



1.5 Million Natural Gas Connections Project in 11 Governorates

Site-Specific Environmental and Social Impact Assessment

Kafr El-Zayat PRS Gharbeya Governorate **Final Report**

November 2018



EGAS

Egyptian Natural Gas Holding Company

Developed by



EcoConServ Environmental Solutions



Petrosafe

**Petroleum Safety & Environmental Services
Company**



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.
BUTAGASCO	The Egyptian Company for LPG distribution
CAPMAS	Central Agency for Public Mobilization and Statistics
CDA	Community Development Association
CO	Carbon monoxide
CRN	Customer Reference Number
CULTNAT	Center for Documentation Of Cultural and Natural Heritage
EEAA	Egyptian Environmental Affairs Agency
EGAS	Egyptian Natural Gas Holding Company
EGP	Egyptian Pound
EHDR	Egyptian Human Development Report 2010
EIA	Environmental Impact Assessment
ER	Executive Regulation
E&S	Environmental and Social
ESIA	Environmental and Social Impact Assessment
ESIAF	Environmental and Social Impact Assessment Framework
ESM	Environmental and Social Management
ESMF	Environmental and Social Management framework
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
GAC	governance and anticorruption
GDP	Gross Domestic Product
GIS	Global Information Systems
GoE	Government of Egypt
GPS	Global Positioning System
GRM	Grievance redress mechanisms
HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene pipes
HH	Households
HHH	Head of the Household
hr	Hour
HSE	Health Safety and Environment
IBA	Important Bird Areas
IDSC	Information and Decision Support Center
IFC	International Finance Corporation
IGE/SR	Institute of Gas Engineers/Safety Recommendations
LDCs	Local Distribution Companies
LGU	Local Governmental Unit
LPG	Liquefied Petroleum Gas
mBar	milliBar
MDG	Millennium Development Goal
MOP	Maximum operating pressure
MP	Management Plan
MTO	Material take-off



NG	Natural Gas
NGO	Non-Governmental Organizations
NO ₂	Nitrogen dioxide
OSH	Occupational Safety and Health
P&A	Property and Appliance Survey
PAP	Project Affected Persons
PE	Poly Ethylene
PM ₁₀	Particulate matter
PPM	Parts Per Million
PRS	Pressure Reduction Station
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SDO	Social Development Officer
SIA	Social Impact Assessment
SO ₂	Sulphur dioxide
SSIAPF	Supplementary Social Impact Assessment Framework
SYB	Statistical Year Book
T.S.P	Total Suspended Particulates
Town Gas	The Egyptian Company for Natural Gas Distribution for Cities
WB	The World Bank
WHO	World Health Organization
\$	United States Dollars
€	Euros

Exchange Rate: US\$ = 17.96 EGP as of November, 2018

Exchange Rate: € = 20.5 EGP as of November 2018



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1 Introduction

1.1 Project Objectives

The objective of the proposed project is to construct Pressure Reduction Station (PRS) at Kafr El-Zayat area, Gharbeya Governorate, in order to install the NG to wider segment of clients. The PRS for Kafr El-Zayat will be designed to reduce an inlet pressure of 25-70 bar to an outlet pressure of 7 bar at a flow rate of 10,000m³/h. Flow rate can be increased to 20,000 m³/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). Off-takes from the national network and high pressure (HP) pipeline “70 bar system “already exist, and have been fully addressed in the Due-Diligence report .

The objectives of the ESIA include:

- 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

This ESIA is site specific for the construction of at Kafr El-Zayat PRS (with a capacity of 10,000m³/h).

The local distribution company responsible for project implementation in Kafr El-Zayat is Egypt Gas.(غاز مصر)

1.3 Contributors

The ESIA has been prepared by Petrosafe (Petroleum Safety & Environmental Services Company) and EcoConServ for Environmental Solutions 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 are listed in **Annex 1** of this report.



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 areas¹ in order to facilitate detection in the event of leaks. In addition to excavation and pipe laying, key activities of the construction phase also include installation of mechanical equipment.

The diagram below 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:

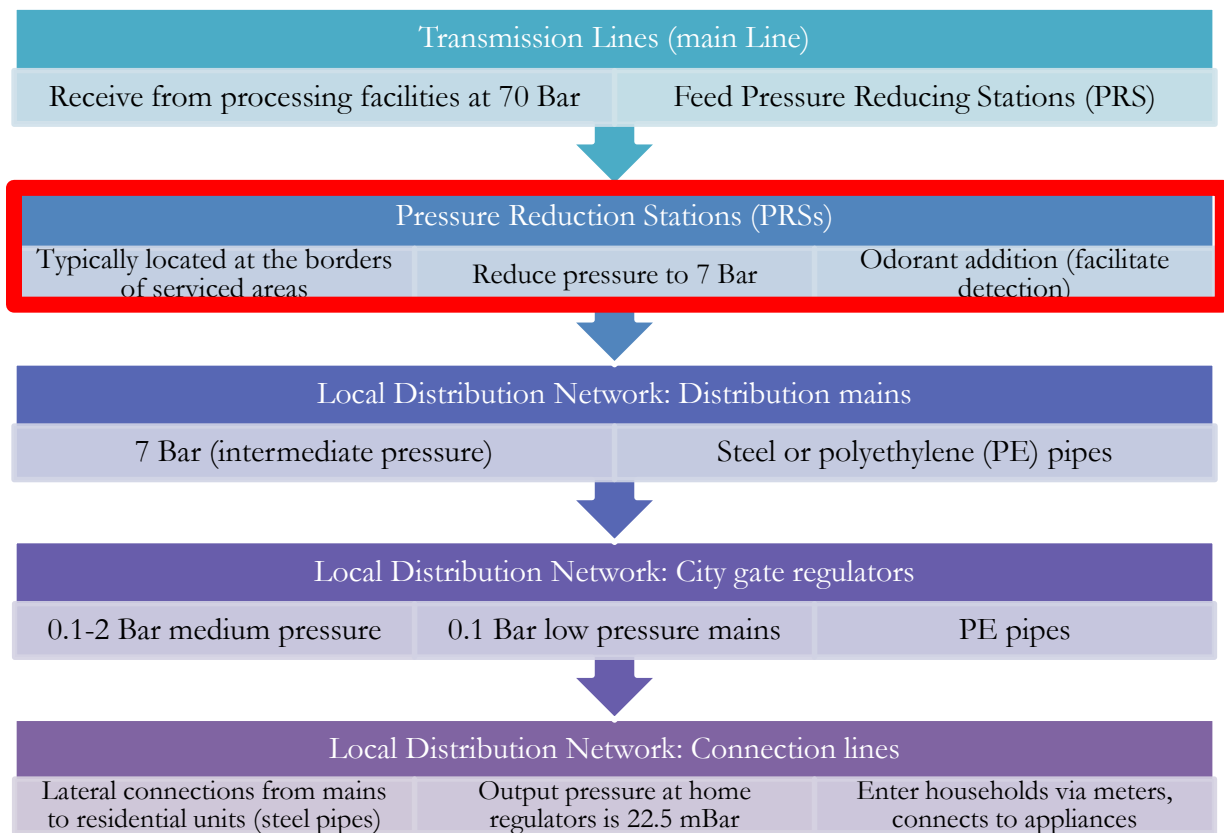


Figure 2-1: General components of the city’s distribution network

2.2 Project Work Packages

2.2.1 Pressure Reduction Station (PRS)

The PRS will consist 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.

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



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

The PRS for Kafr El-Zayat will be designed to reduce an inlet pressure of 25-70 bar to an outlet pressure of 7 bar at a flow rate of 10,000m³/h. Flow rate can be increased to 20,000 m³/h in the future according to demand increase



2.3 Project Location

2.3.1 PRS location

The PRS is located at the Kafr El-Zayat – Kasr Nasr El Din Road, about 800m west Dalgamon village, more than 2.5 km south of Kafr El-Zayat and 2.7km far from Rosetta Branch. The figure below shows the PRS proposed location. The nearest residential building is located approximately 700m away from the PRS as show in the following figure. . The nearest sub-districts around the PRS are namely, Kafr Akhsha village, Monshaet El Kordy, Qasr Nasr El Dein, El Dalgmoun and Shobra Reis.

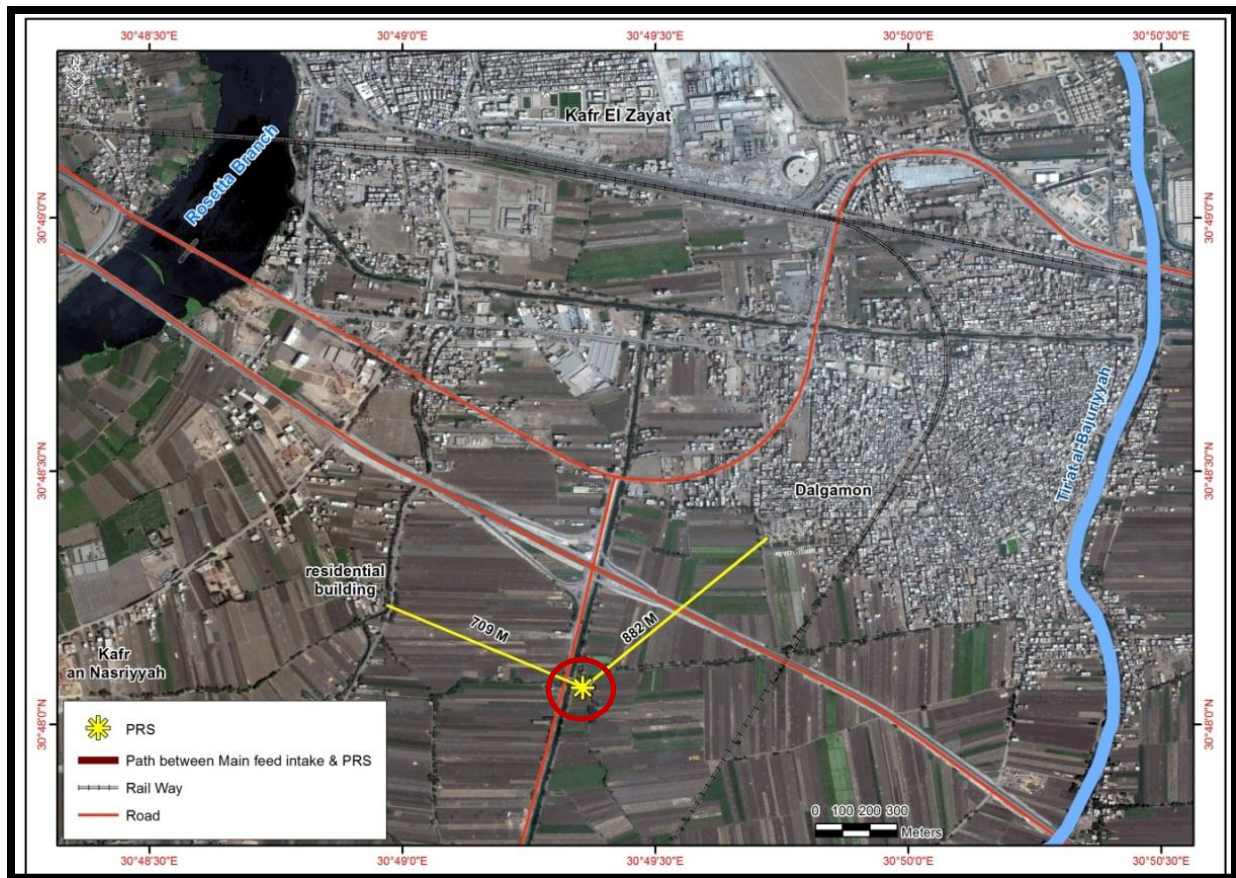


Figure 2-2: PRS location

2.4 Associated facility (Off-take and HP pipeline)

As previously mentioned, the Off-take from the national grid and the HP pipeline (70bar system) already exist (A due diligence study has been prepared and cleared by the bank). The off-take is the point on the HP national grid pipeline where a branch of the pipeline will be constructed to connect a new PRS to the national grid. At the Off-take location, valve rooms/valve ditching will be constructed so as to control the flow of the natural gas through the pipeline (branch). These valves work like gateways for the Kafr El-Zayat area.



Figure 2-3: The route from PRS site and the low pressure network

The Off-take site is 300 m away from the Kafr El-Zayat – Kasr Nasr El Din Road. It is located south of Ezbet Saideh (nearest residential area), which is approximately 1km away. The nearest residential building is located approximately 100m north east of the Off-take site. The figures below presents the Off-take location and the surroundings.

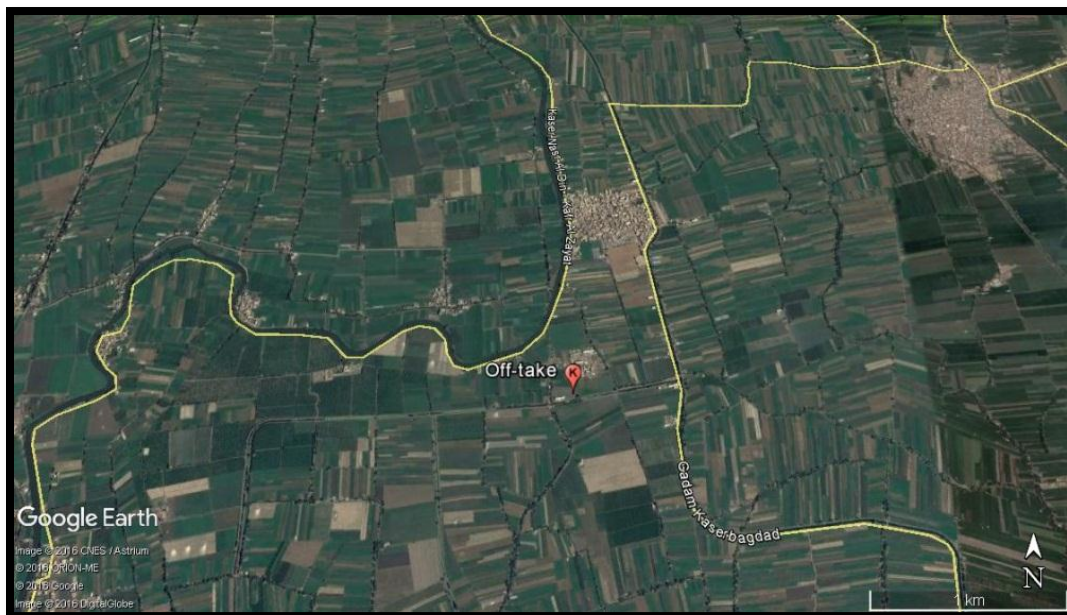


Figure 2-4: Off-take location

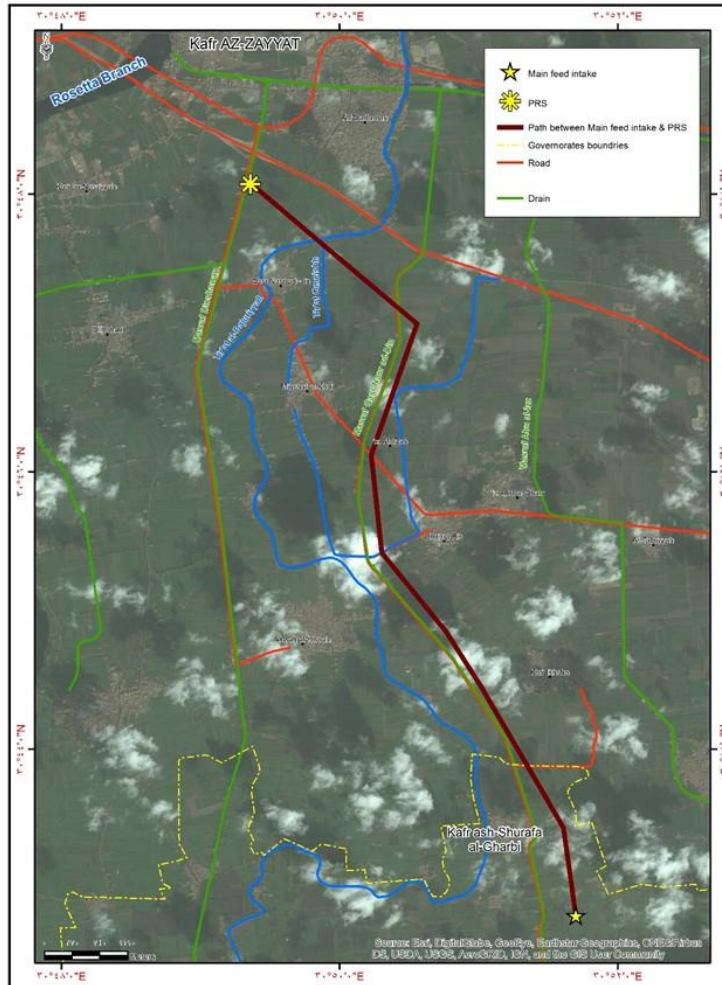


Figure 2-5: The route from intake and the PRS site

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 /pipeline “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 regulators, and metering stations.



2.5.3 Construction works of PRS

2.5.3.1 Pressure Reduction Station area

The PRS land 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 has been 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 700 m west of the proposed PRS location. In the event that buildings are constructed in the area surrounding the PRS, the Institute of Gas Engineers Safety Recommendations requires that the PRS should have free areas from each side to allow for emergency vehicle access. The nearest residential building to the propose PRS is far about 700m.

Kafr El-Zayat PRS will be located in a low-population-density area on plot of land measuring 40m x 70 m. The PRS is to be accessible by an existing road (Kafr El-Zayat – Kasr Nasr El Din Road) to ensure quick response in event of repairs and/or emergencies. The land is owned by EGAS since before the beginning of the project.. The site is located in a large area of agricultural land with no existing facilities. **Annex 2** from the report provides official hand over of the lands to Kafr El-Zayat PRS.

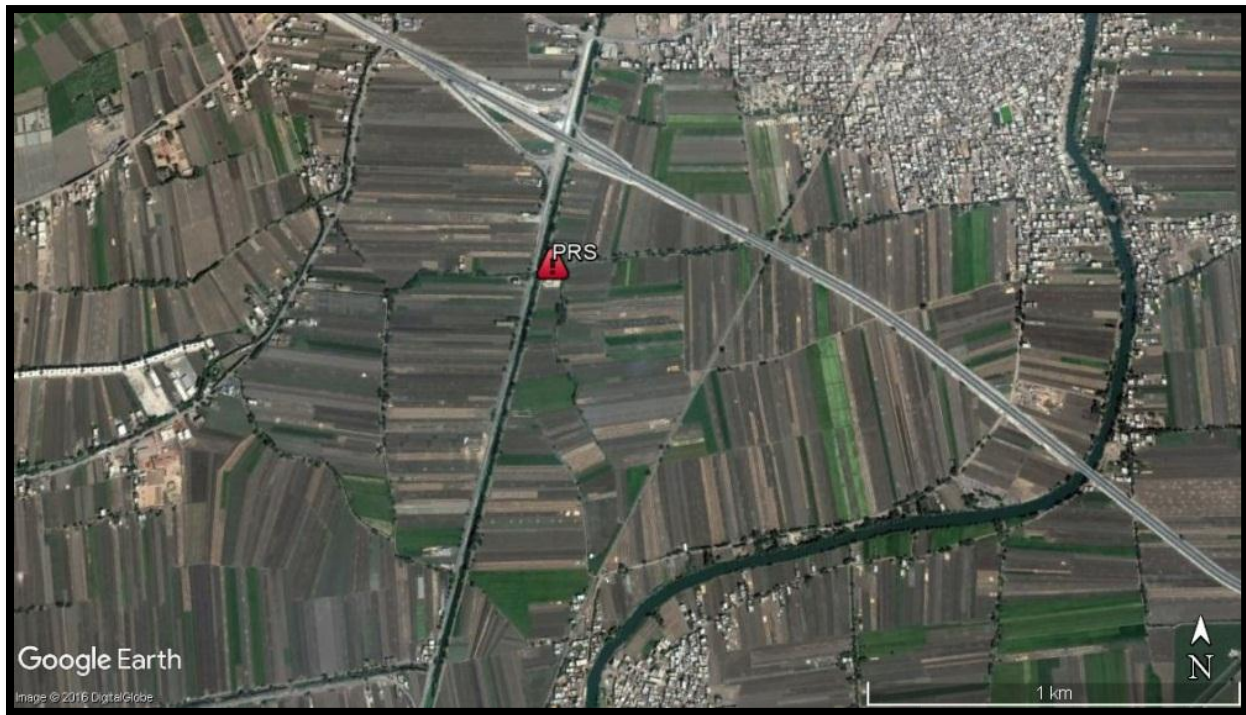


Figure 2-6: Site surrounding Kafr El-Zayat PRS

2.5.3.2 Pressure Reduction Station Civil Works

A 9-month construction schedule was planned for the Kafr El-Zayat PRS with site preparation expected to commence in the first half of 2019.

The following represents the main construction activities:

- 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 installments as necessary, to control erosion and sediment transport during site preparation activities.
- Following site preparation, individual excavations to 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 to be laid down;
- Facility piping (inlet, outlet and 4 inch firefighting line) both above and below ground, are installed.
- Construction of a 100m² control room with a bathroom, an electrical unit's room, and a security room adjacent to the PRS.

2.5.3.3 Pressure Reduction Station Mechanical Works

Kafr El-Zayat 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.



Figure 2-7: Typical example of the planned PRS”

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

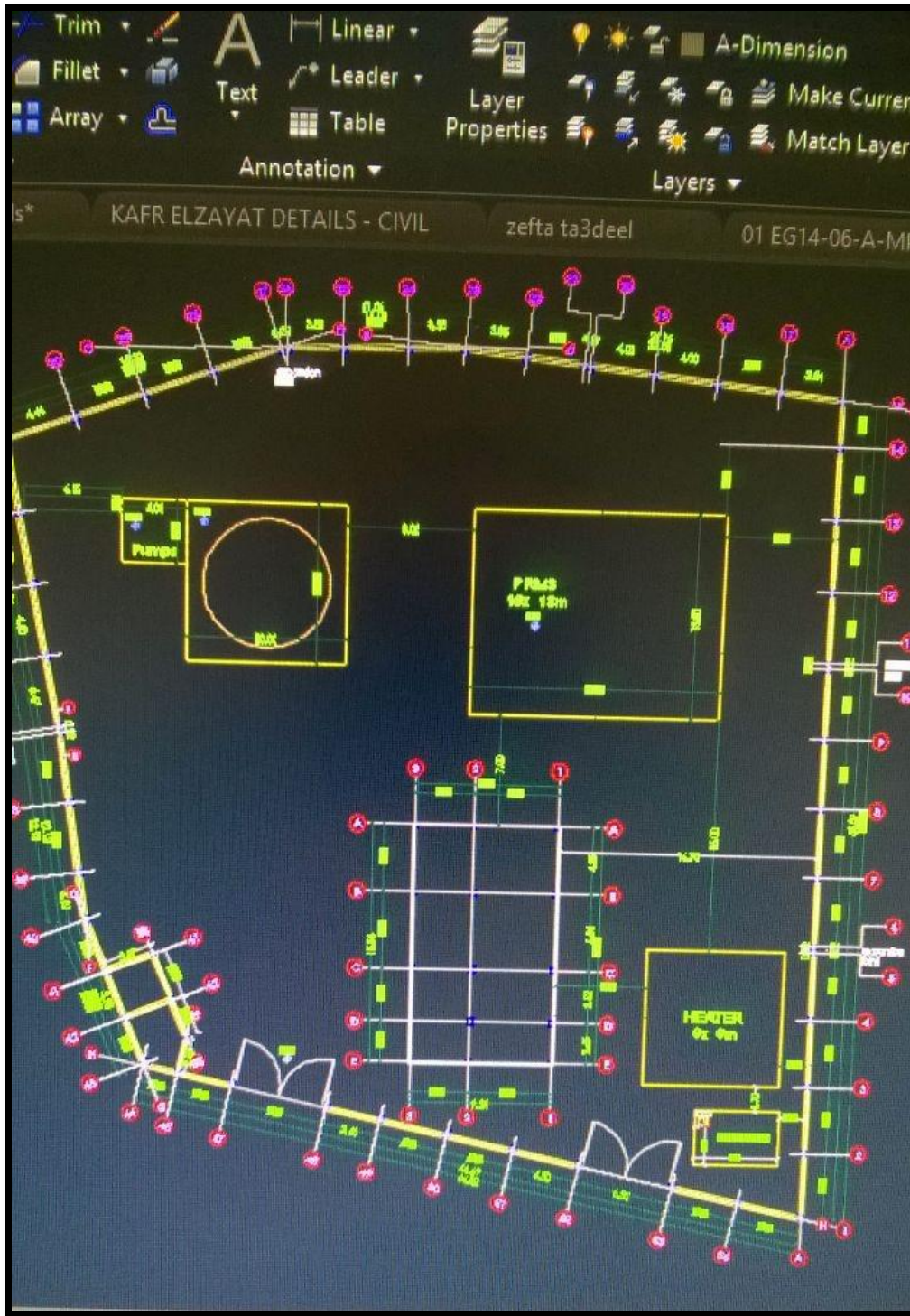


Figure 2-8: Kafr El-Zayat PRS Layout

2.5.3.4 Testing

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



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. Risks associated with those activities are further addressed separately in a Quantitative Risk Assessment (QRA) (Refer to annex - 9 Quantitative Risk Assessment Study).

2.6.1.1 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.

2.6.1.2 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.

2.6.1.3 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 will be equipped with two heaters in parallel (one of them being on standby in case of emergencies).

2.6.1.4 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.

2.6.1.5 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.



2.6.1.6 *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.

2.6.1.7 *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.

2.6.1.8 *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 10-20mg/cm³. The odorant system consists of a stainless steel storage tank, which receives the odorant from 200-liter drums, injection pumps, and associated safety devices.

2.6.1.9 *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.

2.6.1.10 *Hotline*

A 24 hours /7days a week 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.

2.7 Resources Consumption

2.7.1 During Construction

2.7.1.1 *Water*

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: 5 m³/day
- Construction activities: 850 m³

2.7.1.2 *Fuel*

Diesel fuel will be mainly used for:

- Diesel generators to supply electricity to the various 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. All vehicles will get fuel from the nearest gas stations.



2.7.2 During Operation

2.7.2.1 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.

2.7.2.2 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 grid network existing in the area.

2.8 Waste Generation

All solid wastes generated during the construction phase will be managed and disposed in accordance with applicable regulations and established best management practices. All generated wastes will be reused and/or recycled to the maximum extent possible.

2.8.1 During construction

2.8.1.1 Solid waste

Solid waste generated during the construction phase will comprise of domestic waste, construction waste and some hazardous wastes from construction activities. The waste is expected to include the following waste streams:

Table 2-1: Solid waste streams during construction

Waste type	Hazardous/Non- hazardous	Treatment and Disposition
Cement and Concrete Wastes (Including Cement Contaminated Soil)	Non-hazardous	Dispose to an approved waste disposal facility.(El Sadat land field – away about 50 Km from the 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. (Annex 3 from the report provides photos of
Used oil waste		
Batteries		



		previous UNICO receipts)
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 Nasserya hazardous waste facility.

All solid wastes generated during the construction phase will be managed and disposed in accordance with applicable regulations and established best management practices. All generated wastes will be reused and/or recycled to the maximum extent possible.

2.8.1.2 *Wastewater*

During the construction phase, 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 to be generated from the PRS is expected to be minimal and limited to domestic waste and it will be collect regularly by trucks belonging to Kafr El-Zayat 'local unit.

2.8.2.1 *Solid waste*

Hazardous waste mainly empty odor containers- 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. r. **(Annex 3)**

2.8.2.2 *Wastewater*

During operation, 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 Legislations/ guidelines 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
 - 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 for EIAs preparation
- EGAS HSE guidelines for PRS construction 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. LDCs follows EGAS HSE Guidelines which is (provided in Annex 4 of this 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 Labor and Workforce Safety

3.2 World Bank Safeguard Policies

Three safeguard policies are triggered for the project as a whole: Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12).

OP/BP 4.11 will not be applicable to Kafr El-Zayat PRS as no cultural resources are located in the project areas. With regards to OP/BP 4.12, it will not be applicable to the land obtained in Kafr El-Zayat city 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. However, the associated facility, the high pressure pipeline that has already been installed required land acquisition. Consequently, a due diligence assessment was applied. The guidance and requirement of the due diligence was based on OP 4.12. In addition to the above mentioned safeguards policies, the Directive and Procedure on Access to Information² will be followed by the Project³.

² <https://policies.worldbank.org/sites/pp3/PPFDocuments/Forms/DispPage.aspx?docid=3694>

³ All information will be shared under the following links www.egas.com.eg and www.regas.com.eg



3.3 World Bank Group General Environmental, Health, and Safety Guidelines & WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary.⁴

Gaps between requirements outlined by WBG guidelines and actions detailed by the ESIA have been analyzed. There are no significant differences between the requirements outlined by the WBG EHS GUIDELINE on GAS DISTRIBUTION SYSTEMS and the management and monitoring actions outlined by the ESIA.

3.4 International Finance Corporation (IFC) Guidelines

The IFC Environmental Health and Safety (EHS) Guidelines describes pollution prevention and abatement measures and emission levels that are normally acceptable to the Bank. However, taking into account borrower country legislation and local conditions.

In 2007, IFC Environmental, Health, and Safety (EHS) Guidelines were released which replace World Bank Guidelines previously published in Part III of the Pollution Prevention and Abatement Handbook.

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..

3.5 Permits Required

- _ 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.
- _ Approval from the Ministry of Agriculture to construct the PRS on agriculture land in accordance to the presidential decree Number 615 of year 2016.
- _ Army force permits to construct the PRS
- _ Constructions permit to be obtained from the Local Governmental Unit in Kafr El-Zayat -Gharbeya.
- _ Utility installation permission to the PRS (after construction phase).

⁴ www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelin



4 Environmental and Social Baseline

4.1 Introduction

Kafr El-Zayat is affiliated to Gharbeya Governorate which is located in the middle of the Nile delta in Egypt. Kafr El-Zayat is located in the west of the governorate on the Rosetta branch. It spreads in a plain studded with an intricate network of canals and drains.



Figure 4-1: Kafr El-Zayat District

4.2 Climatology and Air Quality

4.2.1 Climate

The average annual temperature is 20.3°C in Kafr El-Zayat . The warmest month of the year is July, with an average high temperature of 32 °C. January has the lowest average temperature of the year at 12.8 °C. Average annual precipitation in Kafr El-Zayat ranges between 0.1-18.1 mm. The wind speed in Kafr El-Zayat area is characterized by a calm to moderate. The highest average wind speed occurs during spring in March and April.



	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. No. of Prec. Days	6.5	5.1	3.4	1.4	0.5	0.1	---	---	0.2	1.4	2.6	5

Source: <http://www.weatherbase.com/weather/weather.php3?s=601818&cityname>

4.2.1.1 Rainfall

Average annual precipitation in Kafr El Zayat ranges between 0.1-18.1 mm *Table 4-1* show the average annual precipitation and average number of rainy days in Kafr El Zayat..

Table 4-1: Average Precipitation in Kafr el Zayat Area

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Prec. (mm.)	18.1	8.9	6.1	3.1	1.6	0.1	---	---	0.1	2.1	7.9	15.7
Av. No. of Prec. Days	6.5	5.1	3.4	1.4	0.5	0.1	---	---	0.2	1.4	2.6	5

Source: <http://www.weatherbase.com/weather/weather.php3?s=601818&cityname>

4.2.1.2 Relative Humidity

The air is driest around April 25, at which time the relative humidity drops below 30% (comfortable) three days out of four; it is most humid around August 11, exceeding 81% (humid) three days out of four.

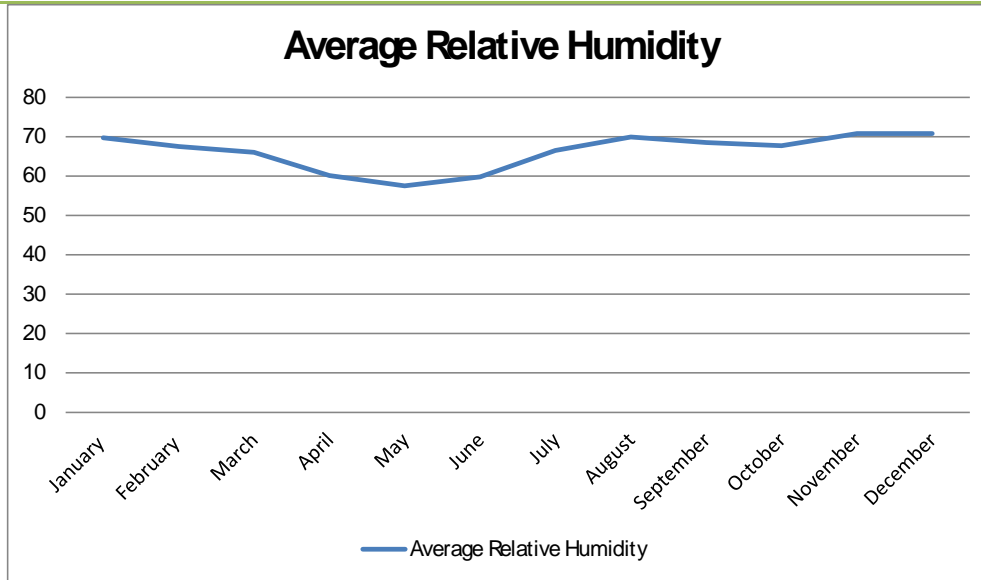


Figure 4-2: Average Humidity at Kafr El Zayat

4.2.1.3 Wind

The wind speed in Kafr El Zayat area is characterized by a calm to moderate. The highest average wind speed occurs during spring in March and April.

Table 4-2: Average Wind Speed (Km/h)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Wind Speed	10.1	11.2	11.5	11.5	11.2	10.4	9.4	8.6	9	9	8.6	9

Source: <http://www.weatherbase.com/weather/weather.php3?s=601818&cityname>

4.2.1.1 Site Specific Ambient Air Quality

The selection of the active air measurement location is based on the nature of the surrounding activities, the location of the nearest sensitive receptors⁵ (such hospitals, schools, protectorates, etc.) 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 GPS coordinates of the selected Ambient Air monitoring locations.

Coordinates	Latitude	Longitude
Kafr El-Zayat – Kasr Nasr El Din Road	30°48'5"N	30°49'20"E

⁵ None were observed during the site visit.



Accordingly, environmental measurements have been taken at the PRS location as a benchmark to be able to assess the impacts of the PRS construction and operation activities on air quality and noise intensity.

8-hour average measurements were conducted for pollutants of primary concerns, namely, carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), Total Suspended Particulates (T.S.P) and particulate matter (PM₁₀). The air quality at the proposed site of the proposed PRS is exhibiting acceptable levels of classic air pollutants in fact the levels are way below the national and international guidelines Table 4-3 presents the results for ambient air quality measurements conducted at the monitoring location. Daily average results are shown in the following table for all the measured parameters.

Table 4-3: Eight (8) hours average ambient air pollutants' concentrations (µg/m³)

Measurements	NO	NO ₂	NO _x	SO ₂	CO(mg/m ³)	PM ₁₀	T.S.P
Average	8.6	5.1	13.7	7.3	1.0	80	99
National	150	200	150	350 (1 h) 150 (24hrs)	30 (mg/m ³)	70 (24hrs)	230 (24hrs)
WB limits	NA	200	150 ^a mg/Nm ³ 50 ^b mg/Nm ³	75 mg/Nm ³	100 mg/Nm ³	10 mg/Nm ³	60-90 long term 150-230 (24 hrs)

- a. The 150 mg/NM3 NOX value is applicable to facilities with a total heat input capacity of up to 300 MWth.
- b. The 50 mg/NM3 NOX value is applicable to facilities with a total heat input capacity greater than 300 MWth.

4.2.1.2 Site specific noise measurements

Noise level measurements were conducted in the same location (proposed site of the new Pressure reduction station) of the ambient air quality measurements. The duration of the measurements is 8 hours with one hour averaging intervals.

Table 4-4 presents the ambient noise measurements at the proposed PRS site.

Table 4-4: Average Ambient noise level measurements

Time	Sound Level Equivalent & Percentile Recordings in dBA for 24 Hours						Permissible Limits LAeq (dBA)
	LAeq	LA10	LA50	LA90	LA95	LCpeak	
	46.0	55.1	45.6	38.2	36.4	106.6	70 National limits 70 International limits



Annex 5 from the report present the full Air and Noise measurements at Kafr El-Zayat PRS location.

4.2.2 Geology

The Nile Delta basin was affected by the complex evolution and interaction among the African, Eurasian and Arabian plates. Six major structural trends delineate the present Nile Delta and affect the distribution of the Miocene sediments in the Nile Delta; the minor NS Baltim fault trends affect the Kafr El Zayat area. The strata of hydrological importance, in the Delta area and its fringes, belong essentially to the Quaternary and constitute the main water-bearing formations. The Kafr El Zayat area belongs to the Mit Ghamr formation, consisting mainly of clay and silt including some sand tracks.

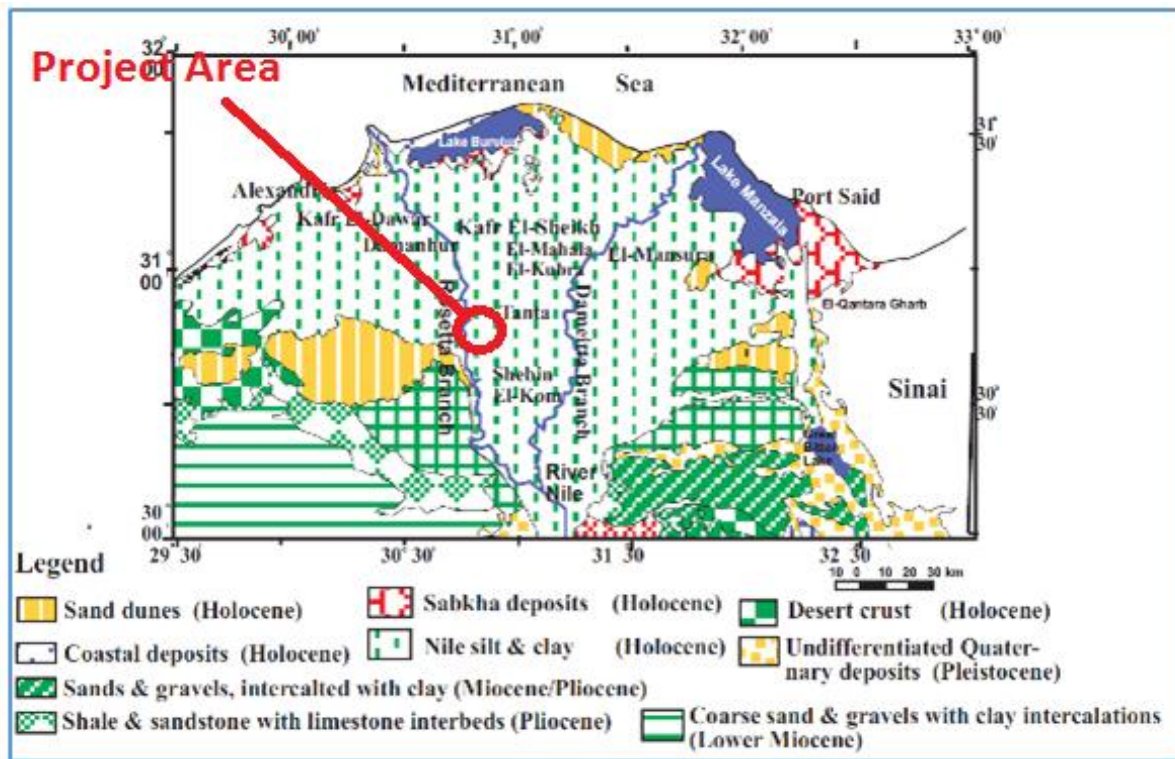


Figure 4-3:Geological Map of Nile delta include project area
Source: H.H. Elewa, 2010

4.2.3 Water resources

4.2.3.1 Surface water

Kafr El-Zayat is located at the Rosetta Branch; however the PRS is located 2.7km away from the branch. The River Nile Branch represents the main freshwater stream that extends northwards for about 236 km on the western boundary of the Nile Delta from Egypt's Delta Barrage Rosetta. The branch has an average width of 180 m and a depth between 2 to 4 m.



Dalgamon canal is located at the west of the PRS; the canal is used as a main water source for agricultural land in Dalgamon city (the city is far 1.4km from the PRS). There is no impact on water quality of the canal during construction or operation phases.



Figure 4-4: Dalgamon canal

4.2.3.2 Groundwater

There is no site specific data available on the groundwater quality in Kafr El-Zayat . The groundwater aquifer of the Nile Delta is not considered as a separate/additional water resource from the Nile as it is directly connected to its river channels (MWRI, 2005). Audebeau (1912) and Zaghloul (1985) gave evidence that the Nile River is the source of the groundwater underlying the valley and Delta.

4.2.4 Terrestrial Environment

Kafr El-Zayat area is not characterized by the presence of endangered species (fauna or flora). The project area is eventually free from any endangered or vulnerable species.



4.2.5 Solid Waste Management

Municipality Solid Waste collection points, used as open transfer systems existed in residential areas in Kafr El-Zayat City. There are open transfer systems, which exist in residential areas, where waste is collected and then transferred to the El-Sadat controlled-landfill, located approximately 120 km from the city.

Waste collection services do not exist at the project sites (PRS). Accumulated waste was observed on the drainage's bank. Most of the dumpsites are located in an agricultural area located in the proximity of residential areas.

4.2.6 Physical cultural resources

The PRS in Kafr El-Zayat is located in an area characterized as agricultural land. These areas have been excavated previously for 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 urban and semi-urban areas, shall be affected by the NG construction works. In case of any unanticipated archeological discoveries within the project areas; **Annex 6**, 'Chance Find Procedure,' prepared in the ESIA framework study details the set of measures and procedures to be followed in such case.

The areas, where the project is to be implemented, are in compliance with the specifications and preconditions of low pressure NG installation pipework set according to the British standards. All the necessary public utilities such as water, sanitary, sewage and electricity networks are in place.

4.2.7 Traffic profile

Kafr El-Zayat is one of the biggest urban areas in Gharbeya Governorate. The city hosts many industrial activities. Consequently, the traffic tends to be dense. There are many commercial areas in Kafr El-Zayat. The biggest area can be noticed in the vicinity of the municipality. Tuk Tuks made traffic conditions in the city worse as they pass in small alleys and in narrow streets. This might cause disturbance to the project as well as the mobility of tuk tuks. Microbuses and private cars were noticed in the whole areas. The traffic is congested between 8 a.m. – 11 a.m. and 2 p.m. – 6 p.m. (during winter season)

There are three types of roads close to the PRS

Highways: The main highways are those connecting Kafr El-Zayat with Tanta City. The road is two lanes width. This road is relatively far from the project site.

Urban roads: They are the roads connecting various villages and mother villages with Kafr El-Zayat they are one lane and relatively narrow roads.



Figure 4-5: Kasr Bagdad and Kafr El Shorafa road



Figure 4-6:Kafr El-Zayat -Qasr Nasr El Dein Road

Local roads: They are one lane width. Some of them are plastered with asphalt while others are not. They enable one vehicle to move. Some of them are wide to enable two cars to move in the same time.



Figure 4-7: Side road not paved with Asphalt



Figure 4-8: local road covered with asphalt

4.3 Socio-economic Baseline

Kafr El-Zayat is located in the western part of Gharbeya governorate. It lies on the bank of Rosetta branch, and is bordered to the west by al-Beheira governorate. To the East lies Markaz Tanta.

4.3.1 Administrative affiliation

The secondary data collected showed that the PRS is located in Kafr El-Zayat. The high pressure pipeline was installed in Kafr El-Zayat District in the jurisdiction of Gharbeya Governorate. The nearest sub-districts surrounding the PRS are namely, Kafr Akhsha village, Monshaet El Kordy, Qasr Nasr El Dein, El Dalgmoun and Shobra Reis. These are the potential areas that might be affected from the construction and operation activities of the PRS.



4.3.2 Urbanization trends

Kafr El-Zayat is of a mixed character. It includes agrarian lands totaling 451 feddans, and urbanized space totaling 411 feddans, according to figures provided by the Information Center. The majority of the population lives in apartment buildings. The condition of the urbanized and semi-urbanized spaces is, mostly haphazard; and lacks proper planning. However, no information or data, regarding the legal status of residential buildings, were obtained by the field research team.

According to CAPMAS poverty mapping data of 2013, the percentage of individuals living in apartments is 92%, while those living in rural houses represent 0.42%.

4.3.3 Demographic characteristics

4.3.3.1 Total Population

The total population of the five areas (sub districts) are estimated at 70,183 people in 2013 in accordance to Poverty Mapping 2013.

Table 4-5: Project areas' population

Population	Kafr Ekhsha	Monshaet El Kordy	Qasr Nasr El Dein	El Dalgmoun	Shobra Reis
Population 2013	6788	7390	5290	43447	7268
Population 2006	5989	6520	4668	38332	6413
Household 2006	1486	1585	1153	9538	1552

Source: Poverty Mapping 2013- CAPMASS

4.3.3.2 Rate of Natural Increase

According to 'Governorates' Description by Information 2010,'developed by the Information and Decision Support Center, the birth rate in Gharbeya governorate stands at 26.80 per 1000 persons. Mortality rate is 6.60 deaths per 1000 .

Neonatal mortality rate is 5.40 per 1000 live births. Infant mortality rate is 12.30 per 1000 infants below 28 days of age. Below five years old mortality rate is 15.90 per 1000 children. Population natural growth rate is 20.20 per 1000 persons.

4.3.4 Living Conditions

4.3.4.1 Household Size and Density

The project areas accommodate 17,357 households. About 62.0% of the households reside in El Dalgmoun village. The households' size varies among project sites. The biggest households are located in Shobra Reis.

Table 4-6: Project areas households' number and size

	Kafr Ekhsha	Monshaet El Kordy	Qasr Nasr El Dein	El Dalgmoun	Shobra Reis
Household size	4.03	4.11	4.05	4.02	4.13



Household 2013	1684	1796	1307	10811	1759
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Source: Poverty Mapping 2013- CAPMASS

4.3.4.2 Dwelling characteristics

As stated in the urbanization trends section, the majority of the population of Kafr El-Zayat lives in apartment buildings (92%), compared to 0.42% living in rural houses. The conditions and characteristics of urban houses are in compliance with the bases and preconditions for connecting NG. That, concrete and red bricks were used in the construction of the walls and ceilings. The finishes and facades of all buildings are of a very poor quality, and some are left with no paintings or cement rendering.

Most of the buildings are legal, and as noted above, the field research team had no access to any reports or data concerning the possibility of illegal buildings within Kafr El-Zayat.

Regarding the conditions and characteristics of the streets; the average width of main streets range between 1 to 2 lanes wide, and side streets and alleyways range between 1 to 2 lanes wide. All streets that were documented by the research team are paved out, though the condition of the asphalt varies between modest and poor.

4.3.5 Access to Basic Services

4.3.5.1 Access to Electricity

According to CAPMAS poverty mapping data of 2013, approximately 100% of individuals, living in the City of Kafr El-Zayat , use electricity for lighting. The majority of focus groups' participants use electricity for water heating. The electricity grid covers 1352.94 subscribers in the entire governorate of Gharbeya, according to 'Governorates' Description by Information 2010.'

4.3.5.2 Access to potable water and sanitary system

According to CAPMAS poverty mapping 2013, the percentage of individuals having access to public water network reach 99.8%, while those having tap water inside their houses stand at 98.4%. Accessibility to public sanitation network stands at 96.65% of individuals, according to CAPMAS poverty mapping 2013.

According to the focus group discussions, one of the female participants complained about the quality of tap water that most of the people use water filters. There are also complains regarding the health and condition of the sanitation network.

4.3.6 Human development profile

4.3.6.1 Education

The illiteracy rate tends to be high in all project. The highest percentage reported in Kafr Ekhsha village (45.54%) whereas the least ratio reported was in El Dalgmoun. (28.18%). There is a significant gap between males and females, as females' illiteracy rate is higher than males in all project areas. The highest percentage reported is (66.37%) in Kafr Ekhsha.



Table 4-7: Project areas illiteracy rate

	Kafr Ekhsha	Monshaet El Kordy	Qasr Nasr El Dein	El Dalgmoun	Shobra Reis
Illiteracy rate	45.54	30.90	28.92	28.18	34.46
Illiteracy rate among females	66.37	44.34	42.82	38.76	48.30

4.3.6.2 Unemployment and Work Status

The total labor force⁶ (15+ years old) within project areas varies between (50.37%) in Kafr Ekhsha and (37.75% in Monshaet El Kordy. The total labor force reduced among females to be less than 8.65% in Shobra Reis as the community does not appreciate female work. Additionally, females are not willing to work outside their house. The highest percentage of female within labor force reported in Qasr Nasr El Dein (16.24 %.) However, the lowest ratio reported was in Shobra Reis.

Agriculture areas tend to be of lowest unemployment rate as agriculture activities can absorb unskilled and semi-skilled laborers aside from their skills and educational level. Unemployment rate is the lowest in **Shobra Reis** village (8.65%), while it is the highest among **Monshaet El Kordy (44.69%)**. Female unemployment tends to be the highest in **Monshaet El Kordy (43.10%)** and the least unemployment ratio reported in **Shobra Reis** District (28.79%). Aside from information provided about females’ unemployment, women tend to work in their houses and their fields. They don’t consider this as a work as it is unpaid. The majority of residents in all project areas work in agriculture sector. This is consistent with the primary data collected from the PAPS.

Table 4-8: Project areas labor force and unemployment rate

	Kafr Ekhsha	Monshaet El Kordy	Qasr Nasr El Dein	El Dalgmoun	Shobra Reis
% of individuals 15 years + who joined labor force	50.37	37.75	44.40	39.27	42.24
% of females 15 years + who joined labor force	12.12	12.45	16.24	11.71	8.65
% of adult 24+ employed from the total labor force	53.46	44.69	49.08	47.08	48.31
Unemployment rate	16.20	20.41	15.87	13.13	8.28

⁶ Those persons who are 15-65 years and willing to work



Females unemployment rate	28.10	43.10	42.10	30.32	28.79
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Source: Poverty Mapping 2013- CAPMASS

The formal Statistics obtained from the Poverty Mapping Data 2013 regarding manpower reflected that the age of starting work is 15 years old.⁷ Both the Child Law and the Labor Law state that children shall not be employed before they complete 14 calendar years old, nor shall they be provided with training before they reach 12 calendar years old; however children between 12 and 14 years old are permitted to work as trainees.

4.3.7 Health Facilities

The city of Kafr El-Zayat has one central public hospital, one fever hospital, respiratory medical unit, one ambulance center, and one childcare center. According to the representative of the Department of Environmental Affairs, interviewed by the field research team, the level of medical services in the City of Kafr El-Zayat has some deficiencies. There is critical lack of specialized doctors as well as critical deficits in the appliances. The hospital can provide services to the workers within the project areas. However, in case of critical and severe health problems the LDC stated that there are in place different levels of health facilities: 1) health units and hospitals within project areas, 2) hospitals in the Tanta, the capital city of Gharbeya Governorate, 3) hospitals in Cairo. The workers are enabled to use any of the alternative health facilities.

The representative of civil society, interviewed by the field research team, commented on the poor level of hygiene and cleanness services in the city, stressing that critical interference from the government is much needed.

4.3.8 Poverty index

According to the Poverty Mapping developed by CAPMAS in 2013, the number of poor people in the City of Kafr Ekhsha is 1983 individuals, representing 29.22% of the total population. The lowest percentage of poor people reported in El Dalgmoun (16.29%).

Per Capita Consumption reflected that El Dalgmoun is of the highest consumption (5567.25 EGP/Annually) however, the least consumption value was reported in Kafr Ekhsha (4783. 20 EGP).

Female headed families tend to be poorer than the male headed families in accordance to the Expenditure, Income and Consumption report 2012. The female headed families ration was the highest in Qasr Nasr El Dein village (15.87%), while the least reported ratio was in Kafr Ekhsha (11.64%).

⁷ Based on Labor law number 12 of year 2003 and The Child Law (No. 12, 1996). There are certain critical obligations to recruit children below 15 years old. Article 98-103 of Labor law put limitations related to age, type of occupation, hazards work...etc



Table 4-9: Poverty index

	Kafr Ekhsha	Monshaet El Kordy	Qasr Nasr El Dein	El Dalgmoun	Shobra Reis
Percentage of poor people	29.22	17.73	17.60	16.29	16.35
Per capita consumption	4783.20	5481.29	5435.53	5567.25	5492.45
Number of poor in 2013	1983	1310	931	7078	1188
% of female headed household	11.64	15.20	15.87	14.09	15.65

Source: Poverty Mapping 2013- CAPMASS



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 different phases (construction and operation) of a 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.

5.1 Impact Assessment Methodology

The impact assessment methodology adopted for this ESIA is a semi-quantitative “cause-effect” matrix modified from Leopold and Buroz’s Relevant Integrated Criteria. The Leopold matrix is two-dimensional, where the stages of the project (activities) are assessed in relation to the existing environmental characteristics and conditions that may be affected during the execution of those actions. The impact of each activity on each receptor was assessed according to magnitude on a scale of -10 to 10, where negative values indicate a negative influence on the receptor, and importance on a scale of 0 to 10, which encompasses the probability of occurrence, frequency of the impact etc. The numbering system is used as a relative measure, where more negative numbers correspond to impacts having a higher negative magnitude. Susceptible receptors and corresponding activity are deduced if magnitude and importance are of minor severity. Then the importance of each impact by activity is determined based on the Buroz relevant integrated criteria. The importance of each impact by activity is assessed by assigning a score for intensity, extension, momentum, persistence, reversibility, recoverability, synergy, accumulation, effect and frequency of the impact. The importance, I, is determined according to $I = \pm (3IN + 2EX + MO + PE + RV + SI + AC + EF + PR + MC)$. Details including definitions of each assessment criterion and corresponding score scale for the Buroz Relevant Integrated Criteria are presented in **Annex 7**.

For both methods, the severity of the impact is defined as either of no significance, minor, medium, or major according to each method’s scoring scale. Detailed tables with numbers and corresponding coloring are provided in **Annex 7**. Results from both methods are summarized and presented according to the following scheme:

Impact rating	Color
None or of no significance (no impact);	
Minor severity (minimal impact; restricted to the work site and immediate surroundings)	
Medium severity (larger scale impacts: local or regional; appropriate mitigation measures readily available);	
Major severity (Severe/long-term local/regional/global impacts; for negative impacts mitigation significant).	



5.2 Potential Positive Impacts

5.2.1 Positive impacts during construction

5.2.1.1 *Impacts related to employment*

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

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

The construction of the Kafr El-Zayat PRS is expected to result in the creation of job opportunities, both directly and indirectly. Based on similar projects implemented recently by EGAS and the local distribution company, the daily average number of workers during the peak time will be about 16 workers, being 14 laborers 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.

5.2.1.1.2 Create indirect opportunities

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

5.2.2 Positive impacts during operation

5.2.2.1 *Impacts related to employment*

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

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

The operation of the Kafr El -Zayat PRS is expected to result in the creation of job opportunities, both directly and indirectly. The average number of workers during operation of the Kafr El -Zayat PRS will be about 12 workers from the permanent workers of the LDC; 6 technicians, 3 maintenance staff (one engineer and two engineer's assistance) and 3 security staff. In addition to that, 4 police staff will be recruited permanently to guard the PRS. With regards to health and safety, one person will be assigned from the staff of Egypt Gas.

Some of the mentioned opportunities are already occupied by Egypt Gas staff while few of the jobs will be need to host additional staff (e.g. additional one in health and safety). The current permanent staff also might move to a new site. In this case, new staff will be trained and recruited.

5.2.2.1.2 Create indirect opportunities

As part of the operation stage, a lot of indirect benefits are expected to be sensed in the targeted areas due to the need for more supporting services to the workers and contractors who will be working in the project site in Kafr El Zayat City. This could include, but will not be limited to, provision of waste disposal services and septic tanks evacuation.



5.3 Potential Negative Impacts

5.3.1 Negative impact during construction

5.3.1.1 Impact on soil

The excavation activities will result in the disturbance of soil characteristics and cause soil erosion. This will be more pronounced when there is excavations soil compaction may occur due to heavy machinery. In addition, potential soil contamination may occur as a result of oil spills and leaks.

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Therefore the impact on soil considered medium.

5.3.1.2 Air Emission

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

These activities in consequence are expected to emit air pollutants to the ambient air. The duration of this impact is expected to be short. The following air pollutants are foreseeable for most of the construction activities:

- Fugitive dust emissions (PM10, PM2.5)
- Exhaust of vehicles or equipment such as temporary generators, trucks, trolley, 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 dust will be of moderate impact on the surrounding area (agriculture land). Soil characteristic at PRS site is mainly hard soil.

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

5.3.1.3 Noise emissions

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 sensitive receptors.

The potential groups who are susceptible to the construction noise during the construction of the Kafr El Zayat PRS are the following:

- Onsite Workers



- Neighboring farmers

It is worth mentioning that the proposed PRS site is located at Kafr El-Zayat – Kasr Nasr El Din 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.

Regarding the construction of the PRS, it is expected that the generated noise will mainly have an impact on workers and to a smaller extent on nearby farmers.

The impact of construction works (PRS) is assessed medium for neighboring farmers and workers.

5.3.1.4 *Impact on occupational health and safety*

Potential health and safety impacts are expected to workers during construction of the Kafr El Zayat PRS.

The occupational health and safety impacts is assessed as medium

5.3.1.5 *Risk pertaining to child labor*

As mentioned in the baseline, child labor is a common practice in the project communities in Gharbia. Children below 18 work almost in all developmental 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 and subcontractors obligations. Rigid penalties should also be applied to the contractor and subcontractors in case of breaching child labor restrictions.

Child labor risk is assessed as low to medium

5.3.1.6 *Inappropriate Hazardous material and waste management*

Normal construction non-hazardous solid wastes includes 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 labor, including sewage and garbage collected from the labor offices location will be also generated. Disposal of sewage and garbage generated from construction labor, if not transported to adequate sites, will be a continuation of the existing sanitation situation and contribute, although to a relatively low extent, to environmental deterioration.

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.

Hazardous material and waste management impact is assessed medium

5.3.1.7 *Traffic impact*

Environmental impacts



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 the Kafr El-Zayat – Kasr Nasr El Din Road.

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 medium

5.3.1.8 Impact on ground water

Groundwater 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 and transported via a certified contractor to the nearest wastewater treatment station.

Therefore the impact is assessed minor

5.3.1.9 Ecological impact

As described in the baseline section, the proposed project site is not characterized by the presence of endangered species. The project site is characterized by agricultural land, and only some non-significant exotic floral species such as grasses, and stray dogs and cats, were recorded in the project area.

Therefore the impact is assessed as of no significance

5.3.1.10 Community health and safety

The proposed project site is located approximately 150 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 it is assessed as minor impact

5.3.1.11 Land related impact

Socioeconomic impacts

The Kafr El -Zayat PRS required a plot of 2698 m².

The land was obtained in accordance to a willing buyer willing seller approach. The PRS land was obtained in 2012.. The process was as follow:

- three potential lands were proposed and site visits paid by EGAS and Egypt Gas team.
- The owners of lands were negotiated until one of them approved on land price.



- A contract was signed and documented with each land owner.
- There were no kind of encroachment in the land allocated for the project. Additionally, obtaining the land have not resulted in any kind of economic displacement. Based on the meeting conducted in the site, no one of the consulted community stated that there were any kinds of customary or formal land use.

Impact related to land during the construction phase is assessed as **of no significance**

5.3.1.12 Visual intrusion and landscaping

During the construction of the PRS visual intrusion is likely to occur due to moving construction materials and vehicles inside the agricultural lands. Given the fact that the PRS land is fenced, the probability of this impact tends to be of no significance .

Impact related to the visual intrusion during the construction phase is assessed as **of no significance**

5.3.1.13 Labor influx

There is a probability to face a labor influx impact that might originate from the migration of laborers to the work site. Additionally, some people might follow workers to provide services. Generally speaking, such an impact is viable in remote areas when thousands of workers invade rural areas causing real disturbance to the surrounding community and absorb their resources. In the Kafr El -Zayat PRS, only 16 workers will come from outside Kafr El -Zayat. Such a number is unlikely to cause any labor influx impacts.

Impact related to the labor influx during the construction phase is assessed as **of no significance**

5.3.2 Negative Impact during operation

Impacts related to water, land, visual intrusion and community health and safety tend to be of no significance.

5.3.2.1 Occupational health and safety

Possible impacts to health and safety during operations include exposure 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 and is addressed in a Quantitative Risk Assessment (Annex-9) attached as a separate study. An odorant is added to the NG in order to enable detection upon leakage. The odorant containing Tertiobutylmercaptin (80%) and Methylsulphide (20%) is classified as a hazardous substance. The MSDS of the odorant identifies the following hazardous properties: Highly flammable, flammable and toxic products upon thermal decomposition, irritant, and toxic to aquatic flora and fauna. In case of emergency, the risk resulting from odorant release or gas leak will be managed by Kafr El-Zayat PRS's emergency response plan.

Therefore the impact is assessed medium



5.3.2.2 Risk pertaining to child labor

Given the permanent nature of job opportunities during operation phase, children below 18 are not allowed to work in the PRS. Consequently, this risk is not valid in the operation phase .

Child labor risk is assessed as of no significance

5.3.2.3 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 briefly, 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.. Poor waste management practices may also have a significant impact on environment (soil, ground water(if exists), visual, and health and safety).

Therefore impact considered medium

5.3.2.4 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.

Therefore the impact is assessed minor

5.3.2.5 Air emissions

No gaseous emissions are expected to occur during the operation phase except for accidental natural gas leak or in case of accidents (odorant handling or storage) and during maintenance activities.

Therefore the impact is assessed as of no significance

5.3.2.6 Soil impact

The normal operation of PRS doesn't has any impact on soil; however risk of soil contamination is only associated with the possible spillage or leakage.

Therefore the impact is assessed as of no significance

5.3.2.7 Ecological impact

The normal operation will not have any impact on flora and fauna.

Therefore the impact is assessed as of no significance



5.3.2.8 Traffic impact

During the operation and maintenance of the PRS, there will be no expected impact. There will be only small number of staff vehicles moving in and out of the PRS as well as trucks to transporting odorant and spare parts to the PRS. Traffic impact are anticipated to be of no significance due to the proposed project located at Kafr El-Zayat – Kasr Nasr El Din Road..

Therefore the impact is assessed as of no significance

5.3.2.9 Labor influx

The Kafr El Zayat PRS will employ between 12 and 14 workers. Such limited number of workers can never create any labor influx impact.

Therefore the impact is assessed as of no significance

5.4 Impact 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 Kafr El-Zayat QRA study, the individual risk level to the exposed workers / public based on the risk tolerability criterion have been identified in Acceptable region (Lower Tolerability Limit⁸). Some Recommendations need to be considered to keep this acceptable risk tolerability, and this will be discussed under item (7.7) (refer to the QRA Study under Annex-9)

8 Lower Tolerability Limit

Which the risks are broadly tolerable to society and comparable to everyday risks faced by the public. If the overall risk is below the Lower Tolerability Limit, the ALARP Assessment is likely to be straightforward and limited to ensuring compliance with Good Practice. Below the Lower Tolerability Limit, the principal risk management concern is the maintenance of existing risk reduction measures to avoid degradation.



5.5 Summary of Impact

Table 5-1: Summary of potential impacts

Impact	Impact Description	Type and significance identification	Impact Significance
During Construction			
Impact on soil	<p>PRS may 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.</p>	Negative impact	Medium
Air emission	<p>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:</p> <ul style="list-style-type: none"> - Particulate matter and suspended solids from excavation/backfilling operations - Possible dispersion from stockpiles of waste or sand used for filling trenches. - Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO_x, NO_x, CO, VOCs, etc. - Traffic congestions resulting from road closure or slowing down of traffic due to excavation works. <p>Dust 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 700 m from the PRS construction site.</p> <p>Gaseous pollutants emissions Provided machinery used during construction is certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and IFC permissible levels.</p>	Negative impact	Medium



Impact	Impact Description	Type and significance identification	Impact Significance
Noise	<p>Noise impact on worker</p> <p>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. The impact of construction (PRS) is assessed medium for neighboring farmers and workers.</p>	Negative impact	Medium
	<p>Noise impact on nearby farmer</p> <p>Noise impacts on farmer in nearby agriculture land will be affected by the increased noise levels during the construction phase.</p>		Medium
	<p>No major noise impacts are expected during construction of the PRS as the nearest receptors are around 700m away and the construction period is limited.</p>		Minor
Occupational health and safety	<p>Inhalation of air pollutants, exposure to high noise levels, injuries and potential death as a result of operating heavy equipment, and handling hazardous materials.</p>	Negative impact	Medium
Risk pertaining to child labor	<p>As mentioned in the baseline, child labor is a common practice in the project communities in Gharbia. Children below 18 work 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 and subcontractor obligations</p>	Negative impact	Low to medium
Solid and Hazardous waste	<p>Inappropriate waste disposal and improper management of construction waste materials, which could lead to spillages that will cause soil contamination.</p> <p>Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. 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.</p> <p>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.</p>	Negative impact	Medium



Impact	Impact Description	Type and significance identification	Impact Significance
Traffic	The transportation of material and equipment to the construction sites will cause temporary increase in traffic along Kafr El-Zayat –Kasr Nasr El Din road, and other main road in the governorate.	Negative impact	Medium
Ground water	Ground water that might exist in the area may be affected by inappropriate liquid and hazardous waste during construction.	Negative impact	Minor
Ecological impact	No anticipated impacts	Negative impact	Of no significance
Community health and safety	Negligent workers may cause accidents harmful to the community members, particularly children and old people, especially close to the digging sites. Impacts associated with Community Health and Safety are limited to the inside the fence of the PRS and in the path of the high-pressure pipeline that have already installed. Therefore, there is no impacts related to community health and safety during construction.	Negative impact	Minor
Impacts related to lands	The PRS required a plot of 2698 m ² The land was obtained in accordance to willing buyer willing seller approach.	Negative impact	Of no significance
Visual intrusion and landscaping	No anticipated impacts	Negative impact	Of no significance
Labor influx	No anticipated impacts	Negative impact	Of no significance



Impact	Impact Description	Type and significance identification	Impact Significance
During operation			
Impact on soil	No anticipated impacts	Negative impact	Of no significance
Air emissions	No anticipated impacts	Negative impact	Of no significance
Noise	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).	Negative impact	Minor
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 recommended some mitigation measures to be implemented during operation(see table 7-5)	Negative impact	Medium
Child labor pertaining risk	Given the permanent nature of job opportunities during operation phase, children below 18 are not allowed to work in the PRS. Consequently, this risk is not valid in the operation phase.	Negative impact	Of no significance
Hazardous material and waste management	Hazardous material Odorant leak can result from improper handling of the odorant includes Storage in unsafe conditions, in terms of occupational health and safety. According to Kafr El-Zayat QRA study, modeling vapour release will be limited inside the PRS boundary with no effects on public and Egypt Gas Kafr El-Zayat ERP will cover this point. Solid and Hazardous waste During operation and maintenance of the PRS, besides industrial hazardous (odorant	Negative impact	Medium



Impact	Impact Description	Type and significance identification	Impact Significance
	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). Poor waste management practices may also have a significant impact on environment (soil, ground water, visual, and health and safety).		
Traffic	No anticipated impacts	Negative impact	Of no significance
Ground water/subsurface contamination	No anticipated impacts	Negative impact	Of no significance
Ecological impact	No anticipated impacts	Negative impact	Of no significance
Community health and safety	No anticipated impacts	Negative impact	Of no significance
Impacts related to lands	No anticipated impacts	Negative impact	Of no significance
Visual intrusion and landscaping	No anticipated impacts	Negative impact	Of no significance
Labor influx	No anticipated impacts	Negative impact	Of no significance



6 Analysis of Alternatives

6.1 Technology Alternatives

6.1.1 Outlet Pressure

A gas pressure reducing station reduces the pressure in the HP pipeline from 30-70 bar to 4 or 7 bar, making it suitable for distribution or use in domestic or industrial applications. Kafr El-Zayat PRS will produce 7 bar outlet pressure for the local distribution network (intermediate pressure). The LDC choose to produce 7 bar instead of 4 bar due to high consumption rate excepted in Kafr El-Zayat city. It is designed to future extension to accommodate future extensions to the distribution network (intermediate pressure) in order to feed other cities and/or villages in the district.

6.1.2 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 odor 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.

6.2 Location Alternative

6.2.1 PRS location

As mentioned in section (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

The land is owned by EGAS since 2012(before the beginning of the project) and was purchased according to EGAS Land securing procedure. Three plots of lands were selected and investigated by the LDC and EGAS teams. Negotiations about the price took place with the land owners. Finally, the most technically and financially acceptable one is purchased.

6.2.2 PRS land selection

Three plots of lands were selected in the project area. These plots of lands were subject to investigations from EGAS and the LDCs. EGAS investigated the legality of lands, the type of ownership and if there was any kind of encroachers.

After defining the owners of lands, EGAS and the LDCs started negotiating the price with the owners. Thereafter, upon reaching agreement with one of the owners, a preliminary agreement was signed. After disbursing the full price, the owner of land transferred the ownership to EGAS.



7 Environmental and Social Management & Monitoring Plan

7.1 ESMMP Definition

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 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 at the previous chapter. This ESMMP was based on the requirements of Environmental, Health, and Safety Guidelines for Natural Gas Processing.

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 Local Distribution Company (LDC).

In the following management and monitoring measures the term **LDC** refers to the gas company in charge of project implementation: **Egypt Gas.**

7.2 Management of Grievance

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.

Anyone will be eligible to submit a grievance to the Project if they believe a practice is having an adverse impact on the community, the environment, or on their quality of life. They may also submit comments and suggestions to the GRM.

The GRM was designed in order to handle all grievances during the construction and operation phases. The aggrieved person has the full right to lodge his complaint anonymously. However, this might cause a challenge to inform him about any corrective procedures. Additionally, if the



complaint is related to service seeking, the aggrieved person should provide full information about himself and about his residential unit.

Objectives: The objective of a grievance procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner. This will manage to build trust and detect any weak signal. The process will reduce risk of litigation and conflicts with the community

Disclosure of the GRM: The Community people will be fully informed about the Grievance procedures in simple language. Information about grievance mechanism will be tailored according to the community. All information about GRM will be made available on the contracting offices during the construction phase and on customer services offices during the operation phase.

Mode and channels of Grievance: The Company will accept all comments and complaints associated with the project from any stakeholder. Comments can be made via email, post, fax, on the telephone or in person. The comments and complaints will be summarized and listed in a Complaints/Comments Log Book, containing the name/group of commenter/complainant, date the comment was received, brief description of issues, information on proposed corrective actions to be implemented (if appropriate) and the date of response sent to the commenter/complainant.

The proposed mechanism is built on three tiers of grievances:

- The foreman working on the ground in **PRS site in Kafr El Zayat**,
- The project manager in **PRS site in Kafr El Zayat**,
- The regional department of Egypt Gas in Gharbeya Governorate

The aggrieved person has the full right to immediately use tier 2 or 3 upon his convenience and there is no need to exhaust the first tier. Additionally, he can resort to any other governmental entities i.e. Ministry of Petroleum. He/ She also have the full right to bring a lawsuit without resorting to any of the grievances tiers.

Grievance channels:

1. During construction phase:

- a) 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
- b) Hotline: 129 is the hotline in Egypt Gas.
- c) The SDO within the LDC and EGAS
- d) Email. info@Egypt Gas.com.eg

2. During construction phase:

- a) Customer service office
- b) Hotline: 129 is the hotline in Egypt Gas.
- c) The SDO within the LDC and EGAS



d) Email. info@*Egypt Gas*.com.eg

Response to grievances: All comments and complaints will be responded to either verbally or in writing, in accordance to preferred method of communication specified by the complainant. Comments will be reviewed and taken into account in the project preparation; however they may not receive an individual response unless requested.

Registration of GRM: All grievances will be registered and acknowledged within 5 business days and responded to between to 15- 30 business days (depending on the nature of grievance). The project management will keep a grievance log and report on grievance management, as part of annual project progress reports, which will be available on the LDC and EGAS.

Confidentiality: Individuals who submit their comments or grievances have the right to request that their name be kept confidential, though this may mean that the LDC is unable to provide feedback on how the grievance is to be addressed.

Management of GRM: During construction and operation phases, grievances in relation to construction activities will be managed by the LDC and the construction contractor(s). The LDC will provide contact information to project areas

A separate grievance mechanism is available in the same manner for workers, including employees of both the LDC-employed and contractors.

Grievance Cycle: The grievance received via any of communication channels and tiers will follow the following cycle. The aggrieved person has the full right to submit his grievance to any of the assigned tiers. The aggrieved person also has the full right to submit his grievance to any entity he prefers i.e the Minister of Petroleum, the Governorate ...etc. It is essential to mention that the acknowledgement of grievance should not exceed two working days.

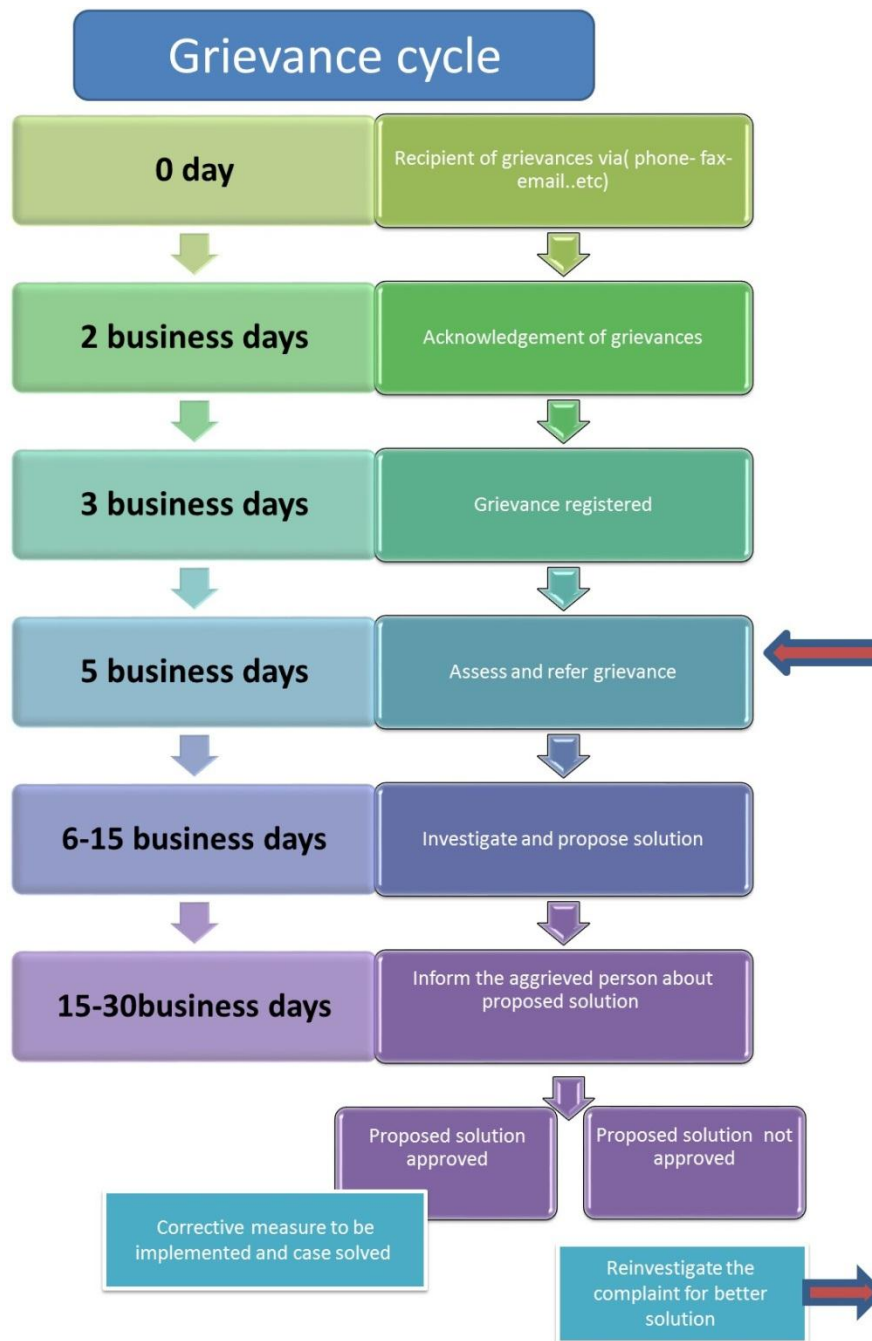


Figure 7-1: Grievance cycles

Monitoring of grievances: All grievances activities should be monitored in order to verify the process. The monitoring process should be implemented on the level of EGAS and the LDC (both in the site and in the headquarter). For more information about GRM please see Annex 8



7.3 Environmental and Social Mitigation 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	Air emission	<ul style="list-style-type: none"> - 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. <p>Additionally, the project will adhere to Environmental, Health, and Safety Guidelines for Natural Gas distribution mitigation measures requirements.</p>	Minor	Contractor	LDC –HSE department	Contractual clauses + Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
	Noise	<p>Worker Application of the normal precautions normally taken by construction workers.</p> <p>Nearby farmer</p> <ul style="list-style-type: none"> - Notification to the surrounding establishment prior to the construction Time management and construction schedule according to the IFC regulation provided by the contractor prior to the construction phase. 	Minor	<ul style="list-style-type: none"> - LDC - Excavation Contractor 	LDC–HSE department	Contractual clauses + Field supervision (audits) - Field supervision Complaints receipt from local administration	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
	Impact on soil	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
	Ground water contamination	<p>In general, the proposed construction activities have a Minor impact on the quality of the ground water; however the following procedures should be follow:</p> <ul style="list-style-type: none"> - Control all onsite wastewater streams and ensure appropriate collection, treatment and discharge. Prevent discharge of contaminants and wastewater streams to ground. - Adequate management and proper handling and storage of construction materials, oils and fuel to avoid spillages. - The implementation of a continuous and regular site inspection system. 	Negligible	Contractor	LDC –HSE department	Contractual clauses + Field supervision	<ul style="list-style-type: none"> - Contractor costs - LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation	Means of Supervision	Estimated Cost of mitigation / supervision	
	Solid and Hazardous waste management	<ul style="list-style-type: none"> - Temporary storage in areas with impervious floor - Safe handling using PPE and safety precautions - Empty cans of oil-based paint resulting from painting the steel connection pipes to households are to be collected and sent back to nearest LDC depots(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 for recycling - Table 7-2 present more details about solid waste management 	Minor	<ul style="list-style-type: none"> - LDC - Excavation Contractor 	LDC-HSE department	Field supervision and review of certified waste handling, transportation, and disposal chain of custody	<p>Indicative cost items included in contractor bid:</p> <ul style="list-style-type: none"> Chemical analysis of hazardous waste Trucks from licensed handler Pre-treatment (if needed) Disposal cost at Nassreya <p>Approximate cost of the above (to be revised upon project execution): 8,000-10,000 LE per ton</p>
Social Health and safety	Occupational health and safety	<ul style="list-style-type: none"> • The project will hire a qualified 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. The contract between the LDC/ EGAS and the contractor should explicitly reflect the rigid commitment of Labor Law Number 12 of year 2003 regarding child labor. • Standard protection by placing clear project signs. • Time management for vehicles movement; especially avoiding the peak hours • Standard protection for the workers especially working at elevated heights or trench. • Regular inspection to compelling worker to used their PPE • Training and licensing industrial vehicle operators of specialized vehicles. • The contractor also should keep attendance worksheet and laborers ID in order to verify the age of workers • Health insurance should be applicable to the contractor workers and workers contracted by a sub-contractor • Full compliance to EGAS and LDC HSE requirements, manuals, and actions as per detailed manuals adopted by EGAS • Ensure the provision of the appropriate personal protective Equipment and other equipment needed to ensure compliance to HSE manuals • As per the QRA recommendations: <ul style="list-style-type: none"> - Provide a suitable tool for wind direction (Windsock) to be installed in a suitable place to determine the wind direction. - Cooperation should be done with the concerned parties before planning for housing projects around the PRS area. - Firefighting brigades, mutual aids, emergency communications and fire detection / protection systems. - Safe exits in building according to the modeling in this study 	Minor	<ul style="list-style-type: none"> - LDC - Excavation Contractor 	LDC-HSE department	Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs



Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation	Means of Supervision	Estimated Cost of mitigation / supervision	
	Risk pertaining to child labor	<ul style="list-style-type: none"> - The project will hire a qualified contractor/ sub-contractor with the high occupational standards. Special attention will be given to add a contract term prohibiting all child labor activities - Rigid obligations and penalties will be added to the contractor ToR in order to warrantee no child labor is occurred in the project. In case of breaching these obligations, financial penalties will be applied - The ToR also will oblige the contractor/subcontractor to keep a copy of IDs of laborers in order to monitor the hired staff, especially, those below 18 years old - The contractor also will be obliged to maintain daily attendance sheets in order to verify the attendance of workers in case of accidents and provide the injured persons with proper health insurance 	Minor	<ul style="list-style-type: none"> - LD C Excavation Contractor/s subcontractor 	<ul style="list-style-type: none"> - LDC– HSE department 	Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
Community	Traffic	<p>Time management for transporting the materials, equipment, debris, etc.</p> <p>Clear sign surrounding construction site and the exit gate.</p> <p>Coordination with traffic department (ministry of interior) for vehicles route and movement.</p> <p>Vehicle speed restrictions should be applied across the project site,</p>	Minor	Contractor	<ul style="list-style-type: none"> - LDC + - Traffic department 	Contractor has valid conditional permit + Field supervision	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
	Grievance and redress mechanism	The detailed grievance mechanism (GRM) is presented in Annex 8 is to be shared with the community beneficiaries. Posters will be prepared and made available to the beneficiaries in the contracting office ⁹ . 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 publically accessible venues. The GRM presented various tiers of complaints, time to respond to the aggrieved person and reporting requirement for grievances. It is crucial to notify that time frame allocated for responding to a complaint will not exceed 15 business days.		Contractor	LDC –HSE department	Contractual clauses + Field supervision	<ul style="list-style-type: none"> - Contractor costs - LDC management costs

⁹ Falls under the budget of the LDCs



Table 7-2 Solid Waste Management during Construction phase

Waste type	Hazardous/Non-hazardous	Treatment and Disposition
Cement and Concrete Wastes (Including Cement Contaminated Soil)	Non-hazardous	Dispose to an approved waste disposal facility.(El Sadat land field –away about 50 Km from the 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		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 Nasserya hazardous waste facility.
Used oil waste		Temporarily stored in isolated area on-site, then transported to Abu Rawash storage site. Final disposal will be Petrotrade.



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 and safety	Community health and safety	<ul style="list-style-type: none"> - 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 - Notify the civil defense authority before refilling of odorant tank - Information should be provided to people in order to be fully aware about safety procedures - The hotline should be operating appropriately - People should be informed of the Emergency Numbers - People should be also informed about GRM telephone numbers The Egyptian Emergency Response Procedure. In addition, reference to the ERP is made in different sections of the report - Other measures as per the QRA: - Review the emergency response plan and update the plan to include all scenarios in the QRA and other needs including: - Firefighting brigades, mutual aids, emergency communications and fire detection / protection systems. - Dealing with the external road in case of major fires. - 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. - Provide the site with SCBA "Self-Contained Breathing Apparatus" (at least two sets) and arrange training programs for operators. - All operation is according to standard operating procedure for the PRS operations and training programs in-place for operators. - Inspection and maintenance plans and programs are according to the manufacturers guidelines to keep all facility parts in a good condition. - Emergency shutdown detailed procedure including emergency gas isolation points at the PRMS and valves room in place. - Cooperation should be done with the concerned parties before planning for housing projects around the PRS area. 	Minor	<ul style="list-style-type: none"> - LDC project department - Designer 	<ul style="list-style-type: none"> - LDC project department - Engineering dep. - HSE dept. - EGAS 	<ul style="list-style-type: none"> - Drawing and design Document Review - Policy and manual review - Inspection by operators - Signage inspection and site visits 	



Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation /
Physical receptor	Noise	<ul style="list-style-type: none"> - Location of reducers should be at least 20 meters away from the PRS fences. - The reducers should be either in a well-ventilated closed area, or in a protected open area according to IGEM standards. If the reducers are in an open area there should be wall barriers to dissipate the noise from the PRS staff offices and the neighboring areas. 	Minor	LDC Design Department	LDC HSE	Review of PRS layout	LDC management costs & PRS cost
	Solid and Hazardous waste management	<ul style="list-style-type: none"> - 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 this will neutralize the odorant 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 QRA <p>In order to minimize risk of spillage of hazardous odorant, the following general precautions should be taken:</p> <ul style="list-style-type: none"> - 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 <p>In case of odorant spillage:</p> <ul style="list-style-type: none"> - avoid inhalation and sources of ignition - immediately cover and mix with sufficient amounts sodium hypochlorite using necessary PPE and tools - collect contaminated sand in clearly marked secure containers/bags - Add sand to inventory of hazardous waste 	Minor			Quarterly auditing for each PRS	Cost to be included in PRS running budget:



7.4 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	<ul style="list-style-type: none"> - 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 f Machines	Vehicles licensing Department	<ul style="list-style-type: none"> Measurements and reporting of exhaust emissions of construction activities machinery Complaints log 	LDC management costs
Ambient noise levels	Increased noise levels	<ul style="list-style-type: none"> - Noise intensity, exposure durations and noise impacts - Use of earmuffs by Construction workers 	LDC HSE	Regularly during site inspections	Construction site	<ul style="list-style-type: none"> Measurements of noise levels Complaints log 	LDC management costs
		Complaints from Farmer	LDC HSE	Weekly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs
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
Labor 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	<ul style="list-style-type: none"> - Safety supervisor should follow the commitment of workers to use the protective equipment - Inspection and recording of the performance -Reports about the workers and complaints 	LDC management costs
		A suitable tool for wind direction (Windsock)	LDC HSE and Projects Dpt.	Daily during construction	Construction site	Supervision & reporting	LDC management costs
		Cooperation reports with the concerned parties before planning for housing projects around the PRS area.	LDC Projects Dpt.	When necessary	Construction site	Supervision & reporting	LDC management costs
	Child labor	Attendees lists with workers IDs Complaints and accidents reports	LDC HSE	Biannual for PRS	Construction site	<ul style="list-style-type: none"> - Safety supervisor observe the laborers Random checkup for laborers IDs 	LDC management costs
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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Noise intensity 	LDC HSE	Quarterly for each PRS	PRSs	- Noise meter	LDC management costs
	Hazardous waste	<ul style="list-style-type: none"> - 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
Labor conditions	Occupational Health and safety	<ul style="list-style-type: none"> - Total number of complaints raised by workers - Periodic Health report - Periodic safety inspection report 	LDC, EGAS	Four times per year, each three months	<ul style="list-style-type: none"> - Safety supervisor should follow the commitment of workers to use the protective equipment - Inspection and recording of the performance - Reports about the workers and complaints 	Complaints log LDC	No cost
		the updated emergency response plan to include the main detailed elements for ERP according to the QRA <i>recommendation</i>	LDC HSE (ERP document)	Before operation then Yearly (ERP doc.)	PRS location	HSE annual audit	LDC management costs



7.5 Kafr El-Zayat Quantitative Risk Assessment Study Recommendations

Regarding to the risk calculations to workers / public which found in Acceptable 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
<ul style="list-style-type: none"> • Ensure that: <ul style="list-style-type: none"> - All PRMS facilities specifications referred to the national and international codes and standards. - Inspection and maintenance plans and programs are according to the manufacturers guidelines to keep all facility parts in a good condition. - All operations are according to standard operating procedures for the PRMS operations and training programs in-place for operators. - Emergency shutdown detailed procedure including emergency gas isolation points at the PRMS and Off-Take Point in place. - Surface drainage system is suitable for containment any odorant spillage. 	Design Operation Operation Operation Design
<ul style="list-style-type: none"> • Considering that all electrical equipment, facilities and connections are according to the hazardous area classification for natural gas facilities. 	Design
<ul style="list-style-type: none"> • Review the emergency response plan and update the plan to include all scenarios in this study and other needs including: <ul style="list-style-type: none"> - Firefighting brigades, mutual aids, emergency communications and fire detection / protection systems. - Dealing with the external road in case of major fires. - 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. - Safe exits in building according to the modeling in this study, and to the PRS from other side beside the designed exit in layout provided. 	Operation Operation Operation Operation Design
<ul style="list-style-type: none"> • Provide the site with SCBA “Self-Contained Breathing Apparatus (at least two sets) and arrange training programs for operators. 	Operation
<ul style="list-style-type: none"> • Provide a suitable tool for wind direction (Windsock) to be installed in a suitable place to determine the wind direction (the PRMS lay-out need to be reviewed for wind direction correction) 	Construction
<ul style="list-style-type: none"> • Cooperation should be done with the concerned parties before planning for housing projects around the PRMS area. 	Operation / Design / Construction



7.6 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 (Egypt Gas). 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.

7.6.1 During the Construction phase reports should include as a minimum

- Monthly report for the implementation of the ESMMP submitted by the contractor to LDC (Egypt Gas) 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 (Egypt Gas) should include 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 (Egypt Gas) 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 performed by the contractor.

7.6.2 During the Operation Phase Reports should include as a minimum

According to law 9-2009 and its executive regulation, each facility should prepare an environmental register. Components of the environmental register are presented in annex 3 of the executive regulation of law 9/2009. All environmental procedures 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 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, and 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.

7.7 Emergency Response Plan

Egypt Gas (غاز مصر) will develop an updated Emergency Response Plan (ERP) which incorporates the QRA recommendations that 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.

PRs emergency plan guidelines, kindly refer to **Annex10** 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.

7.7.1 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.

7.8 Institutional Framework for ESMMP Implementation

7.8.1 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 environmental 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.

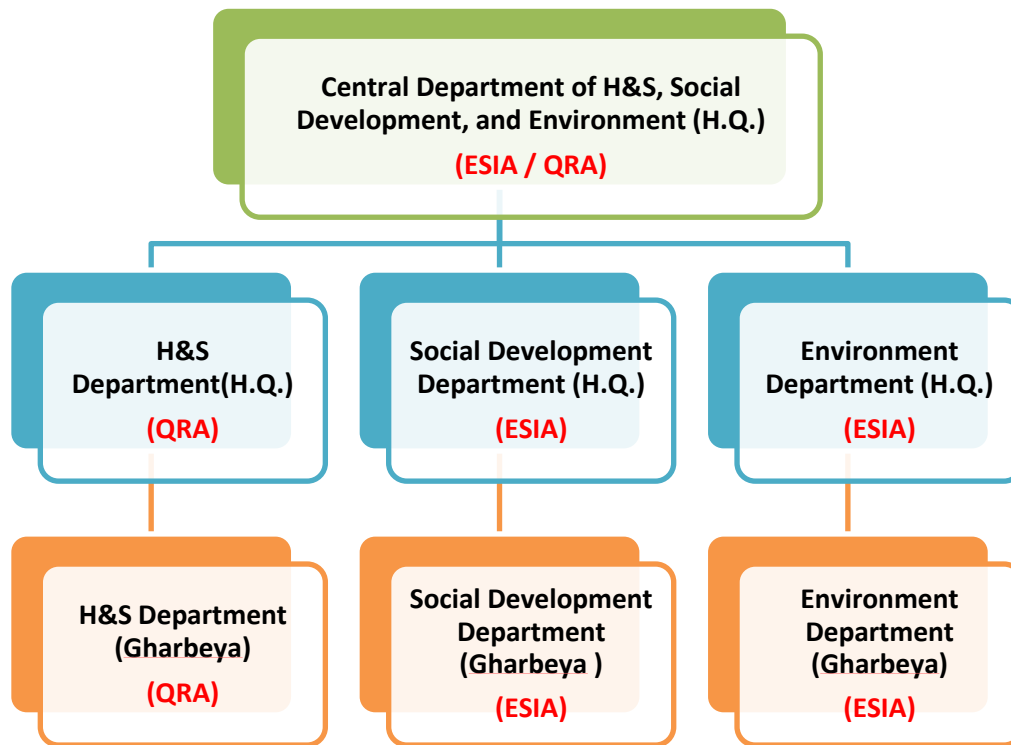


Figure 7-2: Egypt Gas ESMP organogram

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

1. Worker and contractor compliance to EGAS HSE manuals and procedures
2. Occurrence of HSE incidents and suggestions for incident avoidance (Refer to item 7.5)
3. Management of broken asphalt (if any), unused backfill, solid waste, metal scrap
4. Management of paint cans, refueling & lubrication, soil contamination
5. Management of liquid waste such as leaked condensate hydrocarbons (if any) or chemicals used in heaters; and
6. 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
7. Using analyzers to measure noise, SO₂, CO, CH₄ and NO₂ in ambient air, and detect possible natural gas leaks
8. Ensure and log compliant handling of odorant/odorant containers, odorant-contaminated-soils (in case of spillage)
9. Measure noise at different locations of the PRS
10. Other tasks as outlined in ESM&MP

Daily reports are to be compiled and sent to the governorate 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.



7.8.2 Required Actions

- 1- Involvement of environmental and social officers during the design, costing, tendering, and construction phases would be advantageous.
- 2- Detailed HSE manuals covering each activity must be developed and institutionalized in EGAS. Several versions of such manuals have been developed by Egypt Gas and should be mainstreamed to other LDCs, accompanied by the appropriate capacity-building.
- 3- An updated and detailed assessment of EGAS. EHS institutional capacity and available resources for implementation of the ESMP
- 4- Specifically EGAS should take steps to develop capacity of site engineers and HSE officers with specific courses focused on implementation of the ESMP detailed in this ESIA.



8 Stakeholder Engagement and Public Consultation

The public consultation chapter aims to highlight the key consultation and community engagement activities that took place as part of the preparation for the PRS-related ESIA study, developed for Kafr El-Zayat City.

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 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,
 - o Directive and Procedure on Access to Information
 - o World Bank Operational Policy (OP 4.01)
- Egyptian regulations related to public consultation,
 - o 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

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 Consultation Methodology and Activities

The research team for this study has adopted multi-dimensional consultation activities using different tools as public meetings, Focus Group Discussion and Interviews that enable the marginalized, voiceless, youth and women to gain information about the project. As well as, gaining information about their concerns and worries 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 was conducted through the following three phases:
 - **Phase I (Scoping) for the** Preparation of the framework study in 2013 in Gharbeya Governorate building which was disclosed on EGAS website as per the following link <http://www.egas.com.eg/docs/RPF%20for%20NG%20connections%20project%20for%2011%20Governorates.pdf>
 - **Phase II(Data Collection for the preparation of** site-specific studies in February, 2017
 - **Phase III (Consultation activities and final public consultation) in** April, 2017 which was conducted in the Governmental hall
- 3- All activities conducted were documented with photos and lists of participants in order to warrantee appropriate level of transparency.



Figure 8-1: FGD with PAPs in Kafr El-Zayat



Figure 8-2: panel meeting at Kafr El-Zayat 's LGU headquarters 16th of February 2017



8.4 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 and Gender inclusion was considered in consultation activities.

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 included 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.

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

Stakeholders of Phase I:

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
- Governmental entities
- NGOs
- Media
- Community people
- Potential traders
- Females and vulnerable groups

Stakeholders of Phase II:

- Consultants (EcoConServ environmental and social) attended session
- NGOs cooperated in data collection
- Community people
- Potential traders
- Females and vulnerable groups
- Governmental entities
- Media

Stakeholders of Phase III:

The Consultation session was conducted in Gharbeia Governorate on April 2017

- Consultants (EcoConServ environmental and social) attended the meeting
- Gharbeia general secretary (Deputy Governor)



- Representatives of EGAS and Egypt Gas
- Representatives of EEAA accompanied the teams
- Media
- Community people
- Governmental entities
- Potential traders

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

Participants	Number		Methods	Date
	Male	Female		
During the framework				
Various stakeholders	55	24	public consultation event	29 th December 2013
Community residents	25	36	Structured questionnaire	December 2013
Potential beneficiaries and governmental entities	16	8	FGD	
Governmental entities	4	0	in-depth interview	
Total	100	68		
PRS- ESIA related (Kafr El-Zayat City)	Male	Female		
Potential beneficiaries and governmental entities	4	17	FGD	January – February 2017
Governmental and public sector	4	1	In-depth interview	January – February 2017
Civil Society	1	0	In-depth interview	January – February 2017
Governmental, NGOs and community people	34	1	Group meeting	15 th of February 2017
Total	43	19		
Public Consultation event	Male	Female		
Community people, all other stakeholders	72	30	Public consultation	11 th of April 2017

8.5 Consultation processes

It is 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 for the Low pressure network.

Final public consultation outcome (April, 2017):



Table 8-2: Key comments and concerns raised during the different public consultation activities

Subject	Questions and comments	Responses	Addressed in the ESIA Study
The safety of NG high-pressure network	What will happen in case of leakage? The plants and the land will be affected	The pipelines are monitored regularly. A control room is responsible for observing any leakage. An emergency unit will reach the land in less than 15 minutes. There is an emergency plan applied in case of any leakage. The NG companies take it very serious	Addressed in more details in the due diligence plan report ¹⁰
Damaging the water pipeline	The lands were served by a water network made of pottery pipes. The LDC replaced the pipes with low quality plastic pipes. This will necessitate replacing the plastic pipelines with pottery	The LDC is committed to restore the old pipes after the completion of construction activities. Plastic pipes are for temporary use.	Addressed in the Due Diligence plan report ¹¹

In addition to the above mentioned issues a consultation event was conducted in Gharbeya Governorate. The results will be included in Gharbeya ESMP report.

8.6 Summary of consultation outcomes

PRS-related consultation activities in Kafr El-Zayat City 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 PRS did not raise any concerns among the consulted groups. 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.

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.

¹⁰<http://www.egas.com.eg/docs/Environmental%20&%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf>

¹¹

<http://www.egas.com.eg/docs/Environmental%20&%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf>