PROJECT: Gabon Fertilizer Project (GFC)

COUNTRY: Gabon

SUMMARY OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

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Country: Gabon  
Department: OPSM

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<td>AAP</td>
<td>Africa Adaptation Programme</td>
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<tr>
<td>AfDB</td>
<td>African Development Bank’s</td>
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<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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<td>BAT</td>
<td>Best Available Technology</td>
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<td>CAADP</td>
<td>Comprehensive Africa Agriculture Development Programme</td>
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<tr>
<td>CO(^2)</td>
<td>Carbon Dioxide</td>
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<td>DGE</td>
<td>Gabonese Direction Générale de l’Environnement</td>
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<td>DGEF</td>
<td>Directorate General of Water Resources and Forestry</td>
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<td>DGIM</td>
<td>Directorate General of Mining and Industry</td>
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<td>DGPA</td>
<td>Directorate General of Fishing and Aquaculture</td>
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<td>EHS</td>
<td>Environment Health and Safety</td>
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<td>EFMA</td>
<td>European Fertiliser Manufacturer</td>
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<td>EPC</td>
<td>Engineering, Procurement and Construction</td>
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<td>ESAP</td>
<td>Environmental and Social Action Plan</td>
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<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
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<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<td>FCFA</td>
<td>Franc Communauté Financière Africaine</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GFC</td>
<td>Gabon Fertiliser Company</td>
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<td>GH</td>
<td>greenhouse gas</td>
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<td>Ha</td>
<td>hectare</td>
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<td>Acronym</td>
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<td>HAZID</td>
<td>Hazard Identification</td>
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<td>HAZOP</td>
<td>Hazard Operability</td>
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<td>HIV</td>
<td>Human immunodeficiency virus</td>
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<td>HSSE</td>
<td>Health, Safety, Security and Environment</td>
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<td>H₂O</td>
<td>Water</td>
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<td>IBA</td>
<td>Important Bird Areas</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
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<td>JV</td>
<td>Joint Venture</td>
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<td>km</td>
<td>Kilometre</td>
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<td>LTI</td>
<td>lost time incident</td>
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<td>m</td>
<td>metre</td>
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<td>mm</td>
<td>millimetre</td>
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<tr>
<td>MTPA</td>
<td>metric tons per annum</td>
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<td>MTPD</td>
<td>metric tons per day</td>
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<td>NCODI</td>
<td>National Centre for Oceanographic Data and Information</td>
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<td>NGO</td>
<td>Non Governmental Organisation</td>
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<td>NH₃</td>
<td>Ammonia</td>
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<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
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<td>Occupational Health &amp; Safety Advisory Services</td>
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<td>PAP</td>
<td>Project Affected People</td>
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<td>QRA</td>
<td>Quantitative Risk Assessment</td>
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<td>Acronym</td>
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<td>UNDP</td>
<td>United Nations Development Fund</td>
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<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<td>USD</td>
<td>United State Dollar</td>
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<td>RAP</td>
<td>Resettlement Action Plan</td>
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<td>RoG</td>
<td>Republic of Gabon</td>
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<td>SEP</td>
<td>Stakeholder Engagement Plan</td>
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<td>SEZ</td>
<td>Special Economic Zone</td>
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<td>SME</td>
<td>Small, Medium Enterprise</td>
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<td>TB</td>
<td>Tuberculosis</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>ZnO</td>
<td>Zinc Oxide</td>
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<td>ZnS</td>
<td>Zinc Sulphide</td>
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1 INTRODUCTION

This document is a summary of four Environmental and Social Impact Assessment (ESIA) reports, plus an ESIA Addendum report, for the proposed Gabon Fertilizer Company (GFC)’s proposed Fertilizer Plant. The four reports address the four major phases of the project, and were prepared and finalized by URS Scott Wilson on behalf of GFC in 2011 and 2012.

This ESIA summary is prepared in accordance with the African Development Bank’s (AfDB) 2001 Environmental & Social Impacts Assessment Procedures (ESAP). In order to fulfill the requirements of the Bank’s Information Disclosure and Public Consultation Policy, this ESIA summary will be posted on the Bank’s website at least 60 days prior to presentation of the investment proposal for Board approval.

Specifically, this summary provides information on project activities; anticipated impact of the project activities; measures to be put in place to mitigate identified adverse impacts; and institutional arrangement to facilitate implementation and monitoring of the Environmental and Social Management Plan (ESMP).

Attached to this document as Annex 1, is a summary of the Resettlement Action Plan (RAP) Strategy documents prepared to date for the Project.
2 PROJECT DESCRIPTION AND JUSTIFICATION

Gabon Fertiliser Company (GFC), a Joint Venture (JV) led by OLAM International in partnership with Tata Chemicals Limited and the Government of Gabon, plans to develop an Ammonia-Urea Fertiliser Plant on an undeveloped site in Parcel F of the designated Free Trade Zone at Mandji Island (Figures 1 and 2). The Free Trade Zone is 16 km away from the city of Port Gentil, Gabon. Port Gentil is the Provincial Capital of Ogooué-Maritime Province on Gabon’s western coast.

Figure 1: Project Location
2.1 Project Description

The proposed Project is an integrated ammonia-urea fertiliser complex. The complex will include the processing plant, storage, and export facilities. The Project will have a nominal production capacity of 1.3 million metric tonnes per annum (MTPA) of urea (based on 330 days per year of operation) and a maximum production capacity of 1.4 million MTPA urea (based on 365 days per year). The produced fertiliser is to be loaded directly onto awaiting ships and transported to various locations within and outside Africa.

The proposed Fertiliser Plant will comprise the following facilities:

- Urea Plant capable of producing 3,850 metric tons per day (MTPD) Granular Urea (1.3 million MTPA normal capacity, with possibility of producing up to 1.4 million MTPA);
- Ammonia Plant producing 2,200 MTPD (all ammonia will be converted to urea);
- Off-site and on-site utility facilities to meet the plant’s requirements for electrical power, steam, water, air, etc.;
- Jetty for the export of granular urea; and
Abstraction and pumping of about 72 million litres per day (mld)\(^1\) of water from the Ogooué River near Loanda and piping it to the site via an approximately 57 km long pipeline.

Figures 3 and 4 provide flow diagrams for ammonia and urea production, respectively.

**Figure 3: Simplified Fertiliser Plant Process Flow Diagram – Ammonia Production**

![Block Diagram for Ammonia Production](image)

**Key**
- ZnO = Zinc Oxide
- ZnS = Zinc Sulphide
- NH\(_3\) = Ammonia
- H\(_2\)O = Water
- CO\(_2\) = Carbon Dioxide

\(^1\) Not all water extracted from a source ends up at the destination to which it is intended to be delivered; potential losses can include evaporation from storage reservoirs. As such the Phase 4 ESIA assessed an abstraction quantity of 80 MLD, which has not changed.
The Project will be developed in four phases, described below.

- **Phase 1**: Site clearance and temporary access road construction including: (i) Clearing 182 ha of vegetation; (ii) Storage of cleared vegetation on selected plots prior to reuse/disposal; (iii) Removing 0.5m (average) of topsoil from selected plots; (iii)
Storage and drying of topsoil prior to reuse/disposal; and (iv) Construction of a temporary access road of 9 km length, consisting of a sand embankment overlaid with two 150 mm layers of laterite. The size of the workforce needed for this Phase is estimated to be 100 workers in a mix of skilled, semi-skilled and unskilled workers.

As of the date of publication of this ESIA summary, the Phase 1 ESIA report has been approved by the Gabonese Direction Générale de l'Environnement (DGE) and vegetation clearance activities have already occurred.

- **Phase 2**: Dredging and backfilling (reclamation), including: (i) dredging, lifting, transportation and placement of 4 million m$^3$ sand on the site to create a platform to elevate the current site to 3.5 m above sea level; (ii) construction of a 2 m bund/retaining wall to protect the platform from erosion by coastal processes. The estimated workforce is about 200 people in a mix of skilled, semi-skilled and unskilled workers.

As of the date of publication of this ESIA summary, the Phase 2 ESIA has been approved by DGE. Permits have been granted for dredging sand to a depth of 3 m over a wide area and fresh applications have been made for dredging to 15m in two specific locations. Dredging activities are expected to begin once the dredging management plan has been approved by lenders.

- **Phase 3**: Plant design, construction and commissioning of the following: (i) Urea plant; (ii) Ammonia plant; (iii) Offsite utility facilities to meet plant needs for electricity, steam, water, and air, including construction of the 6 km gas pipeline from the existing Parenco gas line to the plant; and (iv) 500 m long and 15 m wide jetty for the export of granular urea (expected 3 to 5 ships per month). Up to 3,000,000 m$^3$/day of gaseous natural gas will be supplied to the plant by a local gas seller. Phase 3 will require approximately 3,050 construction workers, of which the majority will live in a housing camp that will be located near Parcel F.

The Phase 3 ESIA report has been approved by DGE. Phase 3 cannot start until Phase 2 is completed.

- **Phase 4**: Construction of water pipelines, which will include: (i) land acquisition and clearing, (ii) construction of pumping stations with dedicated power supply system; (iii) laying pipelines for water supply for plant as well as for the city of Port Gentil (option under consideration). The water will be abstracted from the Ogooué River near the village of Loanda via two intake wells and pumped to the site via a 57 km pipeline (see Figure 5). Phase 4 activities will involve between 200 and 300 workers as a mix of skilled and unskilled.

The Phase 4 ESIA report is yet to be approved by DGE. GFC has changed the location of water abstraction point from Ngola (the abstraction point designated in the Phase 4 ESIA) to Loanda as the salinity level and the quantity available at Loanda was found to be acceptable. This reduces the length of the proposed pipeline by some 6 km from the original layout.
2.2 Project Justification

Urea is the most popular nitrogen based fertiliser worldwide and is not considered hazardous or toxic under normal conditions of use. Gabon is seen to offer the best prospects for the establishment of an ammonia-urea fertiliser plant because the country has competitive cost natural gas reserves (natural gas provides both the energy and raw material for urea production), offers a strategic port-based location, and has a stable government with progressive policies.

Due to a historical reliance on oil and declining production and oil prices, the Gabonese government is diversifying Gabon’s economy away from the oil sector and is promoting development of other industries. As part of this planned diversification, the Government has identified a 1,500 ha area of land north of Port Gentil, the ‘Free Trade Zone of the Mandji Island’, for industrial, commercial and service investments. Legislation establishing the Free Zone was enacted in October 2002 after 10 years of deliberation. GFC’s Fertiliser Plant will be the first development within the Free Zone.

The Project is a result of the RoG determination to reduce gas flaring. The project will allow the country to monetize its largely untapped gas reserves and use these reserves as one of the drivers to diversify the economy away from oil revenues, and develop a local high-value transformation industry to produce fertilizers. The project is in line with the country’s long-term development vision aimed at making Gabon an emerging country in 2035, through the development of local processing and strengthening of infrastructure to support non-oil growth poles. The project will also contribute to increase the competitiveness of local and regional agriculture by enabling sale of fertilizers in the local and regional markets at competitive prices. GFC will have a strong demonstration effect to encourage further monetization of existing gas reserves, which could also benefit the power industry, in line with RoG’s fiscal and regulatory incentives. GFC will sustain the RoG’s strategy to stimulate local industry through the creation of SEZs that will in turn support the development of the local private sector, particularly SMEs, through outsourced activities. The project will also promote technical and know-how transfer to local workforce through extensive training programs that will indirectly benefit all industrial sectors. Finally the project is also in line with both the Comprehensive Africa Agriculture Development Programme (CAADP) to increase agricultural output and ensure food security and African Union Abuja Declaration of 2006, calling for the promotion of local/regional fertilizer production in Africa.
Figure 5: Water Pipeline Route
3. POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK

The ESIA analyses that have been performed for this project have been carried out following the applicable Gabonese environmental laws, and the international ESIA requirements of the African Development Bank (AfDB) and the International Finance Corporation (IFC).

3.1 National Environmental Legislative and Institutional Framework

At the national level, Gabon’s Environmental Code (Law No. 16/93 dated 26th August 1993) is the key piece of legislation regarding the protection and improvement of the environment that provided the framework for the ESIA reports. The purpose of Gabon’s ESIA process is to: (i) aid the developer in designing a project that respects the environment; (ii) help the public to better articulate their concerns; and (iii) assist policy makers to take sustainable development into account in their decision making.

The Directorate General of Environment and Nature Protection (DGE) has responsibility for validation of the ESIA, along with providing oversight of the ESIA process and reviewing and approval of the project ESMP. The DGE ensures the ESMP follows Gabonese laws regarding, discharges to water, soils, air; management of hazardous substances and wastes, protection of flora and fauna, and management of protected environmental areas.

Government departments that are key in this project include: (i) Directorate General of Environment and Nature Protection (DGEPN), which validates the global ESIA process in country, including ESMP implementation; (ii) Directorate General of Water Resources and Forestry (DGEF), which provides relevant information on natural resources potentially impacted by the project and validates the adequacy of the project’s resource protection measures supporting DGEPN; (iii) Department of Civil and Road Works, which approves large road and civil works; (iv) Directorate General of Fishing and Aquaculture (DGPA), which provides information on existing and planned fishery activities; and the (v) Directorate General of Mining and Industry (DGIM), which approves planned works for dredging activities.

In 2010, the President of Gabon created a National Climate Council, placed directly under his supervision, in order to develop an effective national plan to combat climate change. Gabon is also participating in the UNDP Africa Adaptation Programme (AAP), which supports the design and implementation of climate adaptation programs.

3.2 International Framework

Gabon is a signatory to many international conventions on the environment including those on protection of the marine environment, biodiversity, trade of endangered species, climate change, and several conventions of the International Labour Organization. All these conventions were taken into account in the development of the ESIA reports.

According to AfDB guidelines, this project is considered a Category 1. The ESIA reports were conducted following the Category 1 project AfDB guidelines and policies, and followed IFC’s Performance Criteria for Environmental and Social Sustainability, IFC’s Environmental, Health, and Industrial Safety guidelines, and IFC Section guidelines for fertiliser plants and ports and harbours.
4. DESCRIPTION OF THE PROJECT ENVIRONMENT

The project will occupy approximately 120 ha in the new economic “Free Zone” on Mandji Island. The project is located within 16 km of the urban area of Port Gentil, the capital of the Department of Bendje in Ogooué-Maritime Province, and Gabon’s second largest city. The land in the vicinity of the fertiliser plant is currently undeveloped and consists of low lying greenfield areas with marshland, small lakes, niaouli forest, and mangrove. The 57 km pipeline is anticipated to include a right-of-way to either side of the pipeline of approximately 15 m. The majority of the pipeline runs through grasslands, but near the mouth of the pipeline at Loanda the area is heavily forested.

4.1 Human Environment

Gabon is one of the least densely inhabited countries in Africa, with a population that is estimated at 1,545,255. Port Gentil has approximately 10% of the country’s population, with 150,000 inhabitants. In the vicinity of the project, the majority of the population resides in the urban area of Port Gentil. Data for the Bendje Department shows that 94% of the population lives within Port Gentil and only 6% in rural areas.

Just over 40% of the population is under the age of 15, presenting a potential challenge for job creation over the coming years. Gabon has a birth rate of 39 per 1,000 and a death rate of 15 per 1,000, with an average household size of five people in both rural and urban areas. Life expectancy at birth for women and men is 64 and 60 years respectively and is one of the highest in Central Africa. The fertility rate - births per woman - is 3.2 per 1,000.

Gabon does not appear to have significant problems with racial tensions between disparate ethnic groups. Most of the population is of Bantu origin. Although Bantu represent the majority, there are approximately 40 different ethnic groups present in the country; however, the populations are mixed geographically and inter-marriages are common. The pygmy populations in the country are a disenfranchised group in comparison to the rest of the population. In the area around Port Gentil, there does not appear to be any specific disenfranchised groups. Sensitive subpopulations appear to be those due to gender (women), age (children/elderly), existing health conditions, or poverty.

4.1.1 Health

The baseline health profile for Gabon indicates that the general health of the population, as measured by mortality data, is better than in the rest of the World Health Organization’s (WHO’s) Africa Region. Mortality rates for adults, children under five, and infants in Gabon are lower than those for the rest of the region. Specific health incidence and prevalence rates for Port Gentil and the Department of Bendje in Ogooué-Maritime Province are not available. It is assumed that the country profile information is generally relevant to incidence/prevalence disease rates in the Port Gentil area. As shown in Figure 6, nearly half of Gabonese deaths are related to communicable diseases, namely malaria, tuberculosis (TB), HIV/AIDS and diarrhoea. HIV/AIDS, followed by malaria, are the highest causes of death. The project is not expected to have any negative impacts on heart/cerebrovascular-related incidence rates; however, communicable disease rates could be affected, and communicable disease impacts are discussed in Section 6.
Figure 6: Distribution of Causes of Death, All Ages (2002)

4.1.2 Cultural and Spiritual Heritage

The Nenga Bembé village is located adjacent to the site that will be developed for the fertiliser plant. There are approximately 20 residents in the village. The land in and around Parcel F contains areas of cultural significance, including ancestral lands, family burial grounds and ritual sites. Some archaeological artefacts of local importance have also been identified in the Free zone and Parcel F. In addition, fishing is seen as an important part of local life, culture, and identity.

4.1.3 Economic

Gabon is an upper middle income country and one of the richest countries in Africa with an average per capita GDP of around US$7,280 - four times the average for Sub-Saharan Africa. Economic development is derived predominantly from exploitation of its natural resources, particularly the oil and gas reserves, which account for more than 50% of GDP. However, this has not translated into equitable development or significant reductions in poverty and inequality. The majority of the recent population growth has been experienced in the main cities of Libreville and Port Gentil as a result of the employment opportunities and anticipated economic development. This has led to a large influx of workers to these areas, swelling the urban population and leading to a relative increase in unemployment.
Port Gentil is a leading seaport. The city has long been associated with the oil and gas industry. Other industries include construction, brewery, cement, chemicals, cigarettes, light electrical goods, textile printing and processing plants for fish, rice, palm oil and sugar.

The population living in the area of proposed pipeline route (including the villages of Nenga Bembé, Mbega, N'Tchengué, Mandorobé, and Loanda, as well as the affected areas of N'Tchengué-city and Bac Aviation near Port Gentil) is estimated to be approximately 3,000 residents. The majority of this population is concentrated in the few urban areas (N'Tchengué-city, Bac Aviation). The majority of residents surveyed are involved in some form of economic activity/employment. Unemployment is seen to be extremely low. The survey results indicated on average 88% of men are workers, with approximately 58% of women also employed. The majority of economic activity in the region is focused on either agriculture or fisheries. The majority of workers are self-employed and frequently work by themselves. A small number of public sector workers were present, namely: two teachers and nurses and civil servants of the Gabonese state.

Artisanal fishing is an important source of subsistence/income for the 300 fishermen within Cape Lopez and fishing is the main source of income for three of the households living adjacent to the main project site. It provides both an income for these households and a way of life as it is the only main form of income generation known to them.

Fishing is also a general source of income to many people in the area. There are three main types of fishing in Gabon: large-scale industrial fishing, semi-industrial fishing and artisanal fishing. The majority of fish harvested in Gabon is by industrial and semi-industrial fleets of purse seine, trawl, trap, pole and long-line vessels.

4.1.4 Infrastructures and Services

Infrastructure in the vicinity of Parcel F is almost non-existent and only includes unpaved roads that are in poor condition year round and become impassable during the rainy season.

The villages in the vicinity of the proposed pipeline also suffer from a shortage of infrastructure and equipment, particularly in regards to access to potable water, health care and education. The lack of educational facilities is consistent with the lack of children observed in the villages during the site inspection. The majority of populations living in the vicinity of the proposed pipeline do not have ready access to clean water, with local well or river water most commonly used. Electrical house lighting was available to 16 out of 23 houses. Electricity was typically supplied through the use of diesel generators. Two-thirds of the households in the study area cook with firewood, the remainder are able to access gas or electric systems. This demonstrates the overall reliance of the population upon the local forest for fuel.

Educational services in Gabon appear relatively good with an adult literacy rate of over 86%. In Gabon, children commence school at six years old. Of the residents interviewed for the social survey, all had attended some form of schooling to primary level although none had achieved a higher level of education above middle school; the majority having left school at 11 years old. There are a number of primary schools in Port Gentil but there are none on or
adjacent to the project site or the temporary access road. The relatively low level of academic achievement may be influenced by access to school – the resident children can only access school in Port Gentil via boat to St Diambou and then taxi.

Gabon’s medical infrastructure is considered one of the best in West Africa. According to WHO, from 2000 to 2009 there were 3 physicians per 10,000 people in Gabon, compared to the entirety of WHO’s African Region, of 2 per 10,000 people; and there are 13 hospital beds per 10,000 people in Gabon, compared to 9 per 10,000 people in the WHO African Region. Most of the health services are public, but there are some private institutions. In the vicinity of the plant site and along the proposed 57 kilometre water pipeline, several medical facilities have been identified. Among these are: (i) Sogora Hospital; (ii) Hopital N’Tchengu (Central Hospital); (iii) Mandji Clinic; (iv)Clinique du Littoral; and (V)Polyclinique St Pierre.

A comprehensive government health program was launched on August 21st 2007, The National Health Insurance and Social Welfare Fund (Caisse Nationale d’Assurance Maladie et de Garantie Sociale – CNAMGS). This program highlights the government’s commitment to health and covers the healthcare costs of the unemployed, the peasant farmers, the self-employed, and the poor.

4.2 Natural Environment

4.2.1 Physical

Climate and Air Quality: Gabon’s climate is equatorial, warm and humid. There are four seasons: (i) long dry season from mid-June to mid-September, characterised by lower temperatures, cloudy skies and rare or low rainfall. River levels drop, the sea breeze is steady and winds are southerly; (ii) Short rains from mid-September to mid-December, when there is heavy rainfall and temperatures are highest; (iii) Short dry season from mid-December to late February; and Long rains from March to mid-June, with thunderstorms and maximum rainfall in March-April.

The Ogooué delta is very wet, with annual precipitation ranging between 1,700 and 3,500 mm. Mean monthly temperatures range from 21°C to 28°C, with the lowest temperatures occurring during the June to September dry season. Relative humidity is around 80% throughout the year.

Wetlands represent the largest component of the global terrestrial biological carbon pool and play a key role in global carbon cycles. This includes tidal saline wetlands such as those found in and around the project area. Mangrove forests in particular provide a wide range of ecosystem services, including nutrient cycling, sediment trapping, protection from extreme storm events, habitat for numerous organisms, and wood. One of the most important of these services is carbon storage. While the estimated carbon stored in these ecosystems is vitally important in terms of climate change mitigation, these ecosystems are especially vulnerable to climate and land use change.
Based on the air quality monitoring around Parcel F, ammonia and sulphur dioxide were not detected in the air, nitrogen dioxide levels are very low (less than 3 μg/m³); and particulate (as PM10) concentration varies from 28 to 70 μg/m³.

**Topography, Geology and Soil:** The site is low lying and characterised by a cover of mangroves and shrubs. The geomorphology of Mandji Island is a result of two distinct features. The first is a spit that is orientated south-southeast to north/northeast and formed by coastal currents that has resulted in beaches and well-formed dunes facing onto the Atlantic coast. Deposited materials are generally well homogenised, composed principally of sands. The second characteristic is the delta of the River Ogooué, made up of fluvial sediments and opening out into the Baie du Cap Lopez. The beaches are narrow and sedimentation is characterised by alternating sands and mud that has resulted in weak compressible soils. Across Parcel F, the soil survey reported the presence of an organic layer at the surface extending down to a maximum depth of 0.6m with an average depth of 0.5m. This material was reported to be comprised predominately of fine beach sand with relic blackish organic fragments as well as shells. Beneath the organic layer, natural white beach sand was recorded. This was noted to be predominantly fine and characteristically medium dense near the surface, becoming very dense with depth.

**Hydrology:** The hydrology of Mandji Island is characterised by river systems, basins and lagoons that are subject to maritime and tidal influence (coastal processes). The Ogooué Delta is a prominent geomorphological feature of Mandji Island, and the Ogooué River system is the longest surface watercourse in Gabon. The Ozounga River channel lies to the east of the proposed development site and the Enogoué River channel to the west. The site itself is low lying and prone to flooding. The highest point is 1.3 m above sea level and a number of channels exist that drain towards the Baie du Cap Lopez (the Atlantic). Rainfall in the Ogooué Delta is generally between 1,700 and 3,500 mm per annum.

### 4.2.2 Biological

According to UNEP’s African Environmental Outlook 2, Gabon’s tropical environment supports a rich biodiversity which includes over 6,500 different plant species; with a forest covering around 21.8 million ha or around 85% of the total land area. Within the country there are an estimated 190 different mammal species including 3 endemic species; and 678 different bird species, including one endemic species and 14 species of conservation concern. Due to this rich biodiversity and highly sensitive and vulnerable status of some habitats and species within the country, consideration of ecology and nature conservation is considered to be a significant element of the ESIA.

In addition to the marine environment on the shoreline areas of the project site, three main terrestrial and fresh/brackish aquatic habitat types were defined within Parcel F:

- **Niaouli forest:** This habitat type was almost entirely dominated by the non-native *Melaleuca leucadendron*, which appears to have been planted to drain the wet grassland.
• **Mangrove swamp vegetation**: This habitat comprises ‘humid mangrove’ and ‘high and dense mangrove’.

• **Wet Grassland and Swamp**: This comprised a mix of various herbaceous vegetation dominated by Graminae (true grasses), with frequent Cyperaceae (sedges), Polygonaceae (knotweeds) and Nymphaeaceae (water lilies) e.g. floating swamp with *Nymphaea lotus* (White Lotus). Occasional shrubs were also noted.

The habitats within the proposed pipeline corridor were divided into three main types:

• **Forests of the Ngola and Loanda islands**: forest-type formations with a predominance of ligneous trees. Some riparian formations (mangroves and other wetlands) alternate with dry land habitats;

• **Coastal savannah with small forest groups from Mandorobé to Port Gentil**: sparsely populated area of mainly herbaceous Xyris and Jardinea savannah on a sandy substrate. Some alternating enclosed and open swamps are also found;

• **Peri-urban landscape from Port Gentil coast to the Free Zone**: Plant formations are fragmented by urban growth. Grassy savannah areas are found associated with scattered populations of niaouli or *Melaleuca leucadron* (*Myrtaceae*) on sandy soil. Close to the Free Zone, periodically flooded swamps, savannah and niaouli forests are observed.

There are seven Important Bird Areas (IBAs) identified in Gabon, covering a total of 23,875km$^2$. One of the IBA’s (GA006: Ogooué Delta and Mandji island) is 30,000 ha in size, and includes the study area. Although it is considered to be of importance by BirdLife International, it has no national conservation designation, and is currently unprotected and unmanaged for conservation. In fact, part of the area within the IBA has been designated as a Free Zone for industrial development.

The marine habitat within the area potentially affected by dredging contains no rocky areas, coral reefs, or seagrass meadows. The shallow sandbank habitat that is present is considered representative of similar habitat within the Baie du Cap Lopez and throughout Gabon’s coastal zone, and thus considered of low to moderate biodiversity value and sensitivity. The mudflat habitat found within the deeper sections of the project study area is also likely to be of moderate ecological interest within Gabon, given the limited extent of large river delta systems along Gabon’s coastal zone. There are no confirmed fish spawning, feeding or nursery areas within the study area, however, in the absence of robust data, it is prudent (for mitigation purposes) to assume that habitats with a moderate to high biodiversity value exist within the study area.

Four IUCN endangered species of marine turtle have been recorded in Gabon’s coastal waters. Since 2011 the government of Gabon has decreed that all sea turtle species must be integrally protected. The nesting season in Gabon for marine turtles is variable but generally takes place in the months September/ October to March, peaking in November/ December. Hatching occurs 2-3 months after the eggs are laid. It is likely that turtles will be present within the study area either side of this period.

In the absence of seasonal marine mammal population data for the marine habitat in the vicinity of the project, it has been assumed that key cetacean species of conservation concern, such as the Atlantic Humpback dolphin and Sei whale, are present.
Reliable or verifiable scientific data of marine species diversity, abundance and ecosystem value within the project area, are not available. The critical biodiversity or ecosystem services values assigned to the study area have therefore been conservative. For example, the presence of turtle nesting beaches has not been confirmed either scientifically or other evidence, within the Study Area; however, the presence of IUCN red-list species, such as turtles, and fish species, such as the critically endangered Goliath Grouper, would qualify the area as Critical Habitat. Further monitoring is on-going to confirm assumptions made within the assessments and to inform the development of the Biodiversity Management Plan for the project which will also inform the Dredging Management Plan that shall be approved by Financiers prior to dredging starts.

The proposed site and pipeline route are not designated as a nationally protected area, and is not located close to the boundary of any such protected areas.
5. PROJECT ALTERNATIVES

In accordance with the requirements of Gabon’s ESIA procedures together with international best practice, a number of alternatives were considered during the formulation of the proposed Project design. Alternatives were evaluated for their environmental impacts and the best alternative was selected, using internationally accepted analysis criteria.

At every stage of the project, alternatives were considered:

- Plant Location Alternatives (ESIA Phase 1)
- Dredging Area Alternatives (ESIA Phase 2)
- Production Processes Alternatives (ESIA Phase 3)
  - Ammonia licensing options
  - Best Available Technology
- Pipeline Alternatives (ESIA Phase 4)
  - Water supply options (salt water treatment versus fresh water)
  - Review of multiple freshwater intake points
  - Review of alternative pipeline routes
- No Project

5.1 Plant Location Alternatives

The Mandji Island Free Zone was selected for the fertiliser plant based on the availability of the natural gas feedstock, the location on a protected bay, the availability of the land for industrial development (area is established as an economic zone by the government), and existing air and boat transportation options.

Within the Free Zone, five sites were evaluated for their suitability for the Fertiliser Plant using nine criteria (e.g., risk of coastal erosion), see Figure 7. The results of the alternative analysis found that Location 5 was not technically feasible. Of the remaining sites, Location 1 was considered to be the least environmentally sensitive, (due to the lowest impact on mangroves, location to the gas pipeline and sea), as well as performing well against the other criteria. As such Location 1 was selected to be preferred location for the proposed Project.

5.2 Dredging Area Alternatives

Two locations were identified as suitable for dredging (Figure 8), with other areas ruled out on the basis of potential environmental impact e.g. known cetacean migration routes along the Atlantic Coast. These areas were assessed by GFC based on a number of criteria including availability and transport of sand, marine traffic, and environmental impact. The assessment identified that Area 2 was the best option, due to the dredging technology that would be used. This technology will result in a lower impact on the surrounding area (e.g. suspended solids), and reduced transport movements across the area, resulting in a lower impact on the local sea transport movements.
Figure 7: Five Alternative Plant Locations
5.3 Facility Processes

In addition to the selection of the proposed project location, there are a number of possible alternatives that were evaluated in relation to the production processes and the design of the proposed Fertiliser Plant. These involved:

- Selection of the ammonia, urea & granulation process licensors; and
- Selection of the Best Available Technology (BAT).

There are three main process licensors for ammonia and three main process licensors for Urea synthesis, accounting for the licensing of more than 92% of the ammonia plants worldwide. The EPC contractor will be required to be licensed for one of these three processes, indicating that a reliable and well established process will be selected.

Through the use of BAT assessment on construction methods and operational compliance, the project will not only meet but will exceed industry accepted standards for fertiliser plants. Where the project exceeds these standards, this is primarily due to the implementation of the most efficient and state-of-the-art technologies or processes to reduce environmental impacts from the plant.
5.4 Water Pipeline

GFC analysed a number of different alternatives related to the water pipeline. The initial alternative analysis involved an assessment of whether desalinated sea water or freshwater was more appropriate as the source of the water supply necessary for the facility. The fresh water option has less environmental impact compared to the sea water desalination in view of the much lower energy consumption and much less disturbance to marine ecosystems. The selected freshwater option chose the Loanda beach site (Figure 5) as the best extraction point.

The final portion of the pipeline alternatives analysis was a review of possible power sources necessary to pump the required volume of water to the Fertiliser Plant. The supply of electricity by cable from the proposed Fertiliser Plant is considered to be the preferred option, and placing the majority of the cabling underground is considered to have the smallest potential for environmental and safety hazards. An emergency power supply (diesel generators) will be provided at the pump station site for back-up purposes.

5.5 No Action

The Fertiliser Plant will require land clearing, dredging, facility construction, and construction of a water pipeline. Such works are essential to any development on Parcel F. Therefore the “no action” option would require no development of Parcel F. However, the decision for the development of Parcel F of Mandji Free Zone is a decision that has been made by the Government in order to encourage the much needed economic development in the area and provide employment. Plots within Parcel F that will be developed by GFC are within the area planned for oil and gas related industries and storage and repackaging industries. If the Ammonia-Urea Fertiliser Plant project does not go ahead, it is likely that some other developer will take over responsibility for the selected plots and other industrial/commercial complex(es) will be developed on the site.
6. IMPACT ANALYSIS

The method used to assess the potential significance of the environmental and social impacts of the Fertiliser Plant project involves identifying the potential receptors present within or surrounding the project area, defining the potential sources of impact and evaluating their effects on any identified receptors. Determining the significance of an impact involves assessing both the severity of the impact and the likelihood that the impact will occur. Severity is assessed by evaluating several factors: the level of consequence (how bad is it), the duration of the exposure (short term or long term), and the scale of receptor affected (e.g. number of people, geographical area, species population) potentially affected. In addition to categorizing the strength of the impacts, effects are also categorized as to whether the effects are positive or negative. Using the “severity x likelihood” formula, impacts are then categorized according to the following:

- Minor - not significant, no mitigation is required;
- Medium/moderate - not significant, some mitigation may be necessary to minimise impacts;
- High/significant - mitigation is required, project cannot proceed without it; and
- Critical (significant) – changes to project design will be required to allow mitigation or project may need to be abandoned.

Full impact assessments have been undertaken for topics where proposed activities could lead to significant changes to environmental baseline conditions. The following receptors have been considered in the ESIA Reports and are discussed below: (i) air quality; (ii) greenhouse gas (GH) accounting; (iii) noise and vibration; (iv) geology, soils and sediments; (v) hydrology, hydrogeology, coastal dynamics and water quality (fresh (surface and underground) and marine); (vi) ecology and biodiversity (terrestrial, aquatic and marine); (vii) health, safety, and emergency; (viii) waste; and (ix) socioeconomic impacts. The ESIA reports considered additional areas of potential impact (e.g., traffic and visual); however, details of all areas were not included in this summary if the impacts were very minor and/or easily mitigated.

6.1 Key Impacts and Mitigation Measures

6.1.1 Air Quality

Assuming dust mitigation measures during construction phases, and that the proposed Fertiliser Plant is designed and operated in accordance with IFC Guidelines and industry best practice to achieve the required emission standards, air quality impacts upon human health and the environment are anticipated to be minor. Detailed air dispersion modelling demonstrated that there will be no decrease in air quality in any surrounding urban or inhabited areas, and that the prevailing winds (blowing towards the north east) ensure that emissions if any from the plant during its operating life are dispersed offshore.

6.1.2 GHG Accounting

A comprehensive analysis of GHG emissions has been conducted for all phases of the project. The GHG impacts during construction of the facility and the pipeline are more minor and will
be addressed through good practices (e.g., use of low sulphur diesel) and off-sets. The proposed Fertiliser Plant is potentially a significant source of GHG. Based on tentative continuous vent data provided by GFC, GFC estimates that there will be emissions of approximately 641,590 tonnes of CO₂ a year. GFC is considering all technically and financially feasible options to reduce or offset product-related CO₂ emissions during the ongoing design and subsequent operation of the proposed Fertiliser Plant. Quantification of GHG emissions is incomplete as the final facility design has not been completed. Once the Plant design has been finalised, a full GHG lifecycle analysis will be conducted. As required by IFC Performance Standards, GFC will monitor and report their CO₂ emissions annually, as current estimates are well above the IFC threshold for reporting. As such, carbon monitoring and reporting mechanisms will be established and monitoring/reporting will be implemented on an on-going basis during the operational period of the proposed Fertiliser Plant. GFC will evaluate and, where practicable, implement the full range of mitigation measures appropriate for GHG reduction once the facility is in production. Key mitigation measures that GFC will be evaluating for their process emissions are presented below in Table 6.1

<table>
<thead>
<tr>
<th>GHG source</th>
<th>Proposed GHG mitigation measures</th>
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</thead>
<tbody>
<tr>
<td>Process emissions</td>
<td>• Implementation of BAT</td>
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<tr>
<td></td>
<td>• Undertake a full carbon lifecycle analysis once the design has been completed</td>
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<tr>
<td></td>
<td>• Continuous air emissions monitoring</td>
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<td>• Annual carbon footprinting exercise and reporting to IFC and AfDB</td>
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<td></td>
<td>• Wastewater minimisation</td>
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<td>• Wastewater reduction targets and annual goal setting</td>
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<td></td>
<td>• Water management alternatives</td>
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### 6.1.3 Noise and Vibration

Because of the distance from the plant to the nearest permanent residential receptors (approximately 1.2 km) and the use of noise mitigation measures in the facility design, noise levels for sensitive receptors during and after the construction phase will meet defined IFC criteria for both daytime and night-time periods and community noise impacts will be minor. Noise impacts to workers during construction and plant operations will be managed according to good industrial hygiene practices, good acoustic design, and a noise program in compliance with relevant OSHA guidelines.

### 6.1.4 Geology and Soils

Assuming that best practice measures are implemented, impacts upon geology and soil quality during the construction and operation of the proposed Fertiliser Plant will be no more than minor (not significant).

### 6.1.5 Hydrology, Hydrogeology Coastal Dynamics and Water Quality

Construction phase impacts on the water environment may arise during site clearing, construction of site infrastructure, the installation of the plant process equipment and
supporting facilities, and during construction of the pipeline. Impacts on hydrology and water quality may arise if these construction materials leak or are spilled during handling and storage; if waste oils are incorrectly disposed of; and by the erosion of soil during rainfall events. Furthermore, any piling required for jetty construction and construction of the proposed marine outfall may lead to local disturbance of marine sediment. Mitigation measures during construction include a range of good site practices, including: avoiding earthworks during periods of heavy rain; designing a temporary site drainage system to control site run-off; provision of covered storage for materials with the potential to impact on water courses; limiting piling to certain tidal conditions. Assuming that best practice measures are implemented, impacts upon water resources during the construction of the proposed Fertiliser Plant are anticipated to be no more than minor (not significant).

With regards to coastal dynamics that might be affected by the proposed dredging, Comprehensive hydrodynamic modelling was carried out as part of the Phase 2 ESIA and Addendum ESIA. A number of modelling scenarios were evaluated to assist with decision making regarding areas and depths to be dredged. Modelling was performed to assess changes to the coastline, water levels, wave heights, currents and sediment deposition. Initial modelling results found that potential changes in current speeds will have limited influences on local erosion or tidal creeks, no increased risk of coastal flooding due to raised water levels, and negligible impacts on the local wave climate.

Subsequent modelling was performed to further evaluate the predicted magnitude and extent of changes to the hydrodynamic conditions (i.e. water levels and current speed) under three different scenarios. The results of the modelling found that the predicted local increase in current speeds suggests sand areas north of Port Gentil could potentially undergo erosion as a consequence of the dredging. However, the bed shear stress plots show that none of the areas where current speeds were increased due to dredging are likely to experience actual increased erosion as the increase in bed shear stress is insufficient to mobilize the sand. Therefore, the change in hydrodynamic conditions due to dredging will be expected to have only a localised effect on sediment transport processes.

Operation of the proposed Fertiliser Plant has the potential to impact the water environment due to the generation of process and non-process wastewaters requiring marine disposal via a marine outfall; the need to dispose of sludge from raw water/sanitary wastewater treatment; the discharge of storm water runoff from impermeable surfaces (e.g. roofs, roads, hard standing); accidental spillages of raw materials and finished products; as well as the discharge of sewage and/or oily water from vessels using the proposed jetty. Groundwater, surface water and marine water resources could be impacted by these activities. A range of mitigation measures have been defined, including: reducing the amount of effluent discharged by recycling water onsite; use of a wastewater treatment system which collects and treats effluents to be discharged to agreed IFC standards; appropriate storage of material that could potentially cause water pollution; and the use of a storm water drainage system that will ensure that potentially contaminated water is segregated from general site run-off and treated before being discharged from the site. Assuming that such best practice measures are implemented, impacts upon water resources during the construction and operation of the proposed Fertiliser Plant are anticipated to be no more than minor (not significant).
6.1.6 Ecology and Biodiversity

Some critical habitat and its associated species of importance are likely to be affected by the proposals for the Fertiliser Plant and Pipeline route. Of most significance are impacts arising through loss of mangrove habitats and loss of habitat associated with the Important Bird Area in relation to Phases 1 to 3 of the project.

The impact on biodiversity is considered to be moderate; mitigation may be required for certain impacts. The particular impacts which may require mitigation include:

- Loss of biodiversity due to clearance of mangrove, forest, and grassland habitats during Phases 1 & 4;
- Loss of biodiversity due to pollution of environment as a result of emissions releases and spillages during all phases of the project;
- Disturbance to marine biodiversity during dredging process and construction of jetty; and
- Habitat fragmentation, increased animal deaths due to road crossing, and increased hunting/clearing in forest habitats due to construction of access road in Phase 4.

It is unlikely that the impact on biodiversity can be avoided, but several actions could be taken to minimise the impacts. All impacts on biodiversity will be addressed through the Biodiversity Management Plan for the project, which will include ways to minimise disturbances of marine diversity and include provisions for off-setting where impacts cannot be avoided. The Biodiversity Management Plan Framework is under development as part of the ESIA addendum. Additional details of ecological impacts on terrestrial and marine ecology follow.

Terrestrial/Intertidal Ecology at the Plant Site: Construction activities could lead to a number of ecological impacts. These relate to loss of ecological habitats during vegetation clearance between the site boundary and the coast and along the pipeline route; clearance at the proposed construction camps; marine construction activities (jetty and marine outfall); dredging activities; spillages and/or improper disposal of construction materials/fuel; construction dust, noise and artificial light. A range of mitigation measures have been proposed to minimise these impacts, whilst some additional monitoring is required to quantify potential turtles use of beaches in the vicinity of the proposed plant, see below.

Marine Habitat: Dredging activities could result (under the precautionary principle) in the direct loss of 270 ha of marine habitat, given the extent of the dredging locations identified. Marine habitat surveys to date have identified no seagrass within the area potentially affected. Further detailed surveys fitting in with seasonality factors (upwelling season in the Gulf of Guinea) will be done as part of the Environmental and Social Management Plan (ESMP). The generation of sediment plumes could result in moderate impacts through smothering of adjacent marine habitats. These impacts could be reduced to minor through appropriate mitigation measures such as detailed baseline studies prior to dredging and developing and implementing spill contingency plans for pipeline and hull leaks. Dredging also has the potential to result in the disturbance, displacement or death of marine wildlife within the
dredging site. This could affect species that are important commercially and/or in terms of food security, as well as IUCN threatened/near threatened species. The IUCN species include six species of fish, four species of marine turtle, and the West African manatee. Based on information available at the time of the assessment, the effects on these species are moderate and could be reduced through measures such as implementing a ban on hunting, timing dredging operations to avoid peak periods for nesting turtles, selecting dredging equipment and methods to avoid accidental death of these species, and control of noise and light emissions. A key component of the Biodiversity Management Plan includes the employment of an experienced professional Marine Biologist / Ecologist with diving experience to ensure mitigation measures are effectively implemented.

Ecology impacts during plant operations include increased artificial light and potential nitrification and eutrophication of the marine environment. Light pollution could potentially impact on any turtles nesting on beaches adjacent to the site and as such night time lighting should be shielded/directed away from beach areas to avoid unnecessary light pollution. Deposition of air pollutants could result in a change to the local marine environment over a small area to the north of the plant site. Additional impacts on marine plant and wildlife could result from the discharge of treated wastewater from the marine outfall or accidental spillages of raw materials and products during their storage, use, transportation and loading. This includes potential oil spillages at the proposed loading jetty. Such potential impacts are to be mitigated through the implementation of IFC best practice pollution prevention and control measures and the requirement that wastewater discharges from the marine outfall will achieve defined IFC discharge standards. With the appropriate implementation of defined mitigation measures, the residual ecological and nature conservation impacts are considered to be minor. In addition, regular marine water quality and ecological monitoring at outfall locations and in the local marine environment will be performed on a regular basis in order to detect any ecological effects.

**Terrestrial Ecology Along the Pipeline:** The construction of the pipeline will lead to the loss or degradation of terrestrial vegetation and habitat, through the clearing of vegetation and bulk earthworks, as well as the loss of fauna or behavioural impacts due to disturbance of wildlife. Ecological impacts associated with vegetation clearance and disturbance are considered to be minor to moderate, depending on volume and types of vegetation cleared and the volume of disturbance. The pipeline also has the potential to impact aquatic ecology due to construction dredging and earthworks required at the proposed river crossings. Such impacts are considered to be minor. A range of mitigation measures have been proposed to minimise potential ecological impacts – this including the preparation and implementation of a Framework Biodiversity Management Plan which outlines the responsibilities of workers, best practice for vegetation clearance, wildlife protection and disciplinary measures associated with hunting. In order to ensure that the defined mitigation measures are implemented, monitoring will be undertaken throughout the construction phase and will include routine site inspections, the audit of the Framework Biodiversity Management Plan and applicable Management Plan (which will be prepared as part of the project overall Biodiversity Management Plan).
During operation of the proposed water supply system, a minor ecological impact is predicted due to open space and habitat loss resulting from the failure of re-vegetation activities, as well as aquatic fauna death at the proposed river intake.

6.1.7 Health and Safety

The ESIA documents provided an overview of the health and safety issues for the workers and local community associated with the construction and operation of the proposed Fertiliser Plant. The plant construction contractor will develop an appropriate Health and Safety Management System which will have the aim of reducing lost time incidents (LTIs) to zero. With regard to plant operation, the IFC EHS Guidelines for Nitrogenous Fertiliser Production identifies the most significant health and safety hazards as being: process safety; chemical hazards; fire and explosion hazards; and ammonia storage. The European Fertiliser Manufacturer’s Association (EFMA) has developed guidelines for Best Available Techniques (BAT) for Pollution Prevention and Control for ammonia production and urea production. EFMA provides historical data to show that major accidents at ammonia plants are explosions and fires. The most significant community health and safety hazards relate to: management, storage and shipping of hazardous products (e.g. ammonia) with potential for accidental leaks/releases of toxic and flammable gases; and disposal of wastes. Under Law No 16/93, installations such as the proposed Fertiliser Plant are required to have a comprehensive Operational Emergency Plan. This Operational Emergency Plan is to be developed in discussion with, and approved by, the relevant environmental and civil authorities. GFC is communicating with local authorities regarding the development of coordinated emergency response plans and will have fire response equipment and crews on site at all times. Assuming that best practice and IFC Environmental, Health and Safety Guidance is taken into account, the potential occupational and community health and safety issues associated with the project are anticipated to be minor. GFC’s methodology to maximise the safety of plant processes is discussed in Section 9.

6.1.8 Waste Management

Waste types generated will include general construction wastes, off-specification and damaged and materials, plant and equipment maintenance wastes including discarded equipment, aggregate, sands and cement, concrete products, metal parts and off-cuts, marine sediment and hazardous wastes. Wastes generated during plant operation includes spent catalysts, nitrogen containing dusts from the dust control system, plant and equipment maintenance wastes, water and wastewater treatment sludge, waste from site workers and waste from ships visiting the proposed jetty.

Waste will be managed according to a Waste Management Plan which will provide procedures for: waste prevention and minimisation; identification and segregation of waste types where they are generated (e.g. workshops); appropriate storage, containment, handling and transportation; reuse and recycling of suitable materials; appropriate treatment and disposal. The most common hazardous wastes likely to be produced are spent catalysts, which will be recycled by specialist firms. Assuming that such best practice measures are
implemented, the potential waste management issues associated with the construction and operation of the proposed Fertiliser Plant can be reduced to a minimum.

A large amount of vegetation clearance of the site area has already occurred. This vegetation and soil waste is currently being stored on the site. Opportunities to re-use the material are being explored.

6.1.9 Social Impacts

The potential social impacts of the project activity, including employment generation, on social and economic development at the national, provincial and local level have been assessed. Project activities are expected to lead to both positive and negative impacts on the local communities, households, and the wider economy. Key positive benefits are related to job creation, key negative impacts are related to community safety issues, population influx, and cultural/resettlement impacts.

Employment Opportunities: The key social benefit associated with the proposed Project is the creation of job opportunities for up to 3,050 construction workers including a mixture of skilled, semi-skilled and unskilled posts. At least 350 of these job opportunities will be filled by Gabonese nationals. The local economy will also be stimulated by the use of Gabonese products, goods and services by EPC contractors, which may create additional job opportunities for local people. The proposed Fertiliser Plant is expected to be operational for 25 years and it is expected that 350 direct jobs will be created including skilled manager and engineer positions, semi-skilled technicians and unskilled support staff. A further 200 indirect jobs are also expected to be created during plant operation. GFC has committed to train 100 local, suitably qualified workers during the construction phase for roles required to operate the proposed plant.

In relation to community impacts, the increase in employment and income for local unskilled workers will help to stimulate the local economy.

Community Safety: A number of major hazards are identified associated with an ammonia and urea production plant (see health and safety section above). Community health and safety hazards are generally associated with handling hazardous materials and waste, whilst issues associated with potential plant accidents that have the potential to affect areas outside of the plant site boundary, will be tackled through GFC’s Operational Emergency Response Plan which will be developed in discussion with local communities.

Population Influx: During the construction phases, where there is an influx of workers, many from outside the local communities, there is the potential to impact the community’s experience of diseases, especially TB, malaria, and sexually transmitted infections (STIs), notably HIV/AIDS. The close living quarters of the work camp contribute to the importance of TB; the influx of workers is the primary basis for an impact on communicable STIs; and water management and construction-related effects on surface water flow are the primary basis for an impact on malaria, which is a water-based, vector born disease. These potentially serious impacts from the influx of workers will be reduced to minor project impacts with
appropriate mitigation measures contained in the Influx Management Plan. GFC has committed to establish measures to prevent and control project-related impacts on disease among workers and the community, following best practice guidelines established by IFC. To meet their commitment to raise awareness among workers and the community related to these potential site-related community health impacts, GFC will coordinate with local and national governments as well as appropriate NGOs to develop and implement community and worker awareness programs, as well as screening and surveillance programs for workers and guidelines for worker-community interactions.

Cultural/Resettlement: According to the local population, the clearance of Parcel F to date included the removal of three ritual sites and two areas used for burials. The impact of clearing the site disturbed the spirits inhabiting the area, which in turn affected local people who were initiated to undertake traditional spiritual practices. There were also ancestral relicts buried onsite and totems present. These were believed to protect the local people and provided a form of power to current practitioners related to the ancestors. These have been lost in the site clearance process. However, in line with Gabonese customs, the state provided the local population with a sum of money to undertake a closure ceremony, which took place in July 2011. The Bwiti temple remains untouched on the north western corner beyond Parcel F.

During the clearance of land in Phase 4, several families are at risk of losing access to their ancestral lands. Further, the development may have some cultural impacts in the way in which land and water are valued and accessed by local people. According to local custom, forests are subject to traditional/community forms of ownership (usufruct rights) and access to water is free, the development will involve changes in ownership and use of both of these resources and may impact the well-being of people in the area.

In addition to these cultural/heritage issues, approximately 27 households will be physically or economically displaced from on and near the project site. Mitigation/compensation measures to address cultural and resettlement issues in line with AfDB requirements are discussed further in Annex 1.

6.2 Cumulative Impacts

The combined, incremental effects of human activity, referred to as cumulative impacts, can pose a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts accumulate over time, from one or more sources, or act separately on the same receptor, and can result in the degradation of important resources.

The cumulative impact assessment for the project has considered two aspects: (i) Potential for cumulative impacts arising from the Fertiliser Plant and other planned projects in the vicinity; and (ii) Potential for cumulative impacts arising from the four phases of development associated with the Fertiliser Plant.

Cumulative Impacts with Other Developments

- There are a number of identified / known projects that are in varying stages of development in close vicinity to the fertiliser plant (under construction, permitted or imminently expected to be permitted). Three have been assessed for potential for cumulative impact due to their proximity to the proposed Fertiliser Plant site and their stage of development (i.e. approval received or expected imminently or construction
There are a number of other developments in early stages of planning within the area (including developments associated with the wider Free Zone area, such as the proposed Deep Water Port and further clearance/dredging works). These developments have not been included in the cumulative impact assessment for this project, given the early stage they are at in the ESIA process (meaning very limited information is available). The cumulative impact of the various projects with the Fertiliser Plant will be assessed in full through the ESIAs of these projects as they are developed.

6.2.1 Construction

The potential cumulative impacts from the proposed fertiliser plant and the surrounding developments are primarily associated with the permanent loss of habitat to facilitate the different projects. The combined loss of hectares required for the projects and the lack of direct mitigation result in a significance rating of moderate. Similarly, when taken in conjunction with the Fertiliser Plant, this loss of habitat will result in a moderate impact associated with the disturbance of archaeological assets, and cultural heritage as land will be lost that was used for traditional practices. It should be noted that GFC are in discussion with the local community to fund the necessary procedures to relocate remaining cultural and ritual sites, and appropriate ‘by record’ mitigation will be taken into consideration.

6.2.2 Operation

There are no significant cumulative effects associated with the operational phase of the Fertiliser Plant project and proposed developments in the project’s vicinity.

Cumulative Impacts between Project Phases

The assessment identified potential cumulative impacts associated with the various development proposals in the vicinity of the project site. Professional judgement indicated that the majority of the impacts identified during construction and operation phases had significance ratings that were negligible or low. In addition where lack of information is present, when qualitatively assessed, the cumulative significance was deemed below significant (i.e. no impact, negligible or low).

The assessment identified potential cumulative impacts arising from the four distinct project phases required to construct the Fertiliser Plant. Several minor impacts and three moderate impacts were identified.

6.2.3 Construction

Impacts arising between the four project phases include a minor noise and vibration cumulative effect on sensitive receptors and a minor impact on the generation of construction waste across the four phases. These impacts are minor because proper implementation of the relevant management plans will minimise the potential adverse effects. A moderate cumulative impact is expected with regard to vegetation removal and subsequent habitat loss, through land clearing to accommodate the plant, pipeline and ancillary infrastructure.
6.2.4 Operation

There are no significant cumulative effects associated with the operational phase of the Fertiliser Plant and the other planned phases.
7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

A provisional Environmental and Social Management Plan (ESMP) has been prepared and was included in the Phase 3 ESIA Report, with additional material in the ESIA Addendum Report. A detailed ESMP will be prepared before Phase 2 Operations begin. Measures to reduce impacts and responsibilities for their implementation are included in the provisional ESMP and supporting Management Plans as outlined in Table 7.1.

GFC carries the ultimate responsibility for ensuring that the proposed Fertiliser Plant and jetty is designed, constructed and operated in conformance with IFC General EHS Guidelines, EHS Guidelines for Nitrogenous Fertiliser Production, EHS Guidelines for Water and Sanitation and EHS Guidelines for Ports, Harbours and Terminals and industry best practice to achieve the required emission and effluent standards. In addition, GFC’s ESMP will comply with all applicable Guidelines and Policies of the AfDB as well as with Gabon’s Environment Code 16/93 of 26 August 1993 and Decree No. 0539/PR/MEFEPEPN of 15th July 2005.

In summary, during construction the Contractor’s environmental performance will be monitored. During plant operation, GFC will be required to monitor the quality of air emissions and effluent discharged from the proposed plant into the sea. These results will be reported to the Direction Générale de l’Environnement et de la Protection de la Nature (DGE) on a regular basis (frequency to be agreed) and, where required, to lenders.

Upon project approval, GFC will be submitting an annual report on the implementation and monitoring of the ESMP to DGE. The report will include all necessary information on environmental and social protection and management measures as agreed as part of the project approvals and financing process. The Environment Code 16/9, 3 Articles 52 and 74, also state that classified installations (e.g. industrial installations likely to disturb the neighbourhood, harm the health or impair the quality of the environment) are required to have an approved operational Emergency Response Plan, in case of accident, to alert the public authorities and neighbouring populations, to facilitate the evacuation of staff and enable specific means to limit the damage. According to Article 74, DGE must: be assured that effective measures are being taken to render the Plan operational; be fully informed of the nature and quality of the measures taken; and take appropriate sanctions against operators who do not comply with the measures prescribed.

GFC’s outline ESMP is structured as follows:

- Environmental and Social Policy;
- Project Overview;
- Register of Environmental and Social Impacts;
- Environmental and Social Standard and Quality Objectives;
- Mitigation and Implementation;
- Monitoring and Evaluation;
- Management Structure;
- Data Handling; and
- Audits and Reviews.
In addition, GFC has committed to working towards ISO 14001:2004 and OSHAS-18001:2007 and has created a road map for implementation (included in the ESIA Addendum report). Part of the road map addresses process safety issues. In addition to the commitment to implementation of ISO 14001:2004 and OSHAS-18001:2007, GFC has drafted a procedure titled ‘Management of Health, Safety, and Security and Environmental (HSSE) in Projects’ which apart from various HSSE aspects and information includes various leading and lagging indicators such as:

- no lost time accidents at the site;
- no road accidents or injuries;
- carrying out pre-start up safety reviews; and
- identifying and carrying out the required health and safety studies and developing policies to prevent (if possible) or mitigate health risks.

GFC’s HSSE Management System and two important HSSE Procedures, (Management of HSSE in Projects and Construction Safety) have been developed that cover HSSE Performance Standards & Indicators, tracking systems, information on Security Management, addressing HSSE requirements of Contractors and Sub-Contractors, Drugs and Alcohol Policy, HSSE Training requirements and various other HSSE aspects. A framework for ‘Hazardous Materials Management and Emergency Preparedness,’ has also been prepared by GFC.

Individual management plans provide a mechanism for managing the potential environmental and social effects highlighted within the ESIA reports and addendum through defined ownership (roles and responsibilities), process checklists, and response procedures (timeframes) should adverse changes to the environment occur. The Management Plans and Framework Management Plans to be implemented by GFC and the appointed EPC throughout the construction and operation of the Fertiliser Plant are set out within Table 7.1.

GFC has committed to implement the Environmental and Social Action Plan (ESAP) that will be agreed upon with Financiers, which will be part of the loan covenant.
<table>
<thead>
<tr>
<th>Sector</th>
<th>Acronym</th>
<th>Generic name of Management Plan</th>
<th>Phases of ESIA Concerned / Identified</th>
<th>Construction Phase Inputs</th>
<th>Operational Phase Inputs</th>
<th>URS Input</th>
<th>Surveillance and monitoring during implementation (entity responsible)</th>
<th>Status of Development</th>
<th>Required Date of Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DMP</td>
<td>Dredging Management Plan</td>
<td>Phase 2</td>
<td>Contractual and process methodology input required</td>
<td>DMP</td>
<td>Reference in ESIA (URS) (D&amp;LF Example EMP and D&amp;LF Contractor's Environmental Management Guidance (CEMG))</td>
<td>Dredging Contractor / GFC</td>
<td>In Preparation</td>
<td>Oct-12 (though document will remain live throughout dredging and landfilling phase)</td>
</tr>
<tr>
<td></td>
<td>ETP</td>
<td>Environmental Training Plan</td>
<td>All</td>
<td>ERP roadmap</td>
<td>OSHA roadmap</td>
<td>OLAM ES (E-301)</td>
<td>HMMS Roadmap</td>
<td>Dredging Contractor / Construction Contractor / GFC</td>
<td>In Preparation for operational phase 3 Sub-contractors individual environmental training will be enforced during activities through construction.</td>
</tr>
<tr>
<td></td>
<td>HSP</td>
<td>Health &amp; Safety Plan</td>
<td>All</td>
<td>HSES plan for GFC Project EPC Part II Section 12</td>
<td>OSHS roadmap</td>
<td>N/A</td>
<td>Dredging Contractor / Construction Contractor / GFC</td>
<td>Prepared</td>
<td>Oct-12 for construction plan, 6 months prior to opening for operational plan</td>
</tr>
</tbody>
</table>

Table 7.1: Management Plan and EPC / GFC document references
<table>
<thead>
<tr>
<th>Plan Type</th>
<th>Plan Name</th>
<th>Phase</th>
<th>HSES Plan Details</th>
<th>HMMS Roadmap</th>
<th>Client</th>
<th>Plan Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Material</td>
<td>Hazardous Material Management Plan</td>
<td>Phase 3</td>
<td>HSES plan for GFC Project EPC</td>
<td>HMMS Roadmap</td>
<td>N/A</td>
<td>In Preparation for inclusion within the consolidated ESMP Plan will be finalised before the commencement of Phase 3 works (construction), operational plan six months prior to operation.</td>
</tr>
<tr>
<td>Management Safety</td>
<td></td>
<td></td>
<td>Project EPC Part II section 9.8 and Part II Section 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour Camp</td>
<td>Labour Camp Management Plan</td>
<td>Phase 3</td>
<td>HSES plan for GFC</td>
<td>N/A</td>
<td>Construction Contractor / GFC</td>
<td>In Preparation for inclusion within the consolidated ESMP Plan will be finalised before the commencement of Phase 3 works.</td>
</tr>
<tr>
<td>Management Plan</td>
<td></td>
<td>Phase 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security and</td>
<td>Security and Vigilance Plan</td>
<td>All</td>
<td>SVP for construction phase has been drafted for EPC commitment</td>
<td>N/A</td>
<td>GFC</td>
<td>In Preparation for inclusion within the consolidated ESMP Oct-12 for construction plan, six months prior to operation for operational plan</td>
</tr>
<tr>
<td>Vigilance Plan</td>
<td></td>
<td></td>
<td>GFC prepared framework plan for the operational phase SVP will be prepared meeting the IFC requirements.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Reporting</td>
<td>Incident Reporting, Complaints and Management Plan</td>
<td>All</td>
<td>HSES plan for GFC Project EPC Part II Section 13</td>
<td>OLAM SCoP (S-101&amp;S-102)</td>
<td>N/A</td>
<td>Dredging Contractor / Construction Contractor / GFC In preparation drawing upon OLAM documents to refine content. Working document to be provided within ESMP Stage 2 Closure (construction plan), six months prior to operation for operational plan</td>
</tr>
<tr>
<td>Complaints and</td>
<td></td>
<td></td>
<td>HSES plan for GFC Project EPC Part II Section 12 Typical Incident reporting procedure (dec2011)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Action Plan</td>
<td>Stage 2 Closure for frameworks and construction plan, six months prior to operation for operational plan</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>NMP</td>
<td>Noise Management Plan</td>
<td>GFC will prepare Framework for Noise Management Plan for operation phase. URS to provide specific monitoring noise limits as required Dredging Contractor / Construction Contractor / GFC Prepared as Framework Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHAP</td>
<td>Cultural Heritage Action Plan</td>
<td>Framework of this plan provided within Cultural Heritage Technical Note Construction Contractor / GFC Prepared as Framework for inclusion with any contract specification for on site works</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFP</td>
<td>Chance Find Procedure (cultural heritage)</td>
<td>URS Framework Plan provided within Cultural Heritage Technical Note Construction Contractor / GFC Prepared as Framework for inclusion with any contract specification for on site works</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WDP</td>
<td>Water Development Plan Phase 4 Typical Water management plan (Dec 2011) OLAM ES (E-201) Reference I ESIA (URS)</td>
<td>In Preparation for inclusion within the consolidated ESMP Plan will be finalised before the commencement of Phase 4 works.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAP</td>
<td>Biodiversity Action Plan</td>
<td>BAP Dredging Contractor / Construction Contractor / GFC In Preparation for inclusion within the consolidated ESMP Stage 2 Closure, though document will be live plan throughout works and operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SEP</td>
<td>Stakeholder Engagement (Management) Plan</td>
<td>All</td>
<td>N/A</td>
<td>N/A</td>
<td>SEP</td>
<td>GFC</td>
</tr>
<tr>
<td>LRHP</td>
<td>Local Recruitment and Hiring Plan</td>
<td>All</td>
<td>N/A</td>
<td>For the purpose of preparation of HR policy and related documents GFC are in the process of engaging a HR consultant who has the relevant experience in fertilizer industry in Africa region. HR policy will take care of local recruitment and hiring plan as per Gabonese Law and IFC requirements</td>
<td>N/A</td>
<td>GFC</td>
</tr>
<tr>
<td>IMP</td>
<td>Influx Management Plan</td>
<td>Phase 3 Phase 4</td>
<td>N/A</td>
<td>N/A</td>
<td>URS provided (IMP)</td>
<td>GFC</td>
</tr>
<tr>
<td>WMP</td>
<td>Waste Management Plan</td>
<td>All</td>
<td>HSES plan for GFC Project EPC Part II Section 12 Typical Waste management plan (dec2011)</td>
<td>OLAM ES (E-301) GFC prepared a WMP framework for operational phase.</td>
<td>N/A</td>
<td>GFC</td>
</tr>
<tr>
<td></td>
<td>Decommissioning Management Plan</td>
<td>Phase 2</td>
<td>Phase 3</td>
<td>N/A</td>
<td>GFC Draft Closure Plan Framework (Jul 12)</td>
<td>N/A</td>
</tr>
<tr>
<td>-------</td>
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<td>---------</td>
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</tr>
<tr>
<td>OSPP</td>
<td>Oil Spill and Prevention Plan</td>
<td>Phase 2</td>
<td>Phase 3</td>
<td>N/A</td>
<td>HSES plan for GFC Project EPC Part II Section 12</td>
<td>N/A</td>
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<tr>
<td>FMP</td>
<td>Refuelling and Fuel Management Plan</td>
<td>Phase 3</td>
<td>Phase 4</td>
<td>N/A</td>
<td>HSES plan for GFC Project EPC Part II Section 12</td>
<td>N/A</td>
</tr>
<tr>
<td>TMP</td>
<td>Traffic Management Plan</td>
<td>All</td>
<td>All</td>
<td>N/A</td>
<td>Logistics Plan / Operation will be delivered by GFC at a later date</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*NB: All plans under preparation must be provided to AfDB for review prior to implementation in line with the ESAP, therefore timescales for plans prior to construction and operational phases must account for this review period.*
Indicative costs (to be covered by GFC) of the mitigation measures within the ESMP and supporting management plans for the four phases of the project have been calculated, which are outlined in Table 7.2. These costs do not include those related to the Resettlement Action Plan (RAP) which is set out within the supporting RAP Summary document.

The current estimated up front cost of implementing the ESMP across Phases 1, 2 and 4 is 914,306 thousand USD in addition a sum of 3,942,703 million USD has been allocated to carry out the yearly mitigation and monitoring requirements during construction and a yearly sum of 8,045,012 million USD to implement mitigation and monitoring during the operational phase. It is anticipated these total yearly figures will reduce on a year on year basis as the high initial outlay for implementation of the monitoring is complete.

Table 7.2: Indicative mitigation and monitoring costs as noted within Phases 1-4 ESIA

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Estimated Cost FCFA</th>
<th>Estimated Cost USD²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>153,500,000</td>
<td>294,288</td>
</tr>
<tr>
<td>Phase 2</td>
<td>173,400,000</td>
<td>332,440</td>
</tr>
<tr>
<td>Phase 3 Design and Engineering</td>
<td>11,100,000,000 per annum (3 yr period)</td>
<td>21,280,820</td>
</tr>
<tr>
<td>Phase 3 Construction</td>
<td>2,056,500,000 per annum (3 yr period)</td>
<td>3,942,703</td>
</tr>
<tr>
<td>Phase 3 Operation</td>
<td>4,196,250,000 per annum (25 yr period)</td>
<td>8,045,012</td>
</tr>
<tr>
<td>Phase 4</td>
<td>150,000,000</td>
<td>287,578</td>
</tr>
</tbody>
</table>

As noted these calculations are indicative and reflect the proposed mitigation measures at the time of writing the individual phase reports, and as such have the potential to change once the consolidated ESMP document is prepared.

² 1 USD: 521.596CFA on 4/9/12 from xe.com
8 CLIMATE CHANGE

8.1 Key challenges

Mandji Island is particularly vulnerable to the impacts of global change. Based on the most recent climate projections, Gabon’s Second National Communication to the UNFCCC\(^3\) suggests that Mandji Island is likely to experience

- **A rise in sea level** of between 2 and 5 mm per year resulting in an overall rise of 10 cm in 20 years, 20 cm in 40 and 50 cm in 100 years. This is likely to be further exacerbated by the impacts of coastal erosion, where this is occurring. According to measurements taken in Port Gentil by the NCODI (National Centre for Oceanographic Data and Information), between 1958 and 2008 the coastline in the Mandji Island area receded by 4m per year on the Western Coast of Mandji Island. On the Eastern Coast (where the project is located), there are localised areas of both accretion and erosion though studies indicate that overall the coastline is largely unchanged in recent years.

- **Increased vulnerability to flooding** as a result of sea-level rise and coastal erosion. While flooding is likely to affect mostly uninhabited areas, there is a concern that it could contaminate freshwater resources and, together with an increase in temperatures, create new breeding areas for vectors of diseases such as malaria, Chikungunya or Dengue.

- **Salinisation of surface and groundwater resources**, including freshwater sources for the pumping station at Mandorobé. This could also potentially impact upon vegetation and fish species that are sensitive to changes in salt content.

8.2 Adaptation Measures

Climate change was considered in the project design, with respect to sea level rise. The adaptation selected to address this involved raising the site level to 3.5 m above the sea level. The design/location of the water abstraction point for the pipeline will also take into account the lowest water flow regime under worse case climate scenario or predictions. The process of identifying the Best Available Technology for the Plant has also led to introduction of measures to reduce energy and water use and therefore reduce dependance on potentially limited natural resources.

8.3 Mitigation Measures

GFC estimates that there will be emissions of approximately 641,590 tonnes of CO\(_2\) a year. Mitigation for facility process emissions was discussed in Section 6.1 and includes consideration of off-setting through investment in measures to enhance the protection of intact mangroves and other high carbon sequestration habitats elsewhere in the country.

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9. ENVIRONMENTAL HAZARD MANAGEMENT

GFC has engaged in an extensive safety analysis of the initial Fertiliser Plant design by conducting Hazard Identification (HAZID) and Hazard Operability (HAZOP) reviews, and by conducting a Quantitative Risk Assessment (QRA). The HAZID examines how the risks from facility-wide hazards and external hazards (e.g. flooding) can be prevented or minimised, while the HAZOP focuses on identifying and controlling process-related hazards specific to the internal functioning of the plants’ equipment. The HAZID identified 33 improvement measures related to safety and accident mitigation, and the HAZOPs identified hundreds of process-related improvements. All recommendations from the HAZID and HAZOP analyses have been, or will be incorporated into the final facility design.

The QRA calculates the risks of a fatality occurring if a process/system within the facility fails. The results of these analyses prompted a number of design changes that will result in a reduction in environmental impacts, improved safety, and improved working conditions. In addition, the QRA recommendations on land use restrictions (industrial land use only) and coordinated emergency response efforts for nearby off-site operations in the event of an ammonia-related explosion of release. These recommendations have prompted GFC to communicate the land use restrictions to the appropriate stakeholders (property owners and local authorities) and work with stakeholders to develop coordinated emergency response plans. This communication is required to maintain a future risk level for the public that is as low as reasonably practicable.
10 MONITORING PROGRAM

As detailed in the ESMP and HSSE, there are a number of on-going monitoring programs that GFC will be administering to ensure on-going compliance with all its health, safety, and environmental policies.

During construction, the following monitoring will be taking place:

- Air quality;
- Marine and fresh water quality;
- Marine mammal (during dredging activities)
- Noise;
- Human health screening measures (e.g., health screening for HIV/AIDS, malaria, and tuberculosis prior to employment); and
- Safety practices (performing tasks according to correct safety guidelines, use of correct equipment and protective gear).

During Facility operations monitoring of the following will be performed regularly:

- Ambient air quality;
- Stack emission air quality;
- Marine and fresh water quality;
- Noise;
- Plant effluent;
- Human health screening measures (e.g., health screening for HIV/AIDS, malaria, and tuberculosis prior to employment as established in the HSSE);
- Safety practices (performing tasks according to correct safety guidelines established by the operations HSSE, use of correct equipment and protective gear, investigation of accidents/near misses and appropriate HSSE record keeping).
- Regular site inspections to ensure compliance with safety and environmental policies;
- Jetty, plant and vehicle maintenance records;
- Records of stakeholder complaints;
- Periodic wildlife surveys and records of any wildlife incidents; and
- Sea worthiness certificate of ships.

All monitoring and inspections will be undertaken by a competent person or institution. These trained individuals will conduct regular site walkovers, regular drive-throughs of the Project affected areas and local roads, or on-board check, as appropriate. This will provide useful information on which to base decisions to stop or alter activities that are being undertaken. Records of findings shall be noted in a monitoring log. Regular inspections shall be supplemented by occasional unannounced on/off site audits. Records of the findings of monitoring and inspections, recommendations, and action taken reports, shall be kept.

In highlighting GFC’s commitment to safety and good environmental practices, the company has developed an organizational chart for the HSSE department for facility operations. The
HSSE manager will report directly to the head of the facility and will manage a department of at least 22 people.

As noted in Section 7, many of the environmental monitoring reports will be submitted to government agencies on a regular basis as well as to Financiers (where applicable on a monthly, semi-annually, annually basis).

11. PUBLIC CONSULTATIONS AND PUBLIC DISCLOSURE

Stakeholder consultation has been undertaken both prior to, during, and following the submission of the Project’s four ESIA’s volumes (completed in June 2012) to the Gabonese Government. The public consultation began with pre-scoping consultation meetings in Port Gentil in April of 2011. The pre-scoping meetings included members of the government and local authorities. The pre-scoping meetings were immediately followed by scoping consultations, which included the local public, local authorities, and government agencies, and occurred in late April and May of 2011 in Port Gentil and minutes are attached to the relevant ESIA reports.

A stakeholder Engagement Plan has been prepared which captured relevant government officials, community leadership and potentially interested NGOs. This SEP will be refined and disclosed throughout the progress. The implementation of the actions in the ESAP will be carried out by GFC. This SEP indicates clear mechanisms to respond to people’s concerns, suggestions and grievances. The SEP details the strategy for all external stakeholder engagement and communication throughout the Project, in accordance with national and international standards, as well as OLAM’s corporate requirements. The purpose of an SEP is to: (i) Identify individual stakeholders, stakeholder groups, communities, organizations and businesses that have a direct or indirect interest and influence on the Project site; (ii) Ensure, as far as possible, that stakeholders that might be affected by the Project are fully informed on the Project and its potential impacts (both positive and negative), and have access to project information; (iii) Enable stakeholders to participate and inform the ESIA process and baseline data; (iv) Keep a record of all meetings (both formal and informal), consultations and any commitments made in order to facilitate successful management of stakeholder engagement.

Stakeholder concerns expressed during scoping have been addressed, or will be addressed, as described in the impacts and mitigation sections above.

Under Gabonese law, in order to obtain government approval for an ESIA, the submitted documents must be validated through review and participation in validation meetings. Validation meetings have been held for Phases 1, 2 and 3 of the project which led to the issuance of environmental permit.

On-going consultation with the stakeholders will be occurring over the next few months. Site inspection and consultation recently occurred (during 13th - 19th July 2012) after completion of site vegetation clearance. The information gathered during this visit provided an understanding of the current situation on the Project site and more information regarding the physical and economic displacement of Project Affected People (PAP). Similarly,
consultation for the PAPs living along the water pipe line is currently scheduled to take place as part of a targeted consultation for Phases 3 and 4 Resettlement Action Plan (RAP).

For use by the public prior to the meetings, Non-Technical Summaries of each of the ESIA documents have been produced and these documents have been translated into French. These Non-Technical Summaries will be updated and made available to stakeholders before the final consultation to allow comments on the project design to be incorporated and ensure informed consultation.

The consultation will be a continuous process. GFC will carried out regular consultations with communities to review the ESIA and planned mitigation measures and implement agreed actions in the ESAP

12. COMPLEMENTARY INITIATIVES

GFC has indicated its commitment to capacity building and skills training for facility workers. Since the skill sets required for GFC plant operation and maintenance are quite sophisticated, the company is working on a two pronged strategy: (a) close cooperation with the technical institutions in Gabon to include specific courses to meet these skill sets and (b) a structured class room, plus hands-on practice sessions, plus on the job training, before deploying them at the plant. GFC also intend to work closely with families that have been physically or economically displaced to provide alternative employment, training and potentially custom for goods produced locally. This is set out in Annex 1 (summary of Resettlement Action Plan documents produced for the project to date).

GFC is also exploring ways they can support the existing health programs/infrastructure at the local level in ways that ensure worker health, but also provide support for community health programs. Specifically, GFC and the Government of Gabon are exploring the potential for the new water supply pipeline to the plant to also provide additional clean water supply to the City of Port Gentil, to provide additional (needed) resource to the city.

GFC has committed to and will support the SZES for the Mandji Island Free Trade Zone in the development of a complementary / over-arching Biodiversity Management Plan for the Free Zone. The development of this plan is to be led by SZES, with the support of the National Park Association. Key activities in developing the plan will be habitat appraisals of the wider Free Trade Zone site, assessment of FTZ wide potential impacts and development of overarching habitat and species management plans where appropriate.

The key activities from GFC associated the complimentary initiatives in supporting this wider BMP will be the sharing of:

- contacts and professional relationships;
- local knowledge;
- environmental baseline data already commissioned by GFC; and
- the mitigation measures implemented for the Fertiliser Plant.
These activities are anticipated to inform and feed into this wider plan and will be made available when the SZES BMP is being developed. Outside of that detailed above, information gathered as part of the social and environmental assessment of this project has also been provided for the overall cohesive development and progression of the SZES BMP and supporting documents.

Costs associated with the complementary initiatives are included within the estimated mitigation costs set out above.

13. CONCLUSION

In conclusion, the ESIA’s for the fertiliser plant project have identified and assessed all the potential impacts of the project. Construction and operation of the proposed Fertiliser Plant has the potential to have adverse impacts upon air quality, water quality, climate change, biodiversity, and the social environment (resettlement). However, all negative impacts can be managed/mitigated to be moderate or minor. The proposed Fertiliser Plant is located in a remote location, approximately 6 km from Port Gentil. The location and prevailing environmental characteristics of the site have been key factors in selecting the site for the proposed development, along with its location within a designated Free Zone aimed to promote such development within the area. GFC has committed to designing, constructing and operating the proposed Fertiliser Plant in accordance with IFC Guidance for Nitrogenous Fertiliser Production/industry best practice to minimise adverse environmental impacts and achieve the required emission/effluent standards.

Key positive benefits are economic. The proposed Fertiliser Plant construction phase will last approximately 31 months and will provide jobs for approximately 3,050 workers during that time period, of which 900 will be Gabonese nationals. The proposed Fertiliser Plant is expected to run for 25 years, providing long-term jobs for approximately 100 local workers during its operation. A total of approximately 350 workers are required to operate the plant. In addition, the local economy will also be stimulated by the plant use of Gabonese products, goods and services which may create additional job opportunities for local people.

Key negative impacts (those assessed as potentially moderate) were identified for aspects of the marine environment and certain safety and health impacts. These potentially moderate impacts can and will be mitigated, resulting in only minor negative impacts. These mitigations (along with all others identified in the ESIs), and monitoring to ensure their success, will be implemented through the project ESMP.
The ESIA reports, including annexes and supplemental study reports were the primary documents used in preparing this summary. The ESIA reports reviewed are listed below.


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