



## 1.5 Million Natural Gas Connections Project in 11 Governorates

### Site-Specific Environmental and Social Impact Assessment

## Zefta PRS /Gharbeya Governorate **Final Report**

April 2019



**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 <sub>2</sub>	Nitrogen dioxide
OSH	Occupational Safety and Health
P&A	Property and Appliance Survey
PAP	Project Affected Persons
PE	Poly Ethylene
PM <sub>10</sub>	Particulate matter
PPM	Parts Per Million
PRS	Pressure Reduction Station
PRMS	Pressure Reduction and Metering Station
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SDO	Social Development Officer
SIA	Social Impact Assessment
SO <sub>2</sub>	Sulphur dioxide
SSIAF	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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## Executive Summary

### Introduction

Aiming at connecting the natural gas (NG) to about 15,500 clients in Zefta, Egypt Gas, the local distribution company, will upgrade Zefta network to increase its capacity from 3,000 m<sup>3</sup>/h to 10,000m<sup>3</sup>/h.

The objective of the proposed project is to construct a pressure reduction station (PRS) and increase the capacity of the network in order to connect the NG to wider range of clients. This will enable achieving reduction of leakage, reduction of subsidy allocated for the butane gas, and reducing dependence of imported fuel.

The ESIA has been prepared by a Joint Venture between Petrosafe (Petroleum Safety & Environmental Services Company) and EcoConServ 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.

### Project Description

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

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

The PRS for Zefta will be designed to reduce an inlet pressure of 30-70 bar to an outlet pressure of 7 bar at a flow rate of 10,000m<sup>3</sup>/h. Flow rate can be increased to 20,000 m<sup>3</sup>/h in the future according to the demand increase.

The PRS is located at the Astana-Banha Road (Mit Birah-Zefta) 500 meters south west of Zefta City. Offtake from the national natural gas network is about 18 km away from the PRS location. The HP pipeline connecting the offtake and PRS already exists.

### Legislative and Regulatory Framework

The project will adhere to Egyptian legislations, WB operational policies, and IFC performance standards.

#### Applicable Environmental and Social Legislation in Egypt legislations:

- Law 217/1980 for Natural Gas
- Law 4/1994 for the environmental protection, amended by Laws 9/2009 and 105/2015. Executive Regulation(ER) No 338/1995 and the amended ER No. 1741/2005, amended with ministerial Decrees No. 1095/2011, 710/2012, 964/2015, and 26/2016
- Law 38/1967 for General Cleanliness
- Law 93/1962 for Wastewater
- Law 117/1983 for Protection of Antiquities





- Traffic Law 66/1973, amended by Law 121/2008 traffic planning
- Law 12/2003 on Labor and Workforce Safety

### **World Bank Safeguard Policies**

Three policies are triggered for the project as a whole: Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12). However, OP/BP 4.11 and Involuntary Resettlement (OP/BP 4.12) will not be applicable to Zefta PRS project.

OP/BP4.11 will not be applicable in Zefta as no archeological sites or sites that bear significant historical or cultural value were identified in the project area of Zefta. In case of any unanticipated archeological discoveries; Annex 6, titled 'Chance Find Procedures,' outlines the set of measures and procedures to be followed.

The proposed land for the construction of the PRS was obtained based on willing buyer willing seller approach. Based on the site visits conducted by EGAS and Egypt Gas, there is no encroachment within the PRS land. Supplementary site visits were conducted by the social team. No encroachment were reported and the land purchased for the construction of the PRS was fenced. Therefore, the Involuntary Resettlement (OP/BP 4.12) is not applicable for the proposed project.

In addition to the above mentioned safeguards policies, the Directive and Procedure on Access to Information<sup>1</sup> will be followed by the Project.

### **World Bank Group General Environmental, Health, and Safety Guidelines<sup>2</sup> & WBG Environmental, Health and Safety Guidelines for Gas Distribution Systems<sup>3</sup>**

The General Environmental, Health, and Safety Guidelines (EHS) are designed to be used together with the relevant Industry Sector EHS Guidelines, which provide guidance to users on EHS issues in specific industry sectors. Gas distribution system – HSE Guideline (provided in **Annex 4** from the report) are applicable to the project.

## ***Environmental and Social Baseline***

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### **A. Environmental baseline**

- **Climate**
  - Temperature

The average annual temperature is 26.6°C in Zefta. The warmest month of the year is July, with an average temperature of 26.9 °C. January has the lowest average temperature of the year at 13.1°C

- Rainfall
  - average annual precipitation in Zefta ranges are between 2mm. to 10.5 mm.
- Wind

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<sup>1</sup> <https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=3694>

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

<sup>3</sup> <https://www.ifc.org/wps/wcm/connect/9c6e3d0048855ade8754d76a6515bb18/Final%2B-%2BGas%2BDistribution%2BSystems.pdf?MOD=AJPERES&id=1323162128496>



The wind speed in Zefta ranges are between 43.9Km/h and 59.8Km/h. It is characterized by a calm to moderate breeze. The highest average wind speed occurs during spring, in March and April.

- Site-Specific Ambient Air Quality

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 (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), total suspended particulates (T.S.P) and particulate matter (PM<sub>10</sub>). 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.

- Site specific Noise Measurements

Noise level measurements were conducted at 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. The noise measurements were found to be below national and WB guidelines.

**Annex 5** from the report presents the full Air and Noise measurements at Zefta PRS location.

- **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 non-structural (NS) Baltim fault trend affects the Zefta 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 Zefta area belongs to Meet Ghamr formation. It consists mainly of clay and silt including some sand tracks.

- **Water resources**

- Surface water

Zefta city is located at the Damietta Branch. The PRS is 1.5 km away from the branch. The only existing water body nearby is the main feed canal (as El-Sahil canal) which is used as a main water source for agriculture in Zefta. The canal is approximately 50 m away from the proposed PRS site. The Zefta-Banha road separates the canal from the PRS gate. The canal will not be affected by the proposed project activities during construction or operations due to its separation from the project site by a main road and a railway.

- Groundwater

There is no site specific data available on the groundwater quality in Zefta. Audebeau (1912) and Zaghloul (1985) gave evidence that the Nile River is the source of the groundwater underlying the valley and Delta. The ground elevation is approximately 5 m above the mean sea level (AMSL) near Tanta city (Saleh, 1980). Tanta city is approximately 23 km away from the project area.

- **Terrestrial environment**

Zefta 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.

- **Solid waste management**



The Cleansing department affiliated with the Local unit in Zefta is responsible for waste collection. Few collection bins exist throughout Zefta city. They are used as open transfer systems, existing in residential areas, and later transferred to El-Sadat controlled-landfill located about 140 km from Zefta city. Waste collection services are absent outside the city borders. The accumulated waste in the dumpsite appears as a large plateau. Most of the dump sites are located in an agricultural area close to residential areas.

- **Physical cultural resources**

There are no significant physical cultural resources existing near the PRS's project site. Furthermore, no archaeological or antiquities sites were identified within or near the project area. However, in case of any unanticipated archaeological discoveries, 'Chance Find Procedures outlines the set of measures and procedures to be followed in such a case (Annex 6).

- **Physical structures**

There are no physical structures near the PRS station in Zefta.

- **Traffic profile**

The traffic in Zefta city is of a relatively moderate density. The rush hours can be segregated into two major periods. The first is between 7 - 10 am while the second is between 2 - 4 pm.

## B. Socio-economic Baseline

The PRS is located near Zefta city which is located in the southern eastern part of Gharbeya Governorate. It lies on the Damietta branch across from Meet Ghamr city which lies under the jurisdiction of Al Daqahliyah governorate to the east. There is a small hamlet named Izbet el Gahsh located approximately 700 meter away from the proposed project site. As no information is available on the level of this hamlet, the social baseline will describe the city of Zefta.

- **Administrative affiliation**

Zefta city is affiliated to Zefta district which also includes 8 local governmental units (LGUs) and many other towns, villages, and hamlets. The total area of Zefta city is 1,230 km<sup>2</sup>.

- **Demographic characteristics**

The total population of Zefta city is 106,249 persons distributed among 26,562 households according to CAPMAS poverty mapping data of 2013. The total population of Izbet El Gahsh is about 700 people.

- **Living conditions**

A household is defined as "Family (and non-family) members who share residence and livelihood and act as one social and economic unit". According to CAPMAS poverty mapping data of 2013, the average family size in Zefta city is 4.

- **Access to basic services**

According to CAPMAS poverty mapping data (2013), 99.5% of individuals living in Zefta city use electricity for lighting. The electricity network covers 1,352.94 subscribers all over governorate of Gharbeya according to governorates description by information of 2010.

Zefta city is located on the western bank of the Damietta branch. CAPMAS poverty mapping 2013 figures show that accessibility to the water network is high as 98.11% and 96.21% of individuals have tap water inside their homes.

On the other hand, accessibility to the public sanitation network stands at 53.57% of individuals according to CAPMAS poverty mapping 2013. The representative of the department of urban planning referred to the fact that the construction of the wastewater station is incomplete.

It is noteworthy to mention that the condition of public services in Zefta city is dire according to the information centre representative interviewed by the field research team.



- **Human development profile**

According to CAPMAS poverty mapping data of 2013, 15% of individuals have completed their basic education consists of primary and preparatory stages, while only 18.1% have university degrees. A substantial 94.6% of individuals, between 6 to 18 years old, are enrolled at schools; while the percentage of drop-outs stands at 2.8%.

In the same vein, 96.33% of females between the ages of 6 to 18 years old are enrolled at schools while the percentage of female drop-outs stands at 1.77%. The percentage of females with university degrees is 14.7%.

The illiteracy rate in Zefta city is 26.7%. The illiteracy rate among females is 31%.

According to CAPMAS poverty mapping 2013, the percentage of manpower which joined the labor force at the age of 15 years old and above is 45.32%. Manpower, at the age of 24 years old and above, is 52.4%. The percentage of agriculture workers from total employed persons is 6.8%. The unemployment rate in Zefta city stands at 12.8%.

- **Health facilities**

Zefta city has one central hospital, equipped with an emergency unit. There are a number of private hospitals. Additionally, there is an ambulance station, and a number of urban and rural medical units. There is no assessment of the quality of health services provided in the City of Zefta.

- **Human activities in the project areas**

As noted in the unemployment and work status sections, the City of Zefta encompasses a variety of economic activities including agriculture, industry and services. However, there is no study assessing these activities in terms of the level and quality of goods and services produced in the City of Zefta or in terms of job creation. As indicated above; the labor force includes farmers, land owners who cultivate their own lands, government employees, manufacturing workers and car maintenance workers. One of the participants of the focus group discussions stated that the majority of youth work as drivers of popular auto rickshaw (tuk tuk) as it is the only employment vacancy available to young people in the city.

## ***Environmental and Social Impacts***

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The environmental and social impact assessment (ESIA) is a process used to identify and evaluate the significance of potential impacts on various environmental and social receptors as a result of planned activities during (construction and operation) phases of the Project. Furthermore, the analysis of environmental and social impacts is important to detail an effective management and monitoring plan, which will minimize negative impacts and maximize positives.

### **A. Potential positive impacts**

- **Positive impacts during construction**
  - Impacts related to employment

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

The construction of the Zefta 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.



*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, etc.

- **Positive impacts during operation**

- Impacts related to employment

The operation of the Zefta PRS is expected to result in the creation of job opportunities, both directly and indirectly. The average number of workers during operation of the Zefta 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. 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 increase the number of 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.

## **B. Potential negative impacts**

Various impacts were assessed in accordance with the impact assessment methodology. Impacts of no significance are ecological, land acquisition, and visual intrusion, during construction phase. Risks pertaining to child labor, air emissions, soil, ecological, traffic, and labor influx are assessed as of no significance during the operation phase.

### 5.4 Impacts during Accidental Events (Operation Phase)

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

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

Referring to the risk calculations determined in Zefta QRA study, the individual risk level to the exposed workers / public (PRS / Off-take Point)) based on the risk tolerability criterion have been identified in Acceptable (Lower Tolerability Limit ) for workers / Off-take public and ALARP (Below the Upper Tolerability Limit) region for public PRS. So there are some points (Study Recommendations) need to be considered to keep the risk tolerability, and this will be describe under item (7.5) (for more details refer to the QRA Study under Annex-10)







**Summary of potential negative impacts**

Potential Impact Significance (Duration, Difficulty to mitigate)										
Activity	Air emissions	Noise	Reduction of traffic flow	Ground water	Solid, hazardous wastes and liquid waste	Community health and safety	Labor conditions and occupational health and safety	Labor influx	Child labor	Soil pollution
Potential negative impacts during construction phase										
Mobilization	Temporary, medium	Temporary, low	Temporary, low	N/A	Temporary, low	N/A	Temporary, medium	Temporary, extremely low	Temporary, low	N/A
Excavation	Temporary, medium	Temporary, low	Temporary, medium	Temporary, medium	Temporary, medium	Temporary, low	Temporary, medium	Temporary, low	Temporary, low	Temporary, low
PE Pipe laying	Temporary, medium	Temporary, low	Temporary, medium	N/A	Temporary, low	N/A	Temporary, medium	Temporary, low	Temporary, low	N/A
Leakage testing	Temporary, medium	Temporary, low	Temporary, low	N/A	Temporary, low	N/A	Temporary, medium	Temporary, low	Temporary, low	N/A
Impact Assessment	Medium	Minor-Medium	Medium	Minor	Medium	Minor	Medium	Low	Low to medium	Medium
Potential negative impacts during operation phase										
PRS operation	N/A	Permanent low	N/A	N/A	Permanent medium	Permanent low	Permanent medium	N/A	N/A	N/A
Repairs	N/A	Permanent low	N/A	N/A	Permanent medium	Permanent low	Permanent medium	N/A	N/A	N/A
Impact Assessment	No significance	Minor	No significance	No significance	Medium	Minor	Medium	No significance	No significance	No significance



## *Analysis of Alternatives*

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- **Technology alternatives**

- **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. Zefta's PRS will produce 7 bar outlet pressure for the local distribution network (intermediate pressure). The LDC (Egypt gas) choose to produce 7 bar instead of 4 bar due to high consumption rates excepted in Zefta city. It is designed to accommodate future extensions to the distribution network (intermediate pressure) in order to feed other cities and/or villages in the district.

- **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.

- **PRS location alternatives**

As per national and WB guidelines, PRS siting avoids habitat alteration and seeks to minimize environmental, occupational health and safety, and community health and safety impacts.

In 2012, the LDC that was responsible of constructing Zefta PRS was Maya Gas. They were also responsible for purchasing lands needed to construct the PRS. Thereafter, they handed over the construction of the PRS to Egypt Gas. Therefore, it was relatively difficult to define how the process was implemented.

Given the absence of any information about land acquisition process, the study team conducted meetings with Egypt Gas and EGAS social team for better understanding of the process as Maya Gas was not operating in Zefta any more.

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

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

## *Environmental and Social Management & Monitoring Plan*

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The objective of the Environmental and Social Management and Monitoring Plan (ESMMP) is to outline actions for minimizing or eliminating potential negative impacts and for monitoring



the application and performance of mitigation measures. The ESMMP identifies roles and responsibilities for different stakeholders for implementation and monitoring of mitigations. This section also presents an assessment of the institutional capacity and institutional responsibilities for implementing the ESMMP.

Full ESMMP is presented in section 7 of this report.

### *Stakeholder Engagement and Public Consultation*

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The consultation activities were conducted in full 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 the public consultation
  - o The environmental law No 4/1994 modified by Law 9/2009 modified with ministerial decrees no. 1095/2011 and no. 710/2012

For the purpose of the PRS-related ESIA, qualitative information and data were collected through identifying Project Affected Peoples (PAPs) residing in the areas surrounding the PRS station and recognize their views and concerns about the project. The aim of this endeavor is to ensure a well-integrated and inclusive public review of the project.

Key groups of relevance include: ordinary citizens, community leaderships, officials and government representatives, potential, local Non-Governmental Organizations (NGOs) and Community Development Associations (CDAs). In this regard, key groups of relevance in Zefta were approached and consulted using various tools (i.e. in-depth interviews, focus group, meetings, Panel meeting and public consultation sessions). Stakeholder engagement and public consultation activities encompassed a gender aspect that women's views and concerns were taken into account and documented well.

- **Consultation methodology and activities**

The consultation process was dynamic and evolving which adapted with the nature and expectations of the host community. In order to establish a more profound understanding of the local communities' perceptions and perspectives of the project, stakeholders' engagement and public consultation activities included a broad base of community members and governmental entities.

The first step was to collect the responses and feedbacks of the local communities through conducting Focus Group Discussions (FGDs), structured questionnaires, panel meeting, and public consultation sessions. The second step was to analyze these qualitative data in order to reach a conclusion regarding the general stance and attitudes of the local communities towards the project. Various NGOs participated actively in the preparation of the FGDs and provided data collectors to assist the team in collecting the data.

- **Summary of discussions**

With regard to the PRS, stakeholders' engagement and public consultation activities were conducted in order to ensure that the views and concerns of the local communities are integrated and guarantee that they are taken into account by the different parties in charge of



implementing the project. The views and concerns of local communities are an integral part of the project and to be thoroughly taken into account throughout the different phases of the project.

The field research team commissioned by EcoConServ engaged in a number of social activities. These activities include focus group discussions with potential beneficiaries; in-depth discussions with government officials, representatives of civil society, and community leaders. A panel meeting was held at Zefta's LGU headquarters where the public officials of Zefta's LGU stressed on expediting the implementation of the project in their city.

Throughout the discussions interviewees were asked about three main points:

- The safety of 70 bar pipelines.
- The compensation mechanisms for damages resulting from constructions
- Safety procedures during operations

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

## **ESIA disclosure**

As soon as the site-specific ESIA is approved by the World Bank and EEAA, a final report will be published on the WB, EGAS, and Egypt Gas websites. An executive summary in Arabic will be published on 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.



# 1 Introduction

## 1.1 Preamble

Aiming at installing the NG to about 15,500 clients in Zefta, the Local Distribution Company Egypt Gas will upgrade Zefta network to increase its capacity from 3,000 m<sup>3</sup>/h (to a capacity of 10,000m<sup>3</sup>/h).

The objective of the proposed project is to construct Pressure Reduction Station (PRS) and increase the capacity of the network in order to install the NG to wider segment of clients. This will enable achieving reduction of leakage; reduction of subsidy allocated for the butane gas and reducing dependence of imported fuel.

## 1.2 Environmental and Social Impact Assessment (ESIA)

The World Bank's Environmental and Social Safeguard policies require an Environmental & Social Impact Assessment (**ESIA**) be conducted for the proposed pressure reduction station (PRS). This ESIA has been prepared based on the Terms of Reference prepared by EGAS and cleared by the World Bank. The ESIA has been completed by a joint venture between Petrosafe (Petroleum Safety & Environmental Services Company) and EcoConServ Environmental Solutions.

The ESIA is undertaken to assess and propose mitigation measures for environmental and social impacts of the PRS. 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, which is a standalone document. **The objectives of the ESIA include:**

- Describing project components and activities of relevance to the environmental and social impacts assessments
- Identifying and addressing relevant national and international legal requirements and guidelines
- Describing baseline environmental and social conditions
- Presenting project alternatives and the no project alternative
- 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 PRS (with a capacity of 10,000 m<sup>3</sup>/h, and can be increased to 20,000 m<sup>3</sup>/h. in the future). Off-take from the national Grid and HP pipeline about (18 Km) already exists and will not be addressed in this ESIA.

**The local distribution company responsible for the construction and operation of Zefta PRS is Egypt Gas (غاز مصر).**

## 1.3 Contributors

The ESIA has been prepared by a Joint Venture between Petrosafe (Petroleum Safety & Environmental Services Company) and EcoConServ 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 off from the main lines to regional distribution networks, the pressure of the NG is lowered to 7 Bar at the PRS. An odorant is added to the NG at PRSs feeding distribution networks to residential areas<sup>4</sup> in order to facilitate detection in the event of NG leakage. 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:

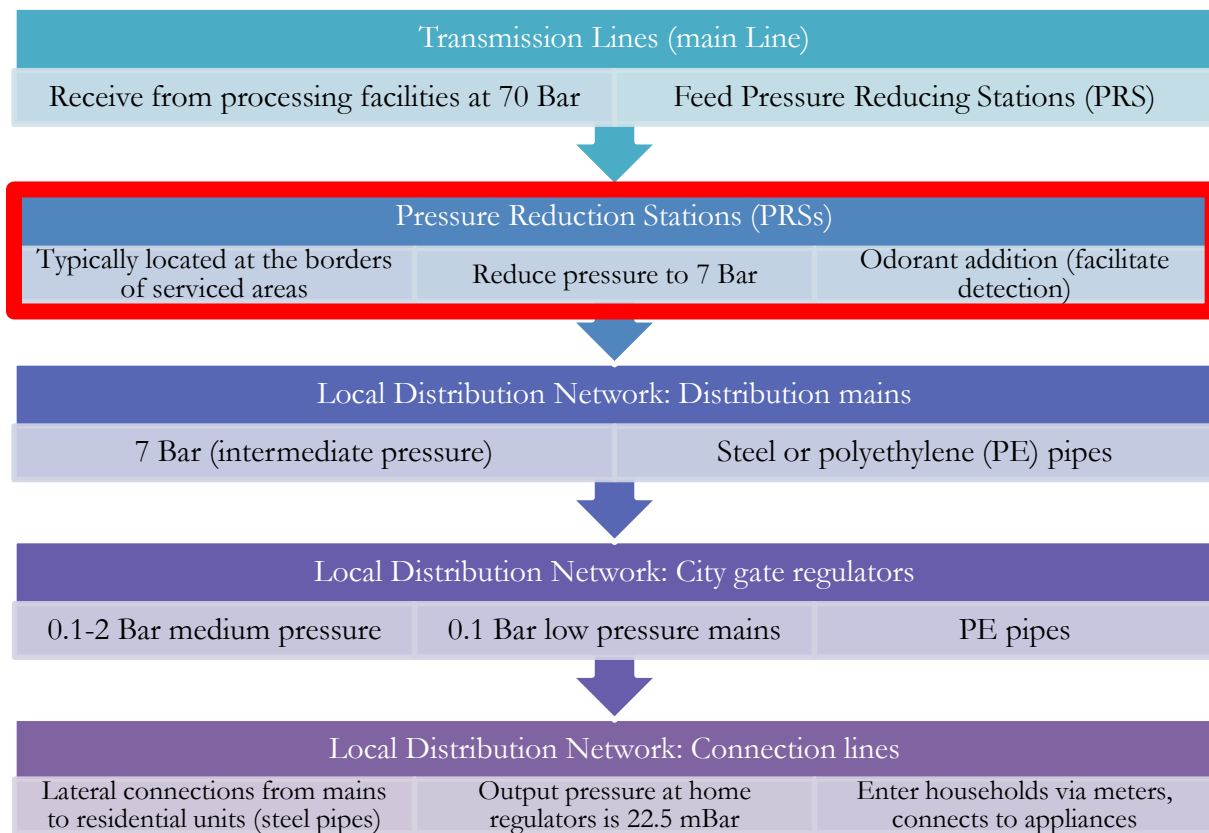


Figure 2-1: General components of the city’s distribution network

<sup>4</sup> Because natural gas is odorless, odorants facilitate leak detection for inhabitants of residential areas.





## 2.2 Project Work Packages

### 2.2.1 Pressure Reduction Station (PRS)

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

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 Zefta will be designed to reduce an inlet pressure of 30-70 bar to an outlet pressure of 7 bar at a flow rate of 10,000m<sup>3</sup>/h. Flow rate can be increased to 20,000 m<sup>3</sup>/h in the future according to demand increase.

## 2.3 Project Location

The PRS is located at the Astana-Banha Road (Mit Birah-Zefta) 500 m south west of Zefta City as shown in the figures below. Off-take from the national natural gas grid is about 18 km away from the PRS location. The HP pipeline connecting the Off-take and PRS already exists.



Figure 2-2: PRS location



Figure 2-3: The road in front of the PRS



Figure 2-4: The route in front of the PRS





## 2.4 Associated facility (Off-take and HP pipeline)

As previously mentioned, the off-take from the national grid and the HP pipeline (70 bar system) already exists. A due diligence study has been prepared for clearance and the LP Network is addressed in a separate ESMP

The off-take is the point on the HP national grid pipeline where a branch of the pipeline is constructed to connect a new PRS to the national grid. At the off-take location, valve rooms/valve ditching is constructed so as to control the flow of the natural gas through the pipeline (branch). These valves work like gateways for the Zefta area.

The off-take is located at Meit Abo Sheikha–Hanoun road, south of Tikh Tambasha Village. The Off-take location is remotely located, away from any residential areas. The nearest village to the north is Tikh Tambasha, approximately 700 m away from the off-take site. The area surrounding the off-take is characterized as agricultural land.

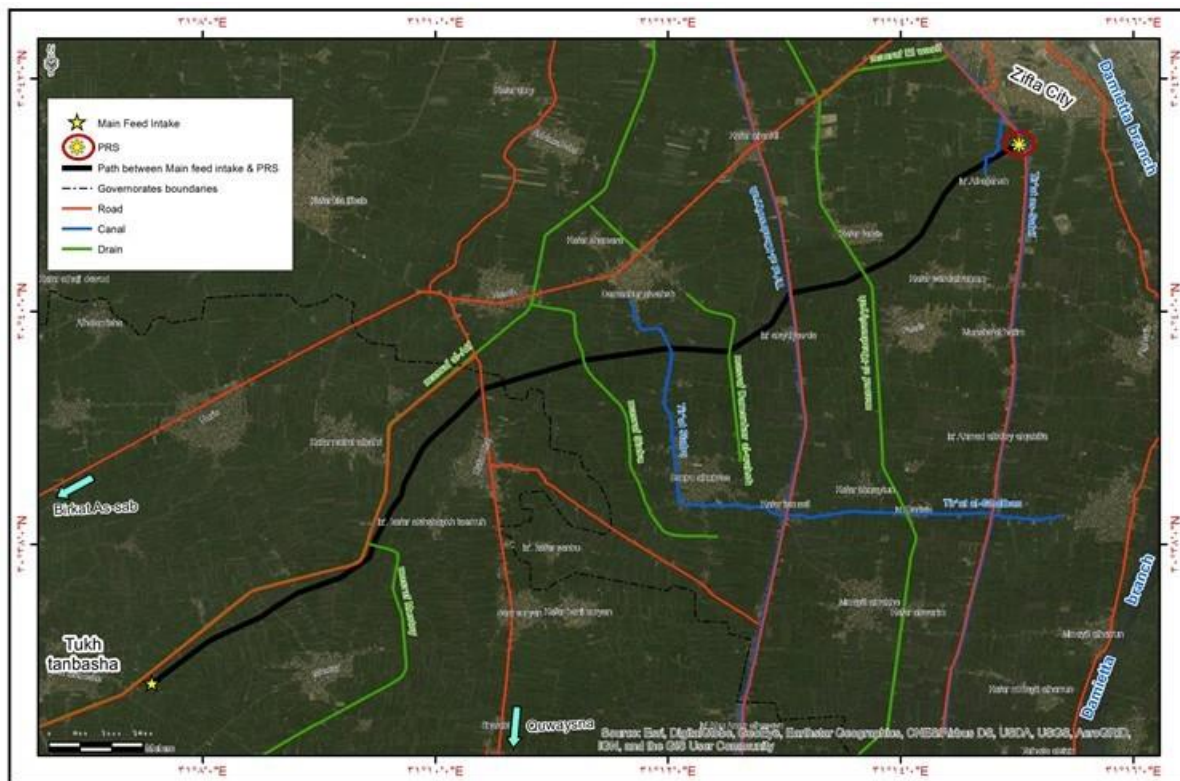


Figure 2-5: Zefta PRS location



Figure 2-6: The off-take

## 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 and off-take.
- Identifying the location of the new PRS location.

### 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 PRS is utilized to estimate the materials and equipment needed to implement the project. Procurement of the materials includes local and international components. The main international purchases may include critical components and PRSs, regulators, and metering stations.

### 2.5.3 Construction works of PRS

#### 2.5.3.1 Pressure Reduction Station Area

Minimizing the possible negative impacts on the project's surroundings, the safety of neighboring areas from possible gas release accidents, and noise associated with the operation of reducers. The PRS will be surrounded by a wall for safety and security purposes (including reducing noise impacts of the PRS on the surrounding receptors). Currently, there are scattered buildings in the agricultural land surrounding the PRS. The closest buildings are around 90-100 m north east of the proposed PRS location, and are separated by the Zefta –Banaha road



(Figure 2-55). In the event that buildings are constructed in the area surrounding the PRS, the Institute of Gas Engineers Safety Recommendations requires the following buffer zones:

- PRS should have free areas from each side to allow for emergency vehicle access. The nearest building is far 90 m to the east of the PRS fence.

Zefta PRS is to be located in a low-population-density area on a plot of land measuring 40m x 70m. The PRS is to be accessible by an existing road (Zefta – Banha Road) to ensure quick response in the 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 Zefta PRS .



Figure 2-7: Site surrounding Zefta PRS

### 2.5.3.2 Pressure Reduction Station Civil Works

A 9-months construction schedule is planned for Zefta's PRS, with site preparation expected to commence in the first half of 2019

The main construction activities will include:

- Site preparation, acceptance and placement of major fabricated equipment items, construction of buildings, testing and commissioning.
- Initial construction activities involve clearing and grading of the site, sediment fences and silt traps will be installed, as necessary, to control erosion and sediment transport during site preparation activities.





- Following site preparation, individual excavations will be made for fire-fighting tanks, domestic wastewater trenches, pipe racks, and a 6-m high wall (of cement) around the PRS.
- Concrete foundations for buildings and footings for mechanical equipment will be laid down;
- Facility piping (inlet, outlet and 4 inch firefighting line) both above and below ground, are installed.
- Construction of a 100m<sup>2</sup> 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

Zefta PRS comprises of two pressure streams; the upstream (inlet) high pressure ranging from 30 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 2-8: 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

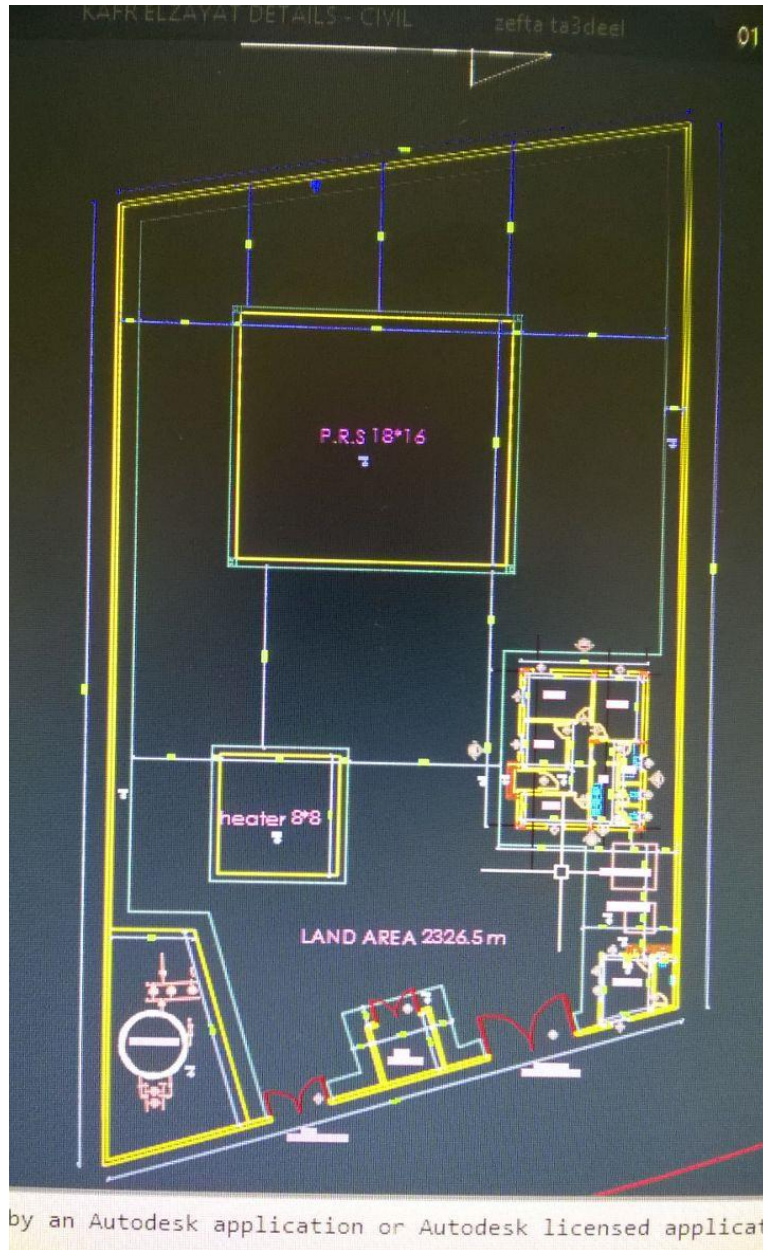


Figure 2-9: Zefta Pressure Reduction Station Layout



#### 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

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### 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 10 quantitative risk assessment study)

#### 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.

#### 2.6.1.1 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.

#### 2.6.1.2 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 comprises 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).

#### 2.6.1.3 Reduction

Each 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 IChemE standards, the reduction unit should be installed in a well-ventilated closed area or, alternatively, in an open protected area.



#### 2.6.1.4 *Active and Monitor Regulator*

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

#### 2.6.1.5 *Slam Shut Valve*

The purpose of slam shut valve 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.

#### 2.6.1.6 *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.

#### 2.6.1.7 *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/cm<sup>3</sup>. The odorant system consists of a stainless steel storage tank, which receives the odorant from 200-liter drums, injection pumps, and associated safety devices.

#### 2.6.1.8 *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.

#### 2.6.1.9 *Hotline*

A 24 hours /7days a week Hotline (129) is available for customers and the public to request repairs or assistance. This line is also used in case of emergencies to report leaks, damage, emergencies, and/or incidents related to gas connections, components, infrastructure, and activities (inside or outside households).

## 2.7 Resources Consumption

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### 2.7.1 During Construction phase

#### 2.7.1.1 *Water*

Water is mainly used during the construction phase in concrete preparation, hydrostatic testing, and domestic uses by the workers and engineers. Water for construction and hydrostatic testing 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 m<sup>3</sup>/day
- Construction activities: 250 m<sup>3</sup>

#### 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.

The expected amount of diesel fuel to be used in the construction phase of the PRS is around 60 liters per day. The fuel will be delivered to the construction site via trucks when needed.

## 2.7.2 During operation phase

### 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 waste 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 hazardous wastes generated from site are of small quantities (mainly empty odorant containers and empty paint containers). These wastes are stored on site and transported to the temporary storage facilities of the LDC where all hazardous wastes are transported to the licensed hazardous waste facilities in Nassreya in Alexandria Governorate The waste is expected to include the following waste streams:

**Table 2-1: Waste types and how they will be managed**

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 120 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
Tires		
Cardboards		



Waste type	Hazardous/Non-hazardous	Treatment and Disposition
Containers		as scrap.
Paints containers	Hazardous	Temporarily stored in isolated area on-site, then transported to Abu Rawash storage site. ( <b>Annex 3</b> from the report provides photos of previous UNICO receipts)
Used oil waste		
Batteries		
Chemicals (solvent, lubricants,...) containers	Hazardous	Temporarily stored in isolated area of the site, thereafter, 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.

### 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. There will be a trench (to be used for wastewater) lined with an impervious layer for use by workers during the construction phase and the wastewater will be collected in a septic tank and disposed of at an authorized wastewater treatment facility.

## 2.8.2 During operation

Solid waste generated from the PRS is expected to be minimal and limited to domestic waste and will be collect regularly by trucks belonging to Zefta's local unit.

Hazardous waste- mainly empty odorant 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 (**Annex 3**)

### 2.8.2.1 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
- 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
- LDCs follows EGAS HSE Guidelines which is provided in Annex 4 of this report
- International Plant Protection Convention (Rome 1951)
- African convention on the conservation of nature and natural resources (Algeria 1968)
- Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal (1989)
- United Nations convention on climate change (New York 1992).
- United Nations Convention on climate change and Kyoto Protocol (Kyoto 1997)

### 3.2 World Bank Safeguard Policies

Three policies are triggered for the project as a whole: Environmental Assessment (OP/BP 4.01), Physical Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12). However, OP/BP4.11 and Involuntary Resettlement (OP/BP 4.12) will not be applicable to Zefta PRS

OP/BP4.11 will not be applicable in Zefta as no archeological sites or sites that bear significant historical or cultural value were identified in the project area of Zefta. In case of any unanticipated archeological discoveries; Annex 6, titled 'Chance Find Procedures,' outlines the set of measures and procedures to be followed.

No pipelines will cross agricultural land in Zefta and accordingly no compensation will be applied.





The proposed land for the construction of the PRS was obtained based on willing buyer willing seller approach. The site visits conducted by EGAS and Egypt Gas reported no encroachment within the PRS land. Supplementary site visits were conducted by social team. No encroachment were reported and the land purchased for the construction of the PRS was fenced. Therefore, the Involuntary Resettlement (OP/BP 4.12 is not applicable for the proposed project.

In addition to the above mentioned safeguards policies, the Directive and Procedure on Access to Information<sup>5</sup> will be followed by the Project<sup>6</sup>.

### 3.3 International Finance Corporation (IFC) EHS Guidelines/

The IFC Environmental Health and Safety (EHS) Guidelines<sup>7</sup> describes pollution prevention and abatement measures and emission levels that are normally acceptable to the Bank. However, it is 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 IFC 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.

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. .

### 3.4 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.
- Decree No 51 o year 2018 pertaining to transfer the ownership of PRS land to EGAS
  
- Army force permits to construct the PRS
- Constructions permit to be obtained from the Local Governmental Unit in Zefta-Gharbeya.
- Utility installation permission to the PRS

<sup>5</sup> <https://policies.worldbank.org/sites/ppf3/PPFDocuments/Forms/DispPage.aspx?docid=3694>

<sup>6</sup> All information will be shred under the following links [www.egas.com.eg](http://www.egas.com.eg) and [www.regas.com.eg](http://www.regas.com.eg)

<sup>7</sup> <https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>



- Permission from the High Council of Antiquities in accordance to Law No 117 of year 1983 and its amendment No 12 of year 1991



## 4 Environmental and Social Baseline

### 4.1 Introduction

Zefta District lies under the jurisdiction of Al-Gharbeya Governorate which is located in the middle of the Nile delta. Zefta city is located at the east of the governorate on the Damietta branch. It spreads in a plain studded with an intricate network of canals and drains.

### 4.2 Climatology and Air Quality

#### 4.2.1 Climate

##### 4.2.1.1 Temperature

The average annual temperature is 26.6°C in Zefta. The warmest month of the year is July, with an average temperature of 26.9 °C. January has the lowest average temperature of the year at 13.1°C

**Table 4-1: Average of high and low Temperature (°C)**

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Temp.	13.1	13.9	15.9	19.7	23	26	26.9	26.7	25.3	22.9	18.6	14.7
Av. High Temp.	18.6	19.9	22.3	26.5	30.1	33	32.9	32.8	31.8	29.1	24.3	20.2
Av. Low Temp.	7.6	8	9.5	12.4	15.3	18.9	20.7	20.5	18.8	16.7	12.9	9.2

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

##### 4.2.1.2 Rainfall

Average annual precipitation in Zefta ranges between 2mm. to 10.5 mm. Table 4-2 show the average annual precipitation and average number of rainy days in Zefta.

**Table 4-2: Average Precipitation in Zefta Area**

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Prec. (mm.)	10.5	7.2	5.6	2.7	2.1	0.2	---	---	---	2	6	8.1
Av. No. of Prec. Days	5.8	4.5	3.1	1.4	0.6	0.1	---	---	0.1	1.3	2.4	4.3

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



4.2.1.3 Wind

The wind speed in Zefta ranges between 43.9Km/h and 59.8Km/h, and it is characterized by a calm to moderate breeze. The highest average wind speed occurs during spring, in March and April.

Table 4-3: Average Wind Speed (Km/h)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Wind Speed	50.4	53.3	59.8	59.8	55.8	53.3	47.9	43.9	45.4	45.4	45.4	47.9

Source: [http://www.weatherbase.com/weather/weather.php?s=601818&cityname= Zefta-Egypt](http://www.weatherbase.com/weather/weather.php?s=601818&cityname=Zefta-Egypt)

4.2.1.4 Site specific ambient air quality

The selection of the active air measurement location is based on the nature of the surrounding activities, the location of the nearest sensitive receptors<sup>8</sup> (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.

Location	Latitude	Longitude
Zefta PRS site	30°41'26"N	31°15'2"E

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 (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), Total Suspended Particulates (T.S.P) and particulate matter (PM<sub>10</sub>). 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

**Error! Reference source not found.** 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.

<sup>8</sup> None were observed during the site visit.

**Table 4-4: Eight (8) hours average ambient air pollutants' concentrations ( $\mu\text{g}/\text{m}^3$ )**

	NO	NO <sub>2</sub>	NO <sub>x</sub>	SO <sub>2</sub>	CO( $\text{mg}/\text{m}^3$ )	PM <sub>10</sub>	T.S.P
	17.5	14.5	28.4	8.2	0.8	80	99
National (24 hrs)	150	150	150		10 ( $\text{mg}/\text{m}^3$ , 8 hrs)	150	230
WB (24 hrs)	-	200(1 hr)	----	125	N/A	150	----

#### 4.2.1.5 Site specific noise measurements

Noise level measurements were conducted at 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. **Error! Reference source not found.** presents the ambient noise measurements at the proposed PRS gate on the Zefta-Banha Road.

#### Results of noise measurements

The noise measurements in the studied areas are below national and WB guidelines. The excavation and construction activities may cause noise levels to temporarily surpass permissible levels at the site. The duration of permissible levels being surpassed will be intermittent for the duration of the workday i.e., 8-10 hours Management and mitigation plans for noise levels beyond permissible levels are further addressed in chapter 7.

**Table 4-5: Ambient noise level measurements**

Time	Sound Level Equivalent & Percentile Recordings in dBA for 24 Hours						Permissible Limits LAeq (dBA)	WB permissible levels
	LAeq	LA10	LA50	LA90	LA95	LCpeak		
	61.7	55.1	45.6	38.2	36.4	106.6	<b>70</b>	<b>70</b>

**Annex 5** from the report presents the full air and noise measurements at Zefta 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 trend affects the Zefta 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 Zefta area belongs to the Mit Ghamr formation. It consists mainly of clay and silt including some sand tracks.

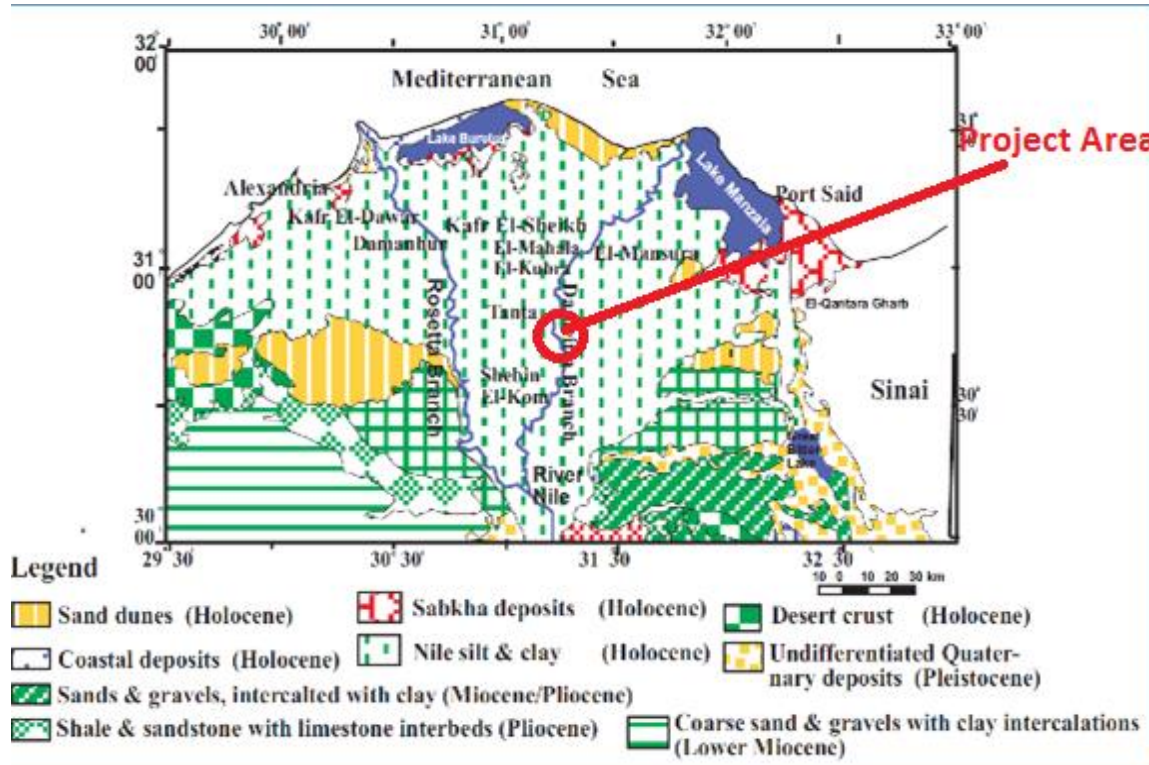


Figure 4-1: Geological Map of Nile delta include project area

Source: H.H. Elewa, 2010

### 4.2.3 Water resources

#### 4.2.3.1 Surface water

Zefta city is located at the Damietta Branch. The PRS is 1.5 km away from the branch. The only existing water body nearby is the main feed canal (AsSahil), which is used as a main water source for agriculture in Zefta. The canal is approximately 50 m away from the proposed PRS site. The Zefta- Banha road separates the canal from the PRS gate. The canal will not be affected by the proposed project activities during construction or operations, due to its separation from the project site by a main road between and a railway.



**Figure 4-1: As Sahil canal**

#### 4.2.3.2 Groundwater

There is no site specific data available on the groundwater quality in Zefta. Audebeau (1912) and Zaghloul (1985) gave evidence that the Nile River is the source of the groundwater underlying the valley and Delta. The ground elevation is approximately 5 m above the mean sea level (AMSL) near Tanta City (Saleh, 1980). Tanta city is approximately 23km away from the project area.

#### 4.2.4 Terrestrial Environment

Zefta current land use for the location of the PRS is for agricultural purposes. Therefore it is a modified habitat and has no ecological importance. Additionally, the 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

The Cleansing department affiliated with the Local unit in Zefta is responsible for waste collection. Few collection bins exist throughout Zefta city. They are used as open transfer systems, existing in residential areas; and later transferred to El-Sadat controlled-landfill, located



about 140 km from Zefta city. Waste collection services are absent outside the city borders. The accumulated waste in the dumpsite appears as a large plateau. Most of the dumpsites are located in an agricultural area close to residential areas.

#### 4.2.6 Physical cultural resources

There are no significant physical cultural resources existing near the PRS's project site. Furthermore, No archaeological or antiquities sites were identified within or near the project area. However, in case of any unanticipated archeological discoveries; 'Chance Find Procedures, outlines the set of measures and procedures to be followed in such a case (**Annex 6**).

#### 4.2.7 Physical structures

There are no physical structures near the PRS station in Zefta.

#### 4.2.8 Traffic profile

The traffic in Zefta city is of a relatively moderate density. The rush hours can be segregated into two major periods. The first is between 7 - 10 am, while the second is between 2 - 4 pm.



Figure 4-2: Zefta city main streets





There are many types of vehicles moving inside and outside Zefta city Such as private cars, minibuses and Rickshaws (Tuk Tuk). The main streets defined in this study were Yosef El Gendy St. El Geish st. and El Tahrir st. The traffic is relatively of high density in the main streets, particularly, as many of them are of commercial nature.

### 4.3 Socio-economic Baseline

The PRS is located in the vicinity of Zefta city which is located in the southern eastern part of Gharbeya Governorate. It lies on the Damietta branch across from Mit Ghamr city, which lies under the jurisdiction of Al Daqahliyah governorate, to the east. There is a small hamlet named Izbet el Gahsh located approximately 700 meter away from the proposed project site. As no information is available on the level of this hamlet, the social baseline will describe the city of Zefta.

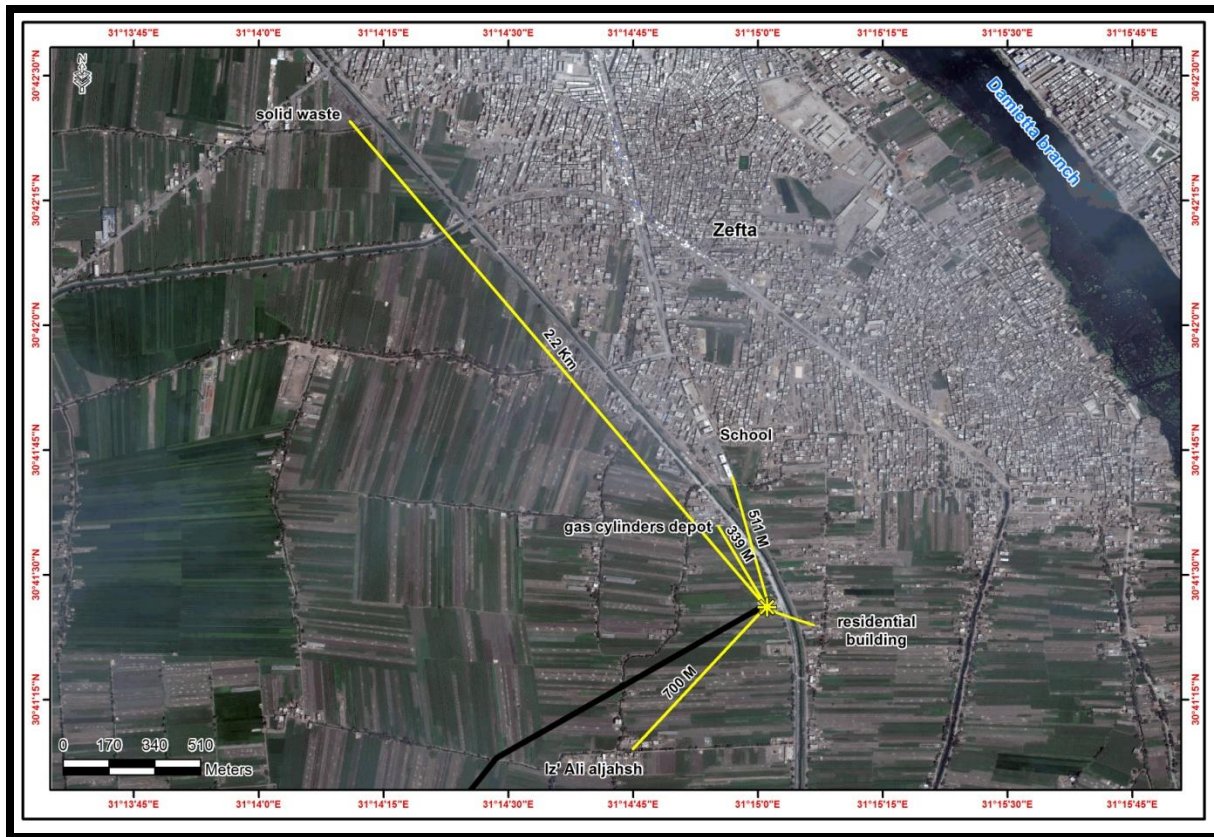


Figure 4-2: PRS location

#### 4.3.1 Administrative affiliation

Zefta city is affiliated to Markaz Zefta which also includes 8 Local Governmental Units (LGUs) and many other towns, villages and hamlets. The total area of the City of Zefta is 1,230 km<sup>2</sup>.

#### 4.3.2 Urbanization trends

Zefta city is of a varied character. It encompasses agrarian lands as well as urban spaces. The condition of the urbanized spaces, which encompass the majority of residents, is haphazard, and



lacks any sort of architectural identity. According to the head of the Projects' department in the municipality, the city center of Zefta contains many illegal and broken down buildings which puts an obstacle to NG connections .

According to CAPMAS poverty mapping data of 2013, the percentage of individuals living in apartments is 90.64%, while those living in rural houses represent 0.62%. The remaining percentage lives in one room or two inside an apartment.

### **4.3.3 Demographic characteristics**

#### *4.3.3.1 Total Population*

The total population of the City of Zefta is 106,249 citizens in 26,562 households, according to CAPMAS poverty mapping data of 2013. The total population of Izbet El Gahsh is about 700 people.

#### *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 the Gharbya 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*

A household is defined as “Family (and non-family) members who share residence and livelihood, and operate as one social and economic unit”. The average family size in the City of Zefta is 4, According to CAPMAS poverty mapping data of 2013.

#### *4.3.4.2 Dwelling characteristics*

As mentioned above, the majority of the population of the City of Zefta lives in apartment buildings. The conditions and characteristics of urban houses are in compliance with the bases and preconditions for connecting NG. Concrete and red bricks were used in the construction of the walls and ceilings. The finishes and facades of all buildings are of very poor quality and the entire city lacks any sort of architectural identity.

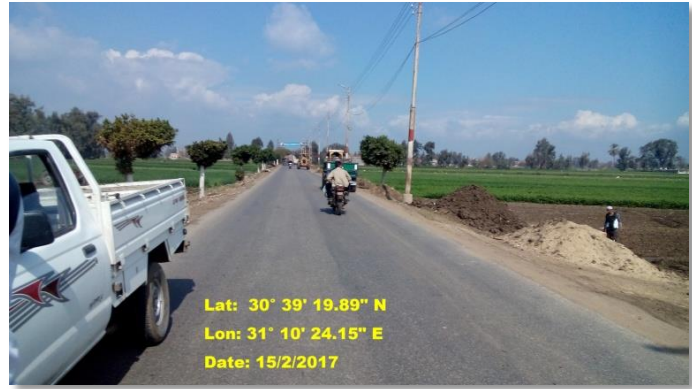
Most of the buildings are legal, however, the research team documented some neighborhoods were illegally built on agrarian lands. In the same respect, the city center contains some unplanned and illegal areas and buildings, as noted by the head of the Projects' department in the urbanization trends section.

Regarding the conditions and characteristics of the streets, the average width of main streets range between 1 to 2 lanes wide and side streets are 1 lane wide. All streets that were documented by the research team are paved out, though the condition of the asphalt varies between modest and poor. The following figures illustrate typical streets and alleyways in the City of Zefta.





**Figure 4-3: Small roads in the project areas**



**Figure 4-4: Hanoun Kafr Helal road**

### 4.3.5 Access to Basic Services

#### 4.3.5.1 Access to Electricity

According to CAPMAS poverty mapping data of 2013, 99.5% of individuals living in the City of Zefta use electricity for lighting. The electricity grid covers 1,352.94 subscribers in the entire governorate of Gharbya, according to 'Governorates' Description by Information 2010'

#### 4.3.5.2 Access to potable water and sanitary system

The city of Zefta is located on the western bank of the Damietta branch. CAPMAS poverty mapping 2013 figures show that accessibility to the portable water network is high at 98.11%, and 96.21% of individuals have tap water inside their homes.

On the other hand, accessibility to the public sanitation network stands at 53.57% of individuals, according to CAPMAS poverty mapping 2013. The representative of the department of urban planning referred to the fact that the construction of the sewage station is incomplete.

It is noteworthy to mention that the condition of public services in the City of Zefta is dire, according to the information center representative interviewed by the field research team.

### 4.3.6 Human development profile

#### 4.3.6.1 Education

According to CAPMAS Poverty Mapping data of 2013, 15% of individuals have completed their basic education consists of primary and preparatory stages, while only 18.1% have university degrees. A substantial 94.6% of individuals, between 6 to 18 years old, are enrolled at schools; while the percentage of drop-outs stands at 2.8%.

In the same vein, 96.33% of females, between the ages of 6 to 18 years old, are enrolled at schools; while the percentage of female drop-outs stands at 1.77%. The percentage of females with university degrees is 14.7%.

The illiteracy rate in the City of Zefta is 26.7%. The illiteracy rate among females is 31%.



#### 4.3.6.2 Unemployment and Work Status

According to CAPMAS poverty mapping 2013, the percentage of manpower which joined the labor force at the age of 15 years old and above is 45.32%. Manpower, at the age of 24 years old and above, is 52.4%. The percentage of agriculture workers from total employed persons is 6.8%. The unemployment rate in the City of Zefta stands at 12.8%. The following table illustrates the distribution of manpower among different sectors:

**Table 4-6: Employment in the City of Zefta**

Self-employed	Government /public sector	Private sector	Permanent jobs	Temporary jobs	Wage workers	Unpaid worker
8.42%	31.44%	46.7%	79.8%	21%	71.7%	0.45%

Source: CAPMAS poverty mapping, 2013

In the same respect, female employment figures show that the female unemployment rate is 24%. The percentage of female workers, who joined the labor force at the age of 15 years old and above, is 19.26%. The following table displays more figures related to the type of work taken up by females in the City of Zefta.

The formal Statistics obtained from the Poverty Mapping Data 2013 regarding manpower reflected that the age of starting work is 15 years old.<sup>9</sup> 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. Furthermore, the governor concerned in each governorate, in agreement with the Minister of Education may permit the employment of minors aged 12-14 years in seasonal work which is not harmful to their health and growth, and which does not conflict with regular school attendance. Consequently, there is always a high probability to detect child labor in most of the projects implemented in Egypt. In the project areas where agriculture work and sales activities are in place, there is a big number of underage laborers were noticed. As a conclusion, there is a high risk that the contractors might employ young people below 18 years old. Therefore rigid restrictions to employ this category must be added to the contractor obligations.

**Table 4-7: Female employment in City of Zefta**

Self-employed females/total employed females	Female wage workers/total employed females	Female agriculture workers/total employed females	Females working in temporary jobs	Unpaid females
0.64%	73.96%	1.27%	5.3%	0.08%

Source: CAPMAS poverty mapping data

<sup>9</sup> 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



According to focus group discussions and interviews with government officials, the labor force includes farmers, land owners who cultivate their own lands, government employees, manufacturing workers and car maintenance workers. Economic activities of the City of Zefta also include commercial activities, brick kilns and carriage manufacturing.

According to 'Governorates' Description by Information 2010,' Zefta produces 80% of Egypt's linen and barley production. It also hosts the spinning, weaving and dying industries.

#### **4.3.7 Health Facilities**

The City of Zefta has one central hospital, equipped with an emergency unit. There are a number of private hospitals. Additionally, there is an ambulance station, and a number of urban and rural medical units. There is no assessment of the quality of health services provided in the City of Zefta.

#### **4.3.8 Poverty index**

According to poverty mapping developed by CAPMAS in 2013, the number of poor people in the City of Zefta is 4,919 individuals, representing 4.63%. The Gini Coefficient, which indicates income inequality, stands at a critical 0.22. The percentage of female-headed households is 14.6%.

According to focus group discussions and consultations with public officials, residents of the City of Zefta are burdened with the pressure of expensive bills, especially electricity bills.

According to CAPMAS poverty mapping of 2013, the annually per capita consumption rate in the City of Zefta is 8,198.22. EGP And based on focus group discussions, the average monthly expenses is estimated between 2,000 and 5,000 pounds.

#### **4.3.9 Human activities in the project areas**

As noted in the unemployment and work status sections, the City of Zefta encompasses a variety of economic activities including agriculture, industry and services. However, there is no study assessing these activities in terms of the level and quality of goods and services produced in the City of Zefta or in terms of job creation. As indicated above; the labor force includes farmers, land owners who cultivate their own lands, government employees, manufacturing workers and car maintenance workers. One of the participants of the focus group discussions stated that the majority of youth work as drivers on popular three-wheeled Tuk Tuk, for it is the only employment vacancy available to young people in the city.



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



## 5.2 Potential positive impacts

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### 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.

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

The construction of the Zefta PRS and hotspot 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.

#### ***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, 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.

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

The operation of the Zefta PRS is expected to result in the creation of job opportunities, both directly and indirectly. The average number of workers during operation of the Zefta 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. 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.

## 5.3 Potential negative impacts

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Various impacts were assessed in accordance to the impact assessment methodology.

### 5.3.1 Negative impacts 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 where excavation, as soil compaction may occur due to





heavy machinery. In addition, potential soil contamination may occur as a result of oil spills and leaks.

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 ( PM<sub>10</sub>, PM<sub>2.5</sub>)
- 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 areas. Therefore, it is expected that the dust impact will moderately impact the surrounding area (agriculture land). Soil characteristic at PRS site is mainly hard soil.

Emissions of CO<sub>2</sub>, CO and PM will result from the operation of 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, vehicles, 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<sup>10</sup> (such hospitals, schools, protectorates, etc.).

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

- Onsite Workers
- Neighbor's farmer

It is worth mentioning that the proposed PRS site is located at the Banha-Zefta 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 Zefta PRS, it is expected that the generated noise will mainly have an impact on workers.

<sup>10</sup> None were observed during the site visit.



The impact on construction workers is assessed as **medium**

The impact on neighboring farmers is assessed as **minor** receptors (neighbor's farmer).

#### 5.3.1.4 *Impact on worker health and safety*

Potential safety and health impacts to workers during construction of the Zefta PRS, in general, are the same as those associated with any construction project involving earthmoving, use of large equipment, transportation of overweight and oversized materials, and construction and installation of facilities. In addition, health and safety issues include working in trenches.

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 Al 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 *Hazardous and non-hazardous waste management*

Normal construction non-hazardous solid wastes includes scrap concrete, steel, bricks, packaging waste, used drums, wood, scrap metal, and building rubble will be generated. Human or domestic wastes by construction labor, including sewage and garbage collected from the labor offices location will also be 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.

Therefore impact is assessed as **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 Banha-Zefta 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).

#### *Socioeconomic impacts*

The project will result in inconvenience and disturbance to local communities and businesses causing delays in the various daily activities due to the fact that minibuses and tuk tuks may find difficulty in maneuvering in the main roads in the vicinity of the Zefta PRS. Moving the PRS equipment might result in short term disturbance to the community.

Therefore impact on traffic in the project site is assessed as **medium**

#### *5.3.1.8 Impact on ground water / Surface 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 exist) during excavation, will be collected in tanks and transported via a certified contractor to the nearest wastewater treatment station.

Therefore impact is assessed as **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 it is assessed as **of no significance impact**

#### *5.3.1.10 Community health and safety*

The proposed project site located approximately 150 m from a rural area, the impact on the community as a result of exhaust gas emissions, dust and noise is likely to be temporary and short term and therefore is predicted to be minor.

Therefore it is assessed as **minor**

#### *5.3.1.11 Land related impact*

#### *Socioeconomic impacts*

- **Zefta PRS** required a plot of ٢٣٢٦٥. m<sup>2</sup>.

In 2012, the LDC that was responsible of constructing Zefta PRS was Maya Gas. They were also responsible for purchasing lands needed to construct the PRS. Thereafter, they handed over the construction of the PRS to Egypt Gas. Therefore, it was relatively difficult to define how the process was implemented.

Given the absence of any information about land acquisition process, the study team conducted meetings with Egypt Gas and EGAS social team for better understanding of the process as Maya Gas was not operating in Zefta any more. Additionally, all land contracts were obtained from EGAS (see Annex 2).



They reported that the process of land acquired was as follows:

- Maya Gas followed EGAS regulations( no enforcement in land purchase) pertaining to purchasing any PRS lands. They visited the project site seeking for lands free of any customary landownership and the owners expressed their willing to sell their lands;
- At the time of handing over the land from Maya Gas to Egypt Gas, the lands were free of any land disputes and had legal and acceptable land tenure without any legal conflicts;
- Maya Gas agreed to purchase three plots of land that the owners approved willingly to sell them to the LDC of proper market value;
- Three contracts were signed with the owners in 2012;
- All lands were taken without any disputes or legal lawsuits.

A site visit was paid by the study social team to land site in 2016, the site was fenced and no encroachments were detected.

Impact related to the land acquisition during the construction phase is assessed as **of no significance as land ownership was based on willing buyer willing seller approach**

#### 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

*The LDC recruits a number of workers and technicians during the construction phase. If not managed properly, the recruited workers' interactions with the local community may result in inconvenience, inappropriate and unappreciated acts, negative impacts on privacy or may even result in serious misconducts (e.g. harassment) or inappropriate behaviors that could affect different groups including women. Although not very much expected in the project, In the meantime the increase of workers might mean in some areas influx of additional population and increased pressure on local resources, prices of commodities, accommodation and rents.*

*In Zefta PRS, only 16 workers will come from outside Zefta. Such a number is likely to cause minor labor influx impacts.*

Impact related to the labor influx during the construction phase is assessed as **low**



### 5.3.2 Negative impacts during operation

#### 5.3.2.1 Impact on worker health and safety

Possible impacts to health and safety during operations include exposures to odorant release, gas leak, fire, noise, 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 10) 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 Methylthiolsulphide (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. Odorant spills can result from improper handling of the odorant tanks. In case of emergency, the risk resulting from odorant release or gas leak will be managed by Zefta PRS's emergency response plan.

Therefore the impact is assessed as **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 generation

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, groundwater (if exists), visual, and health and safety).

Therefore the impact is assessed as **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. Additionally, the PRS is located at the Banha-Zefta road where the noise baseline was recorded is range between 56.9 to 68.6 LAeq.

Therefore the impact is assessed as **minor**





#### 5.3.2.5 Air emissions

No gaseous emissions are expected to occur during the operation phase except for the 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 the PRS will not have an 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 an 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 only be a small number of staff vehicles moving in and out of the PRS, as well as trucks transporting odorant and spare parts to the PRS. Traffic impacts are anticipated to be insignificant due to the proposed project being located at the Banha- Zefta road.

Therefore the impact is assessed as **of no significance**

#### 5.3.2.9 Labor influx

Zefta PRS will employ between 12 and 14 workers, and therefore having no significant impact pertaining to labor influx.

Therefore the impact is assessed as **of no significance**

### 5.4 Impacts during Accidental Events (Operation Phase)

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

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

And referring to the risk calculations determined in Zefta QRA study, the individual risk level to the exposed workers / public (PRS / Off-take Point) based on the risk tolerability criterion have been identified in Acceptable (Lower Tolerability Limit<sup>11</sup>) for workers / Off-take public

#### ***11 Below the Upper Tolerability Limit***

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



and ALARP (Below the Upper Tolerability Limit<sup>(12)</sup>) region for public (PRS). So there are some points (Study Recommendations) need to be considered to keep the risk tolerability, and this will be describe under item (7.5) (for more details refer to the QRA Study under Annex-10)

Therefore, the impact is assessed to be of Low significance.

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***12 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 the impacts

Table 5-1: Environmental and Social impact summary

Impact	Impact Description	Type and significance identification	Impact Significance
<b>During Construction</b>			
Impact on soil	Degradation of soil quality, Excavation and movement of heavy machinery on unpaved surface soils during site preparation and foundation-laying could cause a physical breakdown of soil particles potentially causing destabilization of the soil structure.	Negative impact.	Medium
Air emission	<p>WB/IFC requirements and Law 4/1994 (modified by laws 9/2009 &amp; 105/2015) stipulates strict air quality standards. Air emissions (gases and particulates) during construction shall arise from:</p> <ul style="list-style-type: none"> <li>- Particulate matter and suspended solids from excavation/backfilling operations</li> <li>- Possible dispersion from stockpiles of waste or sand used for filling trenches.</li> <li>- Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO<sub>x</sub>, NO<sub>x</sub>, CO, VOCs, etc.</li> <li>- Traffic congestions resulting from road closure or slowing down of traffic due to excavation works.</li> </ul> <p><b>Dust</b> 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 100 m from the PRS construction site.</p>	Negative impact	Medium



Impact	Impact Description	Type and significance identification	Impact Significance
	<p><b>Gaseous pollutants emissions</b> 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>		
Noise	<p><b>Noise impact on worker</b> 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.</p>	Negative impact	Medium
	<p><b>Noise impact on neighbor</b> No major noise impacts are expected during construction of the PRS as the nearest receptors are around 100m away and the construction period is limited.</p>	Negative impact low momentum intensity and effect	Minor
Impact on worker health and safety	Inhalation of air pollutants, exposure to high noise levels, injuries and potential death as a result of operating heavy equipment, and handling hazardous materials.	Negative impact	Medium
Risk pertaining to child labor	As mentioned in the baseline, child labor is a common practice in the project communities in Al 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	Negative impact	Low to medium
Hazardous and non-hazardous waste generation	<p>Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination.</p> <p>Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site.</p>	Negative impact	Medium



Impact	Impact Description	Type and significance identification	Impact Significance
	<p>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>		
Traffic	The transportation of material and equipment to the construction sites will cause temporary increase in traffic along Banha - Zefta road, and other main road in the governorate.	Negative impact with medium intensity and low momentum, persistence	Medium
Groundwater	Groundwater that might exist in area may be affected by inappropriate liquid and hazardous waste during construction	Negative impact	Minor
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.	Negative	No significance
Community health and safety	The proposed project site 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.	Negative	Minor
Impacts pertaining to land acquired	<p><b>Zefta PRS</b> required a plot of 2326.5 m<sup>2</sup>.</p> <ul style="list-style-type: none"> <li>○ Maya Gas followed EGAS regulations( no enforcement in land purchase) pertaining to purchasing any PRS lands.</li> </ul>	Negative	No significance





Impact	Impact Description	Type and significance identification	Impact Significance
	<p>They visited the project site seeking for lands free of any customary landownership and the owners expressed their willing to sell their lands;</p> <ul style="list-style-type: none"> <li>○ At the time of handing over the land from Maya Gas to Egypt Gas, the lands were free of any land disputes and had legal and acceptable land tenure without any legal conflicts;</li> <li>○ Maya Gas agreed to purchase three plots of land that the owners approved willingly to sell them to the LDC of proper market value;</li> <li>○ Three contracts were signed with the owners in 2012;</li> <li>○ All lands were taken without any disputes or legal lawsuits.</li> </ul> <p>A site visit was paid by the study social team to land site in 2016, the site was fenced and no encroachments were detected.</p>		
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.	Negative	No significance
Labor influx	There is a probability to face a labor influx impact that might originate from the laborers come from other areas to the work site.	Negative	Minor
<b>During operation</b>			
Worker health and safety	Possible impacts to health and safety during operations include exposures to odorant, noise, 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	Negative impact	Medium



Impact	Impact Description	Type and significance identification	Impact Significance
	phase, if there is any incident or emergency situation, the impact will negatively endanger the surrounding community and establishment.		
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.	Negative	No significance
Inappropriate Hazardous material and waste management	<p><b>Hazardous material</b> Odorant spills can result from improper handling of the odorant tanks. According to Zefta QRA study, modeling vapour release will be limited inside the PRS boundary near to the admin office and Egypt Gas Zefta ERP will cover this point.</p> <p><b>Hazardous waste</b> Discharge of remaining odorants in containers, after use, in land or sewers; Disposal of used containers with domestic waste, or by open disposal</p>	Negative impact	Medium
Noise emissions	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.	Negative impact	Minor
Air emissions	No gaseous emissions are expected to occur during the operation phase except for the potential natural gas leak or in case of accidents (odorant handling or storage) and during maintenance activities.	Negative	No significance
Soil	The normal operation of the PRS will not have an impact on soil; however risk of soil contamination is only associated with the possible spillage or leakage.	Negative	No significance



Impact	Impact Description	Type and significance identification	Impact Significance
Ecological	The normal operation will not have an impact on flora and fauna.	Negative	No significance
Traffic	During the operation and maintenance of the PRS, there will be no expected impact. There will only be a small number of staff vehicles moving in and out of the PRS, as well as trucks transporting odorant and spare parts to the PRS. Traffic impacts are anticipated to be insignificant due to the proposed project being located at the Banha- Zefta road.	Negative	No significance
Impact on worker health and safety	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.	Negative impact	Medium
Labor influx	Zefta PRS will employ between 12 and 14 workers, and therefore having no significant impact	Negative	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 4 or 7 bar, making it suitable for distribution or use in domestic or industrial applications. Zefta's PRS will produce 7 bar outlet pressure for the local distribution network (intermediate pressure). The LDC (Egypt gas) choose to produce 7 bar instead of 4 bar due to high consumption rates excepted in Zefta city. It is designed 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 PRS location Alternatives

As per national and WB guidelines, PRS siting avoids habitat alteration and seeks to minimize environmental, occupational health and safety, and community health and safety impacts.

In 2012, the LDC that was responsible of constructing Zefta PRS was Maya Gas. They were also responsible for purchasing lands needed to construct the PRS. Thereafter, they handed over the construction of the PRS to Egypt Gas. Therefore, it was relatively difficult to define how the process was implemented.

Given the absence of any information about land acquisition process, the study team conducted meetings with Egypt Gas and EGAS social team for better understanding of the process as Maya Gas was not operating in Zefta any more. In general, EGAS and LDCs follow a set of agreed upon procedures for the process of permanent Land take for the construction of PRSs. The procedure covers cases of land acquisition of State Owned Lands or privately owned Lands on willing Buyer Willing Seller basis. It is the priority of EGAS as an asset holder, to acquire State Owned Lands that are free of any uses (both formal and informal EGAS never resorts to the land expropriation decrees in PRSs selection, particularly because of the flexibility of the PRSs locations.

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



## 7 Environmental and Social Management & Monitoring Plan

### 7.1 ESMMP Objectives

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

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 Zefta**,
- The project manager in **PRS site in Zefta**,
- 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](mailto:info@Egypt Gas.com.eg)

##### **2. During operation 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](mailto: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.

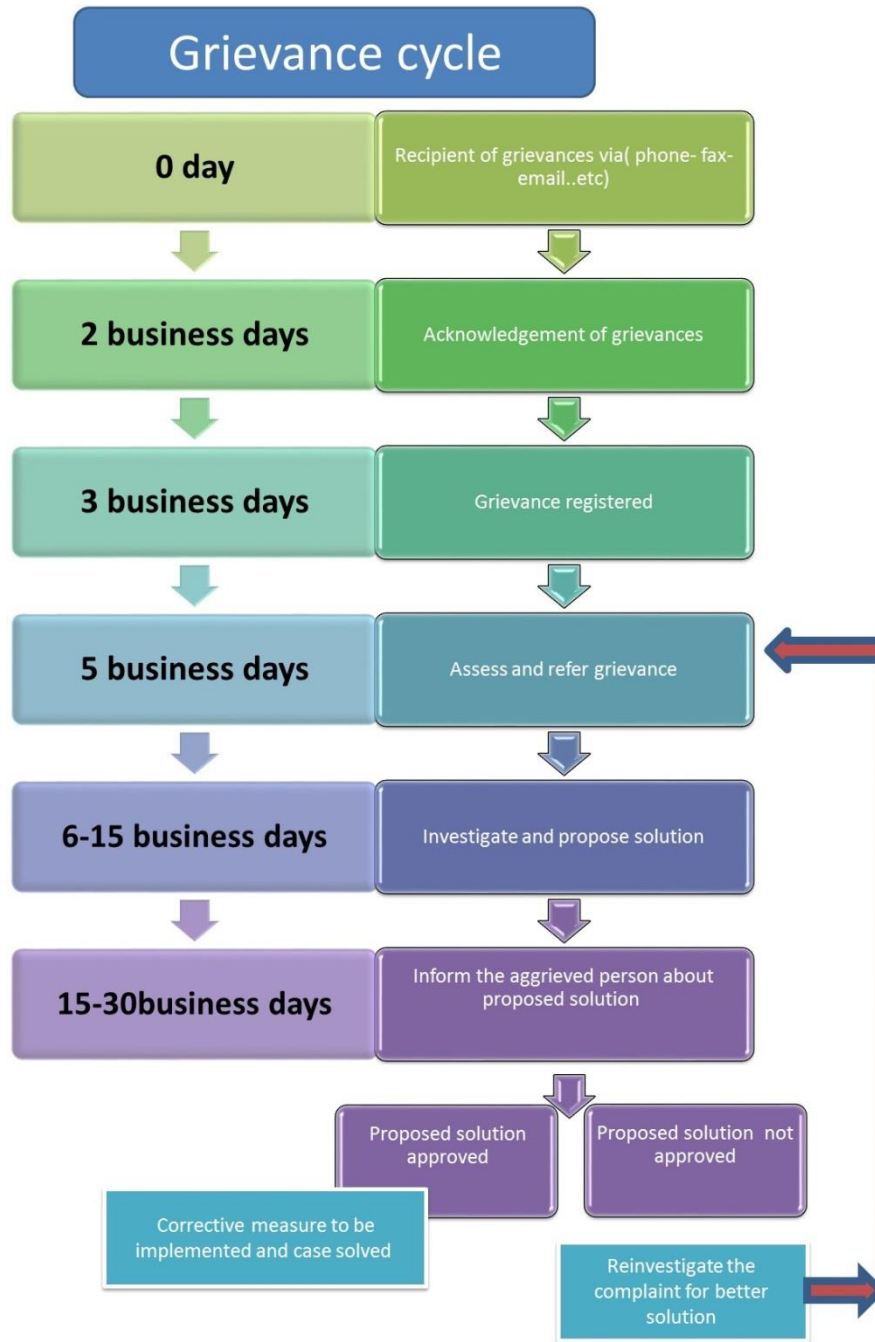


Figure7-7-1: Grievance cycles

**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 9



## 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	On soil	<ul style="list-style-type: none"> <li>- Decrease erosion by minimizing disturbances and scarification of the surface</li> <li>- Best practices for soil management should be followed</li> <li>- Good housekeeping to minimize spills/leaks</li> <li>- Proper handling and management of wastes</li> </ul>	Minor	Contractor	LDC –HSE department	Field supervision (audits)	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management costs</li> </ul>
	Air emission	<ul style="list-style-type: none"> <li>- Monitoring of wind speed and direction to manage dust-generating activities during undesirable conditions.</li> <li>- Management of number of vehicles and equipment in the site.</li> <li>- Appropriate maintenance, engine tuning and servicing of construction equipment to minimize exhaust emissions</li> <li>- Minimize unnecessary journeys or equipment use</li> <li>- Adopt a policy of switching off machinery and equipment when not in use (idle mode).</li> </ul>	Minor	Contractor	LDC –HSE department	Contractual clauses + Field supervision (audits)	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management costs</li> </ul>
	Noise	<p><b>Worker</b> Application of the normal precautions normally taken by construction workers.</p> <p><b>Neighbor</b>  <ul style="list-style-type: none"> <li>- Notification to the surrounding establishment prior to the construction of the PRS</li> <li>- Time management and construction schedule according to the IFC regulation provided by the contractor prior to the construction phase</li> </ul> </p>	Minor	<ul style="list-style-type: none"> <li>- LDC Excavation Contractor</li> </ul>	LDC–HSE department	Contractual clauses + Field supervision (audits)	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management costs</li> </ul>
	<ul style="list-style-type: none"> <li>- Field supervision</li> <li>- Complaints receipt from local administration</li> </ul>						
Social health	Occupational health and safety	<ul style="list-style-type: none"> <li>- 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.</li> <li>- Standard protection by placing clear project signs.</li> <li>- Time management for vehicles movement; especially avoiding the peak hours</li> <li>- Standard protection for the workers especially working at elevated heights or trench.</li> <li>- Regular inspection to compelling worker to used their PPE</li> <li>- Training and licensing industrial vehicle operators of specialized vehicles.</li> <li>- The contractor also should keep attendance worksheet and laborers ID in order to verify the age of workers</li> <li>- Health insurance should be applicable to the contractor workers and workers contracted by a sub-contractor</li> <li>- Full compliance to EGAS and LDC HSE requirements, manuals, and actions as per detailed manuals adopted by EGAS</li> <li>- Ensure the provision of the appropriate personal protective Equipment and other equipment needed to ensure compliance to HSE manuals</li> <li>- Safe exits in building according to the modeling in the QRA study.</li> <li>- Provide a suitable tool for wind direction (Windsock) to be installed in a suitable place to determine the wind direction.</li> <li>- Cooperation should be done with the concerned parties before planning for housing projects around the PRS area.</li> </ul>	Minor	<ul style="list-style-type: none"> <li>- LDC Excavation Contractor</li> </ul>	LDC–HSE department	Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management costs</li> </ul>



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"> <li>- 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</li> <li>- 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</li> <li>- 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</li> <li>- 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</li> </ul>	Minor	<ul style="list-style-type: none"> <li>- LDC</li> <li>- Excavation Contractor/ subcontract or</li> </ul>	LDC–HSE department Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management costs</li> </ul>
Physical Receptor	Solid and Hazardous waste management	<ul style="list-style-type: none"> <li>- Temporary storage in areas with impervious floor</li> <li>- Safe handling using PPE and safety precautions</li> <li>- 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 (Nasreya or UNICO in Alexandria).</li> <li>- 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.</li> <li>- Hand-over selected oils and lubricants and their containers to Petrotrade for recycling</li> </ul>	Minor	<ul style="list-style-type: none"> <li>- LDC</li> <li>- Excavation Contractor</li> </ul>	LDC–HSE department Field supervision and review of certified waste handling, transportation, and disposal chain of custody	<ul style="list-style-type: none"> <li>- Indicative cost items included in contractor bid:</li> <li>- Chemical analysis of hazardous waste</li> <li>- Trucks from licensed handler</li> <li>- Pre-treatment (if needed)</li> <li>- Disposal cost at Nasreya</li> <li>- Approximate cost of the above (to be revised upon project execution): 8,000-10,000 LE per ton</li> </ul>
Community	Labor influx	<p>In order to minimize impacts pertaining to labor influx the following should be thoroughly implemented:</p> <ul style="list-style-type: none"> <li>- All workers should be trained on the Code of Conduct (special attention should be paid to harassment, environmental commitment, safety and security commitments)</li> <li>- Enable grievance mechanism and disclose it to community</li> </ul>	No significant	<ul style="list-style-type: none"> <li>- LDC</li> <li>- Excavation Contractor</li> </ul>	LDC–HSE department - Field supervision - Training list of participants - Complaints from community - Health certificates	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management</li> </ul>
Community	Traffic	<p>Time management for transporting the materials, equipment, debris, etc.</p> <p>Clear sign surrounding construction site and the entrance / 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	LDC + Traffic department Contractor has valid conditional permit + Field supervision	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management costs</li> </ul>
Physical Receptor	Groundwater	<p>In general, the proposed construction activities have a Minor impact on the quality of the groundwater; however the following procedures should be follow:</p> <ul style="list-style-type: none"> <li>- Control all onsite wastewater streams and ensure appropriate collection, treatment and discharge. Prevent discharge of contaminants and wastewater streams to ground.</li> <li>- Adequate management and proper handling and storage of construction materials, oils and fuel to avoid spillages.</li> <li>- The implementation of a continuous and regular site inspection system.</li> </ul>	No significant	Contractor	LDC –HSE department Contractual clauses + Field supervision	<ul style="list-style-type: none"> <li>- Contractor costs</li> <li>- LDC management costs</li> </ul>





Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
Community	All Impacts	The detailed grievance mechanism (GRM) is presented in <b>Annex 9</b> is to be shared with the community beneficiaries. Posters will be prepared and made available to the beneficiaries in the contracting office <sup>13</sup> . 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	- Contractor costs - LDC management costs

**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		
Physical Receptor	Noise	<ul style="list-style-type: none"> <li>- Locate noisy pressure reducers away from PRS borders in residential areas</li> <li>- Location of reducers should be at least 20 meters away from the PRS fences.</li> <li>- 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.</li> <li>- Others measures as per QRA</li> </ul>	Minor	LDC Design Department	LDC HSE	Review of PRS layout	LDC management costs & PRS cost

<sup>13</sup> Falls under the budget of the LDCs



Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
Social health	Community and occupational health and safety	<ul style="list-style-type: none"> <li>- Remote actuation of isolation and slam-shut valves by LDC for PRS and pipelines</li> <li>- Produce Hazardous Area Classification drawings</li> <li>- Control room exit design.</li> <li>- Preventive maintenance policy and station manual</li> <li>- Provision of self-contained breathing apparatus (2 pieces for each station) for handling odorant leaks</li> <li>- Apply jet fire rated passive fire protection system to all critical safety shutdown valves ESDVs or Solenoid valves (As applicable)</li> <li>- Place signs in Arabic and English "Do Not Dig" and "High Pressure Pipeline Underneath"</li> <li>- Install an elevated wind sock and provision of portable gas detectors</li> <li>- The design should fully comply with IGE TD/3 code requirements</li> <li>- Notify the civil defense authority before refilling of odorant tank</li> <li>- Information should be provided to people in order to be fully aware about safety procedures</li> <li>- The hotline should be operating appropriately</li> <li>- People should be informed of the Emergency Numbers</li> <li>- 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</li> <li>• 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"> <li>- Firefighting brigades, mutual aids, emergency communications and fire detection / protection systems.</li> <li>- Dealing with the external road in case of major fires.</li> <li>- 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.</li> <li>- Provide the site with SCBA “Self-Contained Breathing Apparatus” (at least two sets) and arrange training programs for operators.</li> <li>- All operation is according to standard operating procedure for the PRS operations and training programs in-place for operators.</li> <li>- Inspection and maintenance plans and programs are according to the manufacturers guidelines to keep all facility parts in a good condition.</li> <li>- Emergency shutdown detailed procedure including emergency gas isolation points at the PRMS and valves room in place.</li> <li>- Cooperation should be done with the concerned parties before planning for housing projects around the PRS area.</li> </ul> </li> </ul>	Minor	<ul style="list-style-type: none"> <li>- LDC project department</li> <li>- Designer</li> </ul>	<ul style="list-style-type: none"> <li>- LDC project department</li> <li>- Engineering dep.</li> <li>- HSE dept.</li> <li>- EGAS</li> </ul>	<ul style="list-style-type: none"> <li>- Drawing and design Document Review</li> <li>- Policy and manual review</li> <li>- Inspection by operators</li> <li>- Signage inspection and site visits</li> </ul>	Included in PRS cost



Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
Physical Receptor	Solid and Hazardous waste management	<ul style="list-style-type: none"> <li>- Strict use of chemical-resistant suits and PPE when handling odorant barrels, tanks, or spills</li> <li>- Evacuation of odorant from barrels into holding tank with utmost care and full PPE</li> <li>- Covering possible odorant spills immediately with sand and treatment with sodium hypochlorite as this will neutralize the odorant as per EGAS and LDC practices</li> <li>- On-site treatment of empty containers with sodium hypochlorite and detergent as Per EGAS and LDC practice</li> <li>- Ship empty containers to a certified hazardous waste facility via company depot using certified handling and transportation contractors</li> <li>- 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 Nasreya)</li> </ul> <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"> <li>- Pre-Plan the anticipated amounts of odorants to be used in order to minimize leftovers and residuals.</li> <li>- Handle with extreme care and always perform visual checks on the integrity of the odorant container</li> <li>- Avoid rough handling rolling or dropping of odorant containers</li> <li>- Avoid exposure to direct sunlight during storage or transportation</li> <li>- Ensure odorant containers are always sealed properly and secured from tipping/falling/damage during transportation and storage (temporary and long-term)</li> <li>- Always have sufficient amounts of sand, sodium hypochlorite and detergent on standby during usage of odorant</li> <li>- ALWAYS handle containers or spills with care and full PPE compliance</li> <li>- 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</li> <li>- NEVER use empty odorant containers for any other purpose</li> </ul> <p>In case of odorant spillage:</p> <ul style="list-style-type: none"> <li>- avoid inhalation and sources of ignition</li> <li>- immediately cover and mix with sufficient amounts of sodium hypochlorite using necessary PPE and tools</li> <li>- collect contaminated sand in clearly marked secure containers/bags</li> <li>- Add sand to inventory of hazardous waste</li> </ul>	Minor	PRS staff	LDC HSE	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
<b>Local traffic and accessibility</b>	Reduction of traffic flow and accessibility to local community	Comments and notifications from Traffic Department	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports Complaints log	LDC management costs
<b>Ambient air quality</b>	Increased air emissions	HC, CO% and opacity	LDC HSE	Once before construction + once every six months for each vehicle	Vehicles licensing Department	Measurements and reporting of exhaust emissions of construction activities machinery  Complaints log	LDC management costs
<b>Ambient noise levels</b>	Increased noise levels	Noise intensity, exposure durations and noise impacts	LDC HSE	Regularly during site inspections and once during the night in every residential area	Construction site	Measurements of noise levels Complaints log	LDC management costs
		Complaints from surrounding communities	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports	LDC management costs
<b>Physical receptor (soil, groundwater, visual)</b>	Waste generation	Observation of accumulated waste piles	LDC HSE	During construction. Monthly reports	Construction site	Observation and documentation	LDC management costs
		Observation of soil accumulations resulting from excavation (if encountered)	LDC HSE	During construction. Monthly reports	Around construction site	Observation and documentation	LDC management costs
		Chain-of-custody and implementation of waste management plans	LDC HSE	Site 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
<b>Labor conditions Occupational Health and Safety</b>	- Occupational Health and Safety Total number of complaints raised by workers - Periodic Health report Periodic safety inspection report	Total number of complaints raised by workers Periodic Health report - Periodic safety inspection report LDC HSE a suitable tool for wind direction (Windsock) installed in a suitable place to determine the wind direction. Cooperation reports with the concerned parties before planning for housing projects around the PRS area.	LDC HSE Biannual for PRS  LDC HSE and Projects Dpt.  LDC Projects Dpt.	Biannual for PRSPRSs  Daily  Daily	- Construction site - 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	- 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	LDC management costs No cost
<b>Local community</b>	Child labor	Attendees lists with workers IDs - Complaints and accidents reports	LDC HSE	Biannual for PRS	Construction site	- Safety supervisor observe the laborers - Random checkup for laborers IDs	LDC management costs
<b>Local community</b>	Disturbance to local community due to labor influx	- Grievances received related to labor influx, - Number of incidents violating the code of conduct, - Disciplinary actions taken with violating workers	LDC in coordination with contractor	When reported	Construction sites	- Supervision & reporting	Contractor Cost



Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
<b>Local community</b>	Threat to Safety of users and houses (due to limited level of awareness and misconceptions)	<ul style="list-style-type: none"> <li>- Number of awareness raising implemented</li> <li>- Number of participants in information dissemination</li> </ul>	LDC, EGAS	Quarterly monitoring	Office	<ul style="list-style-type: none"> <li>Reports</li> <li>Photos</li> <li>Lists of participants</li> </ul>	No cost

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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
<b>Ambient air quality</b>	Improper management of odorant during operation	<ul style="list-style-type: none"> <li>- Log of spillage incidents</li> <li>- Number of treated containers</li> <li>- Odorant delivery forms</li> </ul>	LDC HSE	Quarterly for each PRS	PRSs	<ul style="list-style-type: none"> <li>- Compare Environmental Register with odorant delivery forms, observation of site</li> </ul>	LDC costs
<b>Ambient noise levels</b>	Noise of PRS operation	<ul style="list-style-type: none"> <li>- Noise intensity</li> </ul>	LDC HSE	Quarterly for each PRS	PRSs	<ul style="list-style-type: none"> <li>- Noise meter</li> </ul>	LDC costs
<b>Labor conditions</b>	Occupational Health and Safety	<ul style="list-style-type: none"> <li>- Total number of complaints raised by workers</li> <li>- Periodic Health report</li> <li>- Periodic safety inspection report</li> <li>- the updated emergency response plan that includes all scenarios in this study</li> </ul>	LDC HSE (ERP)	Biannual for PRS Before operation and annually (ERP doc.)	PRSs PRS location	<ul style="list-style-type: none"> <li>- Safety supervisor should follow the commitment of workers to use the protective equipment</li> <li>- Inspection and recording of the performance</li> <li>- -Reports about the workers and complaints</li> </ul>	LDC costs





## 7.5 Zefta Quantitative Risk Assessment Study Recommendations

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



## **7.6 Reporting of Mitigation and Monitoring Activities**

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

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

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

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

### **7.6.1 During construction phase**

#### **Reports should include as a minimum**

- Monthly report for the implementation of the ESMMP submitted by the contractor to LDC HSE staff.
- Monthly report on incident and complaint from the surrounding establishments and residents nearby the construction site.
- Unusual traffic delays or accident caused during construction or any complaints received should be reported in the monthly report prepared by the construction contractor supervisor. And /or permits and any comments or recommendations by Traffic Department
- Monthly report should include any incidents of high dust emissions or smoke during construction works including the natural dust that might be encountered.
- There should be a form prepared by LDC's HSE department for the contractor to keep records of quantities, types of wastes received and the location where it has been received from.
- The monthly report of HSE supervisor from LDC should 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 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 operation phase**

The 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 procedure included in the EMMP are to be recorded in the Environmental Register so that they can be communicated effectively and clearly. It will include (monitoring plan, solid waste management plan, emergency 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.

## **7.7 Emergency Response Plan**

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Egypt Gas (غاز مصر) developed an Emergency Response Plan (ERP) which relates to its operations for the PRS. The purpose of this document is to outline emergency responsibilities, organizational arrangements and responses and procedures to be followed by personnel based in the field in the event of an emergency. For full details about the emergency plan, kindly refer to **Annex 8 A/B**.

**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**

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#### **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 limited environmental and social background. Therefore, an upgrade in their environmental and social capacity will be necessary. EGAS will be responsible for providing **Egypt Gas** staff with the needed information. One of the standard tasks of the HSE Departments of **Egypt Gas**, supervised by EGAS, is to ensure that the Environmental and Social Management Plan of the project is implemented in all the phases of the Project, through establishing an Environmental Register for Pressure Reduction stations, with frequent auditing of this register.

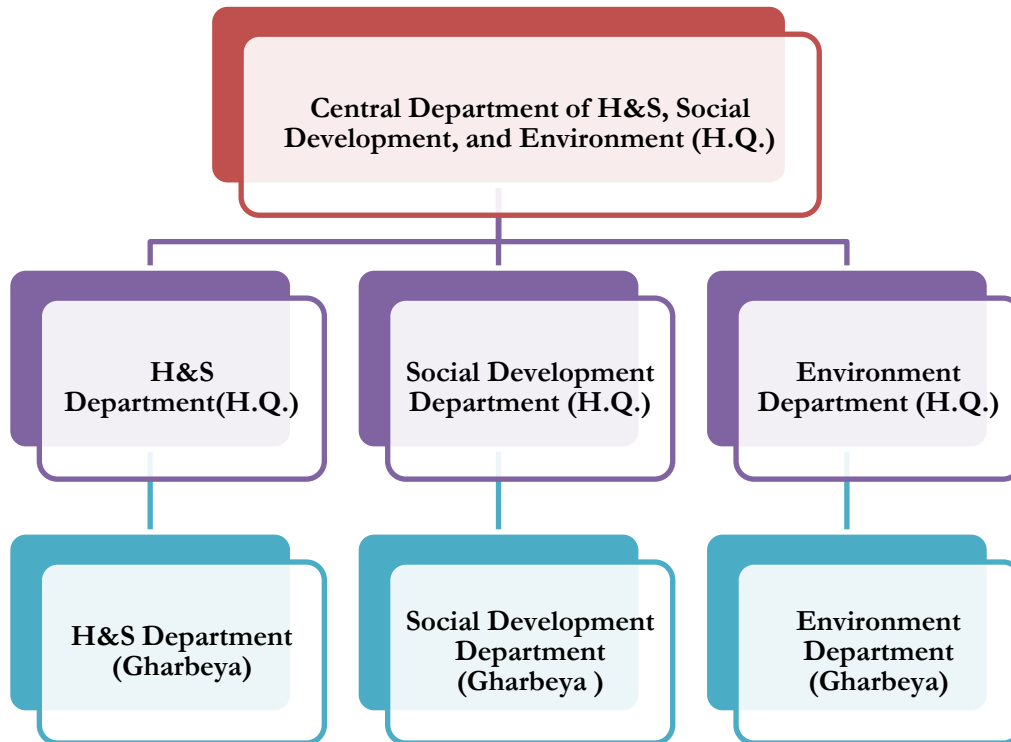


Figure 7-2: Egypt Gas ESMP organogram

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.
4. Management of broken asphalt (if any), unused backfill, solid waste, metal scrap
5. Management of paint cans, refueling & lubrication, soil contamination
6. Management of liquid waste such as leaked condensate hydrocarbons (if any) or chemicals used in heaters; and
7. 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
8. Using analyzers to measure noise, SO<sub>2</sub>, CO, CH<sub>4</sub> and NO<sub>2</sub> in ambient air, and detect possible natural gas leaks
9. Ensure and log compliant handling of odorant/odorant containers, odorant-contaminated-soils (in case of spillage)
10. Measure noise at different locations of the PRS
11. 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 of the ESIA's and their outcomes.

Public consultation activities have been implemented during the preparation of the framework and the site-specific studies.

### 8.1 Legal Framework for Consultation

The consultation activities used multiple tools and mechanisms 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 the 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**

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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.

### **8.4 Defining the stakeholder**

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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. The following is the key stakeholders that were engaged during the consultation process:



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

### **Stakeholders of Phase I:**

The consultation session was conducted on December 2013

- Consultants (Petrosafe environmental and social) attended session
- Representatives of EGAS and Egypt Gas
- Representatives of EEAA accompanied the teams
- NGOs
- Media related expert was recruited to invite media people
- Community people



**Figure 8-1: FGD with PAPs in Zefta**



**Figure 8-2: panel meeting at Zefta's LGU headquarters**

### **Stakeholders of Phase II:**



**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 <sup>th</sup> 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	
<b>Total</b>	<b>100</b>	<b>68</b>		
PRS-related ESIA (Zefta City)	Male	Female		
Potential beneficiaries and governmental entities	5	5	FGD	January – February 2017
Governmental and public sector	5	1	In-depth interview	January – February 2017
LPG Street vendors	2	0	In-depth interview	January – February 2017
Governmental, NGOs and community people	11	1	Group meeting	16 <sup>th</sup> of February 2017
<b>Total</b>	<b>23</b>	<b>7</b>		
Public Consultation event	Male	Female		
Community people, all other stakeholders	72	30	Public consultation	11 <sup>th</sup> of April 2017

**Stakeholders of Phase III:**

- The Consultation session was conducted in Gharbeya Governorate on April 2017
  - Consultants (Petrosafe environmental and social) attended meeting
  - Representatives of EGAS and Egypt Gas
  - Representatives of EEAA accompanied the teams
  - Administrative managers
  - Media related expert was recruited to invite media people
  - Community people





## 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: Consultation session 2017**

Subject	Questions and comments	Responses	Addressed in the ESIA Study
The safety of NG high-pressure network	How safe is NG high-pressure network?	<p>Given the fact that the Local Distribution company adheres to the international standards, the safety of the PRS is guarantee.</p> <p>The pipes used are made of steel. Additionally, patrols in the areas, where the high-pressure pipeline is located, are conducted 2 times every day.</p> <p>The accidents took place is rare and were professionally handled.</p> <p>There is multi-level of safety procedures that minimize any probability of unfavorable impacts.</p>	<p>ESMP section describes safety measures. Additionally, the project description shed light on the safety measures adopted by the NG LDC</p> <p><a href="http://www.EGAS.com.eg/docs/Environmental%20&amp;%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf">http://www.EGAS.com.eg/docs/Environmental%20&amp;%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf</a></p>



Subject	Questions and comments	Responses	Addressed in the ESIA Study
Compensation mechanism	What is the compensation mechanism?	<p>It is the requirement of the Egyptian Law No 10 of year 1990 to compensate for any damage. Additionally, the Natural Gas Law 217/1980 stipulates that any damage occurred due to NG installation activities should be compensated for.</p> <p>A compensation Committee was formed and a price list was issued from the Agriculture Directorate.</p> <p>The damages in crops was valuated based on prices determined by the ministry of agriculture. Thereafter the agriculture association inform the farmer and disburse the compensation. If the farmer have any complaints he can tell the compensation committee</p>	Due diligence report was prepared and annexed to this ESIA
Hotline	What do people do if they felt any leakage?	<p>People can call the hotline (129) if they sensed any risks. Plus, there are additional contacts (landlines and mobiles) that people can use in the time of risk. All these contacts are available on signs distributed at the entrance of each road.</p>	<p>It was mentioned in the ESMP under hotline</p> <p><a href="http://www.EGAS.com.eg/docs/Environmental%20&amp;%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf">http://www.EGAS.com.eg/docs/Environmental%20&amp;%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf</a></p>
Emergency procedures	What are the emergency procedures?	<p>Egypt Gas applies detailed emergency procedures during construction and operation.</p> <p>They managed to develop specific guidelines that will help during emergency activities. All workers of Egypt Gas were trained on these procedures. Additionally, refreshing courses are given to the workers during construction and operation</p>	<p>It was mentioned in the ESMP under emergency planning</p> <p><a href="http://www.EGAS.com.eg/docs/Environmental%20&amp;%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf">http://www.EGAS.com.eg/docs/Environmental%20&amp;%20Social%20Safeguards%20Due%20Diligence%20of%20Kafr%20El%20Zayat%20High%20Pressure%20Pipeline%20-%20Gharbeya%20Governorate.pdf</a></p>



Subject	Questions and comments	Responses	Addressed in the ESIA Study
Duration of construction works	How long does it take to finish constructions on average?	The time plan will be defined after the approval of EEAA and the WB. Additionally, after obtaining all required approvals. The civil work will take about 3- 4 weeks. The installation of the PRS will be defined by the contractor	It was presented in the project description section 2
Access to agrarian lands during construction	Is access to agrarian lands restricted during construction?	No restrictions to use land can be faced during construction. In case of landowners/farmers needed to irrigate their land, the engineers on site open the way and allow farmers to do their work. In case of damaging irrigation canals, the contractor fix the damaged parts in order to enable farmers to continue working	It was mentioned in the mitigation measures section 7

## 8.6 Summary of Consultation Outcomes

PRS-related consultation activities in Zefta 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 general stance towards the project is very supportive; even after the disclosure of the negative impacts during construction. The people realize that these negative impacts are temporary and that during operations the upsides will outweigh the downsides.

## 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.