PROJECT: INDORAMA FERTILIZER PLANT
COUNTRY: NIGERIA

ENVIRONMENT & SOCIAL IMPACT ASSESSMENT SUMMARY

Date: OCTOBER 2012

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<tr>
<th>Appraisal Team</th>
<th>Team Leader: Ousmane Fall</th>
<th>Snr. Investment Officer OPSM 2 Ousmane Dore</th>
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<tr>
<td></td>
<td>E&amp;S Member: Kelello Ntoampe</td>
<td>Environmentalist, ONEC.3 Timothy Turner</td>
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<td>Sector Manager: Mouhamadou Niang</td>
<td>Division Manager OPSM 2 Janvier Litse</td>
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<td>Res. Rep: Ousmane Dore</td>
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<td>Regional Director: Janvier Litse</td>
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1. Introduction:

Indorama Eleme Petrochemicals Company Limited is the current Management of Eleme Petrochemicals Company Ltd (EPCL), having taken over management/ownership of the company from Nigerian National Petroleum Company (NNPC) in 2006. This major Olefins Plant (Eleme Petrochemical complex) situated on a site approximately 9km² is located some 15 km north-east of Port Harcourt, the capital of Rivers State. EPCL is the parent company of Indorama Eleme Fertilizer and Chemicals Ltd (IEFCL), proponent of the proposed fertilizer plant. The existing complex is made up of four major process facilities, namely: Olefins, Butene, Polyethylene and Polypropylene plants. Related utilities units are made up of Power, Water, Air plants and off-site facilities for intermediate product storage, effluent treatment, waste management etc. The proposed nitrogenous fertilizer project is planned to be set up within the existing Eleme Petrochemicals Complex. The complex will consist of Ammonia / Urea trains with a total capacity of 2,300 metric tons per day (MTPD) of ammonia and 4,000 MTPD of granulated urea. Among others, this summary briefly discusses the socio-economic reasons which led to this project, the environmental impacts, mitigation and monitoring aspects including stakeholder consultation and management.

2. Project Description and Justification

The Project entails (i) construction and operation of a 1.4M metric TPA Nitrogenous Fertilizer Complex comprising a 2,300 metric TPD ammonia plant and a 4,000 metric TPD granulated urea plant and supporting infrastructure and utilities (the Plant) at the Eleme petrochemicals complex site, Eleme, Port Harcourt, Nigeria; (ii) construction of a 84 km pipeline from the gas supplier’s processing facilities to the plant (the pipeline) for supply of the feedstock gas that will run adjacent to two existing pipelines within an existing right of way (RoW); and the third and last component though not part of the AfDB transaction will be the (iii) construction of a multipurpose jetty inclusive of material handling facility (jetty) located 16 kms from the site within the operational Onne Federal Ocean Terminal Zone. Due to the difference in activities, impacts and locality of the three components, their environment and social studies have been separated also because they don’t fall in the same category as per national legislation.

2.1 The natural gas feedstock pipeline will be 84 km long and 35 cm in diameter. It will connect the gas supplier (Nigerian Azienda Generale Italiana Petroli (Agip) Pipeline Company (NAOC) from Obrikom (OBOB) within the Ogba-Egbema Local Government Area (LGA) and will cross two further LGAs before terminating at Eleme LGA. All four LGAs are within the Rivers State of Nigeria. The pipeline will run within a right of way (RoW) managed by NAOC which has been in existence since 1992. The RoW is 15 m wide and is currently utilised by two other pipelines with sufficient space for a third pipeline.

2.2 The jetty will be situated approximately 16 km south east of the fertilizer complex within the operational Onne Federal Ocean Terminal (FOT) Zone. The multipurpose jetty will have a section for handling urea loading to vessels capable of handling 30-35,000 MT DWT; and another for containerized and break bulk cargo vessels capable of handling 6-8,000 MT DWT. The total cargo envisaged to be handled at the jetty will be 1 Million MT (MMT) of urea per annum and other cargoes (such as containerized loads, pipes and dry chemicals) are anticipated to be approximately 400,000 MT per annum.

2.3 The fertilizer plant covered in this summary and expected to have the strictest category will be located within the existing IEPL Complex, within which there currently exist four major process facilities, namely: olefins, butene, polyethylene and polypropylene plants. The IEPL Complex is approximately 9 km³ and the fertilizer plant will be located as per Figure 1 below. The existing facilities are self-sufficient in terms of power which
is presently generated by gas turbines. The final product (urea) will be stored in new warehouses to be constructed within the IEPL Complex with approximately 60-70% of the product transported by road to the jetty for the export market. The remaining 30-40% of urea produced will be bagged in 50 kg bags for onward distribution in the domestic market.

**FIGURE 1**

2.4 **Justification:**
Agriculture in Nigeria is a dominant sector that engages about 70% of the population and provides more than 75% of non-oil foreign exchange earnings with the largest share of about 41.84% of overall GDP in 2009 (IEFCL Market Survey, 2010). The agriculture sector contributes significantly to rural employment and food security. At the moment the majority of population dependent on agriculture currently lives below the poverty line due to very poor land yields. Provision of fertilizers at affordable prices will help to get higher yields to meet the demands of growing population as well as to uplift large part of the population out of poverty. The project will help to reach the objectives of the federal gas revolution programme providing necessary infrastructure for natural gas based industries.
3. Policy, Legal and Administrative Framework

The ESIA was carried out in line with national legislation with the most relevant ones being shown in Table 1 below. The ESIA process also conforms to the AfDB’s ESAP.

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<thead>
<tr>
<th>TABLE 1</th>
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<tr>
<td><strong>REGULATORY INSTRUMENT</strong></td>
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<tr>
<td><strong>INTERNATIONAL CONVENTIONS</strong></td>
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<tr>
<td>African Convention on the Conservation of Nature and Natural Resources, Algiers, 1968, ratified by Nigeria on 16 June 1969</td>
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<td>Convention on Occupational Safety and Health and the Working Environment, Geneva, 1981.</td>
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<td>Convention Concerning Safety in the use of Chemicals at work, Geneva, 1990.</td>
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<td>Convention concerning the protection of the world cultural and national Heritage (World Heritage Convention), Paris, 16 November 1972, ratified by Nigeria on 17 December 1975.</td>
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<td>Convention on biological diversity, Nairobi, 22 May 1992, ratified by Nigeria on 27 November 1994.</td>
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<td><strong>REGULATORY INSTRUMENT</strong></td>
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<td>United Nations Framework Convention on Climate Change (UNFCCC or FCCC) 1992.</td>
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**NATIONAL LEGISLATION**

| **Environmental Impact Assessment Act, 86 of 1992** | To ensure that before any decision is taken to undertake or authorize the commencement of any activity likely to impact on the environment by any person, authority, corporate body or unincorporated body including the Government, Federal, State or Local, that the environmental effects of such activity shall first be taken into account. | The public or private sector of the economy is forbidden from undertaking, embarking or authorizing projects or activities without prior consideration, at an early stage, of their environmental effects. Where the extent, nature or location of a proposed project or activity is such that it is likely to cause significant effect on the environment, its Environmental Impact Assessment shall be undertaken in accordance with the provision of the Act. Non-compliance with the Act will attract a fine of One Hundred Thousand Naira (₦100,000.00) or five years imprisonment in the case of an individual and in the case of a corporation a fine of not less than fifty thousand Naira (₦50,000.00) and not more than one hundred thousand Naira (₦100,000.00). |

| **S. I. 8 National Environmental Protection (Effluent Limitation) Regulations 1991.** | Regulation of effluents discharged into the environment by Industries in Nigeria. | Every industry is to install anti-pollution equipment for the detoxification of effluent and chemical discharges emanating from industries. The anti-Pollution equipment should be based on the Best Available Technology (BAT), the Best Practicable/technology (BPT) or the Uniform Effluent Standards (UES). Waste Water parameters to be monitored are as follows: – Ammonia, Chloride, Chromium, Nitrate, Sulphate, Suspended Solids, Urea, Organic Nitrogen Compounds, Zinc, Calcium, COD, Gas purification Chemicals, Iron, Oil & Grease, pH, Phosphate, Sodium, Temperature and Total Dissolved Solids. |

<p>| <strong>S. I. 9 National Environmental Protection (Pollution Abatement in Industries and Facilities Generating Wastes) Regulations 1991.</strong> | Prohibition of industry or facility from the release of hazardous or toxic substances into the air, water or land of Nigeria’s ecosystem beyond limits approved by FMENV. | An industry or facility shall; (a) have a pollution-monitoring unit within its premises; (b) have on site a pollution control; or (c) assign the responsibility for pollution control to a person or body corporate accredited by FMENV. A discharge, including solid, gaseous and liquid waste from any industry or facility shall be analysed and reported to the nearest office of FMENV every month, through a discharge Monitoring Report. An industry or facility shall setup machinery for combating pollution hazard and maintain equipment in the event of an emergency. Engaging in the storage, treatment and transportation of harmful toxic wastes within Nigeria without a permit issued by FMENV prohibited. An industry or facility which is likely to release gaseous, particulate, liquid or solid untreated discharge shall install, into its system, appropriate abatement equipment in such manner as may be determined by FMENV. |</p>
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<th>REGULATORY INSTRUMENT</th>
<th>OBJECTIVE</th>
<th>RELEVANT PROVISION</th>
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<td>S.I. 9 National Environmental Protection (Pollution Abatement in Industries and Facilities Generating Wastes) Regulations 1991.</td>
<td>Prohibition of industry or facility from the release of hazardous or toxic substances into the air, water or land of Nigeria’s ecosystem beyond limits approved by FMENV.</td>
<td>• No effluent with constituents beyond permissible limits shall be discharged into public drains, rivers, lakes, sea or underground injection without permit issued by FMENV.</td>
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<td>• Industry forbidden from exposing an employee to any hazardous condition in his workplace.</td>
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<td>• FMENV shall demand environmental audits from existing industries and Environmental Impact Assessment from new industries and major development projects</td>
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<td>S.I. 15 National Environmental Protection Management of Solid and Hazardous Wastes Regulations 1991.</td>
<td>Management of solid and Hazardous Wastes in Nigeria.</td>
<td>□ All industries or facility to inform the FMENV of all toxic, hazardous and radioactive substances, which they discharge during their production processes.</td>
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<td>Harmful Waste (Special Criminal Provisions, etc) Act 1988. L.F.N. 1990.</td>
<td>Prohibition of the carrying, depositing and dumping of harmful waste on any land or territorial waters.</td>
<td>□ All activities relating to the purchase, sale, importation, transportation, deposit, storage of harmful waste prohibited and declared unlawful.</td>
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<td>□ The carrying on of the above activity without lawful authority is criminal and shall attract an imprisonment for life and forfeiture of carrier object etc.</td>
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<td>□ Harmful Waste means any injurious, poisonous, toxic or noxious substance and, particular, includes nuclear waste emitting any radioactive substance if the waste is in such quantity, whether with any other consignment or the same or different substances, as to subject any person to the risk of death, fatal injury or incurable impairment of physical and mental health; and the fact that the harmful waste is placed in a container shall not by itself be taken to exclude any risk which might be expected to arise from the harmful waste.</td>
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<td>Factories Act, 1990.</td>
<td>To provide for the registration of factories.</td>
<td>□ Factory to provide healthy facilities for workers and ensure the health of workers.</td>
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<td>To make adequate provisions regarding the safety of workers.</td>
<td>□ Workers welfare should be priority of factory.</td>
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<td>□ Director of Factories to be informed of accidents and industrial diseases.</td>
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<td>□ Vitiation of atmosphere and spread of infectious disease prohibited and punishable</td>
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<td>Landuse Act Cap 202, 1978.</td>
<td>Land administered for the use and common benefit of all Nigerians.</td>
<td>□ All land in urban areas shall be under the control and management of the Governor of each State.</td>
</tr>
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<td>Federal government green revolution programme, 1980</td>
<td>To provide enabling environment for improved agriculture. To provide necessary chemical inputs &amp; mechanical equipment to farmers.</td>
<td>□ Create agricultural extension services in all state ministries of agricultural.</td>
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<td>□ Establish a division in the ministry to support state agricultural development program.</td>
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<td>□ Establish a division of ministry to coordinate funding from donor agencies.</td>
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<tr>
<td>REGULATORY INSTRUMENT</td>
<td>OBJECTIVE</td>
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| Federal gas revolution programme, 2011 | To optimize the advantage of the abundance of natural gas to positively impact on the lives of present and future generations of the Nigerian citizens | □ To provide the necessary infrastructures development for capitalizing the nation’s gas resources  
□ To ensure sustainable electricity delivery for domestic and industrial uses.  
□ Accelerate industrialization by providing cheaper, safer, cleaner and environmentally friendly fuel to industries in the region.  
□ By 2014 to position Nigeria firmly as the undisputed regional hub for natural gas-based industries as fertiliser, petrochemicals and methanol. |
| National Environmental Standards And Regulation Enforcement Agency (NESREA) Act And Regulations: 2009 -2011 | Regulations focused on the protection and sustainable development of the environment and its natural resources. | □ Section 7 provides authority to ensure compliance with environmental laws, local and international, on environment sanitation and pollution prevention and control through monitory and regulatory measures;  
□ Section 8(1) (k) empowers the agency to make and review regulations on air and water quality, effluent limitations, control of harmful substances and other forms of environmental pollution and sanitation;  
□ Section 27 prohibits, without lawful authority, the discharge of hazardous substance into the environment. This offence is punishable under this section, with a fine not exceeding One Million Naira (1,000,000) and an imprisonments term of five (5) years. In the case of a company, there is an additional N 50,000 for every day the offence persists. |
Issuance of permits and licenses to protect the environment from degradation and pollution  
• National Environmental (Construction Sector Regulations), 2011  
To ensure construction activities conducted in an environmental friendly manner  
• National Environmental (Control of Vehicular Emissions from petrol and Diesel Engines) Regulations, 2011  
To ensure prevention and control of vehicular emission.  
• National Environmental (Surface and Ground Water Quality Control) Regulations, 2011  
To ensure protection and pollution of surface and ground water quality.  
• National Environmental (Sanitation and Waste Control) regulation 2009  
To ensure protection of the environment against housekeeping, waste generation and disposal.  
• National Environmental (Ozone Layer Protection) Regulations 2009  
To protect the environment against Ozone depleting substances.  
To prevent the production, use, importation or sale of Ozone depleting substances.  
• National Environmental (Wetlands, River Banks and Lake Shores Protection) Regulations, 2009  
To provide for the wise use of wetlands and their resources;  
• National Environmental (Noise Standards and Control) Regulations, 2009  
Prescribe maximum permissible noise levels.  
Provide for the control of noise and mitigation measures for the reduction of noise.  
Ensure maintenance of healthy environment and psychological well-being of the people. |
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<th>REGULATORY INSTRUMENT</th>
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| Rivers State Environmental Protection Agency Edict Number 2 1994 | - Environmental Protection, biodiversity conservation and sustainable development of Rivers State’s Natural Resources.  
- Establishment of standards and guidelines.  
- Technology Development.  
- Monitor and Control Industrial and hazardous Wastes.  
- Collect effluent discharge fee.  
- Enforcement of Industrial and domestic sewage treatment. | - Power to establish specific environmental standards and guidelines.  
- Power to inspect Industries.  
- ‘Polluter pays’ principles.  
- Any actor that pollutes must report within 48 hours to the Ministry. |
| Noise Control Edict, 1985                                     | - Control of Noise Pollution in the Port Harcourt Metropolis, and elsewhere in the State. | - Power to set noise standards for residential and industrial areas.  
- Power to prosecute violators of noise limits. |
| Rivers State Environmental Sanitation Authority Edict, 1986    | - Regulation of Polices and strategies aimed at promoting environmental hygiene sanitation and facilitating the disposal of refuse and other waste product. | - Power to inspect homes, commercial and industrial outfits.  
- Power to enforce sanitation policies.  
- Power to seal outfit for violating sanitation and hygiene rules. |
| Pollution Compensation Tax Edict, 1994                        | - The Edict required persons who are paid compensation as a result of damage to their land and properties to pay a percentage of it to the Government coffers. | - Power to assess degraded/polluted sites.  
- Power to set fees and payment rates for items destroyed by pollution events. |

4. Description of the Project Environment

4.1 Hydrogeology/Geology
The proposed project site is located within the national grid between Latitude 4°49’N and Longitude 7°6’E. The site is underlain by coastal plain sands, which in this area is overlain by firm – stiff sandy clay sediments belonging to the pleistocene formation. Beneath the sandy clay layer is a deposit of fine-medium dense sand.

4.2 Surface Water
The proposed plant located within EPCL Industrial Complex has Okulu Stream situated on the south eastern end. All effluent discharge from the project area is collected and processed in a waste water treatment plant before draining into a retention pond, which flows via a sluice gate into the Okulu Stream. The water quality of the Okulu stream indicates anthropogenic interferences considering that it is not compliant with the FMENV Water Quality Criteria for surface water defined for Irrigation/ Reuse Standards and Fisheries/Recreation standards. Substantial dredging and sand mining observed on Okulu Stream environment during the field study seem to be the most significant cause of impact.

4.3 Ground Water
The project site which falls in the Niger Delta region is reputed for its very high ground water recharge rate (Present consumption of the EPCL complex is equal to about 1000 m³/hr). Groundwater chemical analyses show the respect of Nigerian maximum permissible limits for all the parameters, exception for pH that is below the tolerated rate. It has to be considered that ground water is acidic in Nigeria delta region, due to high content of dissolved CO₂. The sole source of domestic water supply is shallow boreholes. The water table in the study areas is close to the surface and water can be tapped at 10m in most cases.

4.4 Air Quality/Odour
The results of ambient air monitoring reveal that all pollutant’s levels recorded at all the sites were well below the recommended Nigerian Air Quality Standards and the WHO standards, with the only exception of few
cases of Carbon Monoxide (CO) exceeding values registered in sites outside EPCL complex probably due to traffic flows emission.

4.5 Ambient Noise Level
The EPCL complex is in compliance with the noise exposure limit for workers defined by Nigerian for industrial areas. Noise level measurements at sampling stations highlighted the significant influence of the existent traffic flows in the route Akpajo/Port Harcourt axis.

4.6 Meteorology
Long term air temperature data (Onne meteorological station) shows an average monthly maximum temperature equal to about 31°C and an average minimum temperature with a mean value of about 23 °C. Relative humidity values based on above mentioned historical data show average minimum data equal to about 60% and average maximum data equal to 94%. The prevalent wind direction is South-West with an average wind speed equal to about 3.9 m/s, calms are about 2% of the total hours in the year according to the PSU/NCAR mesoscale Model (MM5) output data. The months of July and September had the highest amount of average rainfall (about 420 – 430 mm per month) while December had the lowest amount (about 30 mm per month).

4.7 Land Use
The nearest habitable communities are actually Aleto, and parts of Agbonchia, and Akpajo because of the rate at which residential and commercial buildings are spreading towards EPCL battery limits. Common land use patterns in the project area are subsistence farming, Residential/Estate Housing, Industrial, transport highways/roads and small scale businesses such as auto-mechanic workshops.

4.8 Soil
Soil texture is mainly sandy loamy with sand particles dominating the aggregates. They are slightly acidic to neutral (pH 4.23 to 6.98) within the complex and 4.72-6.60 in the neighbouring communities. The nutrient content in the soils of the entire area were generally low. This trend can be attributed to the high nutrient fixation and shortened fallow period which is indicative of low soil fertility. The values of metals are low despite this, the iron and manganese concentrations are slightly high indicating that there are pyrites in these soils.

4.9 Aquatic Environment
The abundance and diversity of organism from the Okulu Stream is poor.

4.10 Socio Economic and Cultural Environment
4.10.1 The people of Eleme claim a common ancestry, language and ethnicity. Elelenwo is of Ikwerre origin. The total population of the four settlements surveyed in this study is 65,956 in 2010. The population structure based on a pyramid plot is heavy at the bottom and light at the top. Children (0-14) in the settlements constitute 36 per cent of the population. The working class (15-60) constitute 59 per cent, while old and retired people (> 60) constitute 5 per cent of the population. The largest age cohort is infants aged between 0-4 years and they constitute 16 per cent of the population. There are more male (57%) than female (43%) among the households surveyed in this study. The mean household size is 5, the same as the national average.

4.10.2 The farming system is a limited form of shifting cultivation whereby a land is cleared and cultivated for several years until productivity diminishes; it is then abandoned until natural processes regenerate the soil. The fallow period was up to 7 years about 30 years ago it reduced to about 4 years 10 years ago, but now the farms are rarely left fallow. Farming tools and inputs are also basic. Seedlings are obtained from the previous year’s harvest. Cutlasses, hoes and spade make up the farming tools. Mechanization is non-existent.

4.10.3 Movement from one place to another is by road in the area and major means of transportation is motor, bicycles, 2-stroke tri-cycles (popularly called Keke-NAPEP) and buses. The settlements transport requirements are met by the use of tricycles. In Aleto and Agbor Nchia motor bikes are the most important means of internal transport. Neighbouring communities have both primary and secondary schools. Adult literacy rate in the study communities is over 80 per cent. Energy demand in the study area is for lighting, cooking, and driving machines (including automobile). Electricity supply is intermittent and there
are occasions when they receive only a few hours of it in a week. The petroleum based types are scarce and expensive, for instance, one litre of kerosene costs ₦200 as against the advertised and regulated price of ₦50. A modest bundle of wood cost ₦1, 000 because the bushes from where they are sourced have been significantly depleted.

4.10.4 Majority of the houses are constructed with concrete blocks and roofed with corrugated iron sheets (73 %). Other types of houses reported by respondents are concrete blocks roofed with asbestos (11.6%), earth block and iron sheets (11.6), and the traditional wattle and mud houses roofed with thatch or iron sheets (3.2%). The crowding index is 1.2, that is, a room is available to every 1.2 persons in the study area. Four activities dominate the cultural calendar of communities in the study area namely; wrestling, traditional marriages, new yam festival and dances. Social Affiliation in the societies includes politics, co-operatives, social clubs, education, religion and cultural associations. Dispute over land boundary and ownership is the primary cause of intra and inter communal conflicts in the study settlements. The courts are the main avenue for dispute resolution.

4.11 Health Assessment
The principal communicable diseases in the area are Malaria, Diarrhoea, skin rashes, upper respiratory tract infections and STIs. While prevalent non-communicable diseases in the area are hypertension, food poisoning and occupational injury.

4.12 Vegetation and Wildlife
The entire environment of the area in the vicinity of EPCL complex can be divided into the following vegetation types:
- Grasses, weeds and Herbaceous vegetation by the lawn bordering the cement walled fence of EPCL complex and all other lawns within the industrial complex,
- Farmlands vegetation, mainly cassava based;
- Bush fallow lands vegetation;
- Bank side vegetation along fresh water body in Agbonchia;
- Bank side vegetation along Okulu stream in Aleto;
- Ornamental and other aesthetic plants, planted within EPCL complex and along the dual carriageway leading into the complex;
- Okulu stream Wet Land.
Wildlife in the vicinity of EPCL complex includes grass cutter, porcupine, giant rat and snails. Also squirrels and birds, which also play an important role in the seeds dispersal hence propagation of oil palm trees in the ecosystem.

5. Project Alternatives
Availability of raw material and location were the most critical factors in determining the project options. Therefore there were not many alternatives; the two considered were the current project and the do nothing options. The “do-nothing” option as the title imply involves abandoning the idea of building the new plants. This option is anti-progressive and would be detrimental to the nation’s policy on Agriculture, and Food Security in addition to national economy. It will perpetuate the situation where importation of the chemicals will be the only means of satisfying agriculture and chemical industrial sectors. The option would also deny the host communities the huge benefit of acquiring skills and empowerment. Therefore it was discarded.

Alternatives were also considered in terms of raw materials. The usage of natural gas as major feed for the production of Ammonia and Urea was considered more cost beneficial and environmentally friendly than the usage of other raw materials, such as coal and biomass. Alternatives were also considered in terms of location, the EPCL complex already has power, water, wastewater treatment facilities, storage facilities, adequate and available manpower and technology; therefore it was more environmentally friendly to consider it rather than virgin land.
6. Potential Impacts and Mitigation/Enhancement Measures

By the virtue of the identified impacts, prior the beginning of each project phase, the proponent is committed to implement dedicated mitigation/compensation measures to ensure that the project will be sustainable. A dedicated action plan has been prepared in this regard.

6.1 Construction Stage

The project will result in social benefits in terms of jobs for the local communities; induced secondary development in the area; increased cash flow and stimulation of local economy within the host community and localized economic benefits from materials supplies by local contractors. These benefits will cut across all three developmental stages (construction, operation and decommissioning).

The project is likely to result in an influx of job seekers hence likelihood of conflicts, disturbance in family structures and increase in diseases. This will be controlled through a memorandum of understanding that has already been signed and includes issues such as commitment on giving jobs to the local communities and coupling it with health and hygiene awareness training. The communities will also have access to micro lending so as to ensure they are economically empowered. Increased activity in the area including more people may affect biodiversity hence awareness and training for both communities and workers on basic environmental issues and health and safety issues will be conducted periodically.

Increased activity and traffic will result in noise, dust and other air emissions including increased number of road accidents. Monitoring for volatile organic carbons (VOCs) and dust is already in place and more sampling stations will be increased based on risk profiles. Furthermore emissions including that of carbon monoxide will be controlled through the use of clean energy and machinery that are periodically maintained. Dust emissions will also be controlled through spraying with water. This kind of development will include increased hazardous substances in the form of raw materials and waste in the area and their spillage could result in pollution of soil and water. This will be minimised through the use of dedicated storage and containerisation. For waste there is a waste management plan for the complex in line with international organisation for standards (ISO 14001); moreover the majority of the waste during construction will be inert waste that can be used for site filling without any negative impact.

Excavations will likely result in the introduction of invasive alien species and soil erosion; but due to the location of the site it will be of very little significance because it can be minimised or totally avoided. The development will not have significant visual impacts as the area is an already build up industrial area. Minor impacts on wildlife are expected and time limited, associated to diurnal hours. Current fruition of the existing fauna will not change.

6.2 Operation & Maintenance Stage

During operation & Maintenance phase IEFCL will put in place all the necessary measures to ensure health of workers and environmental safeguard and to minimize the risk of possible incidental events. No significant effects are expected on air quality during operation phase, since the pollutants concentrations at ground level due to EPCL complex after the operation of the new Fertilizer plants will be in compliance with air quality regulatory/standards guidelines and with occupational exposure limit values. No cases of odour annoyance are expected due to increase of Ammonia (\(\text{NH}_3\)) emission. Moreover, fugitive emissions and emissions that can occur in abnormal conditions (e.g. emissions from ammonia storage flare) will be managed by a dedicated Management System. Night-time vehicular movements will be minimized up to extent possible. IEFCL will ensure that the operation of the new plants will be in accordance with applicable regulations on noise levels. Water effluent going to existing retention pond and to Okulu Stream will increase due to the operation of the new Fertilizer Plant. This is not likely to generate an additional deterioration of surface water and its hydrobiology/sediment because compliance with regulatory limits at discharge point will be monitored. As a
consequence, no variation in existing surface water quality likely to modify the characteristics of surrounding vegetation is expected. The new project will determine an increase in ground water consumption without affecting the ground water recharge rate and the existing ground water flows as the boreholes will be pumped based on pumping tests results to protect the aquifers.

As per construction phase, risk of ground water/soil contamination due to accidental spills during operation and maintenance will be minimized through the adoption of dedicated management measures. Substantial dredging and sand mining are not related to the project but result from local population actions. The project is taking stringent measures to avoid cumulative impacts. All effluent generated by the fertilizer plant will be treated in a dedicated waste water treatment plant prior to collection in a holding pond with a neutralizing facility. Sanitary waste generated from the fertilizer plant will be treated through the existing waste water treatment plant along with the sanitary waste for the entire complex. The treated sanitary waste and the treated effluent from the fertilizer plant will ultimately be collected in the existing waste water treatment plant holding pond prior to discharge into the Okulu stream. The new project will determine an increase in ground water consumption from current 1000 m3/h to 1750 m3/h expected. This increment will not affect negatively the ground water potential recharge rate and ground water flows. Besides, Risk of ground water contamination due to accidental spills is minor due to designated areas for storage, decanting, loading and offloading etc..

The project does not have negative health impacts on host communities around EPCL complex. The same population increment by the near host communities will be managed in a proper manner to safeguard the health of host communities deriving from possible exposure to infective/transmissible diseases. During the operation phase IEFCL will dispose of EPCL residential facilities inside the complex for all employees. Also an acceptable increase of vehicular traffic is expected and will be adequately managed in order to minimize possible socio economic impacts and potential & associated hazards. There are no socio-economic activities that are going to be negatively affected by the project and the installation of new units will not interfere with cultural/social elements present in the study of area. The initiative will not modify the existing microclimatic conditions of the site considering also the expected increment of aqueous vapour emissions in atmosphere from cooling towers. Concerning CO₂ emissions, it is worth noticing that the project will use natural gas as raw material, energy resource that it is currently unused and that would be flared as alternative with CO₂ emissions already associated.

6.3 Decommissioning phase
At the end of the life span of the project, or otherwise, if proponent and or government decides to decommission the project, a plan would be drawn by the proponent and approved by all concerned (regulators and stakeholders) before execution. Any possible measures will be taken in order to ensure health of workers and environmental safeguards and to minimize the risk of possible incidental events during decommissioning phase. IEFCL commits itself to restoring environmental conditions existing before the realization of the Fertilizer Plant project.

7. Environmental Hazard Management
IEFCL will adopt an Occupational Health and Safety management plan in order to protect their worker from occupational hazards. A contingency/emergency plan will be compiled to ensure that all employees are capable of acting in an emergency so as to protect human life and property. The emergency plan will include security, spills or leakage of hazardous substances, fire and explosion, etc. Furthermore, a hazard identification (HAZID) exercise, hazard and operability (HAZOP) studies and Quantitative Risk Analysis (QRA) have been compiled.
# 8. Monitoring Program

<table>
<thead>
<tr>
<th>Environmental Components</th>
<th>Indicator Parameters</th>
<th>Frequency¹</th>
<th>Location</th>
<th>Responsibility</th>
<th>Remarks/Responsible Regulatory Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use</td>
<td>Waste production</td>
<td>Yearly</td>
<td>Project site</td>
<td>Third Party (Environmental Consultants)</td>
<td>Yearly report to FMENV, RSMENV and NESREA</td>
</tr>
<tr>
<td>Noise</td>
<td>Sound pressure</td>
<td>Yearly</td>
<td>Project site and generator area (in-house daily) EPCL Fence perimeter, communities</td>
<td>Third Party (Environmental Consultants)</td>
<td>Yearly report to FMENV, RSMENV &amp; NESREA</td>
</tr>
<tr>
<td>Climate</td>
<td>Macro/micro climatic data</td>
<td>Yearly</td>
<td>Within project site</td>
<td>Third Party (Environmental Consultants)</td>
<td>Yearly report to FMENV, RSMENV &amp; NESREA</td>
</tr>
</tbody>
</table>
| Stack emission           | SOx; NOx; SPM; PM10; NH₃; CO₂ | Quarterly | Point sources:  
  • Boiler stack: NOₓ, SOₓ;  
  • Reformer stack: NOₓ, SOₓ;  
  • Granulator: SPM, PM10, NH₃ | Third Party (Environmental Consultants) | Quarterly report to FMENV, RSMENV & NESREA |
| Vegetation/wildlife      | Record of vegetation/ wildlife status | Yearly | Around the project site | Third Party (Environmental Consultants) | Yearly report to FMENV, RSMENV & NESREA |
| Air Quality /Odour (ground level pollutants concentration) | NH₃, SPM, PM10, NOx, SOx | Monthly | Plant site and selected community based stations (4 no.) | EPCL Environment Department | Quarterly report to FMENV, RSMENV & NESREA |
| Surface Water Quality   | DO, Nutrient Content, NH₃, NO₃, Methanol, Amines, pH, BOD, Heavy metals, Hydrocarbons | Monthly | Surface water along Okulu stream upstream and downstream IEFCL complex discharge point | ♦ EPCL Environment Department  
♦ Third Party (E&S Consultants) | Quarterly report to FMENV, RSMENV & NESREA |
| Ground Water Quality    | NH₃, NO₃, CH₃OH, Amines, pH, BOD, Heavy metals, Hydrocarbons | Yearly     | At least three (3) bore holes strategically located will be used as monitoring wells. | ♦ EPCL Environment Department  
♦ Third Party (E&S Consultants) | Yearly report to FMENV, RSMENV & NESREA |
| Sediment Quality        | pH, Heavy metals, concentration, Hydrocarbons | Yearly     | Along Okulu stream and retention pond | ♦ EPCL Env. Department  
♦ Third Party (E&S Consultants) | Yearly report to FMENV, RSMENV, NESREA |
| Waste water -1          | pH, BOD, COD, Heavy metals, TSS, TDS, Oil and grease, NH₃, Cl, etc. as it relates to Fertilizer production specified in FEPA 1991  
♦ PH, Oil & | ♦ Monthly | Discharge point | ♦ Third Party (Environmental Consultants) | ♦ Quarterly report to FMENV, RSMENV & NESREA |
| Waste water -2          | ♦ Daily | ♦ Plant level from fertilizer plant | EPCL QAQC | ♦ EPCL QAQC | Quarterly report to NESREA, FNEMV & RSMENV |
| Waste water -3          | ♦ Daily | ♦ Plant level entire complex | EPCL QAQC | | |

¹ The duration of all environmental components monitoring will continue through the life cycle of the project.
<table>
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<tr>
<th>Environmental Components</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grease, Ammonia</td>
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<tr>
<td></td>
<td>PH, Oil &amp; Grease, Ammonia</td>
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<tr>
<td>Hydrobiology</td>
<td>Diversity and abundance of organisms</td>
<td>Yearly</td>
<td>Surface water along Okulu stream upstream and downstream EPCL complex discharge point</td>
<td>EPCL Environment Department, Third Party (E&amp;S Consultants)</td>
<td>EPCL, FMENV, RSMENV, NESREA</td>
</tr>
<tr>
<td>Socio-economics and Community Health</td>
<td>Population, Health status, Infrastructural and Community Development and Assisted Projects, Number of Employed youths from the communities</td>
<td>Yearly</td>
<td>Host Communities</td>
<td>EPCL Community Relation Department and Public Affairs Unit, Third Party (Environmenal &amp; Socio-economic Consultants)</td>
<td>EPCL, RSMENV, NESREA</td>
</tr>
</tbody>
</table>

**DECOMMISSIONING**

<table>
<thead>
<tr>
<th>All affected Environmental Components</th>
<th>All agreed parameters</th>
<th>EPCL Environmental Department</th>
<th>Decommissioning &amp; Closure plan will be executed after successful discussion with all affected Regulatory Agency</th>
</tr>
</thead>
</table>

**9. Public Consultations and Public Disclosure**

**9.1 Stakeholders:**

There is a guideline for community / stakeholder management that outlines the EPC Contractor and subcontractor’s responsibilities for those employed in the construction of the fertilizer plant with regards to community engagement and community social responsibility projects. The framework for stakeholder and community engagement that currently exists for IEPL will be extended to the fertilizer plant element of the Project. The Guidelines set out the requirements for the engagement of manpower and also state that EPC Contractors and sub-contractors must comply with the Sponsor’s community affairs policies, including a Memorandum of Understanding (MOU) with local communities (as discussed in Section 4.3.7). All community engagement is organised by the Sponsor’s Community Liaison Officer (CLO). A PAC exists to deal with stakeholder engagement and project grievances for the entire complex. Contractors working on the fertilizer plant will be required to maintain communication through the PAC. The PAC includes members of the six host communities, local government council and a representative for the King of Eleme (the head of the council of chiefs made up of leaders of ten clans that are located in the Eleme local government area). The PAC is headed by the Commissioner for Chieftaincy, Community Affairs and Local Government.
9.2 Disclosure of Information
Project information has been disclosed in advance of all public consultation activities in the form of information leaflets provided in the English language called ‘Briefing Documents for Public Forum’. Public consultation activities have been held. These leaflets state the aim of the development, any possible benefits and negative effects and an indication of future consultation. Information has also been disclosed to local communities through their representatives who are on the PAC. These representatives are the main contact for local residents to address any grievances.

9.3 Consultation
The sponsor has carried out consultations in the form of public forums and stakeholder interviews. The public meetings included discussions of possible benefits and negative effects of the project, and stakeholders were able to give their views on the project and ask any questions relating to it. Stakeholders at the public forums included representatives of the King of Eleme, local government, youth leaders, women’s leaders and officials of the FMENV of Abuja, the Rivers State Ministry of the Environment and the Police. The forums and meetings were held in English, and minutes of meetings were taken. The ESIA concludes that consultations for the fertilizer plant are in compliance with these national standards. Main concerns for stakeholders can be summarised as follows: (i) the wish to be gainfully employed at all stages of the project; (ii) the necessity to have measures to protect the community from all forms of negative environmental impact; and (iii) Improvement in the asset base of the communities through infrastructural projects should be considered by the proponents. The project sponsors responded to these concerns by stating that:

- The proposed project does not involve any new land take.
- The project will have to support the subsistence farming of host community as well as to improve agriculture potential & food security of the nation.
- The project will help to fulfil partially the high unemployment rate of local government area by providing direct and indirect employment for the young men & women of the area.
- Full ESIA following international standards has been carried out
- Project sponsor has an annual budget of Naira 90 million for CSR and infrastructural improvement

9.4 External Communications
The PAC meets quarterly to discuss project components and community grievances. These meetings are also used to inform PAC members about the progress of proposed projects such as the fertilizer plant. They also hold emergency meetings if the need arises. In 2012 meetings were held on 22 March 2012 and 03 July 2012. At these meetings IEPL is provided with external communications from the public and the meetings are considered a proactive and established process through which IEPL can interface with the community. IEPL does not have an existing, formal grievance mechanism that has been disclosed to communities; however every host village has three democratically elected representatives that sit on the PAC. These representatives are informed of grievances by members of their local communities who bring them to the quarterly PAC meetings for discussion. Minutes of all PAC meetings are maintained and we were provided with examples for review.
10. Complementary Initiatives
The company has set up mobile clinics in collaboration with local government Council for free consultation, diagnosis, provision of drugs for various ailments like malaria, diabetes, hypertensions etc., IEFCL will abide by all Memorandums Of Understanding (MOUs) signed with the host communities providing: (i) Building of/arrangements to educational/health facilities and (ii) Access to micro credit system and merit scholarships for members of the communities. Also, immediate development plans will include:

- **Health Program**:  
  - Eye treatment campaign & health awareness campaign;  
  - Initiatives to Augment Community health centres

- **Educational Development Program**:  
  - Institutionalize scholarships for meritorious candidates;  
  - Enhance Infrastructure in host community primary schools  
  - Construction of computer training center for indigene youth

- **Youth Empowerment Program**:  
  - Promotion of vocational training and  
  - Establishment of computer training centers.

11. Conclusion:
Evaluation of ESIA data, found that the project is environmentally feasible and will not cause serious effect to the environment, provided that the existing and proposed mitigation and compensation measures are implemented. Residual issues associated with the project are expected to be minor and not likely to have long-term significance on the environment. A Pipeline ESIA has not yet been completed although ESIA activities are in progress with preliminary field work completed for the wet season. Ecological surveys and laboratory analysis of life samples are required during both wet and dry seasons and the dry season is scheduled for commencement in October 2012 hence completion expected in early 2013. The ESIA for the Jetty (though outside the scope of the AfDB transaction) is complete and the two components (pipeline and jetty) are expected to be of a less stringent category due to limited impacts. The complete ESIA for the pipeline will be approved by the AfDB Environment and Social Safeguards Division and will be a condition precedent for first disbursement. One other condition precedent for first disbursement will be approval by Safeguards of a cumulative impact study for all the three components combined and in addition to the existing and planned activities in the project areas.

12. References and Contacts
12.1 AfD’s Public & Private Sector Operations 2001, Environmental and Social Assessment Procedure.
12.2 Final EIA Report by Foster Wheeler.
12.3 Contacts:
   i. **Kurt Lonsway**, Manager, Environment and Climate Change Division, African Development Bank, BP 323, Tunis 1002, Tunisia. Email: k.lonsway@afdb.org. Tel.: +216 7110 3313.
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   iii. **Ousmane Fall**, Senior Investment Officer, Private Sector 2, African Development Bank, BP 323, Tunis 1002, Tunisia. Email: o.s.fall@afdb.org. Tel.: +216 7110 3820