











1.5 Million Natural Gas Connections Project in 11 Governorates

Environmental and Social Impact Assessment

Upgrading of Matrouh Matrouh PRS

Final Executive Summary

December 2017

EGAS
Egyptian Natural Gas Holding Company

Developed by

EcoConServ Environmental Solutions

Petrosafe
Petroleum Safety & Environmental Services Company

EXECUTIVE SUMMARY

1 Introduction

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

2 Project Description

2.1 Project Work Packages

2.1.1 Pressure Reduction Station (PRS)

There is an already existing PRS in Matrouh with a capacity of 3,000 m^3/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 m^3/h.

Figure 2-1:Existing PRS

2.2 Project Location

The PRS is located at El Kasr –Agiba Road in front of the Military Naval gate, about 370 m away and the nearest residential area is about 844 m away as shown in the figure below.

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

2.3 Associated facility (Off-take and HP pipeline)

As previously mentioned, the off-take from the national gird and the HP pipeline (70 bar system) already exist. The off-take is the point on the HP 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.

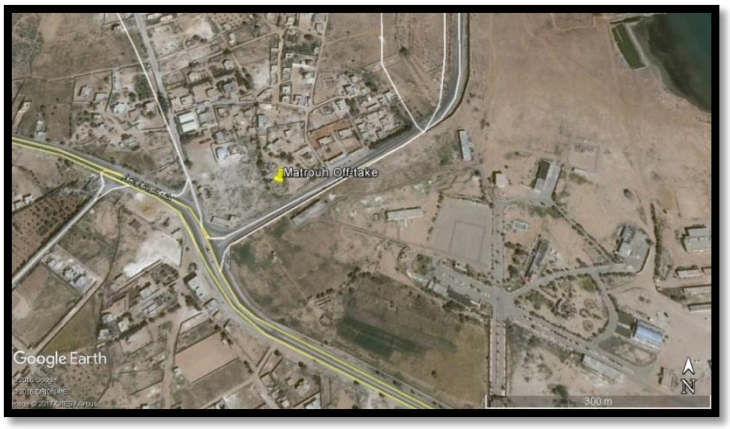

Figure 2-3: Off-take location

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"

2.4 Project Execution Methodology

2.4.1 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.

2.4.2 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.

2.4.3 Construction works/Upgrading of PRS

2.4.3.1 Pressure Reduction Station area

As we mentioned before the Matrouh PRS already exists, the land surface area of the PRS is 6,384.8m^2, the land is located inside the border of Desert Research Center. **Annex 2** from the report provides official hand over of the lands to Matrouh PRS.

2.4.3.2 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.

2.4.3.3 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

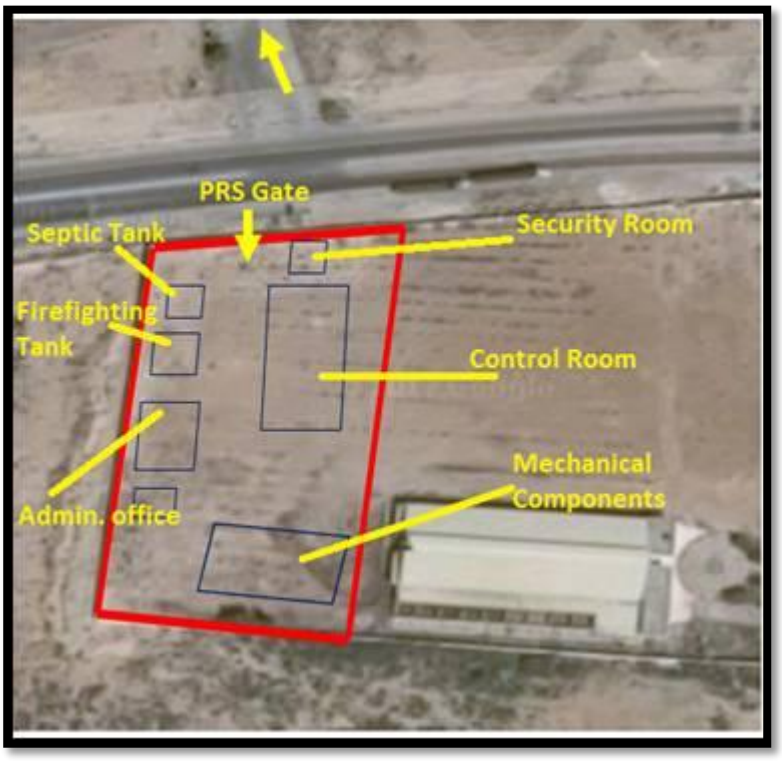

Figure 2-6 Matrouh Pressure Reduction Station Layout

2.4.3.4 Testing

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

2.5 Operation phase

2.5.1 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).

2.5.1.1 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.

2.5.1.2 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.

2.5.1.3 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).

2.5.1.4 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.

2.5.1.5 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.

2.5.1.6 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.

2.5.1.7 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.

2.5.1.8 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/cm^3. The odorant system consists of a stainless steel storage tank, which receives the odorant from 200-liter drums, injection pumps, and associated safety devices.

2.5.1.9 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.

2.5.1.1 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.

2.6 Resources Consumption

2.6.1 During Construction/Upgrading

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 m^3/day

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.

2.6.2 During Operation

Water

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

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.

2.7 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.

2.7.1 During construction /Upgrading

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

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.

2.7.2 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,

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, information sharing procedures will be applicable to the project[1].

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

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which provide guidance to users on EHS issues in specific industry sectors. Gas distribution system – Health and Safety Guideline are applicable to the project.

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

In addition to the above mentioned safeguards policies, the Directive and Procedure on Access to Information[2] will be followed by the Project.

4 Analysis of Alternatives

4.1 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.

4.2 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

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

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

the PRS. Consequently no additional land is needed for the upgrading process.

5 Environmental and Social Impacts and Mitigations

The environmental and social advantages of switching household fuel from LPG cylinders to natural gas pipelines are diverse. On the residential level, the proposed project will lead to improved safety, reduced physical/social/financial hardships, and secure home fuel supply. On the national level, it promotes the utilization of Egyptian natural resources and reduces the subsidy and import burden.

A thorough 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 assessment of impacts distinguishes between the construction phase and the operation phase.

5.1 Positive Impacts

5.1.1 Positive impacts during construction/upgrading

5.1.1.1 Impacts related to employment

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

5.1.1.1.1 **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.

5.1.1.1.2 **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.

5.1.2 Positive impacts during operation

5.1.2.1 Impacts related to employment

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

5.1.2.1.1 **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.

5.2 Anticipated Negative Impacts

5.2.1 Impact Assessment Methodology

To assess the impacts of the project activities on environmental and social receptors, a semi-quantitative approach based on the Leopold Impact Assessment Methodology with the Buroz Relevant Integrated Criteria was adopted.

The table below presents the classification of impact ratings and respective importance of impact values.

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).	

The following tables summarize the impacts and the corresponding mitigation measures within the management plan, in addition the monitoring plans proposed for implementation.

Table 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	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: - 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. **Gaseous pollutants emissions** Provided machinery used during construction is certified and maintained as per guidelines, the increase in emissions stemming from the exhaust of machinery is unlikely to increase ambient levels beyond national and IFC permissible levels.	Negative impact	Medium

Impact	Impact Description	Type and significance identification	Impact Significance
Noise	**Noise impact on worker** Noise impacts on construction workers, technicians and engineers in direct vicinity of the excavation works and heavy machinery are considered more significant than those on residents.	Negative impact	Minor
Impact on worker health and safety	Inhalation of air pollutants, exposure to high noise levels, injuries and potential death as a result of operating heavy equipment, and handling hazardous materials.	Negative impact	Medium
Risk pertaining to child labor	As mentioned in the baseline, child labor is a common practice in the project communities in Marsa Matrouh. Children below 18 work almost in all projects as they receive low salaries and they are less demanding. This risk should be carefully handled in the ESMP and restrict obligations and monitoring should be applied in the contractor and subcontractor obligations	Negative impact	Low to medium

Impact	Impact Description	Type and significance identification	Impact Significance
Inappropriate Solid and Hazardous waste management	Inappropriate waste disposal and improper management of construction waste materials which could lead to spillages that will cause soil contamination. Excavated soil and concrete/bricks waste are inert materials. Improper disposal of such wastes will only have aesthetic effects on the disposal site. The legal standards of Law 4/1994-9/2009-105/2015 for the Environment and Law 38/1967 stipulate that these wastes should be disposed of in licensed sites by the local authority, which minimizes any aesthetic effects of such waste. Hazardous and non-hazardous materials available onsite during construction activities are likely to include fuel, engine oil, paints, Poor handling of those materials and their inappropriate storage may result in poor containment of induced leaks.	Negative 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
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

Impact	Impact Description	Type and significance identification	Impact Significance
Traffic	The transportation of material and equipment to the construction sites will cause temporary increase in traffic along 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, 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. The impact is of Low significance.

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.

5.3 Environmental and Social Mitigation Measures

Table 2: Environmental and Social Management Matrix during Construction/upgrading

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical receptor	Impact on soil	- Best practices for soil management should be followed - Good housekeeping to minimize spills/leaks - Proper handling and management of wastes	Minor	Contractor	LDC – HSE department	Field supervision (audits)	- Contractor costs LDC management costs
	Air emission	- Monitoring of wind speed and direction to manage dust-generating activities during undesirable conditions. - Management of number of vehicles and equipment in the site. - Appropriate maintenance, engine tuning and servicing of construction equipment to minimize exhaust emissions - Minimize unnecessary journeys or equipment use - Adopt a policy of switching off machinery and equipment when not in use (idle mode).	Minor	Contractor	LDC – HSE department	Contractual clauses + Field supervision (audits)	- Contractor costs - LDC management costs

	Noise	**Worker** Application of the normal precautions normally taken by construction workers.	Minor	- LDC - Excavation Contractor	LDC– HSE department	Contractual clauses + Field supervision (audits)	- Contractor costs - LDC management costs
Social receptor (health and safety)	Occupational health and safety	- 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	- LDC - Excavation Contractor	LDC– HSE department	Field supervision and review of HSE report+ Field supervision (audits)	- Contractor costs - LDC management costs
	Risk pertaining to child labor	- The project will hire a qualified sub-contractor with the high occupational standards. Special attention will be given to add a contract term prohibiting all child labor activities	Minor to medium	- LDC - Excavation Contractor/subcontractor	LDC– HSE department	Field supervision and review of HSE report+ Field	- Contractor costs - LDC management costs

		- Rigid obligations and penalties will be added to the contractor ToR in order to warrantee no child labor is occurred in the project. In case of breaching these obligations, financial penalties will be applied - The ToR also will oblige the contractor/subcontractor to keep a copy of IDs of laborers in order to monitor the hired staff, especially, those below 18 years old - The contractor also will be obliged to maintain daily attendance sheets in order to verify the attendance of workers in case of accidents and provide the injured persons with proper health insurance				supervision (audits)	
Physical receptor	Solid and Hazardous waste management	- 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	Minor	- LDC - Excavation Contractor/subcontractor	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

		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					
Social receptor (Local traffic and accessibility)	Traffic	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,	Minor	Contractor	LDC + Traffic department	Contractor has valid conditional permit + Field supervision	- Contractor costs - LDC management costs
Physical receptor	Ground water/subsurface contamination	In general, the proposed construction activities have a minor impact on the quality of the groundwater; however the following procedures should be follow: - 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	- Contractor costs - LDC management costs

Social receptor	Grievance and redress mechanism	The detailed grievance mechanism (GRM) is presented in **Annex (7)** is to be shared with the community beneficiaries.		Contractor	LDC – HSE department	Contractual clauses + Field supervision	- Contractor costs - LDC management costs

Table 3: Environmental and Social Management Matrix during OPERATION

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
Physical receptor	Noise	- 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	- 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	Minor	-LDC project department -Designer	-LDC project department -engineering dep. -HSE dept. _EGAS	- Drawing and design Document Review - Policy and manual review - Inspection by operators - Signage inspection and site visits	Included in PRS cost

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		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					
Physical receptor(air, soil, water)	Solid and Hazardous waste management	- 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	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 Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		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 In order to minimize risk of spillage of hazardous odorant, the following general precautions should be taken: - Pre-Plan the anticipated amounts of odorants to be used in order to minimize leftovers and residuals. - Handle with extreme care and always perform visual checks on the integrity of the odorant container - Avoid rough handling rolling or dropping of odorant containers					

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		- Avoid exposure to direct sunlight during storage or transportation - Ensure odorant containers are always sealed properly and secured from tipping/falling/damage during transportation and storage (temporary and long-term) - Always have sufficient amounts of sand, sodium hypochlorite and detergent on standby during usage of odorant - ALWAYS handle containers or spills with care and full PPE compliance - Never release or empty residual odorant from its container to any receptor or for any reason other than filling the odorant tank at the PRS - NEVER use empty odorant containers for any other purpose In case of odorant spillage: - avoid inhalation and sources of ignition					

Receptor	Impact	Mitigation measures	Residual impact	Institutional Responsibility for Implementation		Means of Supervision	Estimated Cost of mitigation / supervision
				Mitigation	Supervision		
		- immediately cover and mix with sufficient amounts of sand and sodium hypochlorite using necessary PPE and tools - collect contaminated sand in clearly marked secure containers/bags Add sand to inventory of hazardous waste					

5.4 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 4: Environmental and Social Monitoring Matrix during Upgrading

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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
		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

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Frequency of monitoring	Location of monitoring	Methods of monitoring	Estimated Cost of monitoring
	- 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 5: Environmental and Social Monitoring Matrix during OPERATION

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
Ambient air quality	Improper management of odorant during operation	- Log of spillage incidents - Number of treated containers - Odorant delivery forms	LDC HSE	Quarterly for each PRS	PRSs	- Compare Environmental Register with odorant delivery forms, observation of site	LDC management costs
Ambient noise levels	Noise of PRS operation	- Noise intensity	LDC HSE	Quarterly for each PRS	PRSs	- Noise meter	LDC management costs
Labor conditions	Occupational Health and Safety	- Total number of complaints raised by workers - Periodic Health report	LDC HSE	Biannual for PRS	PRSs	- Safety supervisor should follow the commitment	LDC management costs

Receptor	Impact	Monitoring indicators	Responsibility of monitoring	Monitoring Frequency	Location of monitoring	Methods of monitoring	Monitoring Estimated Cost
		- Periodic safety inspection report				of workers to use the protective equipment - Inspection and recording of the performance - -Reports about the workers and complaints	

6 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.

6.1 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,
  - 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,
  - Environmental law No 4/1994 modified by Law 9/2009 modified with ministerial decrees no. 1095/2011 and no. 710/2012

6.2 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 recognize their views and concerns about the project. The aim of this endeavor is to ensure a well-integrated and inclusive public review of the project. The consultation activities used multiple tools and mechanisms including scoping, interviews, focus group discussions, public hearings/consultations

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

Table 6: Summary of Consultation Activities in 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	27th of April 2017
Total		82	20		

See list of participants in **Annex 9**

6.2.1 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 was already in place many oil companies in Matrouh and pipelines were 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)

It was notable that the reactions and attitudes of the local communities towards the project reflecting overwhelming encouraging 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 7: 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 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 Matrouh. Additionally, 5 apartments will be rented to accommodate the workers from outside Matrouh	Positive impact section 5.2.1 & 5.3.1

Subject	Questions and comments	Responses	Addressed in the ESIA Study
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 Matrouh Governorate ESMP study.

6.3 Summary of consultation outcomes

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

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

6.4 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.