owners with no tenants and did not require payment to compensate tenants for crops. It was also mutually agreed that the land owners will be granted time to collect their crops before LDC (Egypt Gas) starts any construction works.

Consultation with the land owners were conducted during the committees visits also further consultation were conducted with the other neighboring land owners to determine the prevailing price (market price) of the land in the targeted area. Prevailing price ranged from 40 to 50 Thousand EGP/Qirate, considering the current situation that the land is for agricultural purposes. Consultation meetings also reflected the future expectation of the land owners in this area that the land could be used in the near future for construction of buildings that is of more value than the current land status (agricultural).

Based on the cost estimation analysis carried out by the LDC, and after the negotiations with the land owners, the land was purchased on 20/3/2017 at a total cost of 1,490,000. EGP (approximately 100 Thousand EGP/ Qirate) and a cheque was issued and received by the land owner. (for further elaboration **Annex-3** is a summary of Aga PRS land acquisition process).

The access to high pressure pipeline owned by GASCO was in the selected and purchased land. Thus, there was no need to the extension of 70 bar steel pipelines. With regards to the exit low pressure pipeline was close to the main roads. Additionally, the grid penetrates the main roads. Therefore, no lands were needed for both the access to high pressure pipeline nor the exit of low pressure pipeline. Thus OP 4.12 is not be applicable to Aga PRS, pipeline extensions lands and the NG grid. Hence, no RAPs are needed

The PRS is to be accessible by an existing road (Mansoura – Met Ghamr road) to ensure quick response in event of repairs and/or emergencies.

Pressure Reduction Station Civil Works:

About a 9-month construction schedule is planned for the Aga PRS with site preparation expected to commence in the first half of 2019.

The main construction activities will include:

- Site preparation, acceptance and placement of major fabricated equipment items, construction of buildings, testing and commissioning.
- Initial construction activities involve clearing and grading of the site, sediment fences and silt traps will be installed, as necessary, to control erosion and sediment transport during site preparation activities.
- Following site preparation, individual excavations will be made for fire-fighting tanks, domestic wastewater trenches, pipe racks, and a 6-m high wall (of cement) around the PRS.
- Concrete foundations for buildings and footings for mechanical equipment will be laid down;
- Facility piping (inlet, outlet and 4-inch firefighting line) both above and below ground, are installed.
- Construction of an 80 m^2 control room with a bathroom, an electrical unit's room, and a security room adjacent to the PRS.

Pressure Reduction Station Mechanical Works:

The Aga PRS comprises of two pressures streams, the upstream (inlet) high pressure ranging from 25 to 70 Bar and the downstream (outlet) low pressure 7 Bar. The PRS design is in accordance with the Institute of Gas Engineers/ Safety Recommendations IGE/SR/9, 10, 16, 18, 22, 23, 24, 25; Institute of Gas Engineers/ Transmission Distribution IGE/TD/13; and National Fire Protection Association NFPA 15.

Following the construction of the foundation and fences, construction will continue with the installation of mechanical components. Mechanical components include the following:

- Inlet ball valve
- Solid filtration
- Liquid filtration
- Water bath heater
- Reduction regulator

- Active regulator
- Monitor regulator
- Slam shut /Safety valve
- Relief valve
- Measuring unit
- Odorizing unit
- Outlet unit

Please refer to **(Figure 2-2) and (Figure 2-6)**

Testing:

Following mechanical completion, testing of the facility components will be performed in accordance with applicable standards.

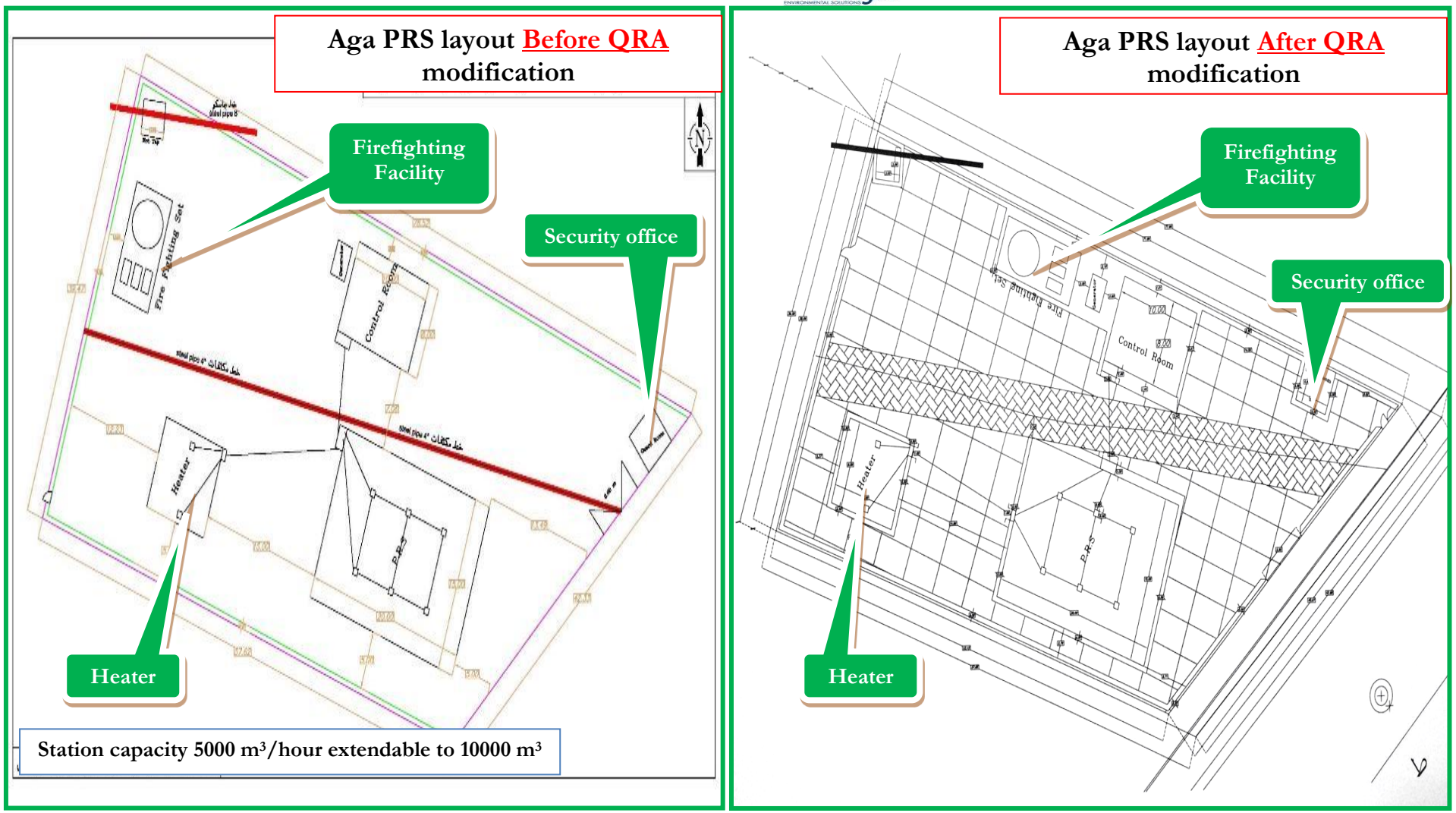

Figure 2-6: Pictures showing the proposed PRS layout (After and Before QRA modifications)

2.6 Operation phase

2.6.1 Operation of the PRS

Operation of the PRS involves operation of the various components outlined in the construction phase as shown in **(Figure 2-2)**. Risks associated with those activities are further addressed separately in a Quantitative Risk Assessment (QRA) **(Annex-4)** and all its outputs will be adhered, and the Emergency Response Plan (ERP) will be updated as shown in **(Figure 2-6)**.

Inlet ball Valves

The inlet valve includes an insulation joint to completely isolate the PRS inlet from the cathodic system applied to the feeding steel. Insulation joints isolate the PRS as measure of protection during strikes and current.

Filtration unit

The filtration unit consists of two main stages, a liquid filtration stage and a solid filtration stage. The aim of the filtration unit is to remove dust, rust, solid contaminants and liquid traces before entering into the reduction stage. Two filters and two separators are installed in parallel; each filter-separator operates with the full capacity of the PRS to separate condensates and liquid traces. The solid filtration unit is designed to separate particulate matter larger than 5 microns. Filter-separator lines are equipped with safety devices such as differential pressure gauges, relief valves, liquid indicators, etc.

Heating unit/Water Bath Heater

This unit ensures that inlet gas to the reduction unit enters with a suitable temperature (the temperature of gas flow entering the station should be 15 °C; and to avoid the formation of natural gas water hydrates in the line downstream of the choke or regulator (due to Joule Thompson effect). Temperature increases by heat exchange between gas pipeline pass through the heating unit filled with hot water. The unit was designed to be heated to 60 °C; while the heating temperatures for the outlet flow gas ranges between 35 °C and 45 °C.

The heating unit comprise of the following components:

- Heater body/shell
- Process gas inlet/outlet
- Water Expansion tank
- Burner, Gas Train & BMS Panel
- Removable Fire tube
- Exhaust stack
- Heating medium (Water Bath)

The PRS is equipped with two heaters in parallel (one of them being on standby in case of emergencies).

Reduction

The PRS includes two reduction lines in parallel (one of them being on standby in case of emergencies). The lines are equipped with safety gauges, indicators and transmitters to maintain safe operating conditions. According to the IGEM standards, the reduction unit should be installed in a well-ventilated closed area or, alternatively, in an open protected area.

Active and Monitor Regulator

The active regulator controls the outlet pressure while the monitor regulator assume control in the event of failure of the active device.

Slam Shut Valve

The purpose of Slam shut is to totally, automatically and rapidly cut off gas flow when the outlet pressure exceeds or drops below the setting pressure. The valve has to be installed to protect the system. The safety valve has to be sized for the maximum gas flow with the highest pressure that could be provided to the pressure reducing valve.

Measuring Unit

After adjusting the outlet pressure, gas flow and cumulative consumption are then measured to monitor NG consumption from the PRS and to adjust the dosing of the odorant indicated in the subsection below.

Odorizing Unit

Natural gas is generally odorless. The objective of odorizing is to enable the detection of gas leaks at low concentration, before gas concentrations become hazardous. The odorant is composed of Tertiobutylmercaptin (80%) and Methylsulphide (20%). The normal dosing rate of the odorant is 10-20 mg/cm^3. The odorant system consists of a stainless-steel storage tank, which receives the odorant from 200-liter drums, injection pumps, and associated safety devices.

Outlet unit

The outlet unit includes an outlet valve gauge, temperature indicators, pressure and temperature transmitters and non-return valves. The outlet pipes are also, like inlet pipes, isolated from the cathodic protection by an isolating joint. ***as shown in*** **Figure 2-2**

2.7 Resources consumption

2.7.1 During Construction

Water:

Water is mainly used during the construction phase by the workers and engineers. There is a permanent source of water from Egyptian Holding Company for Drinking Water and Sanitation

Water is mainly used during the construction phase in concrete preparation and domestic uses by the workers and engineers. Water for construction is sourced from trucks. Bottled water will be used for drinking purposes. The expected amount of water to be used during the construction phase of this project is:

- Domestic uses by the workers and engineers: about 5 m^3/day
- Construction activities: about 75 m^3

Fuel:

Diesel fuel will be mainly used for:

- Diesel generators that supplies electricity to the construction activities including welding.
- Trucks and excavators fuel
- The expected amount of diesel fuel to be used in the construction phase of the PRS is around 60 liters per day. The fuel will be delivered to the construction site via trucks when needed

2.7.2 During operation

Water:

Water is mainly used during the operation phase in the firefighting storage tank as well as for domestic use by workers in the PRS and drinking water.

The water source will be determined during the construction phase: either the PRS will be connected to the public water network or water will be delivered by trucks.

Electricity

Electricity consumption during the operation phase is expected to be minimal which will be mainly consumed at the control room. The PRS will be connected to the national gird network existing in the area.

2.8 Waste Generation

All solid wastes generating during the construction phase will be managed and disposed in accordance with applicable regulations and established best management practices. All generating wastes will be reused and/or recycled to the maximum extent possible **(Table 7-2).**

2.8.1 During construction

Solid waste

Solid waste generated during the construction phase will comprise of domestic waste, construction waste and some hazardous wastes from construction activities.

Liquid waste

Liquid waste will comprise mainly of domestic wastewater and vehicle/equipment wash down water. Domestic water is the only continuous source during construction. Workers during the construction phase will use the nearest public washroom or the Mosque's bathroom.

2.8.2 During operation

Solid waste

Solid waste generated from the PRS is expected to be minimal and limited to domestic waste and it will be collected regularly by trucks belonging to Aga local units.

Hazardous waste

Mainly empty odorant containers and filters- will be treated on-site, transported (using certified hazardous waste vehicles and personnel) to the Egypt gas storage facility in Abu Rawash (Giza) for final disposal at the UNICO hazardous waste facility near Alexandria.

Wastewater

the only wastewater source is domestic wastewater. Wastewater will be collected in a septic tank. The septic tank will be emptied by trucks and disposed of at an authorized wastewater treatment facility. There is a possibility that the site be connected to the municipal sanitary network in the future.

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 ministerial decree No 618/2017
  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
  - EEAA guidelines on ESIAs preparation
  - EGAS HSE guidelines, LDCs will comply with EGAS HSE Guidelines which work as regulation on PRS construction and operation (provided in **Annex-5** from the report)
- Law 38/1967 for General Cleanliness
- Law 93/1962 for Wastewater
- Traffic planning and diversions
  - Traffic Law 66/1973, amended by Law 121/2008 traffic planning.
  - 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 Labour and Workforce Safety

3.2 World Bank Safeguard Policies[2]

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 4.11 will not be applicable to the land obtained in Aga PRS as no cultural resources located in the project area. With regards to OP/BP 4.12, it will not be applicable to the land obtained in Aga as the process of obtaining the land for the pressure reduction station and the off take was based on mutual consent between the seller and buyer with no encroachment (willing buyer willing seller approach).

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. Gaps between requirements outlined by WBG guidelines and the Egyptian Law 4/1994 for Environment

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

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[3] will be followed by the Project.

3.3 Permits Required

- Approval from the ministry of Agriculture to construct the PRS on agriculture land in accordance with the presidential decree number 615 of year 2016.
- Army forces permit to construct the PRS.
- Constructions permit to be obtained from the local Governmental unit in Aga – Dakahliya Governorate.
- 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.
- Utility installation permission to the PRS (after construction phase)

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

4. Environmental and Social Baseline

4.1 Description of the Environment

Qarmut Al Bahw village located in Aga Markaz and affiliated to Dakahliya Governorate, which is located in the middle of the Nile delta in Egypt, which located 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

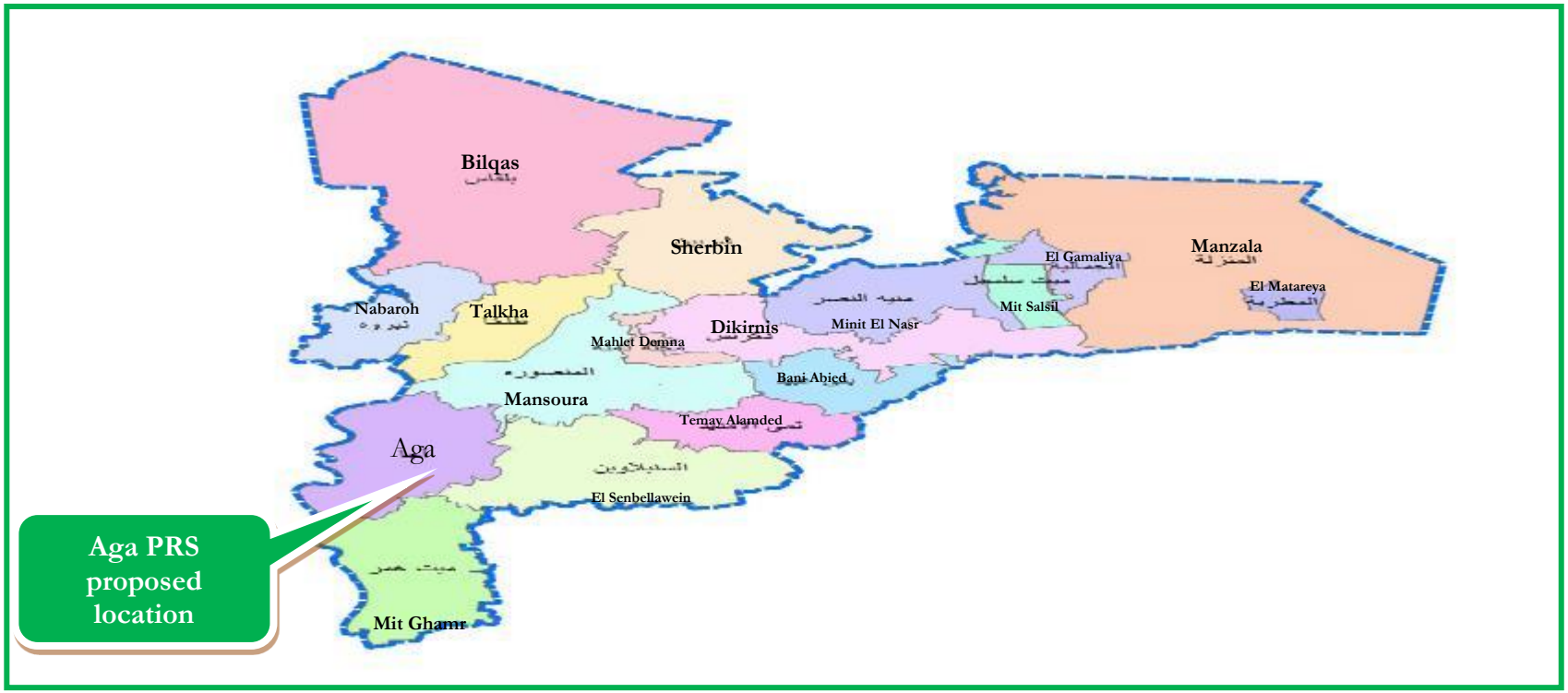

Figure 4-1: Distribution of cities in Dakahliya governorate and proposed Aga PRS location

The proposed project aiming to construct PRS in Qarmut Al Bahw village in Aga district within Dalakhliya Governorate.

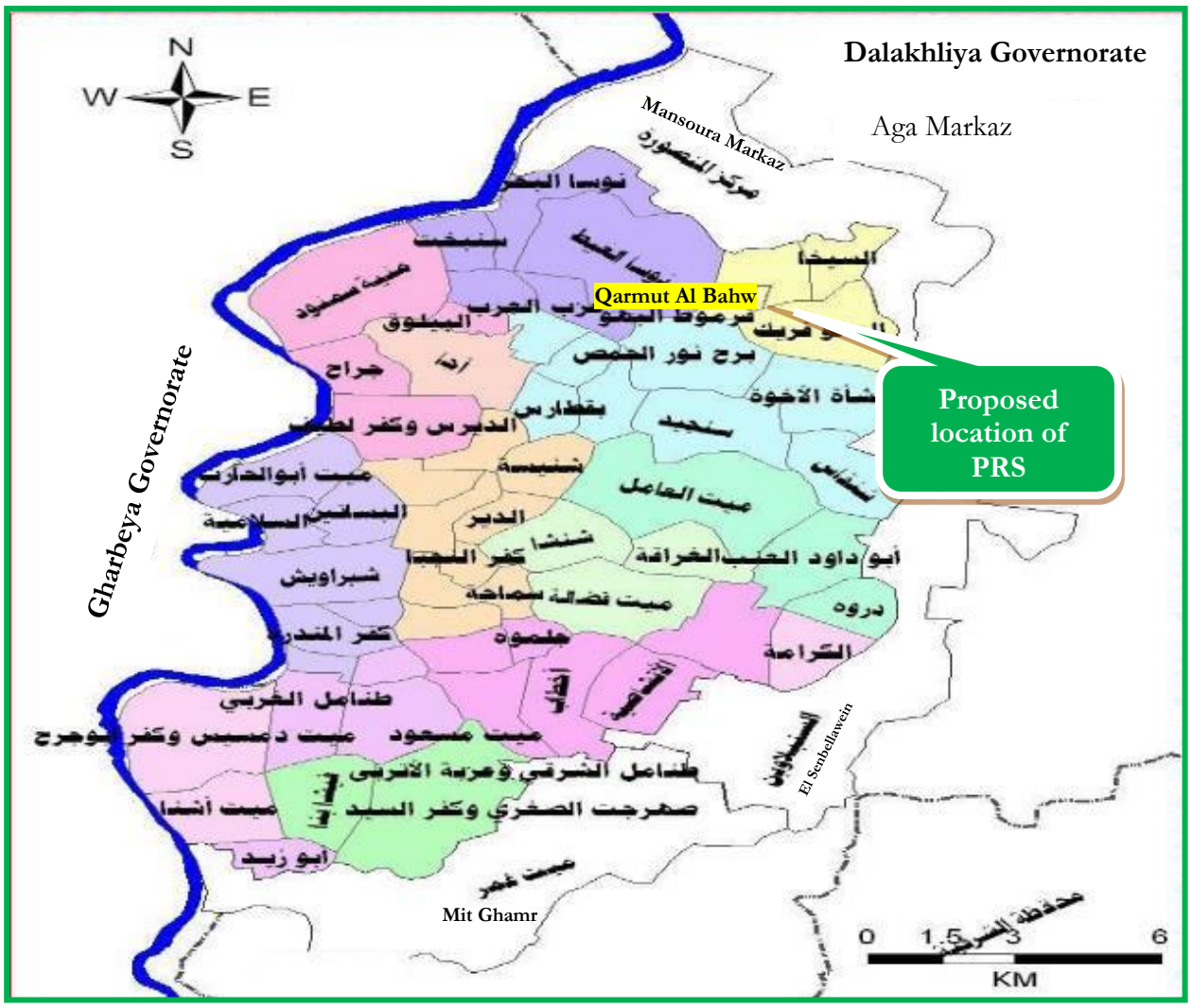

Figure 4-2: A layout showing the location of Aga PRS.

4.1.1 Air Quality

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 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 main road and close to the PRS location.

One-hour average results for 8 hours' continuous measurements were conducted for pollutants of primary concerns, namely, carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), Total Suspended Particulates (T.S.P) and particulate matter (PM10).

Methodology,instrumentation and results of Ambient Air Quality are detailed in Annex-6 attached to this report

Results of ambient air quality measurements:

The concentrations of measured air pollutants in the studied areas are below national and WB guidelines. All the measurements for the gaseous pollutants are complying with the maximum allowable limits according to law 4/1994 for Environment protection and its amendments by law No.9/2009 and the executive regulation issued in 1995 and its amendments no. 710 in 2012 and 618 in April 2017". Accordingly, the ambient air quality in the project areas is one of the tolerable areas in Egypt in terms of ambient air quality, which can be attributed to the absence of any major industrial sources.

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. 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 chapter 7.

4.1.2 Noise

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.

Methodology,instrumentation and results of Noise measurements detailed in Annex-6

Results of noise measurements

The noise measurements in the studied areas are below national and WB guidelines. They are complying with the maximum allowable limits according to law 4/1994 for Environment protection and its amendments. The excavation and construction activities may cause noise levels to surpass permissible levels at the site. 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

Table 4-1: Average temperature, Rainfall, Relative humidity and Wind Speed at Aga district[4]

Factor / Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Temperature (°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
Rain Fall (mm)	13.8	9.3	6.8	3.5	2.1	0.1	0	0	0	2.9	7	10.2
Relative humidity (%)	70.2	67.7	65.7	60	58.1	59.7	66.5	69.7	68	67.3	70.4	70.3
Wind Speed (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

4.1.4 Water resources

Groundwater

No Groundwater is anticipated in the PRS proposed location.

Surface water:

Aga PRS is located about 7 km east Damietta Branch. The River Nile Branch represents the main freshwater stream that extends northwards for about 236 km on the Eastern boundary of the Nile Delta from Egypt's Delta Barrage Damietta. The branch has an average width of 180 m and a depth between 2 to 4 m. Mit AL Amel drain is located at the east of the PRS location. Work will be away from the said drain, therefore there is no impact on water quality of the drain during the PRS construction or operation phases.

Figure 4-3: shows Mit AL Amel drain within Qarmut Al Bahw village in Aga district.

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

4.1.5 Terrestrial Biological Environment:

The current land use for the location of the PRS is for agricultural purposes. Therefore, it is a modified habitat and has no ecological importance, the project area is eventually free from any endangered species as shown in **Figures 4-4 and 4-5**.

Flora

There had not been flora recorded in the studied areas except some non- significant exotic species such as ***Gazwareena and Willow trees***.

Gazwareen trees (Casuarina)	Willow Trees (Salix)
	

Figure 4-4: Shows flora at Study area.

Fauna

Dragonfly (Anisoptera)	Spur-winged Lapwing (Hoplopterus spinosus)
	

Figure 4-5: Shows fauna at study area

In conclusion, the project area is eventually free from any endangered species.

4.1.6 Waste Management:

Solid Waste:

The responsibility of service planning, delivery and monitoring in Aga district is delegated to Cleansing and Beatification Agencies.

In most cases, the proportion of waste collected in the capital cities of the selected districts 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 Aga, then will be transferred by local units Trucks to the dumpsite (**Sandoup Dumpsite**).

Figure 4-6: Shows Sandoub dumping area at Aga district.

Liquid Waste:

The project location within Aga district is well covered by public sanitation network which take all the municipal sewage to be treated in Aga sewage treatment plant.

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

Hazardous Waste:

There are no hazardous wastes site within Aga district, any hazardous Waste generated within Aga will be Temporarily stored in isolated area (in the generated site) and will be transported- by licensed hazardous waste handling vehicles and personnel for final disposal at a licensed hazardous waste facility (Nassreya or UNICO in Alexandria).

4.1.7 Physical cultural Resources

The proposed PRS will be located within Qarmut Al Bahw village in Aga, which characterized as agricultural land. These areas have been excavated before installing other public utilities such as water, sanitary, sewage and electricity networks. For this reason, it is presumably less likely to chance find any artifacts or antiquities in the construction areas. Additionally, there are no identified archeological sites or sites with cultural or historical value, located within the project area, shall be affected by the PRS construction works.

4.1.8 Traffic Profile

Qarmut Al Bahw village congested with pickup truck, TukTuk, carriage pulled by donkeys, bicycles, motorcycles are the most used of transport. TukTuks made traffic conditions in the village worse as they pass in small alleys and in narrow streets. The traffic is congested between 8 a.m. – 11 a.m. and 2 p.m. – 6 p.m. (during winter season)

Types of roads close to PRS

Urban Road

The main road closest to the PRS area is El-Mansoura- Mit Ghamr Road in Qarmut Al Bahw Village.

Figure 4-7: Shows El-Mansoura- Mit Ghamr Road

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. Aga is a town in Egypt, located in the governorate of Dakahliya. The city of Aga is located in the center of the Aga Markaz in the western region of Dakahliya province with a population of 27000 people with a growth rate of 1.95% (2015 census). The total area of Aga is 2100 km^2 and the agricultural land exceeds 63% of the total land. The Aga Markaz has many

factories specialized in producing and exporting the food products such as Aga Factories which are specialized in goods such as: vegetable, fruit canning and the juice. There are also the glass factories and the plastic industry including the El-Shennawi, a very important factory that exports to Germany.

4.2.1 Administrative affiliation

Aga is a Markaz administratively affiliated with Dakahliya governorate. According to the Information Center of Aga, there are (1) city and (56) villages falling under the jurisdiction of Aga Markaz including Qarmout Al-Bahw village.

4.2.2 Urbanization Trends

Aga Markaz occupies an area of 2100 km^2. The urbanization rate of in Dakahliya is 28.2%. Agriculture lands account for 63% of the total land area of Aga. Based on the observations during the site visits, Aga City is considered a semi-urbanized area surrounded by agriculture lands. Qarmout Al-Bahw, the village where the PRS will be located, is a very small village. The local streets in Qarmout Al-Bahw are mostly dust with some asphalt in a moderate condition, percentage of asphalt roads is very low as an indicator for urbanization. Commercial activities available include small restaurants, local groceries, local cafes, small workshops, and village houses. Buildings heights are 2-4 stories. According to field observation, building density can be considered low. Percentage of agriculture at Aga Markaz is very high reaching more than 63% of the Markaz.

4.2.3 Demographic Characteristics

Total population:

According to population estimates from 2015, the majority of residents in the Dakahliya governorate live in rural areas, with an urbanization rate of 28.2%. Out of an estimated 5,949,001 people residing in the governorate, 4,271,428 people live in rural areas as opposed to 1,677,573 in urban areas. Population figures for 2015 shows the very small population of Qarmout Al-Bahw accounting for only 1,939 persons. The table below shows the population of Aga Markaz.

Table 4-2: Population of Aga Markaz

Area	Female	Male	Total population
Qarmout Al-Bahw	940	999	1939
Aga city	13490	13510	27000
Aga Markaz	239,733	246,637	486,370

Rate of natural increase:

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

4.2.4 Living Conditions

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 Qarmout Al-Bahw in Aga is 5.06 individuals.

Dwelling characteristics

Qarmout Al Bahw village is a rural area where around 70% of the total land area is agriculture land. New and most houses in the project areas are usually built of red brick and white stone are used too. 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 stories high are built of mud bricks plastered with mud and straw.

4.2.5 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, Qarmut Al Bahw village found to have access to basic services, such as; electricity, sanitation, and potable water. Thus, it will be possible to install natural gas to households and provide the new PRS with the required basic services.

4.2.6 Human development profile

Educational and work status, poverty index, income and expenditure should be highlighted in order to determine the current socioeconomic conditions of Qarmout Al Bahw village

Education:

The illiteracy rate tends to be high in Qarmout Al Bahw village. Which recording (45.54%). There is a significant gap between males and females, as female's illiteracy rate is higher than males in the project area.

Unemployment and work status

Labour force (15+) is 34.6% of total population at Qarmout Al Bahw level according to the Human Development Report 2010 around 24.7% of the Labour force are women. Percentage of labour 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 Qarmout Al Bahw village are farmers, teachers, craftsmen, and employees.

The formal Statistics obtained from the Poverty Mapping Data 2013 regarding manpower reflected that the age of starting work is 15 years old.5 Both the Child Law and the Labour 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.

4.2.7 Health Facilities

The village of Qarmout Al Bahw (PRS location) use a neighbor health care unit which belongs to Al Bahw freayk village

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 estimated to be higher in Qarmout Al Bahw since they are rural areas where poverty rates are usually higher due to lack of industrial, commercial activities, income sources and job opportunities.

4.2.9 Human Activities in the project area

The Aga Markaz has many factories specialized in producing and exporting the food products such as Aga Factories, which are specialized in goods such as vegetable, fruit canning and the juice. There are also the glass factories and the plastic industry including the El-Shennawi, a very important factory that exports to Germany. Fieldwork discussions revealed that the majority of the people of Aga are engaged in commercial activities and civil services where in Qarmout Al-Bahw, the village where the PRS is will be located, most people are farmers.

4.2.10 Physical cultural resources

As the Aga PRS will be in Qarmout Al-Bahw village, no physical cultural resources are expected to be disturbed by the PRS installation and operation activities. The PRS will be installed in an agriculture land area that already has NG pipeline crossing it and is far by at least 200 meters from any physical assets and structures, which means that no impact on any physical or cultural resources is expected.

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5 Based on Labour 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 Labour law put limitations related to age, type of occupation, hazards work…etc

5. Environmental and Social Impacts

The environmental and social impact assessment (ESIA) is a process used to identify and evaluate the significance of potential impacts on various environmental and social receptors as a result of planned activities during (construction and operation) phases of the Project. Furthermore, the analysis of environmental and social impacts is important to detail an effective management and monitoring plan, which will minimize negative impacts and maximize positives. The evaluation of the potential impacts on various receptors is based on a significance ranking process described in the following subsection. Details presented in **Annex-7**. attached to this report

5.1 Impact Assessment Methodology

To determine and assess the impacts of the project phases on environmental and social receptors, a semi-quantitative approach based on Leopold was first adopted. The impact of each activity on each receptor was assessed according to magnitude on a scale of -10 to 10, where negative values indicate a negative influence on the receptor, and importance on a scale of 0 to 10, which encompasses the probability of occurrence, frequency of the impact etc. The numbering system is used as a relative measure, where more negative numbers correspond to impacts having a higher negative magnitude. Susceptible receptors and corresponding activity are deduced and addressed if both magnitude and importance are of minor severity. The impact assessment methodology adopted for this ESIA is a "cause-effect" matrix modified from Leopold; and Buroz´s Relevant Integrated Criteria to evaluate the impacts. The environmental impact assessment methodology encompasses a semi-quantitative assessment that considers the following:

- Probability of the impacts
- Spatial and temporal scale
- Intensity of the impacts (which also considers the sensitivity of receptors, and the reversibility nature of the impact)

Each impact was identified considering:

- Type of impact: The negative or positive influence on the receptor.
- Magnitude: The extent of the impact within a scale (0-10)
- Significance: That includes the probability of occurrence, frequency, intensity of the impact, etc., within a scale (0-10)

The "cause-effect" matrix identifies the impacts during the mentioned phases, considering the elements of the environment and social context (receptor of the impact).

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 presented in two tables in Annex-7.

5.2 Impacts during Construction

5.2.1 Positive impacts

5.2.1.1 Impacts related to employment

The project will result in positive impacts through the provision of job opportunities.

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

  The construction of the Aga PRS and Off-take expected to result in the creation of job opportunities, both directly and indirectly. Based on similar projects implemented recently by EGAS and Egypt Gas, the daily average number of workers during the peak time will be about 16 workers, being 14 Labourers and 2 supervisors. The workers can also include drivers, digging staff, technicians and welders. About half of them can be recruited from the local community.

- **Indirect benefits**

  As part of the construction stage, many indirect benefits 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 Aga 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; those receptors include; Surface water (Meet El Aamel drainage will not be affected by construction activities), Ground water, 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 Soil

The excavation activities will result in the disturbance of soil characteristics and cause soil erosion and soil compaction as a result of heavy equipment take place. In addition, potential soil contamination may occur as a result of oil spills and leaks.

The proposed project is located in an agriculture area meaning the sensitivity of the receptor is considered high. The duration of the impact is expected to be long-term, with its spatial extent being limited to the boundaries of the Project site.

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

5.2.2.2 Air Emissions

PRS installation of the equipment 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, however it will be conducted for a short period. The following air pollutants are foreseeable for most of the construction activities:

- Fugitive dust emissions (PM10, PM2.5)
- Exhaust from excavation equipment and heavy machinery (excavators, loaders, trucks) containing SOx, NOx, CO, VOCs, etc.

Dust emissions will slightly negatively impact ambient air quality, particularly during the initial phases of construction. An isolating radius will be created around any residential area. Therefore, it is expected that the dust impact will be moderate slightly impact the surrounding area (agriculture land). Soil characteristic at PRS site is mainly hard soil. In addition, Mansoura – Mit Ghamr road (25 m away) already paved.

Emissions of CO2, CO and PM will result from the operation of the construction machinery and road vehicles during construction of the PRS. Air pollutants emitted from construction machinery are generally temporary (during the working activities). The intensity of work activities and the number of vehicles traveling onsite would be relatively low for all tasks. The emissions will be mostly limited to the construction phase and therefore are temporary.

Therefore the impact is assessed as **medium**

5.2.2.3 Noise

Construction of the PRS will require using various construction equipment, vehicle, etc. in addition to the other activities that generate noise. These tools signify potential major sources of noise emissions that will have an impact on receptors.

The potential people groups who are susceptible to the construction noise during the construction of the Aga PRS are the following:

- Onsite Workers
- Neighbor farmers

It is worth mentioning that the proposed PRS site is located in Qarmut Al Bahw village, about 25m from Mansoura – Mit Ghamr road, where the noise baseline is already high but does not exceed the national and international standards. Construction activities may increase the already existing baseline ambient noise. However, increased noise emissions are anticipated to be for a short duration of time.

The main sources of noise and vibration during the PRS construction are the operation of the construction equipment and machinery such as diggers, cranes, loaders; farmer in the nearby agriculture land and worker are the main receptor.

Regarding the construction of the PRS it is expected that the generated noise will mainly have an impact on workers and Neighbor farmers.

The impact of construction for worker and neighbor farmers is assessed **medium**

5.2.2.4 Impact on worker health and safety

Potential health and safety impacts are expected to workers during construction of the Aga PRS., in general, are the same as those associated with any construction project involving earthmoving, use of large equipment, transportation of overweight and oversized materials, and construction and installation of facilities.

The occupational health and safety impacts is assessed as **medium**

5.2.2.5 Temporary Labour 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 rules and code of conduct on the contractors to ensure good behaviors and limit any potential conflict with the communities.

The impacts related to Labour Influx will be **minor**.

5.2.2.6 Child Labour

As mentioned in the baseline, child Labour 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 strict obligations and monitoring should be applied in the contractor obligations.

Child Labour risk is assessed as **Minor**

5.2.2.7 Inappropriate waste management

Normal construction non-hazardous solid wastes include scrap concrete, steel, bricks, packaging waste, used drums, wood, scrap metal, welding belt and building rubble will be generated. Human or domestic wastes by construction Labours, including sewage and garbage collected from the Labours onsite will be also generated. Disposal of sewage and garbage generated from construction Labour, 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.

Solid hazardous waste generated is likely to include empty containers, spent welding materials, solvents, paints or adhesives, and other hazardous waste 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.

Therefore, impact is assessed **medium**

5.2.2.8 Traffic impact

The greatest potential for traffic impacts to occur arises during the short period where construction works peak (transportation of raw materials, equipment, and foundation materials). The traffic flow that will be created during the construction period will to some extent depend on which type and number of trips to and from the proposed site. Additional activities, such as entering and exiting the site will not have significant impacts on the road; given the proposed site is directly located on Mansoura – Mit Ghamr Road. Off-take site is located inside the PRS boundaries.

Based on observation during the site visits, it is predicted that during transportation of the equipment and raw materials, only one lane will be used by the trolleys and the movement of one trip will not last more than 8 hours (during the midnight – morning).

Therefore, impact on traffic in the project site is assessed **minor**

5.2.2.9 Impact on Subsurface water

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

Therefore, the impact is assessed **minor**

5.2.2.10 Community health and safety

The proposed project site is located approximately 200 m from a rural area, and therefore the impact on the community as a result of exhaust gas emissions, dust and noise are predicted to be significant. However, the impact is likely to be temporary and short term.

Therefore, the impact is assessed **minor**

5.2.2.11 Land related impact

The PRS needed a plot of 2610 m^2 (approximately 14.9 Qirats) The plot of land obtained in accordance to a willing buyer willing seller approach as mentioned in (2.5.3 construction works of PRS). EGAS procedures for land acquisition was adopted to choose one plot of all alternatives lands. A survey for market price was conducted by LDC and EGAS social officer. The average price ranged between 40 – 50 thousand EGP/Qirate in the surrounding area. Consultation meetings also reflected the future expectation of the land owners in this area that the land could be used in the near future for construction of buildings that is of more value than the current land status (agricultural).

Based on the cost estimation analysis carried out by the LDC, and after the negotiations with the land owners, the land was purchased at a total cost of 1,490,000. EGP (approximately 100 Thousand EGP/ Qirate). (For further elaboration **Annex-3** is a summary of Aga PRS land acquisition process) also land related documents are attached in **Annex-8** to this report.

Therefore, the impact is assessed **minor**

5.3 Impacts during Operation

5.3.1 Positive impacts

5.3.1.1 Impacts related to employment

The project may result in the creation of job opportunities during the operation phase.

Provide direct job opportunities to skilled and semi-skilled labourers

The operation of Aga PRS and Off-take expected to result in the creation of job opportunities, the average number of workers during operation of the Aga PRS will be about 12 workers in two shifts (6 workers/ shift) from the permanent workers of the LDC; 4 technicians, 2 engineers and

6 security staff. In addition to that, 4 police staff will be security permanently to guard the PRS. With regards to health and safety, one person will be assigned from the staff of Egypt Gas.

5.3.2 Negative impacts

Various impacts assessed in accordance to the impact assessment methodology. The impacts related to Air, soil, ecology and surface water and subsurface water ranked as irrelevant. Also, child labor and labour influx are irrelevant as highlighted in the text. Other impacts will be as follows:

5.3.2.1 Impact on worker health and safety

Possible impacts to health and safety during operations include exposures to odorant release, gas leak, fire, noise and accidental injury to workers. In addition; health and safety issues include working around energized equipment, and possible contact with natural hazards. However, during the operation and maintenance phase, if there is any incident or emergency situation, the impact will negatively endanger the surrounding community and establishment.

Odorant handling is part of the operation of the PRS. An odorant is added to the NG in order to enable detection upon leakage. The odorant containing Tertiobutylmercaptin (80%) and Methylehylsulphide (20%) is classified as a hazardous substance.

Odorant leak can result from improper handling of the odorant includes: Storage in unsafe conditions, in terms of occupational health and safety. In case of emergency, the risk resulting from odorant release or gas leak will be managed by Aga PRS's emergency response plan.

Therefore the impact is assessed as **medium**

5.3.2.2 Hazardous and non- hazardous waste management

During operation and maintenance of the PRS, besides industrial hazardous (odorant containers) and non-hazardous waste, small quantities of domestic waste (solid and liquid waste) will be generated. Industrial hazardous waste is likely to be generated during routine operations (e.g., lubricating oils, odorant containers, chemical containers). These wastes are typically stored temporarily, and transported by a licensed contractor to an appropriate permitted off-site disposal facility as a standard practice, according to EEAA regulations for hazardous waste management.

Therefore the impact is assessed as **medium**

5.3.2.3 Noise impact

The pressure reducers normally cause noise generated from the reducers' pipes. Maximum noise level expected from the reducers is 80db. The generated noise is constant (not intermittent). Assuming ambient noise levels are complying with WB/IFC requirements and Law 4/1994-9/2009- 105/2015 standards for low noise residential areas, a 20-meter buffer distance kept

between the reducers and the PRS fences should lead to minimal impact outside the PRS borders. Additionally, the PRS is located at the highway road.

Therefore, the impact is assessed as **minor**

5.4 Impacts during Accidental Events (Operation Phase)

Regarding to the Quantitative Risk Assessment Study (QRA), which demonstrate on the following hazards:

- Gas Release
- Fires (Heat Radiation)
- Explosion (Overpressure Waves)
- Suffocation (Odorant Leak)

And referring to the risk calculations determined in Aga QRA study, the individual risk level to the exposed workers / public based on the risk tolerability criterion have been identified in ALARP (Below the Upper Tolerability Limit[6]) region. So there are some points (Study Recommendations) need to be considered to keep the risk tolerability, and this will be describe under item (7.4) (for more details refer to the QRA Study under **Annex-4**)

[6] ***Below the Upper Tolerability Limit***

The risk is only tolerable if it is ALARP. This means that all practicable risk reduction measures must be identified and those that are reasonably practicable implemented. The term reasonably practicable indicates a narrower range than all physically possible risk reduction measures. If the cost of a risk reduction measure, whether in terms of money, time or trouble, can be demonstrated to be grossly disproportionate to the risk reduction gained from the measure, taking account of the likelihood and degree of harm presented by the hazard, then implementation of the measure may not be required.

Table 5-2 Impact Assessment

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

Impact	Description	Type	Significance
During Construction			
Deterioration of soil quality	PRS construction will lead to 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**
Air emissions	WB/IFC requirements and Law 4/1994 (modified by laws 9/2009 & 105/2015) stipulates strict air quality standards. Air emissions (gases and particulates) during construction (from transportation and machine operation) shall arise from: - Particulate matter and suspended solids from excavation/backfilling operations - Possible dispersion from stockpiles of waste or sand used for filling excavations. - 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. <u>Dust</u> The impact of dust generation (particulate matter) will be limited to the working hours as excavation and other construction activities. Which lead to temporary reduction of air quality, however is unlikely to cause major air emissions impacts as the nearest receptors are around 200 m from the construction site.	Negative	**Medium**
	<u>Gaseous pollutants emissions</u> Provided machinery used during construction is certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and IFC permissible levels.	Negative	**Medium**
Noise	<u>Noise impact on worker</u> 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.	Negative	**Medium**
	<u>Noise impact on nearby farmers</u> Noise impacts on farmers in nearby agriculture land will be affected by the increased noise levels during the construction phase.	Negative	**Medium**
	No major noise impacts on the nearest receptors expected during construction of the PRS as they are around 200 m away and the construction period is limited.	Negative	**Minor**
Risks on Occupational health and safety	Inhalation of air pollutants, exposure to high noise levels, injuries and potential death as a result of operating heavy equipment, and handling hazardous materials.	Negative	**Medium**

Impact	Description	Type	Significance
Child Labour	As mentioned in the baseline, child Labour 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	Negative	**Minor**
Impacts related to Labor Influx	There is a probability to face a labor influx impact that might originate from the laborers come from other areas to the work site.	Negative impact	**Minor**
Waste generation	Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination. Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. The legal standards of Law 4/1994-9/2009-105/2015 for the Environment and Law 38/1967 stipulate that these wastes should be disposed of in licensed sites by the local authority, which minimizes any aesthetic effects of such waste. Hazardous and non-hazardous materials available onsite during construction activities are likely to include fuel, engine oil, paints, Poor handling of those materials and their inappropriate storage may result in poor containment of induced leaks.	Negative	**Medium**
Reduction of Traffic Flow	The transportation of material and equipment to the construction sites will cause temporary increase in traffic along El Mansoura – Meet Ghamr road.	Negative	**Medium**
Subsurface water pollution	Subsurface water exist in the area may affected by inappropriate waste management during construction. However, the subsurface water quality is brackish due to the infiltrate of agriculture drainage.	Negative	**Minor**
Risk on Community health and safety	Negligent workers may cause accidents harmful to the community members, particularly children and old people, especially close to the digging site. Impacts associated with Community Health and Safety are limited to the inside the fence of the PRS. Therefore, there are minor impacts related to community health and safety during construction.	Negative	**Minor**
Impacts related to lands	The proposed PRS required a plot of 2610 m^2 including offtake needed area. Plot of land obtained in accordance to willing buyer willing seller approach.	Negative	**Minor**

Impact	Description	Type	Significance
	Operation		
Risks on Occupational health and safety	At PRS site, inhalation of air pollutants (odorant or natural gas leak), exposure to noise levels, injuries and potential death as a result of operating equipment with high pressure tools and equipment and handling hazardous materials. In case of emergency / accidents, resultant risks are studied in details in the attached Quantitative Risk Assessment, that show that the required mitigation measures are already in place and no further measures are needed. In cases, where further mitigation measures are required, action plans are set for implementation and follow up by the concerned departments	Negative	**Medium**
Hazardous material and waste	**Hazardous material** Odorant handling will be according to Odorant Material Safety Data Sheet (MSDS) and Egypt Gas procedures. Odorant leak can result from improper handling of the odorant and storage in unsafe conditions, in terms of occupational health and safety. According to Aga QRA study, modeling the vapour release will extend outside the PRMS SE fence, and Egypt Gas Aga PRS ERP will cover this point. **Hazardous waste** During operation and maintenance of the PRS, industrial hazardous wastes will be generated (e.g., lubricating oils, odorant containers, chemical containers). Poor waste management practices may have a significant impact on environment (soil, subsurface water, visual, and health and safety).	Negative	**Medium**
Noise	The pressure reducers normally cause noise. Maximum noise level expected from the reducers is 80 db. The generated noise is constant (not intermittent).	Negative	**Minor**

6. Analysis of Alternatives

6.1 No Project Alternative

The main target of the proposed project is to supply natural gas to households in Aga District and other surrounding areas in the future. This Natural Gas Connections to Households Project expected to yield many economic and social benefits in terms of providing a more stable, energy source, achieve savings in LPG consumption and enhancing 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.

6.2 Technology Alternatives

6.2.1 Outlet Pressure

The Pressure Reducing Station (PRS) will reduce the Natural Gas pressure from 30-70 bar in the HP pipeline to 3 – 7 bars to be suitable for distribution or use in domestic or industrial applications.

Aga PRS will produce 7 bar outlet pressure for the local distribution network (intermediate pressure). The LDC choose to produce 7 bars instead of 4 bar due to high consumption rate excepted in Aga city. It is designed to accommodate future extensions in order to feed other cities and/or villages surrounding Aga district.

6.2.2 Odorant Handling

Environmental and safety control considerations and measures are integrated into the selected technology design. For example, in order to reduce emissions from the odorant unit, the odorant will be automatically added or by using a plunger pump. Automatic and sophisticated unit management systems ensure safe and easy operation and can encompass complete remote operation of the units.

6.3 Location Alternative

As mentioned in item 5.2.2.11 (Impacts related to land), the main criteria for PRS siting are:

- Proximity to High-pressure gas main lines to minimize Off-take length
- Availability of space with adequate dimensions and affordability of the land for PRS construction and possible expansion
- Presence of standard buffer zones between PRS and nearest buildings or receptors
- Due to the unavailability of state owned lands, EGAS/Egypt Gas followed EGAS procedure for acquiring land for the construction of the PRS on Willing Buyer – Willing Seller basis and no involuntary land acquisition took place.
- Three alternatives of privately owned lands were inspected. The agreed land was technically and socially acceptable, as it is lies on top of the HP pipeline and entails no further land acquisition compared to the other two alternatives that require purchasing more land.
- Consultation with the land owners were conducted during the committees visits also further consultation were conducted with the other neighboring land owners to determine the prevailing price (market price) of the land in the targeted area. Prevailing price ranged from 40 to 50 Thousand EGP/Qirate, considering the current situation that the land is for agricultural purposes. Consultation meetings also reflected the future expectation of the land owners in this area that the land could be used in the near future for construction of buildings that is of more value than the current land status (agricultural).
- Based on the cost estimation analysis carried out by the LDC, and after the negotiations with the land owners, the land was purchased on 20/3/2017 at a total cost of 1,490,000. EGP (approximately 100 Thousand EGP/ Qirate) and a cheque was issued and received by the land owner.

7. Environmental and Social Management & Monitoring Plan

7.1 ESMMP Objectives

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

The ESMMP identifies certain roles and responsibilities for different stakeholders for implementing, supervising and monitoring the environmental and social performance of the project during its life cycle. Roles and responsibilities for implementing the ESMMP during the construction and operation phases have been proposed. During construction EGAS/LDC will assign supervision staff who will undertake supervision over the contractor to make sure that the mitigation measures specified in the design/tender document are implemented on field. During the operation phase, the PRS shall have at least one permanent staff member for health, environment and safety.

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. Annex-5 attached to this report

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

7.2 Environmental and Social Management Measures

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

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical receptor	Impact on soil	- Decrease erosion by minimizing disturbances and scarification of the surface - Best practices for soil management should be followed - Good housekeeping to minimize spills/leaks - Proper handling and management of wastes	Minor	Contractor	LDC –HSE department	Field supervision (audits)	- Contractor costs - LDC management costs
	Air emission	- Monitoring of wind speed and direction to manage dust-generating activities during undesirable conditions. - Management of number of vehicles and equipment in the site. - Appropriate maintenance, engine tuning and servicing of construction equipment to minimize exhaust emissions - Minimize unnecessary journeys or equipment use - Adopt a policy of switching off machinery and equipment when not in use (idle mode). - Minimizing drop heights for material transfer activities such as unloading of friable materials. - Transportation of construction waste by a licensed contractor. - Sheeting of Lorries transporting friable construction materials. - Appropriate sitting and covering of stockpiles of friable materials with adequate cover in addition to regular water spraying so as to minimize dust blow.	Minor	Contractor	LDC –HSE department	Contractual clauses + Field supervision (audits)	- Contractor costs - LDC management costs

	Noise	**Worker** - Application of the normal precautions normally taken by construction workers. **Nearby farmers** - Notification to the surrounding establishment prior to the construction phase. - Time management and construction schedule according to the IFC regulation provided by the contractor prior to the construction phase	Minor	LDC Excavation Contractor	LDC–HSE department	Contractual clauses + Field supervision (audits) Field supervision Complaints receipt from local administration	- Contractor costs - LDC management costs
Physical receptor	waste generation	- Temporary storage in areas with impervious floor - Safe handling using PPE and safety precautions - Empty cans of oil-based paint resulting from painting the steel connection pipes to households are to be collected and sent back to nearest LDC depots (Abo Rawash) for temporary storage until disposal at a hazardous waste facility (Nassreya or UNICO in Alexandria). - If hazardous waste quantities generated are too small for isolated transport to the Nassreya landfill, a temporary storage site can be created. Coordination with waste authority will be imperative to secure a location and implement adequate procedures for storage depending on quantities and type of wastes until collection and shipping to Nassreya landfill. - Hand-over selected oils and lubricants and their containers to Petrotrade Co. for recycling **Table 7-2 present more details about waste management**	Minor	- LDC - Excavation Contractor	LDC HSE Department	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 Nassreya - Approximate cost of the above (to be revised upon project execution): 8000 EGP -10000 EGP per ton

Social receptor (health and safety)	Occupational health and safety	- The project will hire a qualified contractor/sub-contractor with the high health and safety standards. In addition, the ToR for the contractor and the ESMP will provide the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction. - Standard protection by placing clear project signs. - Time management for vehicles movement; especially avoiding the peak hours - Standard protection for the workers especially working at elevated heights or trench. - Regular inspection to compelling worker to used their PPE - Training and licensing industrial vehicle operators of specialized vehicles. - The contractor also should keep attendance worksheet and Labourers ID in order to verify the age of workers - Health insurance should be applicable to the contractor workers and workers contracted by a sub-contractor - Full compliance to EGAS and LDC HSE requirements, manuals, and actions as per detailed manuals adopted by EGAS - Ensure the provision of the appropriate personal protective Equipment and other equipment needed to ensure compliance to HSE manuals	Minor	- LDC - Excavation Contractor	LDC HSE Department	Field supervision and review of HSE report+ Field supervision (audits)	- Contractor costs - LDC management costs
	Child Labour	- 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 Labour is occurred in the project - The ToR also will oblige the contractor to keep a copy of IDs of Labourers 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 to ensure first, that workers below 18 years old are not included on site, second, in case of accidents the injured persons will be provided with proper health insurance.	Negligible	- LDC - Excavation Contractor /subcontractor	- LDC–HSE department	- Field supervision and review of HSE report+ Field supervision (audits)	- Contractor costs - LDC management costs

	Disturbance to Community due	In order to minimize impacts pertaining to labor influx the following should be thoroughly implemented: - All workers should be trained on the Code of Conduct (special attention should be paid to harassment, environmental commitment, safety and security commitments) - Enable grievance mechanism and disclose it to community	Negligible	Contractors	LDC	Contractual Clauses & Field Supervision	Contractor costs
Community	Traffic	- Time management for transporting the materials, equipment, debris, etc. - Clear sign surrounding construction site and the exit gate. - Coordination with traffic department (ministry of interior) for vehicles route and movement. - Vehicle speed restrictions should be applied across the project site,	Minor	Contractors	LDC + Traffic department	Contractor has valid conditional permit + Field supervision	- Contractor costs - LDC management costs
	Land related impact	- Land was obtained in full compliance with willing buyer willing seller approach. - No tenants, encroachers, residential laborers or other with customary claims or other of land use. - Enable grievance mechanism and disclose it to community	Negligible	LDC HSE department	EGAS SDO	Field Supervision	- LDC - EGAS management costs
	Concerns of Community	- The detailed grievance mechanism (GRM) is presented in Annex-9 attached to this report is to be shared with the community beneficiaries. Posters will be prepared and made available to the beneficiaries in the contracting office7. 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.	Minor	Contractors	LDC –HSE department	Contractual clauses + Field supervision	- Contractor costs - LDC management costs

[7] Falls under the budget of the LDCs

Table 7-2: Waste management During Construction Phase

Waste Type	Hazardous/ Non-Hazardous	Treatment and Disposal
Cement and Concrete Wastes (Including Cement Contaminated Soil)	Non-Hazardous	- Will be sent to Sandoup Dumping site
Domestic Waste (food waste, packing,)		
Wood – Scrap	Non-Hazardous	- Temporarily stored in isolated area on-site, then transported to Abu Rawash storage site (Egypt Gas facility) to be sold as scrap.
Tires		
Cardboards		
Containers		
Paints containers	Hazardous	- Temporarily stored in isolated area on-site, then transported to Abu Rawash storage site. final Disposal will be UNICO.
Batteries		
Chemicals (solvent, lubricants,…) containers	Hazardous	- Temporarily stored in isolated area of the site, the transported- by licensed hazardous waste handling vehicles and personnel- to Abu Rawash storage site (Egypt Gas facility) for final disposal at Nassreya hazardous waste facility.
Used Oils	Hazardous	- Temporarily stored in isolated area on-site, then transported to Abu Rawash storage site. Final disposal will be by Petrotrade Co.

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

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Social –Health	Occupational health and safety	- Remote actuation of isolation and slam-shut valves by LDC for PRS and pipelines - Produce Hazardous Area Classification drawings - Control room exit design. - Preventive maintenance policy and station manual - Provision of self-contained breathing apparatus (2 pieces for each station) for handling odorant leaks - Apply jet fire rated passive fire protection system to all critical safety shutdown valves ESDVs or Solenoid valves (As applicable) - Place signs in Arabic and English "Do Not Dig" and "High Pressure Pipeline Underneath" - Install an elevated wind sock and provision of portable gas detectors - The design should fully comply with IGE TD/3 code requirements	Minor	- LDC project Department - Designer	- LDC project department - Engineering dep. - HSE dept. - EGAS	- Drawing and design Document Review - Policy and manual review - Inspection by operators - Signage inspection and site visits	- Project cost - LDC management costs

Physical receptor	waste generation	- Strict use of chemical-resistant suits and PPE when handling odorant barrels, tanks, or spills - Evacuation of odorant from barrels into holding tank with utmost care and full PPE - Covering possible odorant spills immediately with sand and treatment with sodium hypochlorite as per EGAS and LDC practices - On-site treatment of empty containers with sodium hypochlorite and detergent as Per EGAS and LDC practice - Ship empty containers to a certified hazardous waste facility via company depot using certified handling and transportation contractors - Ensure full and empty (treated) odorant containers are accompanied by a trained HSE specialist during transportation to and from the depot and to/from the hazardous waste disposal facility (UNICO and/or Nassreya) - Others measures as per item 7.4: Aga quantitative risk assessment study recommendations. In order to minimize risk of spillage of hazardous odorant, the following general precautions should be taken: - Pre-Plan the anticipated amounts of odorants to be used in order to minimize leftovers and residuals. - Handle with extreme care and always perform visual checks on the integrity of the odorant container - Avoid rough handling rolling or dropping of odorant containers - Avoid exposure to direct sunlight during storage or transportation - Ensure odorant containers are always sealed properly and secured from tipping/falling/damage during transportation and storage (temporary and long-term) - Always have sufficient amounts of sand, sodium hypochlorite and detergent on standby during usage of odorant - ALWAYS handle containers or spills with care and full PPE compliance - Never release or empty residual odorant from its container to any receptor or for any reason other than filling the odorant tank at the PRS - NEVER use empty odorant containers for any other purpose - In case of odorant spillage: - avoid inhalation and sources of ignition - immediately cover and mix with sufficient amounts of sand and sodium hypochlorite using necessary PPE and tools - collect contaminated sand in clearly marked secure containers/bags - Add sand to inventory of hazardous waste	Minor	PRS staff	LDC HSE Dpt.	Quaternary auditing	- Project cost - LDC management costs

7.3 Monitoring and Review

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

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

Table 7-4: 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
Ambient air quality	Increased air emissions and dust	- Inspection of vehicle and machinery maintenance schedule - Inspection of the construction activities - Exhaust emissions concentrations from diesel generators	LDC HSE	Monthly during construction + before construction and each three month for machines	Vehicles licensing Department	Measurements and reporting of exhaust emissions of construction activities machinery Complaints log	LDC management costs
Ambient noise levels	Increased noise levels	- Noise intensity, exposure durations and noise impacts - Use of earmuffs by Construction workers	LDC HSE	Regularly during site inspections	Construction site	Measurements of noise levels Complaints log	LDC management costs
		Complaints from Farmers	LDC HSE	Weekly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Physical receptor (soil, subsurface water, visual)	Waste generation	Observation of accumulated waste piles	LDC HSE	During construction. Monthly reports	Construction site	Observation and documentation	LDC management costs
		Observation of water accumulations resulting from dewatering (if encountered)	LDC HSE	During construction. Weekly reports	Around construction site	Observation and documentation	LDC management costs
		Chain-of-custody and implementation of waste management plans	LDC HSE	Area reports	Construction site and document examination	Site inspection and document inspection	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
Labour conditions	Occupational Health and safety	Total number of complaints raised by workers Periodic Health report Periodic safety inspection report	LDC HSE	Biannual for PRS	Construction site	Safety supervisor should follow commitment of workers to use the protective equipment -Inspection & recording of the performance -Reports about the workers and complaints	LDC management costs
		For the condensates pipeline (4") owned by Mansoura Petroleum Company which passes under-ground through the PRS, considerations should be took in account which will be as follows:					

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
		• A comprehensive work plan should be prepared jointly between Egypt Gas and Masoura Petroleum Company before starting construction work.	LDC HSE and Projects Dpt. / Mansoura Pet. Com. HSE & Projects	Daily during construction	Construction site	Supervision & reporting	LDC management costs
		• Removing soil above and around the pipeline route should be done by using manual excavation with supervision from Egypt Gas and Mansoura Company representatives.	LDC HSE and Projects Dpt. / Mansoura Pet. Com. HSE & Projects	Daily during construction	Construction site	Supervision & reporting	LDC management costs
		• Installing of isolation valves before and after pressure reduction station to facilitate maintenance or isolation in case of emergency.	LDC HSE and Projects Dpt. / Mansoura Pet. Com. HSE & Projects	Daily during construction	Construction site	Supervision & reporting	LDC management costs
		Provide a suitable tool for wind direction (Windsock) to be installed in a suitable place to determine the wind direction.	LDC HSE and Projects Dpt.	Daily during construction	Construction site	Supervision & reporting	LDC management costs
		Cooperation should be done with the concerned parties before planning for housing projects around the PRS area.	LDC Projects Dpt.	Daily during construction	Construction site	Supervision & reporting	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
	Child Labour	Attendees lists with workers IDs Complaints and accidents reports	LDC HSE	Biannual for PRS	Construction site	Safety supervisor observe the Labourers Random checkup for Labourers IDs	LDC management costs
	Disturbance to local community due to labor influx	- Complaints raised by the local community (GRM) -	LDC in coordination with contractor	When reported	Construction sites	Supervision & reporting	Contractor Cost
Local traffic and accessibility	Reduction of traffic flow and accessibility to local community	Comments and notifications from Traffic Department	LDC HSE	Weekly during construction.	Construction site	Documentation in HSE monthly reports Complaints log	LDC management costs

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
Ambient air quality	Improper management of odorant during operation	- Log of spillage incidents - Number of treated containers - Odorant delivery forms	LDC HSE	Quarterly for each PRS	- PRSs	Compare Environmental Register with odorant delivery forms, observation of site	LDC management costs
Ambient noise levels	Noise of PRS operation	- Noise intensity	LDC HSE	Quarterly for each PRS	- PRSs	- Noise meter	LDC management costs
Physical receptor (soil, subsurface water, visual)	Waste generation	- Best practice of handling and intermediate storage - Disposal to appropriate and license land field	LDC HSE	Quarterly for each PRS	- PRSs	- Hazardous waste Register	LDC management costs
Labour conditions	Occupational Health& safety	- Total number of complaints raised by workers	LDC, EGAS	Four times per year, each three months	- Safety supervisor should follow the commitment of	Complaints log LDC	No cost

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
		- Periodic Health report - Periodic safety inspection report			workers to use the protective equipment - Inspection and recording of the performance - Reports about the workers & complaints		
		Review and update the emergency response plan to include the main detailed elements for ERP and all scenarios in this study and other needs including:	LDC HSE (ERP document)	Yearly (ERP doc.)	PRS location	HSE annual audit	LDC management costs
		Firefighting brigades, mutual aids, emergency communications and fire detection / protection systems.	LDC HSE (ERP document) LDC HSE and Operation Dpt. for facilities.	Yearly (ERP doc.) Weekly	Area head office / PRS location PRS location	HSE annual audit Inspection checklist	LDC management costs
		First aid including dealing with the odorant according to the MSDS for it, with respect of means of water supply for emergency showers, eye washers and cleaning.	LDC HSE (ERP document) LDC HSE and Operation Dpt. for facilities.	Yearly (ERP doc.) Weekly	Area head office / PRS location PRS location	HSE annual audit Inspection checklist	LDC management costs
		Safe routs and exits for the control room and security office according to the modeling in this study.	LDC HSE (ERP document) LDC HSE and Operation Dpt.	Yearly (ERP doc.) Daily	Area head office / PRS location PRS location	HSE annual audit Inspection checklist	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
		Provide the site with SCBA "Self-Contained Breathing Apparatus" (at least two sets) and arrange training programs for operators.	LDC HSE and Operation Dpt.	Daily	PRS location	Inspection checklist	LDC management costs
		All operation is according to standard operating procedure for the PRS operations and training programs in-place for operators.	LDC Operation Dpt.	Daily for operation Yearly for training	Area head office / PRS location	HSE annual audit	LDC management costs
		Inspection and maintenance plans and programs are according to the manufacturers guidelines to keep all facility parts in a good condition.	LDC Operation and maintenance Dpt.	Periodic maintenance plan according to manufacturers	Area head office / PRS location	HSE annual audit	LDC management costs
		Emergency shutdown detailed procedure including emergency gas isolation points at the PRMS and valves room in place.	LDC Operation Dpt.	Yearly (ERP doc.)	Area head office / PRS location PRS location	HSE annual audit	LDC management costs
		Cooperation should be done with the concerned parties before planning for housing projects around the PRS area.	LDC Security Dpt.	Daily	Around PRS location	Patrolling and recorded in logbook	LDC management costs

7.4 Aga Quantitative Risk Assessment Study Recommendations

Regarding to the modeling scenarios and risk calculations to workers / public which found in ALARP region, therefore there are some points need to be considered to maintain the risk tolerability in its region and this will be describe in the following recommendations:

Recommendation	Timeline Phases
Rearrange of PRS components (control room / firefighting facility) as these located in the range of high values of heat radiation and explosion overpressure waves. (considering standard spacing):	Design Phase
Considering that all electrical equipment, facilities and connections are according to the hazardous area classification for natural gas facilities.	Design Phase
Emergency shutdown detailed procedure including emergency gas isolation points at the PRS and GASCO valves room in place.	Design Phase
Surface drainage system is suitable for containment of any odorant spills.	Design Phase
For the condensates pipeline (4") owned by Mansoura Petroleum Company which passes under-ground through the PRS, considerations should be took in account which will be as follows:	Construction Phase
• A comprehensive work plan should be prepared jointly between Egypt Gas and Masoura Petroleum Company before starting construction work.	Construction Phase
• Removing soil above and around the pipeline route should be done by using manual excavation with supervision from Egypt Gas and Mansoura Company representatives.	Construction Phase
• Installing of isolation valves before and after pressure reduction station to facilitate maintenance or isolation in case of emergency.	Construction Phase
• Provide integrated coordination plan between the two (Egypt Gas/Mansoura Petroleum Company) companies including emergency communications plan along 24 hours.	Operation Phase
Provide a suitable tool for wind direction (Windsock) to be installed in a suitable place to determine the wind direction.	Construction Phase
Review and update the emergency response plan to include the main detailed elements for ERP and all scenarios in this study and other needs including:	Operation Phase
• Firefighting brigades, mutual aids, emergency communications and fire detection / protection systems.	Operation Phase
• First aid including dealing with the odorant according to the MSDS for it, with respect of means of water supply for emergency showers, eye washers and cleaning.	Operation Phase
• Safe routs and exits for the control room and security office according to the modeling in this study.	Operation Phase
Provide the site with SCBA "Self-Contained Breathing Apparatus" (at least two sets) and arrange training programs for operators.	Operation Phase
All operation is according to standard operating procedure for the PRS operations and training programs in-place for operators.	Operation Phase
Inspection and maintenance plans and programs are according to the manufacturers guidelines to keep all facility parts in a good condition.	Operation Phase
Cooperation should be done with the concerned parties before planning for housing projects around the PRS area.	The Three Phases

7.5 Reporting of Mitigation and Monitoring Activities

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

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

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

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

7.5.1 During the Construction phase reports should include as a minimum

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

- Monthly report on health and safety performance. This report will include any incident and complaint regarding health and safety measures perform by the contractor.
- According to the QRA recommendations the PRS layout has been modified in order avoid of the risk affecting the control room, security office and firefighting facility.
- Daily report to be prepared on construction work of the pressure reduction station including follow-up the work for safety of Mansoura Petroleum Company condensate pipeline.
- Daily report in a logbook to consider any outside construction works around the PRS location that related to public or industrial buildings.

7.5.2 During the operation phase reports should include as a minimum

According to law 4/94 amended by law 9/2009 and its executive regulation, each facility should prepare an environmental register. Components of the environmental register are presented in annex three of the executive regulation. All environmental procedure included in the EMMP are to be recorded in the Environmental Register so that they can be communicated effectively and clearly. It will include (monitoring plan, solid waste management plan, emergency response plan,).

Environmental Register shall contain:

- Any complaint related to the noise generated from the PRS
- Regular noise and air measurement reports.
- Record keeping of the admitted waste and their quantity and management (bills of waste transportation).
- Summary of the HSE monthly report.

According to Article 29-32 from law 9/2009 and its executive regulation, the PRS shall prepare a hazardous material and waste register containing the handling and storage of hazardous material and waste in the facility (types, quantities, material safety data sheets, type of storage and means of transportation). Additionally, the register should contain a contract and /or bills of hazardous waste disposal at UNICO and /or Nassreya.

7.6 Emergency Response Plan

Egypt Gas (غاز مصر) developed an Emergency Response Plan (ERP), which relates to its operations for the PRS and for its intermediate and low-pressure distribution network. The purpose of this document is to outline emergency responsibilities, organizational arrangements, responses, and procedures to be followed by personnel based in the field in the event of an emergency. For full details about the emergency plan, kindly refer to **Annex-10** attached to this report.

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

The first level of Emergency:

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

The Second level of Emergency:

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

The Third level of Emergency:

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

7.6.1 Hotline

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

7.7 Institutional Framework for ESMMP Implementation

7.7.1 Environmental Management Structures

EGAS is the supervisory body. Egypt Gas is the implementing body. Below is the management structure of Egypt Gas.

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 good environment, occupational health and safety and social background.

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.

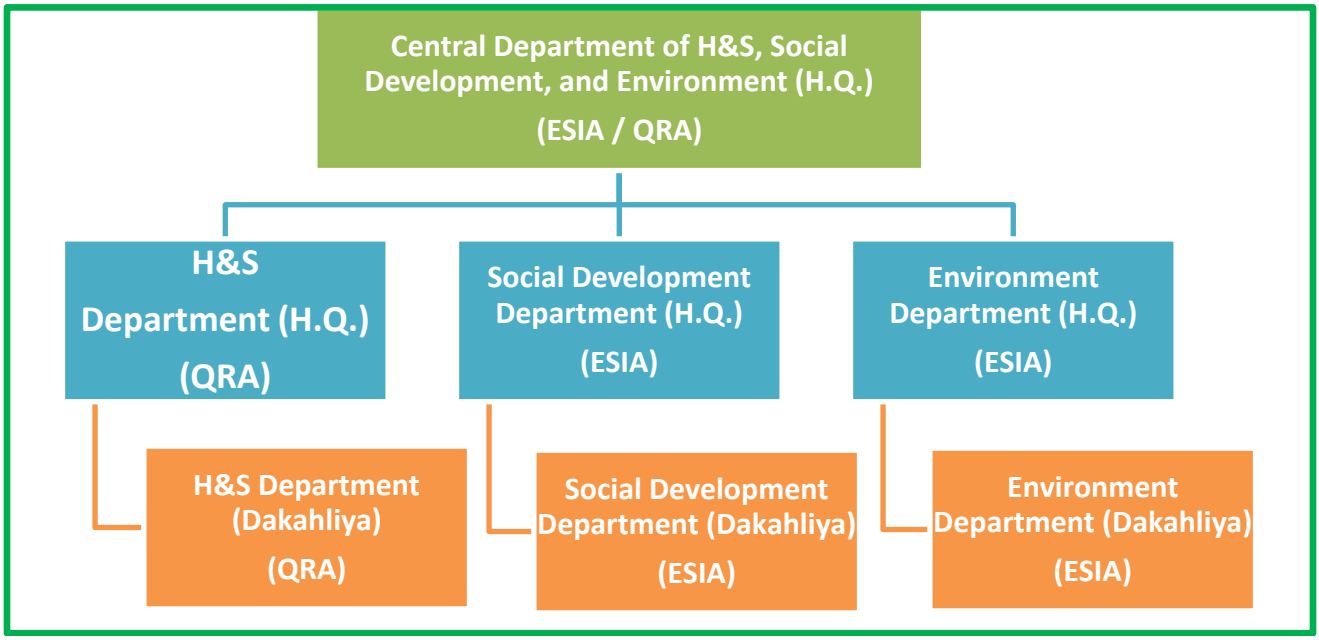

Figure 7-1: Egypt Gas ESMP organogram.

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

- Worker and contractor compliance to EGAS HSE manuals and procedures
- Occurrence of HSE incidents and suggestions for incident avoidance (Refer to Item 7.4)
- Management of broken asphalt (if any), unused backfill, solid waste, metal scrap
- Management of paint cans, refueling & lubrication, soil contamination

- Management of liquid waste such as leaked condensate hydrocarbons (if any) or chemicals used in heaters; and
- Checking that handling of hazardous waste is done according to the requirements of the Environmental Law, where a permit for handling hazardous material and Hazardous wastes is issued from EGAS Environment Department
- Using analyzers to measure noise, SO2, CO, CH4 and NO2 in ambient air, and detect possible natural gas leaks
- Ensure and log compliant handling of odorant/odorant containers, odorant-contaminated-soils (in case of spillage)
- Measure noise at different locations of the PRS
- Other tasks as outlined in ESM & MP

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

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

7.7.1 Required Actions

1- Involvement of environmental and social officers during the design, costing, tendering, and construction phases would be advantageous.

2- An updated and detailed assessment of Egypt Gas EHS institutional capacity and available resources for implementation of the ESMP

3- 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.

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

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

Identifying, preventing and managing unanticipated impacts are facilitated by a grievance redress mechanism (GRM). As the World Bank's governance and anticorruption (GAC) agenda moves forward, grievance redress mechanisms (GRMs) are likely to play an increasingly prominent role in Bank-supported projects. 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

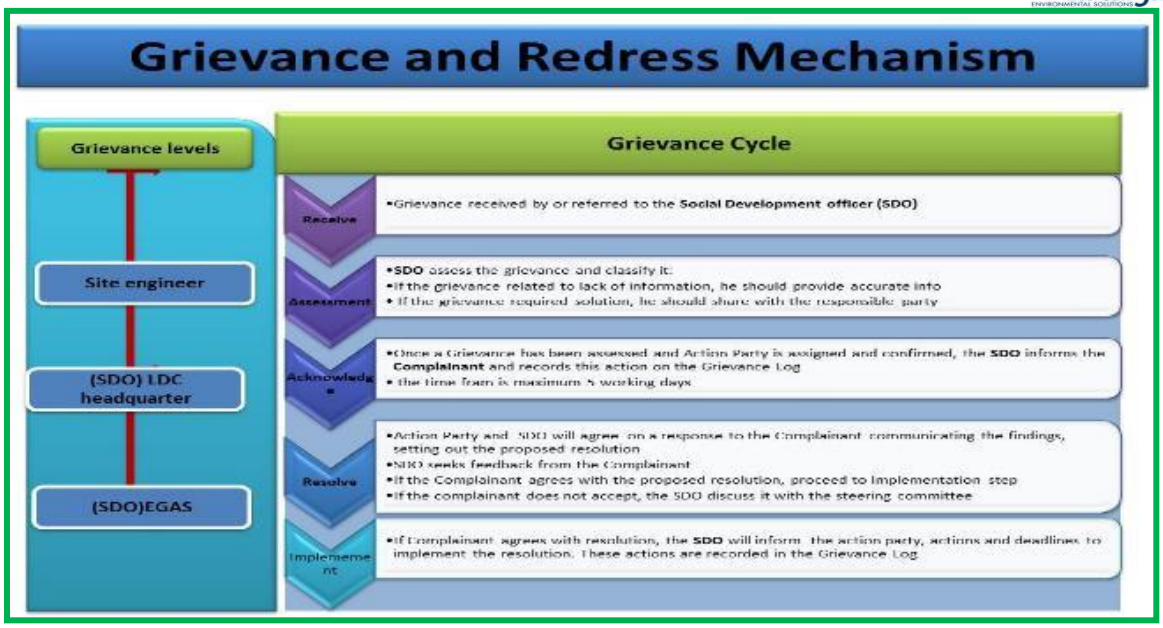

Figure 7-2 Proposed Grievance and Redress Mechanism

7.7.2.1 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. (a complain form is attached see **Annex-9**)

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

7.7.2.2 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-9**. 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.

7.7.2.3 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.

7.7.2.4 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.

7.7.2.5 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 7-6 Means of verification and indicators

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

7.7.2.6 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.

7.7.2.7 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

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.

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 were implemented to reach the most 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.

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 ESIA 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.

For the purpose of this site specific ESIA, 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 following is the key stakeholders that were engaged during the consultation process:

- Local community representatives
- Governmental Organizations and Authorities
- NGOs / CDAs
- Educational institutions and universities
- Environmental administrations
- Formal and informal LPG distributors.
- In addition to, Egypt Gas company.

Table 8.1 includes a list of key stakeholders of both men and women within the project areas.

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:

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 2013
- **Phase II:** The site-specific studies in February, 2017
- **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, February, 2017

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 / CDAs	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	0	FGD In depth	February 2017

8.5 Consultation processes

It worth to mention that the public consultation has covered both the PRS and all the Low pressures pipelines networks activities. All questions raised during the public consultation were related to the connection activities (Low pressures pipelines networks), where most of the people are not familiar of the PRS activities. So all questions, comments and responses were concentrated on the NG connection activities and have been addressed in the ESMP study.

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: Final public consultation 2017

The results of the phases will be presented as follows:

Summary of phase I: Preparation of the framework study 2013

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

- 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[8] 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. http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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. http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf

[8] http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf

Subject	Questions and comments	Responses	Addressed in the ESMP[8] 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 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf

Subject	Questions and comments	Responses	Addressed in the ESMP[8] study
Impact on LPG vendors	The project might result in unfavorable impacts on the LPG vendors (Sareha).	The NG project will partially affected the vendors, but it will reduce the dangers of LPG cylinders which are considered bombs in houses. The LPG distributors have their vehicle in transporting the LPG cylinders. These vehicles could be used in transporting other goods. Also NG is not going to cover all areas, so LPG distributors will not lose their jobs.	See The potential adverse impacts during the operation phase http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf
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 table 7.2 http://www.egas.com.eg/docs/Dakahlia_ESMP%20.pdf

8.6 Summary of consultation outcomes

The consultation outcomes revealed that:

- The interviews with the Egypt Gas revealed that, they are fully aware about security and safety procedures and the nature of the project area.
- The AFD in cooperation with the European Union will provide the poor with a kind of grant to be able to install the NG. This initiative has been approved and will be 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 ESIA disclosure

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


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