

1.5 Million Natural Gas Connections Project in 11 Governorates

Environmental and Social Impact Assessment

Upgrading of Marsa Matrouh PRS **Final Report** December 2017



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)
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
ESIADF	Environmental and Social Impact Assessment Framework
ESM	Environmental and Social Management
ESMF	Environmental and Social Management framework
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
GAC	governance and anticorruption
GDP	Gross Domestic Product
GIS	Global Information Systems
GoE	Government of Egypt
GPS	Global Positioning System
GRM	Grievance redress mechanisms
HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene pipes
HH	Households
HHH	Head of the Household
hr	hour
HSE	Health Safety and Environment
IBA	Important Bird Areas
IDSC	Information and Decision Support Center
IFC	International Finance Corporation
IGE/SR	Institute of Gas Engineers/Safety Recommendations
LDCs	Local Distribution Companies
LGU	Local Governmental Unit
LPG	Liquefied Petroleum Gas
mBar	milliBar
MDG	Millennium Development Goal
MOP	Maximum operating pressure
MP	Management Plan
MTO	Material take-off
NG	Natural Gas
NGO	Non-Governmental Organizations
NO ₂	Nitrogen dioxide
OSH	Occupational Safety and Health
P&A	Property and Appliance Survey



PAP	Project Affected Persons
PE	Poly Ethylene
PM ₁₀	Particulate matter
PPM	Parts Per Million
PRS	Pressure Reduction Station
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SDO	Social Development Officer
SIA	Social Impact Assessment
SO ₂	Sulphur dioxide
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\$ = 18.15 EGP. as of April 2017

Exchange Rate: € = 19.26 EGP as of April 2017



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1 Introduction

1.1 Preamble

Aiming at installing the NG to about 30,000 clients in Marsa Matrouh City, the Local Distribution Company ReGas will upgrade Matrouh governorate PRS to increase its capacity from 3,000 m³/h (to a capacity of 10,000m³/h).

The objective of the proposed project is to increase the capacity of the existing PRS 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 ESIA is undertaken to assess and propose mitigation measures for environmental and social impacts of encompasses decommissioning of a current rented PRS and installing the units, processors and components of a new 10,000 m³/h. Impacts of NG exploration, extraction, refining, and transmission are outside the scope of this ESIA. Off-takes from the national network and high pressure (HP) pipeline “70bar system “already exist.

The objectives of the ESIA study 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 the upgrading of Matrouh PRS (with a capacity of 10,000m³/h). Off-take from the national Gird and HP pipeline about (1.8 Km) between the Off-take and PRS already exists and will not be addressed in this ESIA.

The local distribution company responsible for project implementation in Marsa Matrouh city is ReGas (شركة غاز الاقاليم).

1.3 Contributors

The ESIA has been prepared by a Joint Venture between Petrosafe (Petroleum Safety & Environmental Services Company) and EcoConServ for Environmental Solutions with collaboration, and facilitation from EGAS, ReGas HSE and Engineering Departments. The names of the Petrosafe and EcoConServ experts who have participated in the preparation of the ESIA study are listed in **Annex 1** of this report.



2 Project Description

2.1 Background

Natural Gas (NG) is processed and injected into the high pressure lines of the national Grid (70 Bar) for transmission. Upon branching from the main lines to regional distribution networks, the pressure of the NG is lowered to 4-7 Bar at the PRS. An odorant is added to the NG at PRSs feeding distribution networks to residential areas¹ in order to facilitate detection in the event of leaks. In addition to excavation and pipe laying, key activities of the construction phase also include installation of mechanical equipment.

2.2 Project Work Packages

2.2.1 Pressure Reduction Station (PRS)

There is an already existing PRS in Matrouh governorate with a capacity of 3,000 m³/h. The PRS is currently being rented from Egypt Gas. The PRS consists of the following components: an inlet unit (isolated cathodic system), a liquid separation unit, a filtration unit, and a pressure and temperature gauge. Other components include auxiliary devices such as a safety valve (Slam Shut), relief valves, an odorizing unit, ventilation equipment, as well as diesel and jockey pumps.

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. New components, processors and units in the PRS will be installed to reduce an inlet pressure of 25-70 bar to an outlet pressure of 4-7 bar at a flow rate of 10,000 m³/h.



Figure 2-1: Existing PRS

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



2.3 Project Location

The PRS is located at El Kasr –Agiba Road in front of the Military Naval gate, about 370 m away. The nearest residential area is about 844 m away as shown in the figure below where few partially occupied residential buildings and rental houses for summer vacationers exist. No nearby schools, hospitals or religious facilities (mosques or churches) exist within a radius of 3 km from the location of the PRS.

There is an off-take from the natural gas grid about 1.8 km away from the PRS proposed location. The High Pressure pipeline connects the off-take with the existing PRS.



Figure 2-2: PRS location

2.4 Associated facility (Off-take and HP pipeline)

As previously mentioned, the off-take from the national grid and the HP pipeline (70 bar system) already exist. The off-take is the point on the HP grid pipeline where a branch of the pipeline was constructed to connect Matrouh PRS to the NG grid. At the off-take location, valve area is constructed so as to control the flow of the natural gas through the pipeline (branch). These valves are used as gateways for Matrouh areas.

The off-take is located at Cleopatra Street (intersection of El Gharam and Cleopatra). The off-take location is remotely located, away from any residential areas. The area surrounding the off-take is affiliated to the army force.

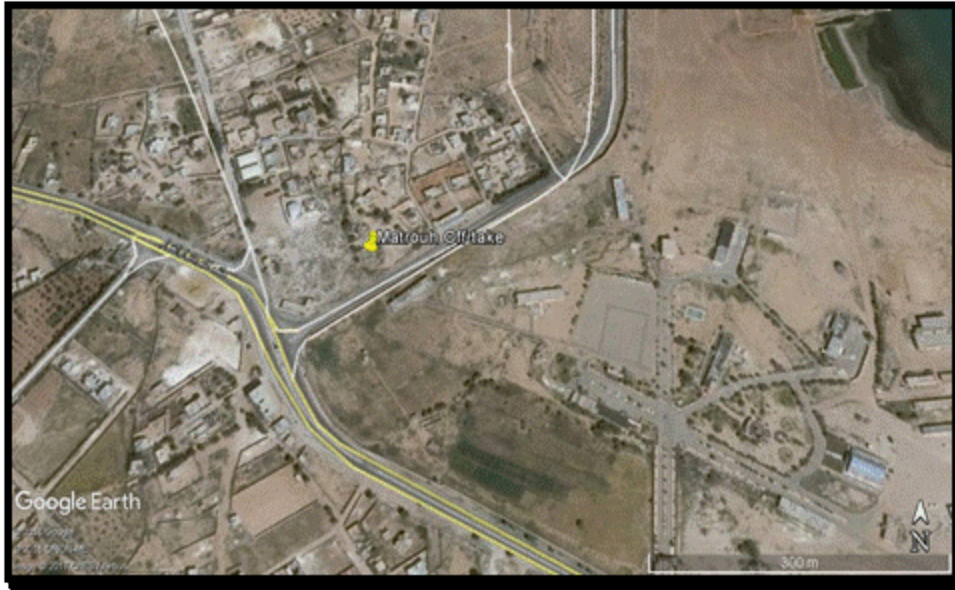


Figure 2-3: Off-take location



Figure 2-4: Existing off-take

The figure below shows the existing pipeline route, along the whole route, the pipeline was buried 1.5 m below the ground surface. The route of the pipeline was mainly located in desert land, about one km away from residential areas; the route is parallel to El Kasr –Agiba Road.



Figure 2-5: Existing Matrouh inlet connection / pipeline “70bar system”

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.
- Obtain the latest aerial maps of the project areas from the Egyptian Survey Authority
- Identifying Global Positioning System (GPS) coordinates of the sites
- GPS team develops a survey map to be used by the survey team to generate exact route for the inlet connection/pipeline “70 bar system”
- Data is entered into a central database and G.I.S system for review by a design team
- Design team finalizes pipe sizing, capacity & locations and routing.

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

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

2.5.3 Construction works/Upgrading of PRS

2.5.3.1 Pressure Reduction Station area

As we mentioned before the Matrouh PRS already exists, the land surface area of the PRS is 6,384.8m², and the land is located inside the border of Desert Research Center. **Annex 7** from the report provides official hand over of the lands to Matrouh PRS.



2.5.3.2 Pressure Reduction Station Civil Works

The main construction activities will be during the replacement of the current rented PRS with the permanent one and this will include:

The main construction activities will include:

- Site preparation, acceptance and placement of major fabricated equipment items, testing and commissioning.
- Removing the current components of the PRS from the site and transporting it to Egypt Gas storage site in Alexandria after agreement between Egypt GAS and ReGas. The new PRS will be transported into the current site.
- Welding activities to connect the off-take with the new PRS inlet.
- Assembling the components of the new PRS and fixing it into the PRS concrete base.

2.5.3.3 Pressure Reduction Station Mechanical Works

Matrouh new PRS comprises of two pressure streams; the upstream (inlet) high pressure ranging from 25 to 70 Bar and the downstream (outlet) low pressure 4-7 Bar. The PRS design is in accordance with the Institute of Gas Engineers/Safety Recommendations IGE/SR/9, 10, 16, 18, 22, 23, 24, 25; Institute of Gas Engineers/ Transmission Distribution IGE/TD/13; and National Fire Protection Association NFPA 15.

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

- Inlet ball valve -Solid filtration -Liquid filtration -Water bath heater -Reduction regulator
- Active regulator -Monitor regulator -Slam shut /Safety valve -Relief valve-Measuring unit
- Odorizing unit -Outlet unit



Figure 2-6 Matrouh 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

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).

2.6.1.1 Inlet ball Valves

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

2.6.1.2 Filtration unit

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

2.6.1.3 Heating unit/Water Bath Heater

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

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

2.6.1.4 Reduction

The PRS includes two reduction lines in parallel (one of them being on standby in case of emergencies). The lines are equipped with safety gauges, indicators and transmitters to maintain



safe operating conditions. According to the IGEM standards, the reduction unit should be installed in a well-ventilated closed area or, alternatively, in an open protected area.

2.6.1.5 *Active and Monitor Regulator*

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

2.6.1.6 *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.

2.6.1.7 *Measuring Unit*

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

2.6.1.8 *Odorizing Unit*

Natural gas is generally odorless. The objective of odorizing is to enable the detection of gas leaks at low concentration, before gas concentrations become hazardous. The odorant is composed of Tertiobutylmercaptin (80%) and Methylsulphide (20%). The normal dosing rate of the odorant is 10-20mg/cm³. The odorant system consists of a stainless steel storage tank, which receives the odorant from 200-liter drums, injection pumps, and associated safety devices.

2.6.1.9 *Outlet unit*

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

2.6.1.1 *Hotline*

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

2.7 Resources Consumption

2.7.1 During Construction/Upgrading

2.7.1.1 *Water*

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

- Domestic uses by the workers and engineers: 5 m³/day



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.

The expected amount of diesel fuel to be used in the construction/upgrading phase of the PRS is estimated at 10 liters per day. The fuel will be delivered in small tanks to the construction site via trucks when needed.

2.7.2 During Operation

2.7.2.1 Water

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

2.7.2.2 Electricity

There is a source of electricity from the Egyptian Electricity Holding Company in both the PRS and the storage.

Electricity consumption during the operation phase is expected to be about 1200-1500KW/month.

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 /Upgrading

2.8.1.1 Solid waste

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

Waste type	Hazardous/Non-hazardous	Treatment and Disposition
Domestic Waste (food waste, packing)	Non Hazardous	Disposed to an approved solid waste facility(by contractor)
Wood – Scrap	Non-hazardous	Stored at a land site (south of the PRS) rented by ReGas. Transported to ReGas storage area in Alexandria and sold to specialized companies in a public auction
Tires		
Cardboards		
Containers		
Paints containers	Hazardous	Transported for final disposal is Nassreya - Alexandria
Batteries	Hazardous	Resold to the supplier



Used oil waste (vehicles and machines)	Hazardous	Transported for final disposal to UNICO
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2.8.1.2 Wastewater

During the construction phase, liquid waste will comprise mainly of domestic wastewater and vehicle/equipment wash down water. Domestic water is the only continuous source during construction. Workers during the construction phase will use the facility located in the PRS.

2.8.2 During operation

Solid waste generated from the PRS is expected to be minimal and limited to domestic waste and will be collected regularly by trucks affiliated to Agiba's local unit.

Hazardous waste- mainly empty odor containers- will be treated on-site, transported (using certified hazardous waste vehicles and personnel) to the ReGas storage facility in Alexandria for final disposal at the UNICO hazardous waste facility near Alexandria.

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 evacuated by trucks and disposed at an authorized wastewater treatment facility.



3 Legislative and Regulatory Framework

3.1 Applicable Environmental and Social Legislation in Egypt

- Law 217/1980 for Natural Gas
- Law 4 for Year 1994 for the environmental protection, amended by Law 9/2009 and law 105 for the year 2015
 - Executive Regulation(ER) No 338 for Year 1995 and the amended regulation No 1741 for Year 2005, amended with ministerial decree No 1095/2011, ministerial decree No 710/2012, ministerial decree No 964/2015, and ministerial decree No 26/2016
- Law 38/1967 for General Cleanliness
- Law 93/1962 for Wastewater
- 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
 - Decree Number 619 of year 2015 pertaining to reallocation of land to the Ministry of Petroleum

3.2 World Bank Safeguard Policies

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

OP/BP4.11 will not be applicable to Matrouh PRS as no cultural resources are located in the project areas. With regards to OP/BP 4.12, it will not be applicable to the land obtained in Marsa Matrouh city as there is in place a PRS that will be replaced by a new PRS. The current PRS is located inside a big plot of lands that is owned by EGAS. No further lands will be needed for the PRS. With regard to the High Pressure pipeline, it will pass in the main streets owned by the state. Consequently, no land acquisition will be in place for the PRS or the HP pipeline.

In addition to the above mentioned polices, Directive and Procedure on Access to Information will be applicable to this project².

3.3 International Finance Corporation (IFC) Guideline

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



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

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

The 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.– HSE Guidelines (**Annex 3** from the report) for a gas distribution system are applicable to the project.

3.4 Permits Required

- Army force permits
- Environmental permit: according to Egyptian Law for the Environment, Law 4/1994 amended by Law 9/2009. EEAA approval on ESIA is considered the environmental permit.
- Utility installation permission to the PRS
- 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

Marsa Matrouh is the capital of Matrouh Governorate which is a city located in the western section (Mariut coast) that extends from Sallum to Abu Qir for about 550 km as apart from the Mediterranean coastal land of Egypt (the northern coast) extends from Sallum eastward to Rafah for about 970 km. It is the narrow, less arid belt of Egypt (Zahran et al., 1985a, 1990). Marsa Matrouh belongs to the western section which is the northern coast of the Western Desert. It is a thin belt of land parallel to the Mediterranean

Sea, that narrows or widens according to the position of its southern boundary, the Western Desert Plateau. Its average north-south width, from sea landward, is about 20 km and it is bordered by Lake Mariut on the east.³

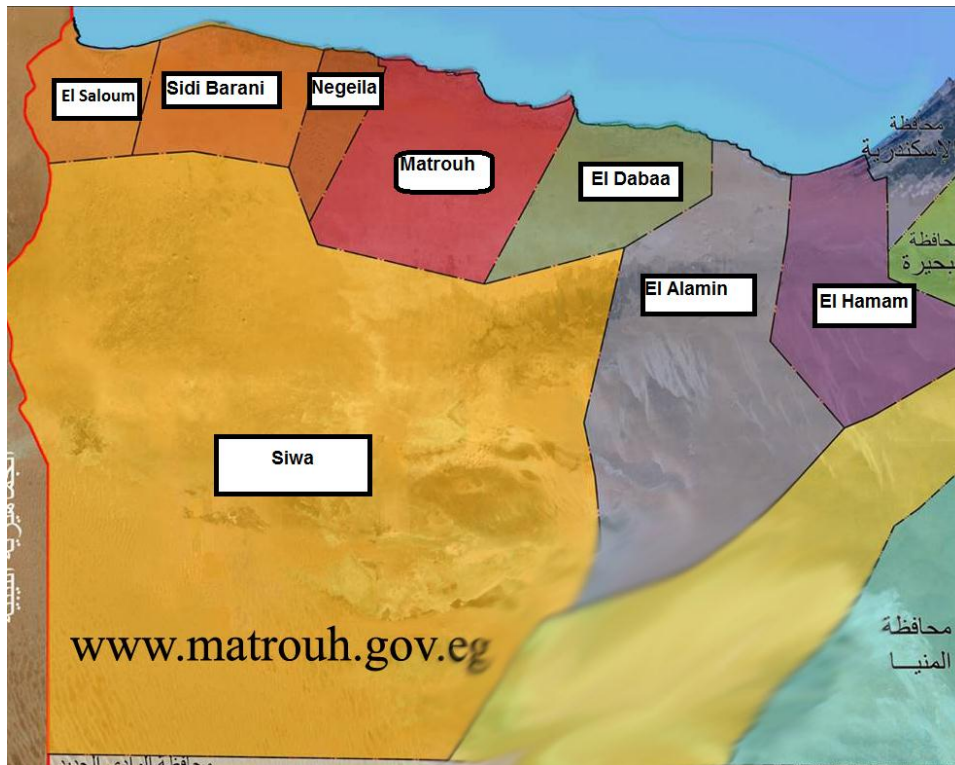


Figure 4-1: Matrouh District

4.2 Climatology and Air Quality

4.2.1 Climate

The area is generally characterized by mild semi-arid climate with relatively high temperatures in summer during the months of June, July and August, and relatively low temperatures during the months of December, January and February. The prevailing wind directions are north, northwest

³ M.A.Zahran,A.J.Willis,the vegetation of Egypt 2nd edition, Spring



and southeast. During spring Khamasin winds, which is sand storms, blow in Matrouh region for average of 10 days per year.

4.2.1.1 Temperature

The average annual temperature is 19°C in Marsa Matrouh. The warmest month of the year is July, with an average temperature of 31.7 °C. January has the lowest average temperature of the year at 14.5 °C.

4.2.1.2 Rainfall

The average annual precipitations in Marsa Matrouh were 410 mm recorded.

Table 4-1: Average Precipitation in Marsa Matrouh Area

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Av. Prec. (mm.)	50	40	30	20	10	---	---	10	10	70	40	90

Source: Weatherbase.com

4.2.1.3 Humidity

Table 4-2: Average Humidity

	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average Relative Humidity	69	67	67	66	68	72	79	77	74	71	72	70
Average Dew Point	8	8	10	11	13	17	20	21	19	17	14	10

Source: Weatherbase.com

4.2.1.4 Site Specific Ambient Air Quality

8-hour average measurements were conducted for pollutants of primary concerns, namely, carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), Total Suspended Particulates (T.S.P) and particulate matter (PM₁₀). The air quality at the proposed site of the proposed PRS is exhibiting acceptable levels of classic air pollutants in fact the levels are way below the national and international guidelines

Table 4-3: Average ambient air pollutants' concentrations (µg/m³)

Time	NO	NO ₂	NO _x	SO ₂	CO(mg/m ³)	PM ₁₀	T.S.P
	2.3	7.5	9.7	7.4	3.2	95.3	136.4



Time	NO	NO ₂	NO _x	SO ₂	CO(mg/m ³)	PM ₁₀	T.S.P
Limits	150	200	150	350	30 (mg/m ³)	150	230

Source: Prepared by the study team

4.2.1.5 Site specific noise measurements

Noise level measurements were conducted in the same location (proposed site of the new Pressure reduction station) of the ambient air quality measurements. The duration of the measurements is 8 hours with one hour averaging intervals. **Table 4-4** presents the ambient noise measurements at the proposed PRS gate on latitude:31°21'13.91"N and Longitude27°11'1.37"E.

Table 4-4: Ambient noise level measurements

Time	Sound Level Equivalent & Percentile Recordings in dBA for 24 Hours						Permissible Limits
	LAeq	LA10	LA50	LA90	LA95	LCpeak	LAeq (dBA)
	52.4	52.1	47.1	42.1	40.9	103.3	60

Source: Prepared by the study team

The full report for the site measurements of air and noise is presented in **Annex 4**.

4.2.2 Soil

The proposed project of PRS is located in the north western province typically taking place in Marsa Matrouh and its soil belongs to the sandy northern coastal sediments. The exposed rock units in Marsa Matrouh are dominated by the Middle Miocene sediments. Marsa Matrouh’s soil characterized by Marmarica Formation, which is made up of limestone, dolomite and shale sequences of Middle Miocene age. In the study area Marmarica limestone is characterised by the presence several Oyster banks and rich in neritic and reefal assemblage (Said, 1962).

The significant presence of clay in wadi deposits is explained by effective water management which resulted in soil harvesting, be it intended or unintended (Vetter et al, 2013).



Figure 4-2: Longitudinal section in the soil of the PRS project at depth about 1 meter

4.2.3 Water resources

4.2.3.1 Surface water

In year 2008, there are about 6483 cisterns with a total capacity of about 886946 m³ in Matrouh, they are constructed either by Matrouh Reconstruction Device or by Water Resources Authority. The constructed dams along the wadis course are about 2941 with a total capacity of about 294100 m³. Freshwater bodies in the areas are limited to temporary rainwater collection ponds that accumulate in wadis and low elevation areas during the rainy season. The coastal zone in the north of the area receives most of the rainfall and also receives the runoff collected by wadis in northern tableland and drainage wadis area.

Large amount rainwater harvesting structures and systems in the coastal area bear witness to the profound hydrological experience of and successful management by the inhabitants. The terraced tableland fields (kurum) and lateral wadi terraces, including their supply infrastructure, are the most remarkable rainwater harvesting systems of the region. This is beside the construction of cisterns (underground water storage) to collect and save the surface run-off, but the team study did not observe these practices in the projects area. The PRS and near sites do not have any source of ground water

4.2.3.2 Groundwater

As for groundwater, it is divided into shallow groundwater, amounting to about 160 million cubic meters per year, of which about 10 million m³/year is only used. Whilst the deep groundwater about 300 meters depth from the Earth's surface and are being used in the case of desalination processes in the basin of Sidi Barani and Salum and within a number of oil fields sites.

4.2.4 Terrestrial Environment

4.2.4.1 Flora

With respect to flora of significance, none were encountered in the proposed project area, where PRS site is constructed. The current PRS area is free of significant vegetation as shown in the



figure below. Planned off-take from national grid to the gas route shall not come into contact with flora and the uncultivated vegetation cover alongside the desert.

Except *Arundo plinii* and some grasses recorded at the project area, the project area has a very low floral diversity.



Figure 4-3: *Peganum harmala* (Family: Nitrariaceae) with bitter taste flower



Figure 4-4: *Silbum marianum* (Family: Asteraceae) behind PRS site in MARSA MATROUH City.

4.2.4.2 Fauna

Very confined species have been recorded in the project site in Marsa Matrouh city. *Coturnix's* species might be observed in migrating populations towards Marsa Matrouh city especially in September month every year as Marsa Matrouh is considered the first station for the migrating birds from European shores.

Cats (*Felis domestica*) have been noted in the project site, living among garbage in the area of influence. Also, dogs (*Canis sp*) were noticed, *Upupa epops* (weakly endangered Avifauna according to IUCN 3.1) is a fairly common visitor in the summer, but nesting has not been recorded, sparrows (small passerian sp.) species in very little number have been recorded around the PRS. In addition to that, the study team observed some camels and donkeys touring in the study area. The region's reptile fauna is typified by the lizards Painted Agama (*Laudakia stellio*), Dotted Skink (*Eumeces schneideri*), and Mediterranean Chameleon (*Chamaeleo chamaeleon*); the snakes include Egyptian cobra (*Naja haje*) Spotted Sand Boa (*Eryx jaculus*), Hooded Snake (*Macroprotodon cucullatus*) and Montpellier Snake (*Malpolon monspessulanus*); and the Egyptian tortoise (*Testudo kleinmanni*).



Figure 4-5: *Coturnix's* Species might be found in September at the Study Area

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



4.2.4.3 Nearest Environmentally Sensitive Areas

The area of the PRS project does not include protected areas under law 102/1983. The protected areas nearby Marsa Matrouh and the important birds areas defined by EEAA are shown in the figure below.

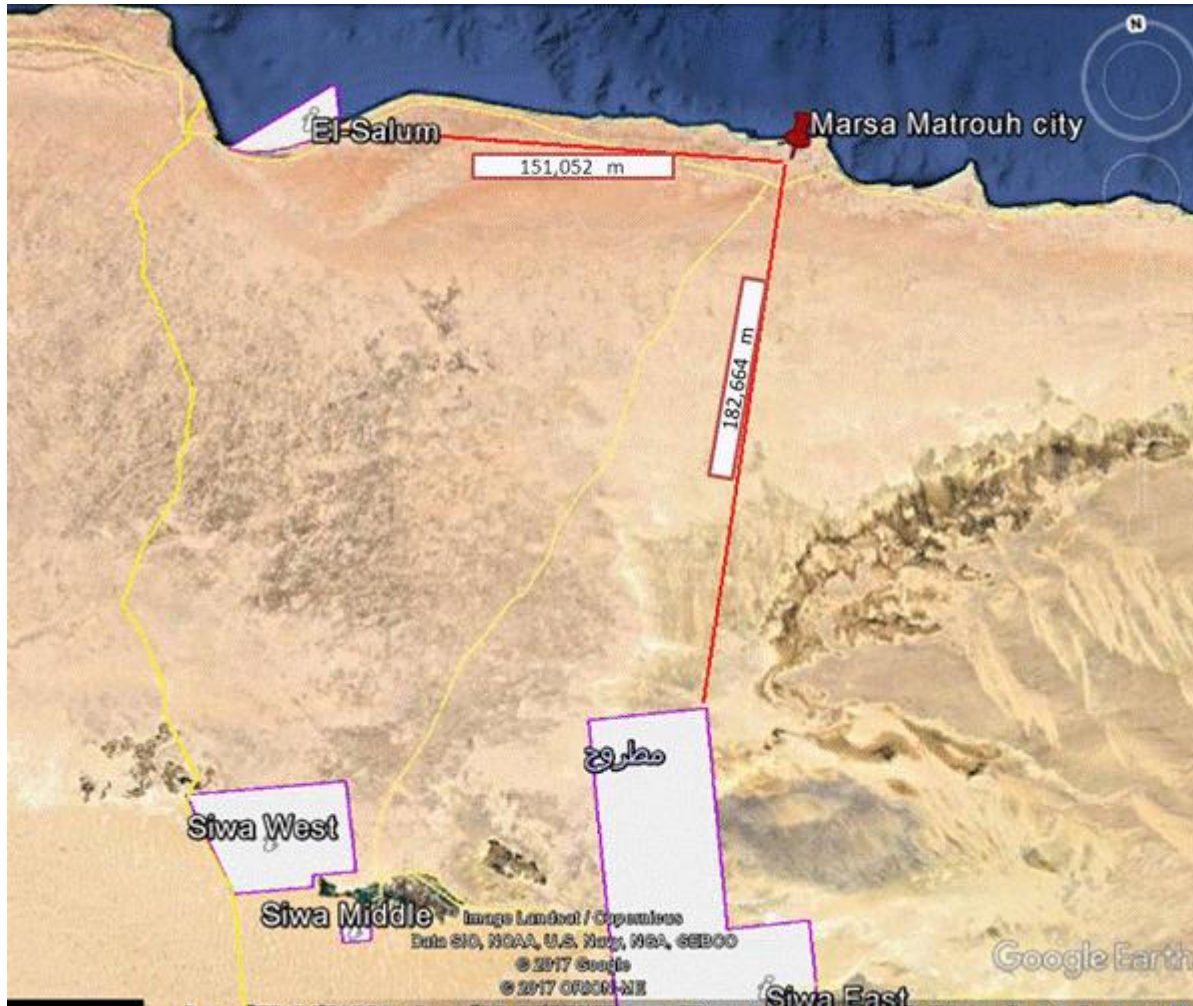


Figure 4-6: Nearest Protectorate Area
Source: General Organization for Physical Planning

4.2.5 Solid Waste Management

The municipality of Marsa Matrouh city and the Local Governmental units are the responsible entities for transferring solid waste. They use collection points where waste is accumulated and transferred to open transfer systems, located in residential areas in the capital cities of Matrouh Governorate.

Marsa Matrouh has a controlled-landfill, located about 35 km from Marsa Matrouh city. The landfill contains a leachate collection system.

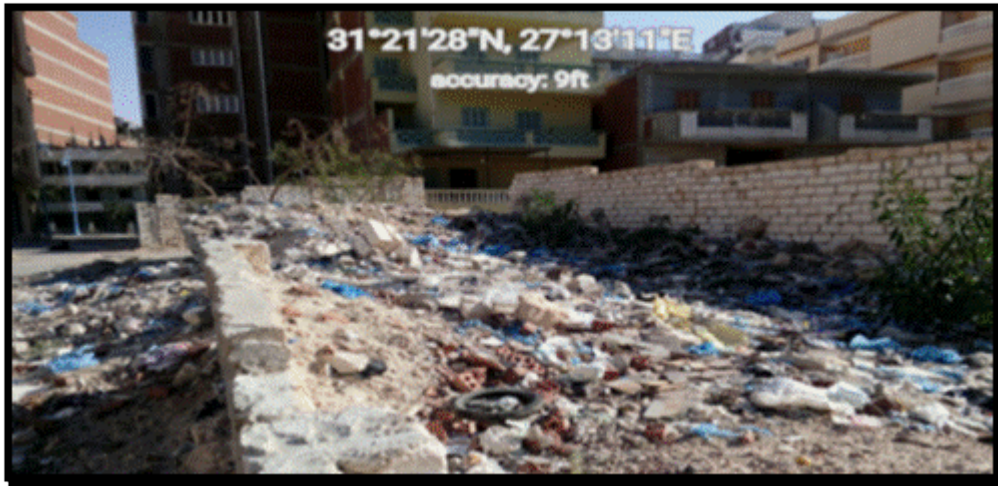


Figure 4-7: Illegal Collection point in Al Qasr road Marsa Matrouh city

4.2.6 Physical cultural resources

Matrouh Governorate comprises many archeological sites, as the area has been used by many old civilizations. Most of Matrouh archeological sites are in Siwa, however the vicinity of Marsa Matrouh City also includes some archeological sites. It is worth noting that some of the archeological sites are already registered in the Supreme Council for Antiquities (SCA) and some are still under research and further excavations to extract potential antiquities.

Um El Rakham Archeological Area

Um El Rakham Archeological area comprises two pieces of land at the northeast. The first land is about 150,000 m² north of Matrouh-Agiba road and south of tourist villages on the coast. The area includes a number of tombs sculptured in the rocks.

The second piece is 500,000 m² south of Matrouh-Agiba road about 150 meters south of the northern piece, it is located within an area of olive farms. This southern piece includes the remains of Ramses II Temple and Castle.



Figure 4-8: Map showing the two pieces of Um El Rakham Archeological Area



Fayez Zayton Area

The area is located east of Um El Rakhm area over an area of about 10,000 m², it includes remains of ceramic jars and other tools from the Roman-Greek era.

All archaeological sites are located in the vicinity of Marsa Matrouh city. In case of any unanticipated archeological discoveries within the project areas; **Annex 5**, 'Chance Find Procedure,' details the set of measures and procedures to be followed in such case.

4.2.7 Traffic profile

There are three types of roads in Marsa Matrouh City in the vicinity of the project areas:

- **The highways:** They are the roads connecting the city with Alexandria and Siwa oasis. The roads available close to the project sites are Marsa Matrouh – Siwa road, Cairo-Matrouh road and Alexandria Matrouh road.

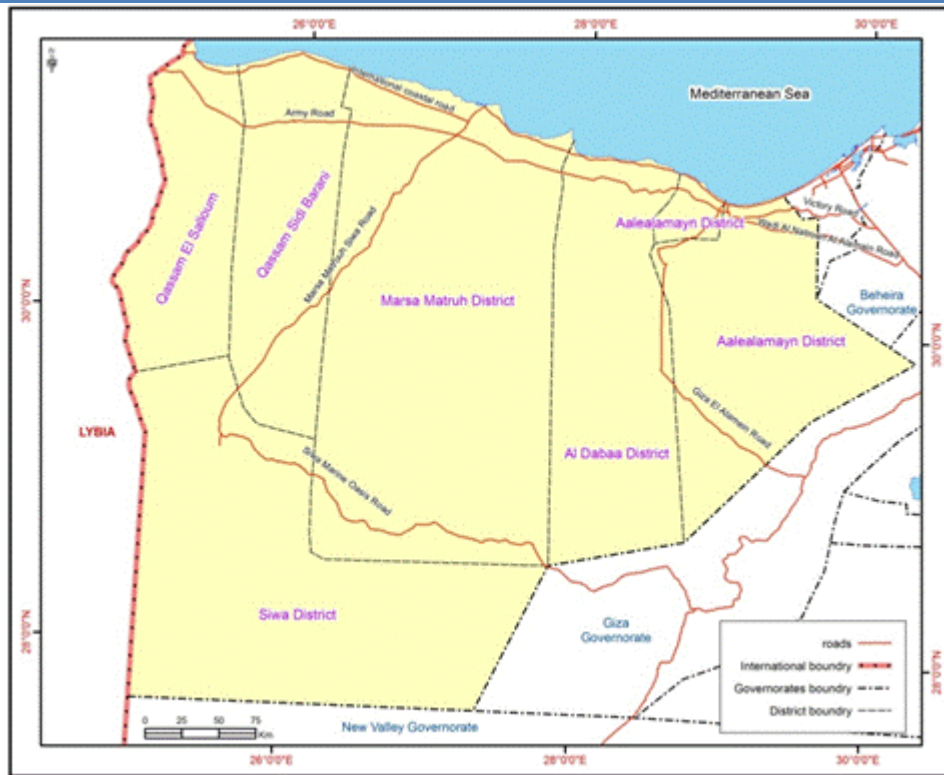


Figure 4-9: Roads in Marsa Matrouh

The urban roads: they are the main roads penetrating Marsa Matrouh i.e. Cornish street, Alam El Roum street and Alexandria street. The streets are relatively wide with three or four lane width.

Local streets: they are the streets passing through Marsa Matrouh City. They consist of two lanes or one lane



The area located in the vicinity of the project site has limited traffic. Observation checklist applied by the study team reflected that the number of cars and other vehicles is limited all day. This will put limitation to any traffic impact.



Figure 4-10 : Marsa Matrouh –Siwa road

4.3 Socio-economic Baseline

The PRS is located in the jurisdiction of Matrouh Governorate. It is constructed in Marsa Matrouh City that is a major Egyptian tourist resort and serves as a getaway resort for Europeans as well as Alexandria and Cairo Governorates. Marsa Matrouh is the base of the Egyptian sponge fishing fleet. It is also a busy trading center for the Bedouin of the Western Desert, who bring to market their sheep, wool and agriculture products (barely, dates, olives and melons) (Source: www.our-Egypt.com).

4.3.1 Administrative affiliation

Administratively, Matrouh Governorate is divided into 8 districts or centers each of them is known as "Markaz". These are from east to west: Al Hammam, Al Alamein, Al Dabaa, Matrouh, Siwa, Al Nogila, Barani, and Al Sallum and also it comprises 8 cities, 56 rural local, and 631 sub villages (kafr). 53% of Matrouh Governorate's population are living in urban areas while the rest are living in rural areas (IDSC, 2011).

The PRS is located in Marsa Matrouh City that lies under the jurisdiction of Matrouh governorate. It is located on the north coast of Egypt.

4.3.2 Urbanization trends

Marsa Matrouh is a big city that has potential urbanization activities to the east and west. During the previous five years, illegal expansion of residential areas was noted in all Egyptian communities. There has been huge illegal incursion into agricultural land in the form of unstructured urban expansion and construction activities. It was obvious that the houses are scattered in the vicinity of project areas. The residents construct houses with no legal license. Aiming at declaring their legal possession of the lands, separate houses are built and scattered in the western and eastern suburbs of Marsa Matrouh city. Additionally, there is a rapid expansion for newly constructed resorts in the north coast of Marsa Matrouh. This expansion is of legal and organized nature. In the vicinity of project areas, there are no foreseen construction activities as the area falls under military property.



4.3.3 Demographic characteristics

4.3.3.1 Total Population

According to the Poverty Mapping data CAPMAS 2013, the total population of Marsa Matrouh City is 138,612 people. 52.7% of the total population are males, whereas 47.3% are females. Those who reside in the urban areas of Marsa Matrouh are 77.9% versus only 22.01% live in rural areas. In urban areas there are about 30,133 households.

4.3.3.2 Rate of Natural Increase

Crude birth rate (per 1000 people) in Egypt was last measured at 23.82 in 2011, according to the World Bank. Crude birth rate indicates the number of live births occurring during the year, per 1,000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration.

In Matrouh the crude birth rate is doubled (46.47 per 1000 people). The population shows a natural increase of 4%.

This means that the potential beneficiaries' number might be escalated rapidly.

4.3.4 Living Conditions

4.3.4.1 Household Size and Density

The total households in Marsa Matrouh city are about 30,757. The Poverty Mapping data developed by CAPMAS in 2013 reported that the average family size of Marsa Matrouh City is about 4.6 persons/household. The density rate (total number of household/ total number of rooms in the residential unit) in Matrouh Governorate is 2.2 person/room, whereas, it is only 1.23 person/room in Matrouh District in accordance to the Egyptian Governorate Description by Information report 2012 developed by the Information and Decision Support Center.

4.3.4.2 Dwelling characteristics

The majority of the people living in Marsa Matrouh dwell in urban houses. The houses are of acceptable condition required to install the NG. The buildings are 6-10 stories high. The construction materials are mainly concrete and red bricks. Indicating that the dwellings within project areas are technically accepted to install the NG. Additionally, the width of streets will not affect installing of the NG.

With regard to the legal status of buildings; all buildings and neighborhoods are mostly legal, and no illegal or unplanned neighborhoods were documented within the project area by the research team.

4.3.5 Access to Basic Services

4.3.5.1 Access to Electricity

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



4.3.5.2 *Access to potable water and sanitary system*

Accessibility to water network is high in Marsa Matrouh, almost 94.8% of individuals have access to the public water network; and 35% of individuals have tap water inside their houses, according to CAPMAS poverty mapping data of 2013. The PRS will be connected to potable water network.

However, the coverage of the public sanitation network is still limited in the project areas. The secondary data provided from Matrouh information center revealed that only 19,329 from a total of 30,757 households residing in urban areas in Marsa Matrouh are connected to a public sewage grid.

4.3.6 **Human development profile**

4.3.6.1 *Education*

The Poverty Mapping data, CAPMAS 2013, revealed that illiteracy rate in Marsa Matrouh City is 25.26% of the population while female illiteracy in Matrouh is estimated at 34.23% of the total female in Marsa Matrouh City.

In Matrouh Governorate about a quarter of those enrolled in school completed their basic education. In Marsa Matrouh, the basic education is also more prevailed. The variation by sex reflects a significant gap between males and females particularly in Matrouh governorate.

There is a petroleum section in one of the vocational schools in Matrouh City. Semi-skilled laborers for the project can be hired from this petroleum section.

4.3.6.2 *Unemployment and Work Status*

According to the Statistical Year Book of Matrouh Governorate 2012, the total unemployment rate is about 8.58% which increases among females to be 10.95%. The total workforce is estimated at 44.96%. About a third of Matrouh Governorate population work as farmers. However, only 20.5% of Marsa Matrouh population work as farmers. The second occupation reported in Marsa Matrouh is skilled workers. 15.8% of the employed people work as skilled laborers. 11.0% of Marsa Matrouh employed people are specialist.

The formal Statistics obtained from the Poverty Mapping Data 2013 regarding manpower reflected that the age of starting work is 15 years old.⁴ Both the Child Law and the Labor Law state that children shall not be employed before they complete 14 calendar years old, nor shall they be provided with training before they reach 12 calendar years old; however children between 12 and 14 years old are permitted to work as trainees.

⁴ 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



4.3.7 Health Facilities

There are six hospitals serving Marsa Matrouh, according to the Information Center of Marsa Matrouh's LGU. Additionally, there are a number of private clinics offering their services to the public.



Figure 4-11: Private health facility in Marsa Matrouh City



Figure 4-12: Health Directorate in Marsa Matrouh City

4.3.8 Poverty index

According to poverty mapping developed by CAPMAS in 2013, the percentage of poor people represents 18.43% of the total population of the city. The Gini Coefficient, which indicates income inequality, stands at 0.23. Finally, the percentage of female-headed households is 6.89%.

According to CAPMAS poverty mapping of 2013, the per capita consumption in Marsa Matrouh is 5992.0 EGP/annually.

4.3.9 Human activities in the project areas

Agriculture activities are substantial in Marsa Matrouh, as it absorbs 7.68% of total employed individuals. According to the Poverty mapping 2013, the governmental sector absorbs 41.17% of labor force in Marsa Matrouh City. 66.9% of total employed people work on permanent bases contracts. Certain number of individuals (young people) work in tourism sector

Given the touristic nature of the city, there are lots of traders, retailers and small shops located in Libya Street, Alexandria street and Alam El Roum. These streets might be influenced by digging activities. (see section 5.3). The consultation activities conducted in Marsa Matrouh revealed that the average monthly salary is about 2.5 thousand EGP. The majority of consulted groups are of Bedouin and non-Bedouin who work in governmental sector.

The residential area near the PRS is located about 844 meters away. This area is mainly composed of low rise residential buildings which are characterized by being partially occupied during winter time and rented out to vacationers during the summer holiday season. No nearby schools, hospitals or religious facilities (mosques or churches) exist within a radius of 3 km from the location of the PRS.



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 subsections. Details are presented in **Annex 6**.

5.1 Impact Assessment Methodology

To determine and assess the impacts of the project phases on environmental and social receptors, a semi-quantitative approach based on Leopold was first adopted. The impact of each activity on each receptor was assessed according to magnitude on a scale of -10 to 10, where negative values indicate a negative influence on the receptor, and importance on a scale of 0 to 10, which encompasses the probability of occurrence, frequency of the impact etc. The numbering system is used as a relative measure, where more negative numbers correspond to impacts having a higher negative magnitude. Susceptible receptors and corresponding activity are deduced and addressed if both magnitude and importance are of minor severity.

The impact assessment methodology adopted for this ESIA is a “cause-effect” matrix modified from Leopold; and Buroz’s Relevant Integrated Criteria to evaluate the impacts. The environmental impact assessment methodology encompasses a semi-quantitative assessment that considers the following:

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

Each impact was identified considering:

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

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

Importance of Impact	Impact rating	
0-25	None or irrelevant (no impact);	
26-50	Minor severity (minimal impact; restricted to the work site and immediate surroundings)	



51-75	Medium severity (larger scale impacts: local or regional; appropriate mitigation measures readily available);	
76-300	Major severity (Severe/long-term local/regional/global impacts; for negative impacts mitigation significant).	

5.2 Potential Positive impacts

5.2.1 Positive impacts during construction/upgrading

5.2.1.1 Impacts related to employment

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

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

The construction of Marsa Matrouh PRS is expected to result in the creation of job opportunities, both directly and indirectly. These jobs are of short time nature. Construction workers are 7 technicians and eleven unskilled laborers for civil work. However, ReGas have their permanent staff working now in the current PRS and will continue working during the upgrading process. They are as follow: one health and safety specialist, 5 workers and two technicians plus one engineer are operating the current PRS.

5.2.1.1.2 Create indirect opportunities

As part of the construction stage, a lot of indirect benefits are expected to be sensed in the targeted areas due to the need for more supporting services to the workers and contractors who will be working in the various locations. This could include, but will not be limited to accommodation (5 apartments), food supply, transport, trade, security, manufacturing, waste transfer, etc.

5.2.2 Positive impacts during operation

5.2.2.1 Impacts related to employment

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

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

The operation of Marsa Matrouh PRS is expected to result in the creation of job opportunities: 2 health and safety personnel; 1 environmental specialist, 5 workers and 2 engineers and 2 security staff. Some of the mentioned opportunities are already occupied by ReGas 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

5.3.1 Negative impacts during construction/Upgrading

5.3.1.1 Impact on soil

There are no excavation activities as the PRS already exists. Potential soil contamination may take place as a result of spillage or leaks from the activity of moving the equipment

Therefore the impact on soil considered minor.



5.3.1.2 Air Emission

The PRS upgrading activities include decommission of rented equipment and installation of the new equipment. Activities such as transportation of material and equipment, burial of cables and pipes, etc. are taken place in this phase. 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 upgrading activities:

- Fugitive dust emissions (PM10, PM2.5)
- Exhaust of vehicles or equipment such as temporary generators, trucks, trolley, etc

Emissions of CO₂, CO and PM will result from the operation of construction machinery and road vehicles during construction/upgrading of the PRS. Air pollutants emitted from machine 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

As mentioned previously that there are no construction activities in the PRS. The only construction noise during the movement of the processors of the PRS will be the noise from the trucks' operation. The WB/IFC guidelines and Law 4/1994-9/2009-105/2015 have defined standards for noise intensity and exposure periods in the work place, in addition to certain limits for ambient noise levels for different types of urban and rural areas.

The impact is assessed minor

5.3.1.4 Impact on worker health and safety

Potential safety and health impacts to workers during construction /upgrading of the Matrouh PRS, in general, are the same as those associated with any construction project involving 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 Egypt at large. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and restrict obligations and monitoring should be applied in the contractor and subcontractors obligations. Rigid penalties should also be applied to the contractor and subcontractors in case of breaching child labor restrictions.

Child labor risk is assessed as low to medium

5.3.1.6 Inappropriate Hazardous material and waste management

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



wastes by construction labor, including sewage and garbage collected from the labor camp 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 minor

5.3.1.7 Traffic impact

Environmental impacts

The greatest potential for traffic impacts to occur arises during the short period where works peak (transportation of raw materials and equipment.). The traffic flow that will be created during the construction/upgrading period will to some extent depend on which type and number of trips to and from the proposed site. We have to mention that the traffic density in Matrouh governorate is low.

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 moving of told PRS and new PRS units will not result in any disturbance to drivers and small microbuses. This is mainly due to the limited traffic on El Geish road located in the vicinity of the PRS.

Therefore impact on traffic in the project site is assessed as minor

5.3.1.8 Impact on ground water / Subsurface water

Groundwater/Subsurface water may be impacted in case of improper disposal of sanitary wastewater, construction wastes or debris (generated from activities like ditching, and excavation). Generated sanitary wastewater, as well as water resulting from the dewatering activities (if 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 desert area, and only some non-



significant exotic floral species such as grasses, and stray dogs and cats, were recorded in the project area.

The PRS is already exist in the site , the proposed activities to upgrade the PRS.

Therefore it is assessed as an irrelevant impact

5.3.1.10 *Community health and safety*

During the construction phase, since the proposed project is at a close distance from the residential area, the temporary impacts due to exhaust gas emission, dust and noise that could affect the health of the population if it is not managed is expected to be significant. However, as the exhaust gas emission is temporary and short term and actually minimal due to the type of activities used in upgrading the PRS, These impacts are considered irrelevant

Impacts due to construction activities on community health and safety are of minor severity

5.3.1.11 *Land related impact*

Socioeconomic impacts

Marsa Matrouh PRS needed a plot of land. The total area of land required to install the PRS was 6348.8 meter square. It was obtained from a plot of land allocated for Agriculture Center Research for Animal Production. The land was allocated to the PRS in accordance to decree 619 of year 2015. It is already in place and the PRS is being constructed and the current unit will be decommissioned and replaced by another unit.

Additionally, a plot of land needed to extend the high pressure pipeline from the off-take to the PRS. The land was 2300 meter length and one meter width. It was extended from the valve room number (5) on El Salam Matrouh pipeline. The high pressure pipeline extends in state owned lands.

There were no kind of encroachment in all lands allocated for the project. Additionally, obtaining the land have not resulted in any kind of economic displacement. Based on the meeting conducted in the site, no one of the consulted community stated that there were any kinds of customary or formal land use.

Impact related to the visual intrusion during the construction phase is **irrelevant**

5.3.1.12 *Visual intrusion and landscaping*

During the replacement of the PRS there is a probability to result in visual intrusion due to moving construction materials and vehicles inside the area. Given the fact that the PRS land is fenced and the nearest residential area is about one km from the PRS, the probability of this impact tends to be irrelevant in Marsa Matrouh.

Impact related to the visual intrusion during the construction phase is **irrelevant**



5.3.1.13 Labor influx

There is a probability to face a labor influx impact that might originate from the migration of laborers to the work site. Additionally, some people might follow workers to provide services (the followers). Generally speaking, such impact is viable in remote areas when thousands of workers invade rural areas causing real disturbance to the surrounding community and absorb their resources. In Marsa Matrouh PRS, about 11 unskilled workers will be recruited from Marsa Matrouh for limited number of days and only 7 workers will come from outside Marsa Matrouh. Such number can't cause any labor influx impacts, particularly, as ReGas staff is fully acquainted of norms and traditions of the Bedouins residing the surrounding communities.

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

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, 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 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 Methylehlysulphide (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 leak can result from improper handling of the odorant includes: Storage in unsafe conditions, in terms of occupational health and safety

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 irrelevant

5.3.2.3 Hazardous and non-hazardous waste management

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



consider minor impact of the wastes generated. Poor waste management practices may also have a significant impact on environment (soil, subsurface water, 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 highway road.

Therefore the impact is assessed as minor

5.3.2.5 Air emissions

No gaseous emissions are expected to occur during the normal operation of the PRS. In case of accidental natural gas leak, or in case of accidental spill of odorants (during handling or storage) and during maintenance activities, the odorant concentration will be dispersed in the air since the area is close to the sea side and windy most of the time. The main impact of leakage of the odorant is occupational and will cause irritation to the workers within the PRS. However, no negative health or environmental impacts are expected on the nearest residential area due to the dispersion of the odorant and being non-hazardous in the gaseous form.

Therefore the impact is assessed as irrelevant

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 irrelevant

5.3.2.7 Ecological impact

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

Therefore the impact is assessed as irrelevant

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. .

Therefore the impact is assessed as irrelevant

5.3.2.9 Labor influx

There is a probability to face a labor influx impact that might originate from the migration of laborers to the work site. Additionally, some people might follow workers to provide services (the followers). Generally speaking, such impact is viable in remote areas where thousands of workers invade rural areas causing real disturbance to the surrounding community and absorb their resources. In Marsa Matrouh PRS, only 10-15 workers will come from outside Matrouh. Such number can't cause any labor influx impacts.



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

5.4 Impact during accidental events

Assessment of significance of impacts for the accidental (non-routine) events throughout the project phases and safety issues will be included as a separate quantitative risk assessment (QRA) study that is being under preparation.



5.5 Summary of the impact

Table 5-1: Environmental and Social impact summary

Impact	Impact Description	Type and significance identification	Impact Significance
During Construction/upgrading			
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.	Minor
Air emission	<p>WB/IFC requirements and Law 4/1994 (modified by laws 9/2009 & 105/2015) stipulates strict air quality standards. Air emissions (gases and particulates) during construction shall arise from:</p> <ul style="list-style-type: none"> - Particulate matter and suspended solids from excavation/backfilling operations - Possible dispersion from stockpiles of waste or sand used for filling trenches. - Exhaust from excavation equipment and heavy machinery (excavators, trenchers, loaders, trucks) containing SO_x, NO_x, CO, VOCs, etc. - Traffic congestions resulting from road closure or slowing down of traffic due to excavation works. <p>Gaseous pollutants emissions</p> <p>Provided machinery used during construction is certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and IFC permissible levels.</p>	Negative impact	Medium
Noise	<p>Noise impact on worker</p> <p>Noise impacts on construction workers, technicians and engineers in direct vicinity of the excavation works and heavy machinery are considered more significant than those on residents.</p>	Negative impact	Minor



Impact	Impact Description	Type and significance identification	Impact Significance
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 Egypt at large. This could be also an applicable risk in the project. Children below 18 are favorable labor as they receive low salaries and they are less demanding. There is a risk that this common practice is used in the project. This risk should be carefully handled in the ESMP and restrict obligations and monitoring should be applied in the contractor obligations.	Negative impact	Low to medium
Inappropriate Solid and Hazardous waste management	<p>Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination.</p> <p>Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. The legal standards of Law 4/1994-9/2009-105/2015 for the Environment and Law 38/1967 stipulate that these wastes should be disposed of in licensed sites by the local authority, which minimizes any aesthetic effects of such waste.</p> <p>Hazardous and non-hazardous materials available onsite during construction activities are likely to include fuel, engine oil, paints, Poor handling of those materials and their inappropriate storage may result in poor containment of induced leaks.</p>	Negative impact	Minor
Traffic	The transportation of material and equipment to the construction sites will cause temporary increase in traffic along El Kasr-Agiba road, and other main road in the governorate.	Negative impact with medium intensity and low momentum , persistence	Minor



Impact	Impact Description	Type and significance identification	Impact Significance
Ground water/subsurface contamination	Subsurface exist in area may affected by inappropriate liquid and hazardous waste during construction	Negative impact	Minor
Ecological	During construction of the PRS, No protected species have been observed onsite and their presence is not expected within the project site. No protected areas will be affected(the nearest protectorate area far 98kn.	Negative impact	Irrelevant
Traffic	The transportation of material and equipment to the construction sites will cause temporary increase in traffic along Matrouh –siwa Road	Negative	Minor
Ecological	During the upgrade of the PRS, No protected species have been observed onsite and their presence is not expected within the project site.		Irrelevant
Community health and safety	Community Health and Safety impacts are limited to the inside the fence of the PRS and in the path of the high pressure pipeline that have already installed. Therefore there are no impacts related to community health and safety during construction.	Negative impact	Irrelevant
Impacts related to lands	The PRS in Marsa Matrouh required no new lands. The pipeline also was installed and no new lands are needed	Negative impact	Irrelevant
Labor influx	The invasion of workers and migration to Marsa Matrouh might result in disturbance to the community. However, there is no probability to such impacts as the total number of construction workers is about 20 workers.	Negative impact	Irrelevant



During operation			
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
Child labor pertaining risk	Given the permanent nature of job opportunities during operation phase, children below 18 are not allowed to work in the PRS. Consequently, this risk is not valid in the operation phase .	Negative impact	Irrelevant
Inappropriate Hazardous material and waste management	<p>Hazardous material</p> <p>Odorant handling is part of the operation of the PRS and is addressed in a Quantitative Risk Assessment attached as a separate study.</p> <p>Odorant leak can result from improper handling of the odorant includes:</p> <p>Storage in unsafe conditions, in terms of occupational health and safety</p> <p>Hazardous waste</p> <p>Discharge of remaining odorants in containers, after use, in land or sewers;</p> <p>Disposal of used containers with domestic waste, or by open disposal; and</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 emission	Impact on worker health and safety during PRS operation include inhalation of air pollutants, exposure to noise levels, maintaining high pressure equipment (reduction pressure unit) and handling hazardous materials(odorant).	Negative impact	Irrelevant
Impact on Soil	No anticipated impacts	Negative impact	Irrelevant
Impact on Ecology	No anticipated impacts	Negative impact	Irrelevant



Impact on Traffic	No anticipated impacts	Negative impact	Irrelevant
Impact on sensitive receptors	In case of accidental gas leakage and subsequently emissions of the odorant is in the air, if it reaches the residential area it will be already dispersed and of very low concentration. In addition, it is not a harmful substance to inhale in a gaseous form especially with such low concentrations. It is only hazardous when it is in the liquid chemical form	Negative impact	Low

5.6 Impact during accidental events

Assessment of significance of impacts for the accidental (non-routine) events throughout the project phases and safety issues will be included as a separate quantitative risk assessment (QRA) study.

In case of accidental gas leakage and subsequently emissions of the odorant is in the air, if it reaches the residential area it will be already dispersed and of very low concentration. In addition, it is not a harmful substance to inhale in a gaseous form especially with such low concentrations. It is only hazardous when it is in the liquid chemical form.

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



6 Analysis of Alternatives

6.1 Technology Alternatives

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

The selection of PRS lands passed through various steps until the current land is obtained. ReGas asked Matrouh Governorate to give them a plot of land for the purpose of constructing a PRS inside. The Governorate proposed some plots of lands that were not approved on by the military as the proposed lands were located inside military lands. As an alternative option another plot of land was dedicated to the current PRS. The transfer of ownership was issued by a decree number 619 of year 2015. (see **Annex 2**). This land is located inside a plot of land owned by the Agriculture Center Research for Animal Production. This land was about 6385 meter square. This is relatively a huge area of land. It was kept for any potential upgrading of the PRS. Consequently no additional land is needed for the upgrading process.



7 Environmental and Social Management & Monitoring Plan

7.1 ESMMP Objectives

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

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

Overall, the following Environmental and Social measures are complementary to and do not substitute compliance to the detailed HSE guidelines, procedures, and actions adopted by EGAS and its subsidiary Local Distribution Company (LDC).

In the following Management and Monitoring measures the term **LDC** refers to the gas company in charge of project implementation: **ReGas Gas**.



7.2 Environmental and Social Mitigation Measures

Table 7-1: Environmental and Social Management Matrix during Construction/upgrading *upgrade*

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical receptor	Impact on soil	<ul style="list-style-type: none"> - Best practices for soil management should be followed - Good housekeeping to minimize spills/leaks - Proper handling and management of wastes 	Minor	Contractor	LDC –HSE department	Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
	Air emission	<ul style="list-style-type: none"> - Monitoring of wind speed and direction to manage dust-generating activities during undesirable conditions. - Management of number of vehicles and equipment in the site. - Appropriate maintenance, engine tuning and servicing of construction equipment to minimize exhaust emissions - Minimize unnecessary journeys or equipment use - Adopt a policy of switching off machinery and equipment when not in use (idle mode). 	Minor	Contractor	LDC –HSE department	Contractual clauses + Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
	Noise	<p>Worker Application of the normal precautions normally taken by construction workers.</p>	Minor	<ul style="list-style-type: none"> - LDC - Excavation Contractor 	LDC–HSE department	Contractual clauses + Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
Social receptor (health and safety)	Occupational health and safety	<ul style="list-style-type: none"> - The project will hire a qualified sub-contractor with the high health and safety standards. In addition, the ToR for the contractor and the ESIA will assure the provision of the health, safety and precaution of the environmental impacts and its mitigation measures to be followed during construction. - Standard protection by placing clear project signs. - Time management for vehicles movement; especially avoiding the peak hours - Standard protection for the workers especially working at elevated heights or trench. - Regular inspection compelling workers to use their PPE - Training and licensing industrial vehicle operators of specialized vehicles. 	Minor	<ul style="list-style-type: none"> - LDC - Excavation Contractor 	LDC–HSE department	Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
	Risk pertaining to child labor	<ul style="list-style-type: none"> - The project will hire a qualified contractor/ sub-contractor with the high occupational standards. Special attention will be given to add a contract term prohibiting all child labor activities - Rigid obligations and penalties will be added to the contractor ToR in order to warrantee no child labor is occurred in the project. In case of breaching these obligations, financial penalties will be applied - The ToR also will oblige the contractor/subcontractor to keep a copy of IDs of laborers in order to monitor the hired staff, especially, those below 18 years old 	Minor	<ul style="list-style-type: none"> - LDC - Excavation Contractor/ subcontractor 	LDC–HSE department	Field supervision and review of HSE report+ Field supervision (audits)	<ul style="list-style-type: none"> - Contractor costs - LDC management costs



		<ul style="list-style-type: none"> - 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 					
Physical receptor	Solid and Hazardous waste management	<ul style="list-style-type: none"> - Temporary storage in areas with impervious floors - Safe handling using PPE and safety precautions - Empty cans of oil-based paint resulting from painting the steel connection pipes to households are to be collected and sent back to nearest LDC depots (Alexandria) for temporary storage until disposal at a hazardous waste facility (Nassreya or UNICO in Alexandria). - If hazardous waste quantities generated are too small for isolated transport to the Nassreya landfill, a temporary storage site can be created. Coordination with waste authority will be imperative to secure a location and implement adequate procedures for storage depending on quantities and type of wastes until collection and shipping to Nassreya landfill. - Hand-over selected oils and lubricants and their containers to Petrotrade for recycling 	Minor	<ul style="list-style-type: none"> - LDC - Excavation Contractor/su bcontractor 	LDC–HSE department	Field supervision and review of certified waste handling, transportation, and disposal chain of custody	Indicative cost items included in contractor bid: Chemical analysis of hazardous waste Trucks from licensed handler Pre-treatment (if needed) Disposal cost at Nasreya Approximate cost of the above (to be revised upon project execution): 8,000-10,000 LE per ton
Social receptor (Local traffic and accessibility)	Traffic	<p>Time management for transporting the materials, equipment, debris, etc. Clear sign surrounding construction site and the enter / exit gate. Coordination with traffic department (ministry of interior) for vehicles route and movement. 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"> - Contractor costs - LDC management costs
Physical receptor	Ground water/subsurface contamination	<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"> - Control all onsite wastewater streams and ensure appropriate collection, treatment and discharge. Prevent discharge of contaminants and wastewater streams to the ground. - Adequate management and proper handling and storage of construction materials, oils and fuel to avoid spillages. - The implementation of a continuous and regular site inspection system. 	Irrelevant	Contractor	LDC –HSE department	Contractual clauses + Field supervision	<ul style="list-style-type: none"> - Contractor costs - LDC management costs
Social receptor	Grievance and redress mechanism	<p>The detailed grievance mechanism (GRM) is presented in Annex (7). It will to be shared with the community beneficiaries. 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.</p>		Contractor	LDC –HSE department	Contractual clauses + Field supervision	<ul style="list-style-type: none"> - Contractor costs - LDC management costs



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

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical receptor	Noise	<ul style="list-style-type: none"> - Location of reducers should be at least 20 meters away from the PRS fences. - The reducers should be either in a well-ventilated closed area, or in a protected open area according to IGEM standards. If the reducers are in an open area there should be wall barriers to dissipate the noise from the PRS staff offices and the neighboring areas. Others measures as per QRA	Minor	LDC Design Department	LDC HSE	Review of PRS layout	LDC management costs & PRS cost
Social receptor (health and safety)	Occupational health and safety	<ul style="list-style-type: none"> - Remote actuation of isolation and slam-shut valves by LDC for PRS and pipelines - Produce Hazardous Area Classification drawings - Control room exit design. - Preventive maintenance policy and station manual - Provision of self-contained breathing apparatus (2 pieces for each station) for handling odorant leaks - Apply jet fire rated passive fire protection system to all critical safety shutdown valves ESDVs or Solenoid valves (As applicable) - Place signs in Arabic and English "Do Not Dig" and "High Pressure Pipeline Underneath" - Install an elevated wind sock and provision of portable gas detectors - The design should fully comply with IGE TD/3 code requirements 	Minor	-LDC project department -Designer	-LDC project department -engineering dep. -HSE dept. _EGAS	<ul style="list-style-type: none"> - Drawing and design Document Review - Policy and manual review - Inspection by operators - Signage inspection and site visits 	Included in PRS cost
Physical receptor(air, soil, water)	Solid and Hazardous waste management	<ul style="list-style-type: none"> - Strict use of chemical-resistant suits and PPE when handling odorant barrels, tanks, or spills - Evacuation of odorant from barrels into holding tank with utmost care and full PPE - Covering possible odorant spills immediately with sand and treatment with sodium hypochlorite as per EGAS and LDC practices - On-site treatment of empty containers with sodium hypochlorite and detergent as Per EGAS and LDC practice - Ship empty containers to a certified hazardous waste facility via company depot using certified handling and transportation contractors - Ensure full and empty (treated) odorant containers are accompanied by a trained HSE specialist during transportation to and from the depot and to/from the hazardous waste disposal facility (UNICO and/or Nassreya) - Others measures as per QRA <p>In order to minimize risk of spillage of hazardous odorant, the following general precautions should be taken:</p> <ul style="list-style-type: none"> - Pre-Plan the anticipated amounts of odorants to be used in order to minimize leftovers and residuals. 	Minor	PRS staff	LDC HSE	Quarterly auditing for each PRS	Cost to be included in PRS running budget:



Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for		Means of Supervision	Estimated Cost of mitigation supervision
				Mitigation	Supervision		
		<ul style="list-style-type: none"> - Handle with extreme care and always perform visual checks on the integrity of the odorant container - Avoid rough handling rolling or dropping of odorant containers - Avoid exposure to direct sunlight during storage or transportation - Ensure odorant containers are always sealed properly and secured from tipping/falling/damage during transportation and storage (temporary and long-term) - Always have sufficient amounts of sand, sodium hypochlorite and detergent on standby during usage of odorant - ALWAYS handle containers or spills with care and full PPE compliance - Never release or empty residual odorant from its container to any receptor or for any reason other than filling the odorant tank at the PRS - NEVER use empty odorant containers for any other purpose <p>In case of odorant spillage:</p> <ul style="list-style-type: none"> - avoid inhalation and sources of ignition - immediately cover and mix with sufficient amounts of sand and sodium hypochlorite using necessary PPE and tools - collect contaminated sand in clearly marked secure containers/bags <p>Add sand to inventory of hazardous waste</p>					

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 7-3: Environmental and Social Monitoring Matrix during CONSTRUCTION

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
Local traffic and accessibility	Reduction of traffic flow and accessibility to local community	Comments and notifications from Traffic Department	LDC HSE	Monthly during construction.	Construction site	Documentation in HSE monthly reports Complaints log	LDC management costs
Ambient air quality	Increased air emissions	HC, CO% 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
Ambient noise levels	Increased noise levels	Noise intensity, exposure durations and noise impacts	LDC HSE	Regularly during site inspections	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
Physical receptor (soil, subsurface water, visual)	Waste generation	Observation of accumulated waste piles	LDC HSE	During construction. Monthly reports	Construction site	Observation and documentation	LDC management costs
		Observation of 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
Labor conditions	Occupational Health and Safety	Total number of complaints raised by workers Periodic Health report Periodic safety inspection report	LDC HSE	Biannual for PRS	Construction site	- 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
	- 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



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

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



7.5 Reporting of Mitigation and Monitoring Activities

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

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

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

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

7.5.1 During the construction /Upgrading phase

Reports should include as a minimum

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

7.5.2 During the operation

According to law 9-2009 and its executive regulation, each facility should prepare an environmental register. 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 should contain as minimum:

- 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, MSDS (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.

7.6 Emergency Plan

ReGas (شركة غاز الاقاليم) will develop an Emergency Response Plan (ERP) which relates to its operations for the PRS and for its intermediate and low pressure distribution network. The purpose of this document is to outline emergency responsibilities, organizational arrangements and responses and procedures to be followed by personnel based in the field in the event of an emergency. **Emergency Response Plan of the LDC** (in Arabic) is in annex 8 A of the study and only a small part concerning the followed procedures during some emergency scenarios is translated in annex 8 B. Additionally, there is a classification for emergency that might occur as follows:

7.6.1 Classification of Emergency Levels

Risk levels are classified for each assumed scenario according to the potential risks to which the Enterprise, individuals or the public may be subjected and the requirements that must be met to meet each level of emergency. The higher the level of emergency, the greater the requirements to meet and the higher the level of response required to deal with the state of emergency.

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.

For full details about the emergency plan, kindly refer to **Annex 8**

7.6.2 Hotline

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

7.7 Institutional Framework for ESMMP Implementation

7.7.1 Environmental Management Structures

EGAS is the supervisory body. ReGas is the implementing body. Below is the management structure of ReGas.

Being the implementing body of the natural gas network in project areas, ReGas has a direct involvement with the environmental management and monitoring of the natural gas network. ReGas has limited environmental and social background. They will be in need to upgrade their capacity regarding the environmental and social aspects. EGAS will provide ReGas staff with the needed information.

One of the standard tasks of the HSE Departments of ReGas, 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.

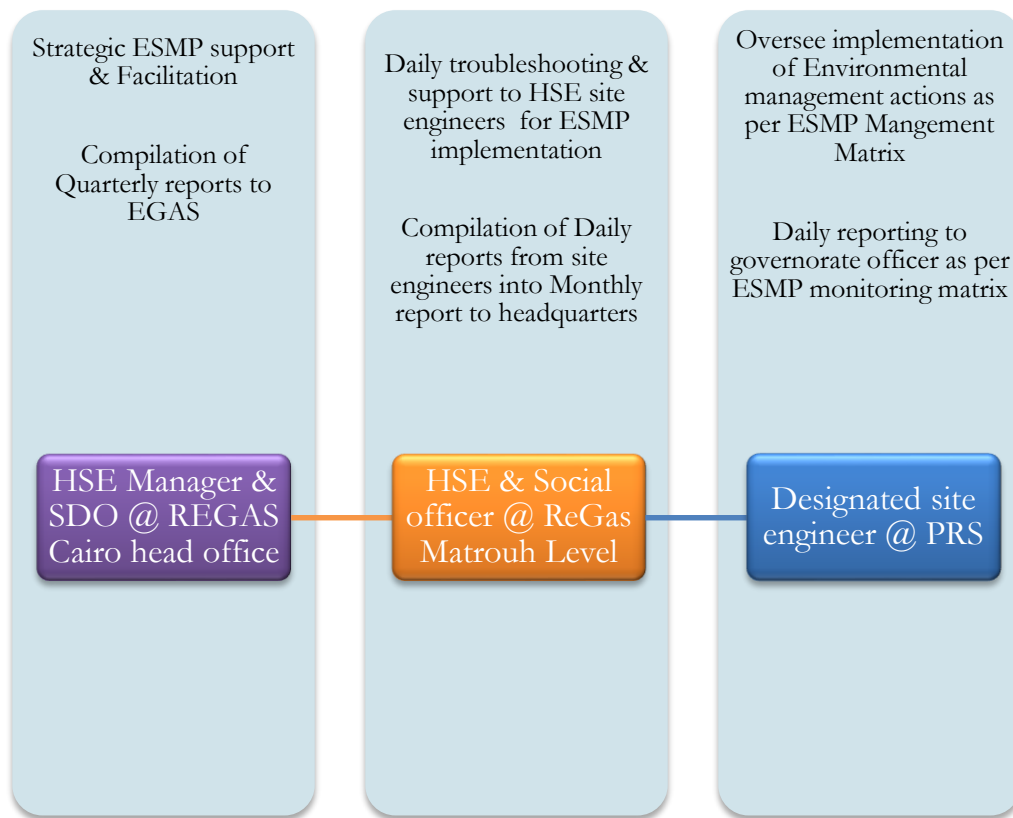


Figure 7-1: ReGas ESMP organogram

In the structure above, designated site engineers perform daily implementation, monitoring and reporting of activities as per the ESMP 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
3. Management of broken asphalt (if any), unused backfill, solid waste, metal scrap
4. Management of paint cans, refueling & lubrication, soil contamination
5. Management of liquid waste such as leaked condensate hydrocarbons (if any) or chemicals used in heaters; and
6. Checking that handling of hazardous waste is done according to the requirements of the Environmental Law, where a permit for handling hazardous material and Hazardous wastes is issued from EGAS Environment Department
7. Using analyzers to measure noise, SO₂, CO, CH₄ and NO₂ in ambient air, and detect possible natural gas leaks
8. Ensure and log compliant handling of odorant/odorant containers, odorant-contaminated-soils (in case of spillage)
9. Measure noise at different locations of the PRS
10. Other tasks as outlined in ESM&MP

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

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



7.7.2 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 ReGas. 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 ReGas EHS institutional capacity and available resources for implementation of the ESMP
- 4- Specifically, ReGas should take steps to develop capacity of site engineers and HSE officers with specific courses focused on implementation of the ESMP detailed in this ESIA.



8 Stakeholder Engagement and Public Consultation

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

8.1 Legal framework for consultation

The consultation activities were conducted in full compliance with the following legislations:

- WB policies and directives related to disclosure and public consultation, namely,
 - o The World Bank Policy on Access to Information (AI Policy). It was effective since July 1, 2010, sets out the institution's policy on public access to information in the Bank's possession. On April 3, 2013 the World Bank's Board approved revisions to the Policy on Access to Information, which became effective on July 1, 2013. The changes to the AI policy are clearly aligned with the World Bank Group's commitment to greater transparency, accountability and access to information. The AI Policy endeavors to strike an appropriate balance. It is based on the following five principles: 1) maximizing access to information; 2) setting out a clear list of exceptions; 3) safeguarding the deliberative process; 4) providing clear procedures for making information available; and 5) recognizing requesters' right to an appeals process.
- Egyptian regulations related to public consultation,
 - o Environmental law No 4/1994 modified by Law 9/2009 modified with ministerial decrees no. 1095/2011 and no. 710/2012

8.2 Objectives of consultations

Objectives of various consultation activities are summarized as follows:

- 1- Define potential project stakeholders and suggest their possible roles in the project.
- 2- Disseminate comprehensive information about the project to enable stakeholders to identify their concerns, needs, and recommendations.
- 3- Document stakeholder feedback on the defined impacts as well as the social and environmental management plan and enhance the ESIA accordingly
- 4- Identify the most effective outreach channels that support continuous dialogue with the community

For the purpose of the PRS-related ESIA; qualitative information and data were collected through identifying stakeholders, and recognizing 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. The consultation activities used multiple tools and mechanisms including scoping, interviews, focus group discussions, public hearings/consultations

8.3 Defining the stakeholder

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.

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 Marsa Matrouh 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 were well documented.

8.4 Consultation Methodology and Activities

The consultation process was a dynamic and evolving process 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 involved a broad base of community members; and Bedouin tribes.

Consultation activities in Marsa Matrouh took place in 2013 and completed on 2017. Two NGOs were recruited to take part in consultation activities with the community people. One of them is female headed NGO that works with disabled persons and the other one is Abnaa El Qabael NGO (*Sons of tribes*) that works with the Bedouin tribes and is headed by Bedouins.

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 by providing data collectors to assist the team in collecting the data.



Figure 8-1: Consultation event in Marsa Matrouh
25th of December 2013

Figure 8-2: Head of handicapped NGO in Marsa
Matrouh

The following table summarizes the main groups consulted during the consultation and the engagement tools used.



Table 8-1: Summary of Consultation Activities in Marsa Matrouh Governorate

Phase	Participants	Number		Methods	Date
		Male	Female		
During Framework preparation					
During data collection phase	Potential beneficiaries and government officials	11	1	FGD	October- November 2013
	Governmental entities	7	1	In-depth	
	NGOs	2	12		
	Stakeholders and community people	19	6	Group meeting	
	Potential beneficiaries	24	35	Structured questionnaire	
Public Consultation	Stakeholders and community people	47	4		25th of December 2013
Total		110	59		
During Site Specific Studies					
During data collection phase	Potential beneficiaries and government officials	8	7	FGD	Apr-17
	Governmental entities	2	0	In-depth	
	NGOs	1	1		
	Stakeholders and community people	6	2		
Public Consultation	Stakeholders and community people*	65	10	Public consultation event	27 th of April 2017
Total		82	20		

See list of participants in **Annex 9**

8.4.1 Main results of consultation during the framework

The consultation activities conducted during the framework preparation reflected overwhelming acceptance to the project. However, the PRS did not raise any of the community concerns. There are many oil companies in place in Marsa Matrouh and the pipelines are already installed. Therefore, no safety concerns were raised about the PRS. However, the two main concerns raised are related to employment and the necessity to rehabilitate streets after any construction activities in place. See **Annex 9** for the consultation event conducted on the 25th of December 2013)



8.4.2 Main results of consultation during the ESIA

With regard to the PRS station, 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 they are to be thoroughly taken into account throughout the different phases of the project.



Figure 8-3: Consultation with the head of environmental department in Matrouh Governorate



Figure 8-4: Public Consultation event on the 27th of April 2017



Figure 8-5: Participants in the Public consultation event conducted on the 27th of April 2017



Figure 8-6: Open discussion in the Public consultation event conducted on the 27th of April 2017

It was notable that the reactions and attitudes of the local communities towards the project reflect encouragement to the NG installation. The field research team noted a strong public support and eagerness towards the project. Beside some legitimate concerns expressed by the public, the field research team recorded the general view that NG is a far better substitute for the type of fuel currently in use and that it carries many economic benefits for Marsa Matrouh. The following table illustrates the different subjects, questions, comments and responses that were discussed throughout the different public consultation activities.



Table 8-2: Key comments and concerns raised during the different public consultation activities, and the way they were addressed during in the ESIA study

Subject	Questions and comments	Responses	Addressed in the ESIA Study
Employment	The young people of Marsa Matrouh are deprived of jobs	The PRS and the networks will result in limited job opportunities that will not exceed 30 job opportunities. It will be crucial to provide some of these jobs to the residents of Marsa Matrouh. Additionally, 5 apartments will be rented to accommodate the workers from outside Marsa Matrouh	Positive impact section 5.2.1 & 5.3.1
Street rehabilitation	The low pressure pipeline damaged streets in the entrance of the City. When will streets be rehabilitated?	ReGas agreed with the municipality and local units to pay for street rehabilitation. The local units try to finalize all activities in the street i.e maintenance of water and sanitary system networks before paving the roads. This might take some times. However, ReGas has already disbursed the money to the Local Unit	The LDC has already disbursed street rehabilitation costs even before starting drilling activities. The municipality will be responsible to rehabilitate the streets after testing the network. It is worth mentioning that the NG installation is one of the projects implemented in the governorate. There are electricity and water supply projects that will entail excavating streets. Therefore, it is much useful to do all excavations prior to any paving taking place. The municipality is aware about various plans therefore, they are more capable to define the proper time to restore their street conditions. Coordinating with other entities prior to street restoration is crucial in order to pave whole streets and not only the damaged parts of the street. This will result in better street conditions

Detailed results of public consultation conducted in Marsa Matrouh on the 27th of April 2017 are presented in the Marsa Matrouh Governorate ESMP study.



8.5 Summary of consultation outcomes

PRS-related consultation activities in Marsa Matrouh City included wide range of concerned stakeholders. This include but not limited to; individuals/households affected by the project activities, civil society organizations representing the interest of the community, and governmental bodies who will play a role in facilitating or regulating the implementation of site-specific project activities.

The PRS did not cause any critical concerns among the community rather than the ability to provide young people in Marsa Matrouh with proper job opportunities

8.6 ESIA disclosure

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



Annex 1: Contributors to the ESIA



Annex 2: Land Recipient Document



Annex 3: Health & Safety Guidelines



Annex 4: Air Quality and Noise Monitoring Report

This is a comprehensive document in Arabic which covers H&S aspects of nearly all possible project activities with clear instructions, administrative requirements, and illustrations.



Annex 5: Procedures for chance finds and ESM



Annex 6: Impact Assessment



Annex 7: Grievance and Redress Mechanism



Annex 8: Emergency Plan

Three documents are attached

- 1- Emergency plan in Arabic
- 2- Emergency plan in English
- 3- Classification of Emergency Levels



Annex 9: Marsa Matrouh consultation event during the ESIA framework

