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This Environmental Impact Assessment (EIA) has been prepared to comply with the Egyptian Environmental Regulations (Law No. 4, 1994 and its Executive Regulations), in line with the principles with the *European Communities/Directive 97/11/EC* guidelines and *GASCO's* Health, Safety and Environment Policy (*Appendix (4)*).

The scope of work includes construction of Abr Sinai pipeline. This pipeline will be constructed for the purpose of increasing gas maneuvering along north Sinai area, and increasing Natural Gas exportation capacity, the pipeline extend from El-Tena East to El-Areish in two loops, where loop 1 is 33 KM, and loop 2 is 78 KM.

The route of pipeline starts from the existed valve room of El-Tena East site (*long. 31° 01' 27.74" lat. 32° 20' 39.3"*) heads south for a distance of 400 m. then turn east crossing El-Qantara - Port Foad Road., and continue parallel to El-Sheikh Gaber Canal (El-Salam Canal) from the west bank in the vicinity of canal parallel to the High voltage towers in the safe zone, to reach El-Qantara – El-Areish road, where the proposed pipeline will extend parallel to the road from North side in the back area of Roman village to be connected to Roman compressing station (*long. 31° 01' 23.9" lat. 32° 40' 06.3"*) (End point of Loop 1 “from KM 0.00 to KM 33.00”)

Loop 2 starts from the existed valve room no 4 of the existed pipeline 36” at Bair El-Abd (*long. 31° 00' 11.6" lat. 33° 03' 18.4"*) , where the pipeline heads to the East direction to El-Areish parallel to the existed 36” pipeline with a distance about 10 m and parallel to El-Kantara El-Areish. About 3 KM from the south site crossing paved road at El-Medan village, and crossing the low voltage lines continues parallel to El-Kantara El-Areish road, crossing number of farms for a distance about 2 KM , then crossing the Airport road heads to End point At El-Areish (*long. 31° 05' 43.9" lat. 33° 50' 36.1"*) with a total distance of 78 KM End of Loop 2.

All positive and negative impacts were analyzed, and suitable mitigation measures were designed for the negative impacts.



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The undertaken project has major environmental and socio-economic positive impacts. From the environmental point of view, the use of natural gas (green fuel) will help in conserving the surrounding air quality due to the following reasons:

- Natural gas produces neither particulates nor significant quantities of sulphur dioxide (SO₂) and/or nitrogen oxides.
- Only minute quantities of unburned residues of combustion, carbon monoxide (CO) or hydrocarbons remain after burning of the natural gas.
- Natural gas is clean also in terms of trace elements as it does not contain more than minute quantities of the heavy metals encountered in other fuels.
- The properties of natural gas have advantages with regard to the prevention of acid rain and ozone depletion.

From the socio-economic point of view, the proposed project represents an economic attractive option because of the following reasons:

- This project will effectively improve the Egyptian natural gas transmission infrastructure.
- It represents a core element for transporting natural gas to canal area by increasing the gas maneuvering.
- It will provide the mentioned areas with the required fuel supply.

Moreover, pipelines are a safe and reliable method of transportation of natural gas. Also they have a very low accident rate compared with other transportation methods (e.g. manual handling for gas cylinders).

In addition, the construction phase of the proposed project will employ 294 persons approx. with different levels and backgrounds. Such man power employed will improve the economic profile of the inhabitants of neighboring areas.



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1. ABOUT THE EIA

This Environmental Impact Assessment (EIA) has been presented in compliance with the Egyptian Environmental Regulations and *EGAS/GASCO* Environmental Conscious Policy. It has been designed specifically to support the future environmental management of the area and to be a reference document for the life of the project. This assessment describes the project activities, the current and proposed Egyptian environmental legislation, and the existing environmental features around the study area. It evaluates the potential impact of the operations and identifies the mitigation procedures to be followed in order to eliminate any risk of contamination through construction and operation phases. It provides the framework for the future environmental management of the area in order to minimize the negative impacts of construction and operations.

A description of the existing environment in the study area provides details on physical, chemical and biological features.

The contents of this report cover the findings of the environmental impact assessment of the proposed project. It deals with several stages of the project as outlined in the sections through this report:

Section 1: Introduction

It gives description of the aim of the EIA, the system of the review and the history of EIA. It also set out the objectives of establishing EIA for the project.

Section 2: Environmental Legislation And Regulations

It discusses the policy, legal, and administrative framework within which the EA is carried out. Also, it explains the environmental requirements of any co financiers. Identifies relevant international environmental agreements to which the country is a party.



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Section 3: Project Description

It gives description of the project location and surrounding environment. It also includes an assessment of activities of the proposed project facilities.

Section 4: Existing Environment

This section gives analysis of the environmental data regarding the surrounding environment to identify any particular areas of significant environmental sensitivity.

Section 5: Analysis of Alternatives

Systematically compares feasible alternatives to the proposed project site, technology, design and operation including the “no action” situation.

Section 6: Environmental Impacts & Mitigation Measures

It gives prediction of the likely effective potential environmental impacts and assessment of their significance. And It describes of the mitigation measures during construction and operation to minimize potential environmental negative impacts from the different project stages

Section 7: Environmental Management Plan

EMP is a document designed to ensure that the commitment in the EIA, subsequent assessment reports, approval or license conditions are fully implemented.

Section 8: Monitoring Plan

Environmental monitoring during project implementation provides information about the key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures.

Section 9: Conclusions



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This section segregate the conclusions derived through the EIA process.

Section 10: Public Consultation

This section discusses the public consultations that were held. It details the response of public and landowners towards the project, supported with photos.

2. FUNDAMENTALS

2.1. The Preliminary Environmental Assessment

Prior to the EIA, a preliminary phase was carried out in the purpose of evaluating the selected route of the pipeline from the environmental point of view.

Following are the objectives of conducting the preliminary Environmental Assessment Study for the proposed onshore pipelines:

- Carry out screening study and identification of key environmental issues/ aspects.
- Identify the potential impacts/ risks associated with each section of the pipeline route.

2.2. The Site Visit

A site visit was held for the route of the pipeline through the period of 11 - 12 July 2007 (please see pictorial record appendix-7) . The need of the site visit is to examine the route to record the surrounding environments along the route and to specify the environmental aspects which must be considered.

The methodology adopted for the site visit is as following:

- Review of all the technical data and maps.
- Determination of the environmental aspects that shall be considered during the site visit. It was found that eight environmental aspects must be examined along the pipeline route, which are:

1.Environmental protected areas.



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2. *Water bodies.*
3. *Agriculture / Land use*
4. *Existing corridor.*
5. *Topography / Seismic.*
6. *Social sensitivities.*
7. *Archaeological / Historical sites.*
8. *Third party interference.*

- Dividing the route into sections for the ease of the examining the whole route. In the proposed pipeline, valve rooms locations were considered for the sectioning the route.
- Preparing a checklist for the sections to record the site visit notes versus the chosen environmental aspects.
- Taking photographs as pictorial records.
- Consulting the concerning parties such as:
 - *EEAA*
 - *Ministry of Irrigation & Water Resources*
 - *Ministry of Agriculture*
 - *Ministry of Defense*
 - *Authority of Railway*
 - *Authority of Roads & Bridges*
 - *Authority of Archeology*
 - *General Authority for Fisher Resources Development.*

3. MAJOR ENVIRONMENTAL IMPACTS

The assessment of the potential environmental impacts of the proposed pipeline project revealed that the main potential sources of impact are almost exclusively associated with the construction phase which is temporary. Operational impacts could only arise through unforeseen accidents since the operating company (*GASCO*) will take all necessary precautions against such incidents to protect pipeline from damage and maintain its integrity.

In general, the basic environmental impacts associated with the construction and operation phase of the proposed pipeline could be summarized as following:



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- Temporary disturbance to the surrounding nature (desert, canals, roads, agricultural and urban areas, etc.) from the pipeline crossings.
- Temporary disturbance to local community.
- Discharge of air pollutants due to the following:
 - Potential pipeline rupture or leak.
 - Small controlled amount of natural gas which commonly releases during operating safety devices and maintenance procedures.

The potential environmental impacts from the construction phase will be temporary and limited to the construction sites, but even these areas will be rapidly rehabilitated.

There is a low risk of major accidental gas release. However, *EGAS/GASCO* will take all necessary precautions against such incidents and a contingency plan will be in place.

The mitigation measures cover the whole life cycle of the proposed project in order to minimize the expected environmental consequences as far as possible. These mitigation measures are covered in details in the course of EIA report section 6.

A briefing of the most significant impacts is listed below.

3.1. Hydrostatic Test Water

The hydrostatic test is one that being done for the pipeline to examine its quality and being free from any leak or defects. It is done by filling the pipeline with water which is subject to high pressure equal to 1.5 times to the pressure of the gas that will pass in the pipe. The pressure is left for 24 hours, meanwhile patrolling along the pipe is done to check any leakage in pressure along the pipeline.

In general, the impact arising from test is resembled in the water used in the test on three axes: (a) *source of water*; (b) *the place of disposal of the water after test*, and; (c) *the additive to the water like the corrosion inhibitor*. The receptors of the hydrostatic water are the soil, the surface water or the groundwater or all of them; this is in case that the water was discharged to them.



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As for our project, the impact significance of this test is low. About 27635 m³ of El-salam canal water will be used for testing loop #1, and About 65320 m³ of sea water from Mediterranean sea will be used for testing of the second loop and shall be gradually discharged again into El-Salam canal and Mediterranean sea at El- Areish area into the same locations. No discharge to soil or ground water, shall take place. And the chemical anticorrosion that will be used in the second loop are environmentally friendly, and there is no chemical or additives will be used in the first Loop. So, the impact of this test is of low magnitude and short duration; since the test last only for 24 hours. However, sampling and analysis for the water after test as well as the drainage locations to assure that no change in the water features that may affect the quality of water before discharging into El-Salam canal, and Mediterranean sea, shall be done.

3.2. Solid Waste

Solid waste in this project arises only from the construction phase. The solid waste resembled in the sands, stones and rubbles resulting from the trenching the tunnels of the pipeline and flattening the route, empty containers, scraps, garbage, wood and waste from the welding works. The receptors in this case are the soil and/or the surface water if this waste being thrown on them. The impact resembled in affecting badly the quality of the water bodies besides its aesthetic value if these waste were thrown on the ground or into the surface water.

As for our project, the soil, sands and rubbles that shall arise will be reused in backfilling of the pipeline after laying in the trench. The areas along the pipeline shall be restored as before. Regarding the garbage and other types of solid waste, **GASCO** shall use an authorized contractor for collecting and disposal of this waste in coordination with the local authorities. Therefore, the project will have a short-term and low magnitude impact on aesthetic.

Waste oil from the servicing of vehicles during the construction phase is hazardous waste, which will be collected through Misr Petroleum Co. for oil recovery.



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3.3. The Pipeline Through The Agricultural Lands

The pipeline extends through the vicinity of El-Sheikh Gaber Canal in the north Bank in Loop#1, "and not in the reclaimed agriculture land", and the Loop#2 part pass in about 2 KM reclaimed agricultural land, the receptors are the farms and cultivated areas. The impact resembled in removing of the fertile soil in these areas.

The project has a short-term, localized and moderate magnitude on the agricultural lands. The impact is restricted on the construction phase, so it is a short term impact. Removal of the soil shall not be done in an aggressor manner; it shall be localized limited to the pathway of the pipeline. Also, the soil arising from the trenching process shall be reused in the backfilling after laying the pipeline. The areas shall be re-habilitated and restored as before. This shall not affect the fertility or quality of the soil and it is capable to be re-vegetated since the trench is as deep as 1.5 m. Besides, the owners of these farms shall be compensated according to the decree No. 318/1993 declared by the Ministry of Agriculture and Reclamation. Appendix (5)

3.4. Crossing of Water Bodies

The only water body along the pipeline route are existed along Loop 1 called Kliopatra drainage canal and branch canals number 1.3.5.7 from El-Sheikh Gaber canal, and. The impact resembled in disturbance on the water bodies such as turbidity affecting the sediment and marine fauna besides the risk from laying the pipeline on the canal bed. However, crossing of water bodies and main canals in this project shall not be done by the traditional open-cut method. It shall be done using a new technology named *Horizontal Directional Drilling (HDD)*. Horizontal Directional Drilling (HDD) is a trench-less methodology that provides an installation alternative that can offer a number of benefits over traditional open-cut. HDD can be implemented with very little disruption to surface activities, requires less working space, and may be performed more quickly than open-cut methods. In this technique, a tunnel is drilled beneath the bed of the water body. From one side, a rig is drilling with an angle between 5° and 30° associated with equipment pulling the pipeline till being settled in the tunnel then the rig exits with the equipment to the other side.



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Using this technique, the project has low magnitude and short-term impact and does not significantly affecting the water bodies.

3.5. Dust Generation

Dust generated during construction will result from clearing and earthworks, including trenching, leveling, bund construction and reinstatement operations. The major dust sources will be from the movement of vehicles over the cleared work area within the pipeline easement and from vehicles transporting pipes and equipment to the work areas.

There will be relatively high quantities of fugitive dust generated during the construction phase estimated 1,828,529.58 kg of dust over the construction time period, 70% of dust will be less than 10 micron (i.e. 1,295,208.45 kg PM10).

The pipeline route avoided major settlements areas, so it is not anticipated that dust levels will impact greatly on existing settlements, in additions of many control cost-effectiveness measures were reviewed and some of these measures will be applied.

3.6. Land Use

Whilst the majority of the pipeline route passes through low population rural areas with low number of houses where most of the area are desert area and agricultural activities are very rear, the project will involve impacts on land, productive assets, and livelihood through:

- *Temporary use of land for construction purposes.*
- *Permanent acquisition of land for valve rooms.*

Only 0.04 km² of agricultural land temporary used in LOOP#2 and 0.46 of the vicinity of agricultural land (north bank of El-Sheikh Gaber canal) in LOOP#1, 0.01 km² approx. of permanent use. However, Early notice will be provided to all landowners and tenants prior to work commencing. This will include details of the work schedule, the nature of the work, its location and access requirements. Used



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land's owners (temporary / permanently) will be compensated accordance with to the agreement between *EGAS / GASCO* and ministry of agriculture (See appendix 5).

4. GENERAL CONCLUSION

Natural gas will be used primarily as a substitute for Diesel / Mazout, therefore it can be concluded that this project will greatly contribute in conserving the air quality through maximizing the use of natural gas which is much cleaner than other conventional fuels in different industrial and domestic sectors. Additionally, the project is economically attractive because the natural gas is cheaper than other fuel sources.

On the other hand, short and long term risks to the environment of the proposed pipeline project will cause no major consequences to the ecosystem. Moreover, implementation of the recommended mitigation measures and management plan will significantly reduce the potential environmental risks associated with the proposed project.

