ENVIRONMENTAL AND
SOCIAL IMPACT ASSESSMENT SUMMARY

Project Name:	**Egypt Hydrocarbon Company Ammonium Nitrate Plant**
Country:	**Egypt**
Project Number:	**P-EG-BG0-001**

1. Introduction

The Bank has been invited to extend a senior loan of up to USD 50 million to Egypt Hydrocarbon Company (EHC) for a proposed ammonium nitrate plant. EHC is joint stock company registered under the laws of Egypt. The Bank's presence on the project will contribute to ensuring that the project adheres to global environmental and safety standard.

The Front End Engineering and Design (FEED) study was completed by Kellogg Brown Root (KBR), one of the world's premiere engineering, procurement and construction companies with extensive experience in designing industrial plants.

WorleyParsons was retained by EHC to conduct an Environmental and Social Impact Assessment (ESIA) study for the ammonium nitrate production facility located within the ninth industrial zone at Ain Sokhna, Arab Republic of Egypt.

This document – the ESIA Summary- aims to present a précis of the major finding of the assessment study. It provides information on the project description and justification, the environmental and social baseline conditions of the project area, the envisaged adverse and beneficial impacts of the project as well as mitigation measures and monitoring programs which would be implemented to ensure to ensure that the project is developed and operated in a sustainable manner.

EHC is the Borrower and Project Company. Carbon Holdings owns 44% stake of EHC, whereas Platinum Investments Limited and SEDCO International Holdings Limited each own 30% and 26% of the project company respectively.

Carbon Holdings group focuses on investments in downstream oil and gas sector. One of their project- Egypt Basic Industries Corporation (EBIC) is a 2000 MT/ per day ammonia production plant. Currently, the group has plans for three more projects that will synergize with one another.

SEDCO is a private wealth management arm of the Bin Mahfouz family (Founder of National Commercial Bank – the largest privately owned bank in Saudi Arabia). Platinum Investments Limited is part of Hayel Saeed Anam group (HAS) – the largest commercial group in Yemen with activities spread across Egypt, Saudi Arabia, Malaysia, Indonesia, Dubai and U.K. HSA Group is active in manufacturing, trading, banking, agriculture, services and real estate. It employs 24,000 people and has been a successful diversified investor for over 35 years.

2. Project Description and Justification

Project Description

EHC proposes to establish a new ammonium nitrate project which will be located at the ninth industrial zone at Ain Sokhna, Arab Republic of Egypt. This is inland and west of the central portion of the Gulf of Suez.

The project will consist of a nitric acid unit and ammonium nitrate unit; where the nitric acid is consumed in the production of ammonium nitrate. The ammonium nitrate unit will use a single-stage, neutralization process. The processes for production of nitric acid and ammonium nitrate are well proven, with several licensors offering proprietary technology and know-how, and with multiple existing plants in operation.

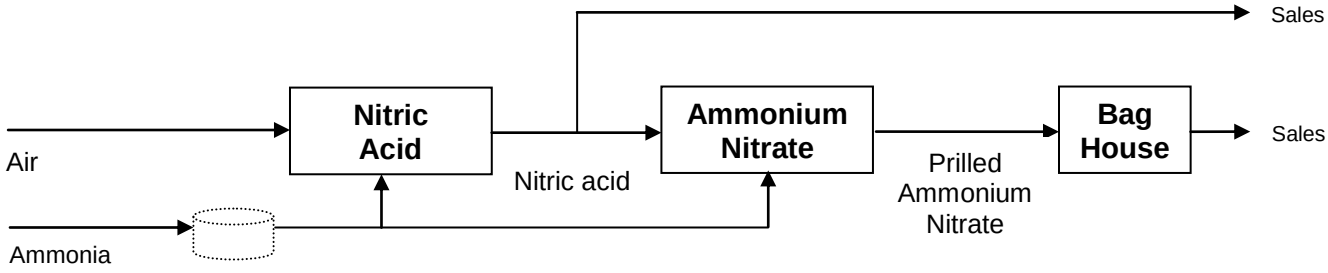

Figure 1 : MGAN Block Flow Diagram

The facility will consist of a 925 MTPD (metric ton per day) nitric acid unit and a 1 060 MTPD low density ammonium nitrate unit. Storage capabilities at the plant site will consist of tanks for nitric acid, sulphuric acid, caustic sodium hydroxide and hydrochloric acid. A storage tank for refrigerated ammonia will be located offsite having a storage capacity of 40 000 MT. The expected starting date for start-up is during the third quarter of 2013. The plant facilities will be installed at the western end of a tract of land owned by EHC, with a total area of 500,000 square meters oriented northwest to southeast and located west of the Suez-Hurgada Highway.

The dry product of ammonium nitrate will be handled, bagged and stored at the onsite Low Density Ammonium Nitrate (LDAN) product storage facilities of capacity 14 000 tons. Stored products will then be transported by trucks to local distribution locations or transported to the Adabiya Port to be loaded onto ships for export. A trucking logistics study report has been prepared that discusses the traffic between the production facility and the sea port for product export.

The facility will also consist of associated utilities and offsite support facilities. The offsite and utility systems will enable the stand-alone operation of the plant with backup power supplied from the local grid. The overall project will require the construction of an underground pipeline in the utility corridor from a marine terminal at the McDermott Jetty to the plant site. This pipeline is required for the transport of ammonia feedstock needed for the plant operation.

The estimated electric power demand for the facility is approximately 12 megawatts (MW); 6 MW of which will routinely be generated from natural gas turbine generators or in the case of emergencies from the local grid and an on-site 1MW diesel generator. The remaining 6 MW will be self generated by converting the heat release from exothermic reaction using steam turbines.

Brakish water will be drawn from onsite water wells and would be further processed for use in the facility. Wastewater from the proposed facility will be collected and treated in evaporation ponds (i.e. zero liquid discharge).

Once commissioned the ammonium nitrate plant will operate 24 hours a day, seven days a week. Scheduled shutdowns for inspection and maintenance are planned to occur every two years. A maintenance building staffed with dedicated skilled labour is provided to support all maintenance activities for the facility. The major components of the ammonia plant will be designed to have a life of more than 30 years.

Project Justification

The primary purpose of the proposed facility is the production of Mining Grade Ammonium Nitrate which is used in the production of explosives for mining and other blasting applications, such as in construction. British Sulphur Consultants ("BSC") performed a market study which details demand and supply forecasts for MGAN through 2020. The supply/demand balance to 2020 suggests that there could be scope for EHC to place tonnage in the Middle East, Africa, and Asian markets. BSC forecasts that demand, between 2009 and 2020, will increase by 4.03 million tonnes product while supply is forecast to increase by 3.84 million tonnes product. The EHC's project represents only 8.7% of the projected incremental demand.

The project presents an opportunity for the private sector development in Egypt, foreign exchange earnings and revenues for the government. It will also provide employment opportunities for up 2000 Egyptian staff during the construction period and for up to 220 people during the facility operation.

3. Policy, Legal and Administrative Framework

This section outlines the legal and regulatory framework, which have been prescribed for the development of the plant and ancillary facilities. The legal and regulatory framework provides the various legal aspects that must be adhered to at project design, implementation and later when it is decommissioned and during operation. The following are the applicable policies and regulations.

African Development Bank Policies and Procedures: Environmental Policy (2004), Policy on Poverty Reduction (2004), Policy on Population (2002), Gender Policy (2001), Policy on, Involuntary Resettlement (2003), Policy on Disclosure of information (2005), Policy on Good Governance, Policy on Public Consultation and Cooperation with Civil Society (2001), African Development Bank Environmental and Social Assessment Procedure (2001).

Egyptian Environmental Policies and Regulations:

- Egyptian Environmental Law No.9 of 2009 modifying Law No. 4 of 1994 (Law of the Environment);
- The executive regulations No. 338 of 1995 of the Egyptian Environmental Law No.4 of 1994 modified by Prime Minister Decree no. 1741/2005;
- Egyptian Environmental Affairs Agency guidelines for environmental impact assessment (January 2009 – 2nd edition);
- Egyptian Environmental Affairs Agency guidelines for environmental impact assessment for oil and gas sector (January 2005);

International Guidelines and Requirements:

- US EX-IM Bank environmental requirements;
- World Bank Group requirements;
- Equator Principles (July 2006); and
- International Finance Corporation (IFC) Performance Standards 1-8 for the management of social and environmental risks and impacts (April 2006); IFC Environmental Health and Safety Guidelines (April 2007); and other relevant World Bank guidelines and standards, as applicable.

4. Description of the Project Environment and Social Baseline Conditions

Air Quality: Past records on the regional ambient air quality of the Suez area from 2000 to 2008 showed that air pollutant concentrations have generally not exceeded the local guidelines except in 2002 when measured concentrations of NO_2 were above Egyptian guidelines.

Additional site-specific air quality monitoring campaigns for the primary air quality pollutants was conducted by WorleyParsons to further understand the local air quality and determine baseline data. These included both active and passive measurements using US Environmental Protection Agency reference methods at the project site, proposed boundaries, adjacent port facilities and nearest touristic developments for different pollutants including: CO, SO_2, NOx , Dust (Total and Thoracic Particulates (PM10)), and relevant toxic gases (NH_3, toluene, benzene, propane, and butane).

There were no "above limit" measurements recorded at any of the six monitoring locations for all the measured parameters when compared to both the national and international regulations.

Climate: The Ain Sokhna area is known for its mild climate all over the year. In January the average temperature ranges from a minimum of 12.2^{o}C to a maximum of 21.2^{o}C and ranges in July from a minimum of 22.5^{o}C and a maximum of 35 ^{o}C. The analysis of meteorological data obtained for Suez Governorate indicates that the annual average minimum and maximum temperatures are 17.8^{o}C and 28.6^{o}C respectively.

The average relative humidity in Ain Sokhna is 53.6%. It ranges between a minimum of 45% and a maximum of 60%. Average relative humidity records for the Suez Governorate shows that the highest humidity levels occur during January while the lowest occur during August and September. The annual average relative humidity is 58.6%.

The annual average number of rainy days in Ain Sokhna is 11 days. The rainy season occurs between November and May and the average annual amount of rainfall is about 10-15 mm

A 35-year Suez database (1972-2007) indicated that the wind speed in the study area was found to range between 6 to 11 Knots (3.36 to 6.16 km.h^{-1}) with a mean annual average 8.83 Knots (4.94 km.h^{-1}). The prevailing wind at the site is northerly wind with a secondary maximum of winds from the North-Northwest.

Sea water: It is noted that the project has been designed to no discharges or effluents to the sea water and thus no anticipated impacts on the marine environments are expected. A study was however carried out to determine the baseline conditions of sea water. The analysis results of surface water samples showed water pH is slightly Alkaline, dissolved oxygen values, chemical and biological oxygen demands reflects a non-contaminated environment. Measurements for heavy metals, cyanide, poly aromatic hydrocarbons, total petroleum hydrocarbons and microbial loads also indicated a non-contaminated environment.

Ground water: Investigations has been carried out on the site for groundwater down to 200m revealed two underground water aquifers are encountered in the considered section, the higher aquifer (second layer) is thinner and contains fresh water, while the lower aquifer (third layer) is thicker and includes saline water. Accordingly, the higher aquifer is of phreatic type and recharged from the interstitial fresh water comes from the rainfall, while the lower aquifer is of semi-confined type and recharged from the salt water intrusion of the Gulf of Suez. Meanwhile, the main flow directions of these water supplies are from the north, west, south and east. The two aquifers were found to be water producing in most parts of the study area, but with more water in the lower aquifer.

Topography and Geology : The project location is bounded from the west by Okheider mountain, from the northwest by Kaheilia mountain, from the north by Ataqa mountain and from the south by El Galala El Bahariya

plateau. Further, a number of major wadis dissect the neighbourhood of the concerned area; among these: wadis Homth and El Naqa to the north, and wadis Hagoul, El Bedaa and Ghweiba to the south

In general the very top layer of Ataqah and Galalah Plateaux is comprised of units of Eocene rock.The upper Ataqah formation consists of a 150m layer of sandstone (with thin clay carbonaceous bands) known as the Upper Palaeozoic formation (Kostandi 1959). The Cenomanian section, is also encountered at Ataqah, and is mainly composed of shale, marble and limestone and is of approximate thickness, ranging from 70 – 170 m.

Soil: The dominant soil component of the project area is constituted of sandstone. Chemical analysis results indicated unpolluted samples where no contamination of hydrocarbons, polychlorinated biphenyls and pesticides were detected. Additionally the analysed heavy metals were also very low in comparison with Ontario guidelines for industrial community (2003).

Terrestrial Ecology: A walkover methodology was used for surveying and assessing the terrestrial biodiversity at the project area. A desk study was also initially conducted to determine potential major environmental variables.

The area of interest (project site, main route of pipeline and marine terminal) is not located within any statutorily Protected Area. However, it is noted that Ain Sokhna lies within the Important Bird Area. Ain Sokhna is situated along a major flyway for Palearctic migrant birds. Large birds of prey (passive flyers) concentrate in significant numbers, particularly in spring. Environmental pollution from minor oil spillage from Ain Sokhna oil terminal constitutes serious threat to migrating birds in this area. Dust emissions from cement processing plants, fast-growing tourist developments, overgrazing, misuse of off-road vehicles, land reclamation, unregulated quarrying and solid-waste dumping are all causing rapid degradation of the natural habitats of the region.

During the survey of the plant facility area and the main pipeline route no Red List species were discovered. All vegetations were of relatively common species and sparsely distributed. At face value, this appears to suggest that the habitats are of low conservation value. However, the sparse vegetation raises the value to medium. Faunal evidence was dominated by opportunistic species, such as *Canis lupus familiaris* around of the fast food restaurants and close to food wastes, suggesting that poor waste management is encouraging these species.

The study area has been heavily impacted by anthropogenic impacts. This has not only resulted in habitat loss but also in fragmentation of habitats. The lack of vegetation makes large foraging areas essential for coastal desert and salt marsh species.

Although bird species were limited during the survey, the regional area is listed as an Important Bird Area. The survey was conducted outside the optimal time for migrant bird species in Egypt. Thus, it is likely that the area is an important route for migrant birds, as detailed by BirdLife International, and should be regarded as of high conservation value for this Class.

Marine Ecology: The project has been designed to have no discharge to the marine environment and thus no impacts are anticipated. However, an ecological survey was carried out to evaluate the current status of the marine environment for the analysis of fauna, flora and benthic communities at the project area. Results of the survey are meant to serve as baseline information which can be referred to in the occasion of accidental release or failure during the process in the future. The survey noted different ecological features including coral reefs, fisheries, zooplankton, phytoplankton, seaweed, seagrasses and seabirds.

Current Land Use: The plant facilities will be installed at the western end of a tract of land owned by EHC, with a total area of 500,000 square meters, oriented northwest to southeast and located west of the Suez-Hurgada Highway. The area in general has two main characteristics, the presence of dedicated industrial zones west of the Suez-Hurghada road and tourism development areas on the east of the same road. The industrial zones in Sokhna area host different array of industries which include: fertilizers (nitrogenous fertilizer, phosphate fertilizers), petrochemicals, building materials, ceramics, steel flat sheets, and other industries.

Socio-economic conditions: The Ain Sokhna area is one of the districts of the Suez Governorate, and belonging to the Ataqa quarter. The area of the existing Sokhna port was previously an area where the Bedouin communities of the Ain El Sokhna region used to grow certain crops, including olives trees and tomatoes. Now the Ain Sokhna area is generally inhabited by Bedouins (locals), workers from different industrial facilities and tourist resort(s) employees. Those Bedouins were compensated by the government for the whole development area, including the proposed project site. The area is designated for industrial use. Thus, the specific site location for the proposed project is currently unoccupied.

The Suez governorate ranks 2 out of 26 governorates according to the 2008 United Nations' report on Human Development Index (HDI), which looks beyond Gross Domestic Product (GDP) to a broader definition of well-being.

The total population in Suez governorate considered as urban population as there is no rural population. According to Suez statistical book for 2008, the total population in the study area; Ataqa district reaches approximately 27 887 inhabitants, with nearly 5.2% inhabitants from the total population of the governorate.

Health Profile: The Egyptian government has adopted a Health Sector Reform Program (HSRP) to improve the health status for all Egyptians. According to the Suez statistical book (2008), the health insurance program covers 55% of the inhabitants and the future plan aims to cover the other 45%. The project area is served by a number of health facilities including clinic centres, health units, emergency units and ambulances.

Education Profile: For the year 2006, illiteracy rate in Egypt is estimated at 29.3%, and the illiteracy in Suez was estimated at 17.3% which considered as one of the lowest percentages through the country. However the percentage of the inhabitants with university degree or above was estimated by 10.3% which considered as one of the highest percentages through the country.

Infrastructure Profile: Various infrastructure facilities are available in the project area including water supply network, electricity supply, roads, natural gas, marine transport, communication, sanitary waste water and solid waste landfills. However, the absence of a sewer facility was also noted, while a landfill for non-hazardous is under development and one for hazardous wastes is being planned. It was also noted that housing remains an issue in the area with about 22.3% of total number of urban buildings in Suez remain occupied.

Ain Sokhna is one of the core areas of fishing in Gulf of Suez. There are three fishing methods used in the Gulf of Suez and Ain Sokhna: artisanal, purse seining and trawling. On the other hand, agriculture is not a major economic sector in Suez. The important crops are wheat, maize, barley, broad beans and sesame. However the Industrial area and specifically the project location do not include any agricultural areas.

The development of the Ain Sokhna industrial zone commenced during the early 1990s at the western coast area. Due to the various industrial and leisure activities present, the Ain Sokhna area is expected to experience economic growth attracting increased migration to the area. As one of these activities, it will be incumbent on EHC to mitigate against possible adverse effects of in-migration by adhering to accepted standards relating to labour and working conditions.

The total area of the North industrial zone of Suez Gulf (Ataka) is 38 million m2 with 150 projects in different investment fields; iron, wood, petrochemicals, fertilizers and electronics tools, with total investment 33 billion EGP. Ataqa district includes around 18 thousands worker. The employees working in these industries come from different areas of Egypt.

The tourism industry is one of the most important sectors in the economy in terms of high employment and incoming foreign currency. Egypt offers tremendous cultural heritage and natural beauty. Ain Sokhana is considered an international tourist destination.

A survey was carried out on 38 local representatives to guage their perceptions of the environmental and social impacts of the proposed project. The survey showed that a majority of the interviewee had positive perceptions on

the projects impacts including increase in population size, employment opportunities, and infrastructure development while a majority had negative perceptions on impacts including culture, noise, public health and safety. The interviewees also noted the weak state of existing educational, health and infrastructure facilities while nothing the availability of employment opportunities.

5. Project Alternatives

The consideration of project alternatives acknowledges that the proposed site is within an area designated for industrial activities, thus the no-project alternative has not been considered feasible as it would lead to loss of investment opportunity as well as expected employment for up to 2000 Egyptian workers during the construction phase and up to 220 during the operations phase. More over, the proposed location will still be designated for other industrial activities even if the no-project scenario should apply.

Considerations for social, environmental and economic sustainability have been applied in decisions on other aspects of the proposal specifically on the following issues. These considerations would ensure that beneficial impacts are optimized while adverse impacts are avoided or at least minimized.

Project location: The chosen project location satisfies the economic feasibility criteria being close to the final product exporting port and also the raw material receiving port. Plans would also be designed to ensure that the transportation of the final product does not significantly impede public access to roads.

Project technologies and design: The EHC ammonium nitrate facility will use the process technology offered by Espindesa, a subsidiary of Tecnicas Reunidas (TR), both of Madrid, Spain. The choice for this technology is based on its extensive use at various other projects similar to the proposed project . The technology company has an established track record internationally and locally.

Resource use including water and fuel and material handling and storage facilities: The chosen alternative for source of water for use in the plant is water from constructed onsite wells. The well water will be brackish, which will require desalination by reverse osmosis units, with the resulting fresh water used for the different requirements of the facility. A hydro-geophysical investigation was carried out and proved the potential of the ground water resources in the project area. This alternative avoids reliance on public water networks which as yet have not satisfied other local demands and also avoids reliance on the costly desalinization of sea water from the Suez canal.

Natural gas powered generators would provide the main source of energy for the plant. This alternative was chosen due its economical feasibility and avoiding the need for installing onsite fuel storage tanks, which might increase the fire risks within the different units of the plant. Moreover, Natural gas will reduce the NOx, particulates and green house gases emissions compared to using diesel as the source of fuel.

The Ammonia unloading facilities will be located and constructed within the McDermott Port which has been selected for receiving raw material (ammonia). This is based on environmental consideration, proximity to the project site and other exiting infrastructure facilities. The McDermott port is currently hosting a propylene gas receiving facility and future construction activities are also envisaged. A Quantitative Risk Assessment (QRA) has been conducted for the Ammonium Nitrate Plant Project which includes the unloading and storage equipment for ammonia, at the McDermott Port, the underground Ammonia pipeline from the Ammonia Port to the Ammonium Nitrate Plant, the Ammonium Nitrate Plant and associated Ammonium Nitrate storage. It was concluded that the individual associated risks meets with the adopted Risk Tolerability Criteria.

6. Potential Impacts and Mitigation/Enhancement Measures

6.1 Potential Impacts:

The impact assessment has studied the significance of impacts from the development of EHC's project process facilities, associated utilities and offsite support facilities. An outline of the impact assessment procedure is as follows:

• Identification of the valued receptors; defined as any part of the environment or society that is considered important by the developer, operator, general public, or any non-governmental or governmental organisation involved in the assessment process. Importance is determined on the basis of cultural values and/or scientific and public concern.

• Identification of the key activities of the project throughout its life span that can interact with the environment.

• Impact evaluation; each potential impact is evaluated by applying the following descriptors;

Magnitude: describes the quantity of the resource (VR) potentially affected by the activity.
Spatial extent: the geographical area over which the impact is experienced.

Duration: the length of time over which the impact will be experienced. An impact may be present only while an activity is active, or it could persist long after the activity has ceased, in which case the duration may be regarded as the time the VR needs to recover from the effect.

• Significance ranking; the final impact significance is the result of the combination of the and the and the Valued receptor categorization. impact significance may result in one of the following classes: Insignificant (IN), Minor (MI), Moderate (MO) or Major (MA).

It is projected that decommissioning may occur after at least 30 years of operation. It is not realistic to attempt to predict impacts that may be associated with works so far ahead, as legislation and technologies are likely to have changed. EHC is committed to follow best practices at that time and comply with applicable regulations. It is expected that a separate ESIA would be undertaken at the time of decommissioning.

6.2 Cumulative Impacts

Cumulative impact assessment studies were also carried out to understand the Potential Cumulative Environmental Impacts caused by EHC and other existing contributors prior to implementing mitigation measures. These assessments focused on impacts on air quality and climate, land use, ecology and biodiversity, noise levels, groundwater.

The air quality and climate assessment using the AERMOD model showed that the highest predicted concentrations of pollutant gases would not exceed local and international standards.

Ground water contamination impacts are also predicted to be insignificant. On the other hand, predictions on ground water sustainability have not been considered due to the lack of comprehensive and accurate data on the groundwater in the surrounding project area. However, preliminary groundwater investigations have shown that the aquifer that were encountered is rich and have high potentials for use in the specific project area.

On cumulative impacts on land use, it is predicted that no impacts are expected to arise from construction and operation activities taking into account the industrial site is far from any major residential areas. Given the current context of the site, it is also predicted that the landscape, ecology and biodiversity will not be particularly sensitive to EHC's activities. Thus the cumulative impact on these aspects is considered insignificant.

The assessments also showed that the cumulative noise levels would be below national and international standards at locations 100m from the immediate boundaries of the facility.

6.3 *Beneficial Impacts*

According to the plant design (annual), the estimated reduction in greenhouse gas emission is estimated at 91,066 Mt/year $CO_{2\ equivalent}$ resulting from absorption of NO_2 gas. In addition, a further reduction of greenhouse gas emission is achieved the heat recovery steam generator, this emission reduction is up to 81,420 metric tonnes of $CO_{2\ equivalent}$ per year. These emission reductions can potentially be receive Certified Emission Reduction credits under the enabling Clean Development Mechanism (CDM) of the United Nations Framework Convention for Climate Change (UNFCCC).

6.4 Mitigation and Enhancement Measures:

The project proponents have developed an encompassing environmental and social management plan which indicates the time line and responsible entities for the different actions to be taking for avoiding or at least reducing adverse impacts.

The following tables summarize the different impacts at all phases of the project and the prescribed mitigation measures:

Table 1: Impacts and Mitigation Measures during the construction phase:

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
Labours' Temporary Accommodation	Soil	Removal of the surface layer of the land and contamination and change of soil characteristics.	Temporary ditches, sediment fences will be installed as necessary to control erosion and sediment transport due to site preparation activities.	Minor	Minor
	Groundwater	Contamination from sanitation facilities	Subsurface pipes should be adequately maintained so that leakage into surrounding natural ground is kept at a minimum. Frequent and regular discharge of wastewater storage tanks/trenches.	Minor	Insignificant
Accommodating Experienced Staff	Economic Activities	Income to local community	-	Positive	Positive
Construction of Access Roads	Air	Reduction of air quality due to dust and particulate generations	Dust suppression should be undertaken where necessary.	Moderate	Minor
	Soil	Degradation of soil quality	Where possible, excavated material shall be reused during the construction works onsite	Insignificant	Insignificant

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
			as appropriate.		
	Terrestrial Ecology and Biodiversity	Loss of terrestrial habitat and flora	Vehicles and equipment should be well maintained to minimize unnecessary emissions and leaks. Vehicle tracks and roads should be used to decrease habitat destruction.	**Minor**	**Insignificant**
Site Clearing and Grading	Air	Reduction of air quality due to dust and particulate generations	Dust suppression should be undertaken where necessary. All vehicles carrying demolition waste should be covered to prevent spread of dust, demolition material, etc.	**Moderate**	**Minor**
		Reduction of air quality due to burning of cleared vegetation	Limit burning processes as much as possible Burning shall be in pits and limited to cleared vegetation not plastics and wasts that can cause harmful emmisions	**Minor**	**Minor**
	Global Climate	Temporary increase in CO2 concentrations due to burning of cleared vegetation	All energy consuming and CO2-generating activities should be done as efficiently as possible to minimise CO2 emissions	**Minor**	**Minor**

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
	Soil	Degradation of soil quality	Limit vehicle movements to essential construction areas, thereby limiting unnecessary soil compaction. Use hard cover areas for vehicle movements where possible.	**Insginificant**	**Insginificant**
	Terrestrial Ecology and Biodiversity	Loss of habitat and flora	No mitigation measures.	**Minor**	**Minor**
Excavations and Foundations	Air	Reduction of air quality due to dust and particulate generations	Dust suppression should be undertaken where necessary.	**Moderate**	**Minor**
	Soil	Degradation of soil quality	Where possible, excavated material shall be reused during the construction works onsite as appropriate.	**Insignificant**	**Insignificant**
Material and Equipment Transport / Use of Vehicles	Air	Reduction of air quality due to dust and particulate generations	Dust suppression should be undertaken where necessary.	**Minor**	**Insignificant**
		Reduction of air quality due to exhaust gas emissions	Minimise unnecessary journeys and adopt a policy of switching off machinery and equipment when not in use.	**Minor**	**Insignificant**

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
	Population	Nuisance due to increased ambient noise levels	Minimise night time vehicle movement. Fitting vehicles with effective exhaust silencers, where available. Vehicle speed restrictions should be applied.	**Minor**	**Minor**
	Traffic	Temporary increase in traffic	Avoid vehicle movements during rush hours. Adopt a traffic plan and ensure adequate planning of activities to ensure and avoid unnecessary transportation trips	**Minor**	**Minor**
Use of Site Machinery and Equipment	Air	Reduction of air quality due to exhaust gas emissions	Use low sulphur content fuel for machinery/equipment, modify machinery, and switch off machinery/equipment when not in use. Air quality impact from combustion sources during construction phase should be minimized through routine inspection and maintenance of combustion emissions sources such as generators, diesel engines…etc. maintenance will ensure that equipment is operating efficiently and not	**Minor**	**Minor**

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
			producing excessive emissions.		
	Climate	Temporary increase in CO2 concentrations due to exhaust emissions from diesel engines	All energy consuming and CO2-generating activities should be done as efficiently as possible to minimise CO2 emissions Consider a choice of machinery, equipment, vehicles and materials that takes into account CO2 emissions as part of the purchasing procedure.	**Minor**	**Minor**
	Population	Nuisance due to increased ambient noise levels	Regular inspection and maintenance of construction equipment should be made to maintain smooth running of equipment. Machinery and generators with 'quiet', 'muffled' or 'silenced' running should be used where available. Restricting working hours for particularly loud or intrusive activities such as piling.	**Minor**	**Minor**
Construction of Plant	Air	Reduction of air quality due to dust and particulate generations	Dust suppression should be undertaken where necessary.	**Minor**	**Minor**

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
Construction of Ammonia Pipeline	Air	Reduction of air quality due to dust and particulate generations	Dust suppression should be undertaken where necessary.	Moderate	Minor
	Soil	Soil degradation and change of soil composition	Where possible, excavated material shall be reused during the construction works onsite as appropriate.	Minor	Minor
	Terrestrial Ecology and Biodiversity	Loss of flora parallel and in close proximity to the road	Vehicle tracks and roads should be used to decrease habitat destruction. Minimizing areas of excavation and work as possible Proper materials and product storage and handling practices should be followed to reduce uncontrolled releases.	Minor	Minor
Subcontracting; Purchasing /Renting tools; and Services	Economic Activities	Income to local community	-	Positive	Positive
Staffing	Economic Activities	Employment and income	-	Positive	Positive

Table 2: Impacts and Mitigation Measures during Operational Phase

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
Accommodating Operation Personnel	Economic Activities	Income for local economy	-	Positive	Positive
Plant Equipment Testing and Start-up	Air	Reduction of air quality due to particulate generation	Installation of wet scrubbers Regular spraying of off-road tracks Cover stockpiling locations Transport material in closed/covered trucks	Moderate	Minor
		Reduction of air quality due to gaseous emissions	Keep plant's testing procedures that may produce air emissions to a minimum. Use low sulphur content fuel for machinery/equipment, modify machinery, and switch off machinery/equipment when not in use. Use scrubbers to reduce SOx and NOx concentrations.	Moderate	Minor

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
	Global Climate	Climate change due to increased CO_2 levels.	Consider a choice of machinery, equipment, vehicles and materials that takes into account CO2 emissions as part of the purchasing procedure. Consider purchasing carbon credits can off-set carbon generation (requires CO2 accounting project).	Major	Moderate
	Terrestrial Ecology and Biodiversity	Harmful emissions causing their disturbance	Apply measures for mitigating the reduction of air quality.	Minor	Minor
	Population	Nuisance due to increased ambient noise levels and odour	Regular inspection and maintenance of construction vehicles and Equipment should be made to maintain smooth running of vehicles. Machinery and generators with 'quiet', 'muffled' or 'silenced' running should be used where available. Restricting working hours. Testing of plant process likely to generation excessive noise should be kept to a minimum	Moderate	Minor
Operation of Plant and	Air	Reduction of air quality due particulate generations	Installation of wet scrubbers;	Moderate	Minor

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
	Soil	Soil degradation due to release of contaminants	Store and manage potentially contaminating materials according to best environmental practice.	Minor	Minor
	Groundwater	Reduction of quality due to possible leaks	Ensure double lining of evaporation pond intact, and not damaged during routine removal of solids Subsurface pipes should be adequately maintained so that leakage into surrounding natural ground is kept at a minimum. Store and manage potentially contaminating materials according to best environmental practice. Piling and foundations should be constructed so that they do not create a vertical pathway into deep strata that may be used for groundwater abstraction. Continuous monitoring of the groundwater quality. Minimizing usage of groundwater as possible	Moderate	Minor
	Terrestrial Ecology and Biodiversity	Harmful emissions and noise causing their disturbance	Apply measures for mitigating the reduction of air quality (descrived above) and for mitigating the increased noise levels (refer to population section).	Minor	Minor

Aspect	VR	Impact	Mitigation	Significance before mitigation	Significance after mitigation
	Economic Activities	Employment opportunities and revenue	-	Positive	Positive
	Population	Nuisance due to increased ambient noise levels and odour	Use baffles and acoustic insulation where appropriate. Fitting vehicles with effective exhaust silencers, where available. Restrict working hours for particularly loud or intrusive activities. Ongoing good maintenance, operation, and housekeeping should be applied to minimise odour emissions.	Moderate	Minor
Product and Material Transport/ Use of Trucks and Vehicles	Air	Reduction of air quality due to gas emissions	Minimise unnecessary journeys and adopt a policy of switching off machinery and equipment when not in use. Vehicle movements should be kept to a minimum, and hard cover areas should be used where possible. Regular inspection and maintenance of site vehicles and equipment should be made Consider a choice of machinery, equipment, vehicles and materials that are fuel-efficient as part of the purchasing procedure. Vehicles and equipment should be well maintained to minimize unnecessary emissions and leaks.	Moderate	Minor
	Soil	Degradation due to incidental release of contaminants	Store and manage potentially contaminating materials according to best environmental practices. Adopt good handling and transportation practices to avoid loss of material and soil contamination	Minor	Minor
	Terrestrial Ecology and Biodiversity	Harmful emissions	Minimise unnecessary journeys. Regular inspection and maintenance of vehicles should be made to maintain smooth running. Vehicle tracks and roads should be used to decrease habitat destruction.	Minor	Minor
	Population	Nuisance due to increased ambient noise levels	Minimise night time vehicle movement. Fitting vehicles with effective exhaust silencers, where available.	Moderate	Minor

Table 3: Impacts and Mitigation Measures for Non-Routine Events

Aspect	VR	Impact	Mitigation	Significance Before Mitigation	Significance After mitigation
Spills and Leaks	Air	Degrading air quality due to VOCs	Regular inspection and maintenance for all units including pipelines to avoid the accidental release of emissions. Emergency shutdown (remote manual shutdown and isolation of unit/plant) Emergency warning alarms should be in place to address potential human health and safety issues All areas where environmental contaminants are stored should have adequate secondary containment to collect accidential spillage Around the storage tanks there there will be an impounding area for spillage to contain any spilled liquid Double lining of all ponds	**Moderate**	**Minor**
	Soil	Soil contamination		**Minor**	**Insignificant**
	Groundwater	Groundwater contamination		**Moderate**	**Insignificant**
	Terrestrial Ecology and Biodiversity	Harmful to inhabitants and affecting their safety		**Minor**	**Minor**
	Population	Offensive odours disturbing the population	An emergency notification system should be implemented to inform nearby industries and residential communities of an emergency Regular inspection and maintenance for all units including pipelines to avoid the accidental release of emissions.	**Moderate**	**Minor**

Aspect	VR	Impact	Mitigation	Significance Before Mitigation	Significance After mitigation
			Emergency shutdown (remote manual shutdown and isolation of unit/plant)		
	Traffic	Traffic delays and congestions due to clean up and accidents	A traffic plan should be appropriate to cover all transport arrangements.	**Moderate**	**Moderate**
Vehicle Collision / Accidents	Population	Human Injury or loss of life	Training drivers to drive safely Government emergency sevices should be aware of fast access routes defined by emergency response plans Availability of first aid kit and safety equipment. . Immediate clean up of spills. Full emergency response plans should be in place.	**Major**	**Moderate**
	Traffic	Traffic jamming	A traffic study should be prepared. Adopt a traffic plan, minimize rush-hour transportation.	**Moderate**	**Moderate**
Inappropriate Waste	Soil	Soil degradation due to release of contaminants	A comprehensive Waste Management Policy should be implemented which ensures the safe storage and timely treatment and/or removal of waste.	**Minor**	**Minor**

Aspect	VR	Impact	Mitigation	Significance Before Mitigation	Significance After mitigation
Disposal	Groundwater	Contamination due to seepage of contaminants	Wastes should be properly managed and disposed of Control all leaching with best practice.	**Moderate**	**Minor**
	Sea Water	Reduction of quality due to blow-down of litter and wastes		**Minor**	**Insignificant**
	Terrestrial Ecology and Biodiversity	Harmful to inhabitants and affecting their safety		**Insignificant**	**Insignificant**
	Marine Ecology and Biodiversity	Reduced O_2 content and exposure to harmful materials		**Minor**	**Insignificant**
	Population	Dissatisfaction to the community		**Moderate**	**Minor**
Fire	Air	Reduction of air quality	Emergency shutdown (remote manual shutdown and isolation of unit/plant)	**Moderate**	**Minor**

Aspect	VR	Impact	Mitigation	Significance Before Mitigation	Significance After mitigation
	Terrestrial Ecology and Biodiversity	Toxicity and disturbance	Emergency warning alarms should be in place to address potential human health and safety issues	**Moderate**	**Moderate**
	Population	Panic and disturbance and possible injuries	An emergency notification system should be implemented to inform nearby industries and residential communities of an emergency Full emergency response plans should be in place. Government emergency sevices should be aware of fast access routes defined by emergency response plans Fire services may require specific information on the plant so that the most effective fire fighting methods can be determined. A site health and safety plan should be developed (including emergency procedures) and all employees and subcontractors should have induction training. Appropriate training should be given for particular tasks (where necessary), and subcontractors should prove competency. Adequate personal protective equipment should be used, based upon risk assessments for particular tasks or handling of hazardous materials	**Major**	**Moderate**
Explosion	Air	Reduction of air	Emergency warning alarms should be in place to address potential	**Moderate**	**Minor**

Aspect	VR	Impact	Mitigation	Significance Before Mitigation	Significance After mitigation
		quality	human health and safety issues		
	Terrestrial Ecology and Biodiversity	Toxicity and disturbance	An emergency notification system should be implemented to inform nearby industries and residential communities of an emergency Full emergency response plans should be in place.	Moderate	Minor
	Population	Panic and disturbance and possible losses of lives	Government emergency sevices should be aware of fast access routes defined by emergency response plans Fire services may require specific information on the plant so that the most effective fire fighting methods can be determined. A site health and safety plan should be developed (including emergency procedures) and all employees and subcontractors should have induction training. Appropriate training should be given for particular tasks (where necessary), and subcontractors should prove competency. Adequate personal protective equipment should be used, based upon risk assessments for particular tasks or handling of hazardous materials	Major	Minor

The landscaping of the project site will also ensure that trees which may have been cut down during site preparation are replaced by new trees.

Environmental Hazard Management

As part of the ESIA study, a quantitative risk assessment has been carried out to identify the major hazard which may be associated with the project were identified. These include:

i. The hazardous materials present on the facilities that are identified with the potential to cause offsite impact from fires, explosions or toxic exposure based on review of their chemical properties

ii. A spontaneous failure involves the loss of containment either by leak or rupture from process equipment without any external influences or factors.

iii. An external event which may lead to impacts on the facilities thus causing releases. These hazards may be outside the control of the operating personnel but could still pose a threat to the facility.

The quantitative risk assessment applied relied on the UK Health Safety Executive Methodologies and risk criteria. These methodologies have been applied since Egypt has not have any regulations regarding such risk assessment for this specific industry.

The QRA was conducted for the Ammonium Nitrate Plant Project which includes the unloading and storage equipment for one of the raw materials, Ammonia, at the existing Marine Terminal, the underground Ammonia pipeline from the Marine Terminal to the Ammonium Nitrate Plant, the Ammonium Nitrate Plant and associated Ammonium Nitrate storage. The hazards associated with the Project were identified via a desktop Hazard Identification exercise. The total leak frequency at the marine terminal is 8.49×10^{-3} per year; corresponding to a leak once every 118 years. For the AN Plant, the total leak frequency is approximately 4.24×10^{-1} per year which corresponds to a leak once every 2.4 years. This is quite a high leak frequency which is contributed by the large number of equipment in the Nitric Acid and Ammonium Nitrate units.

Individual risks for the Project are contributed due to release of hazardous materials onsite, namely toxic gas releases from ammonia, flammable gases/ liquids releases from utilities including fuel gas, hydrogen, etc. The major risk contributors at the Ammonium Nitrate plant are the liquid ammonia releases from the liquid ammonia filter/ evaporators.

It was concluded that the individual risks associated with ammonia unloading and storage equipment at the existing Marine Terminal and the underground Ammonia pipeline meets with the adopted Risk Tolerability Criteria.

A logistics study was conducted as part of the ESIA and there is evidence that the current road network is sufficient to handle the trucking operation required for the project. The study is attached. Emergency Plan and transportation plan developed as part of the ESIA and approved by the EEAA.

7. Monitoring Program

This section shall summarise the surveillance and monitoring activities proposed in the Environmental and Social Management Plan prepared for the project. It shall identify the roles and responsibilities of stakeholders in the implementation as well as the estimated cost of the activities.

An environmental and social monitoring program will be implemented with respect to all aspects of the project at all phases of the project including post-closure.

Monitoring and measurement of key environmental performance indicators shall be undertaken and documented. Use of the monitoring plan (Section 9 of this EIA report) will be mandatory during construction and operation; however the frequency of measurement depends on the aspect and the plan of work. Monitoring will cover the following aspects:

- Air (dust, emissions, odour);
- Noise (in/out workplace);
- Water (wastewater, drinking water, and groundwater); and
- Waste (solid and hazardous waste).

All the results shall be recorded and tacked into the performance of the project during construction and operation. The monitoring plan shall be regularly reviewed (schedules, parameters, etc.).

Any corrective or preventative actions taken to eliminate the causes of the actual or potential non-conformances shall be appropriate to the magnitude of the problems and commensurate with the environmental impacts encountered. Moreover, documentary evidence of any changes to operating procedures shall be made.

An auditing programme will be applied involving an annual audit which will cover the various aspects of the Environment Monitoring and Management Plan that is detailed in the ESIA report. The primary purposes of the audit programme will be to verify continued conformance with respect to all applicable laws and regulations and to EHC internal policy and procedures; to confirm the continued existence and efficacy of management systems to ensure compliance and performance; and to assist in the identification of actual and/or potential risks.

In terms of institutional responsibilities; ultimately, the project company is bound to responsibilities for ensuring that they adhere to all conditions contained in the environmental approvals. Contractors as project implementing agents on are bound to conditions as would be stipulated in the contractual agreements and are therefore responsible for fulfilling relevant parts of these agreements.

Qualified environmental personnel will be employed by EHC during the construction phase, in order to address the Environmental Aspects of the Construction Phase. Once operation of the plant commences, the responsibilities of the environmental personnel will be transferred to the Safety Health and Environment Quality (SHEQ) Department within the project company. The SHEQ Department will form part of the management team of the EHC. The personnel employed during the construction phase must attend to relevant project meetings, conduct inspections to assess compliance with the management plans and emergency response plans and be responsible for providing feedback on potential environmental problems associated with

the development of the project. In addition, the personnel is responsible for liaison with relevant authorities; liaison with contractors regarding environmental management; and undertake routine monitoring.

In terms of costs for environmental and social management activities; some of these costs have already been integrated in the design of the plant operation in the application of environmental and socially sustainable alternatives and safety standards. As part of the project construction budget, EHC will spend around US$ 500,000 on the environmental monitoring plan during construction to monitor the environmental performance and ensure compliance with the laws and the ESIA. In addition, spending on social projects for the community and surrounding areas is forecasted to be around US$ 200,000 per annum.

8. Public Consultations and Public Disclosure

Civil society was part of the approval process for the ESIA and there was acceptance for the development of the project.

First Public Consultation:

According to the ESIA report, a first public consultation was conducted on 8 September 2009 at Suez governorate in the presence of the Governor of Suez governorate. The consultation was attended by a total of 46 attendees/representatives from different agencies, authorities, and companies including, but not limited to, Suez Governorate, Red Sea Ports Authority, EEAA, EHC, and Worley Parsons. The ESIA report noted that the consultation concluded with a conceptual preliminary approval given by the Environment Committee at Suez governorate for this proposed project as announced by Suez Governor.

Second Public Consultation:

The second public consultation was conducted on 28 February 2010 also at Suez governorate in the presence of the Governor of Suez governorate. The consultation was attended by a total of 51 attendees/representatives from different agencies, authorities, and companies including, but not limited to, Suez Governorate, Ministry of Tourism, Suez Canal University, Red Sea Ports Authority, EEAA, EHC, WP. The consultation featured discussions on the methodologies and data of the ESIA study. The following issues were highlighted at the end of the discussion sessions, which were of importance to the consultation participants:

- Impacts of transportation on roads and traffic;
- Ensure the security of the ammonia pipelines;
- Impacts on touristic areas/resorts;
- Social contribution; and
- Labour force.

At this forum, the members of the Environment Committee of Suez Governorate agreed upon approving the proposed project and the Governor announced the approval accordingly on the conditions that concerns raised during the open discussion are addressed.

9. Complementary Initiatives

EHC will focus on hiring skilled local people for the plant operation and services. Training will be an ongoing process in EHC's training center to develop the people employed by the company in order for them to progress into higher positions within the company. The same model has been employed successfully in Carbon Holdings' current project, EBIC. A detailed employment and training plan will be developed within the Owner Project Execution Plan which includes all Environmental and safety training for the project.

Financial Provisions for Accidents, Remediation, Compensation:

As part of the project development and construction, EHC has developed a comprehensive insurance plan and will undertake policies to cover construction all risk insurance and third party liability insurance in case an accidents do occur. These insurances will continue post operation to cover any potential accidents that could affect the plant or the nearby community.

10. Conclusion

In conclusion an Environmental and Social Impact assessment has been carried out which satisfies the applicable national legislations and relevant requirements applicable to the Environmental and Social Safegaurds Policies and Procedures of the African Development Bank. This assessment has also enabled the recommendation of mitigations action which are aimed to mitigate the adverse impacts of the project..

It is therefore recommended that the loan conditions and covenants for this project make explicit requirements for strict implementation and compliance to the recommended mitigation actions as contained in the full Environmental and Social Impact Assessment (ESIA) report and Environmental and Social Management Plan (ESMP), Environmental Monitoring Plan (EMP), Traffic Logistics Plan, Emergency Response Plans as well as other recommendations by the national government authorities. Certified copies of these plans and all their attendant components should be provided to the African Development Bank in forms acceptable to it. In addition, the borrower should commit to annual reports to AfDB containing details of the implementation ESMP and findings of the EMP.

11. References and Contacts

References

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