



FINAL REPORT

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE CONSTRUCTION OF AGRO-CARGO TERMINAL AND WAREHOUSE AT BODINGA, SOKOTO STATE.

**BY
SOKOTO STATE GOVERNMENT**

Submitted to

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Final ESIA Report on Agro Cargo Terminal and Warehouse in Sokoto

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Finally, we would like to express our deep appreciation to the Federal and State Ministries of Environment for their regulatory support and guidance throughout the study.

We look forward to the implementation of this project with the expectation that it will significantly improve the livelihoods of millions of people in the State.



LIST OF ABBREVIATION AND ACRONYMS

BAT	Best Available Technology
dB	Decibel
EA	Environmental Audit
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
HIV/AIDS	Human Immuno-deficiency Virus/Acquired Immune Deficiency Syndrome
HSE	Health Safety and Environment
NGO	Non-governmental Organization
NOx	Nitrous Oxide
OD	Operational Directives (of the World Bank)
OP	Operational Policy
OS	Operational Safeguard
OSHA	Occupation Safety and Health Association
PAP	Project Affected Persons
PM	Particulate matter
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
ROW	Right of Way
SOx	Sulphur oxides
SPM	Suspended Particulate Matter
STI	Sexually Transmitted Infections
TDS	Total Dissolved Solids
ToR	Terms of Reference
TSP	Total Suspended Particulate
VOC	Volatile Organic Compounds



UNITS OF MEASUREMENT

%	Percentage
µg	Microgramme
µm	micrometer
µS	micro Siemen
Cfu/ml	Colony forming unit per milliliter
cm	Centimeter
dB	Decibel
Ft	Feet
g	Gram
G/cm	Gram per Centimeter
K	Kilogramme
Km	Kilometer
M	Meter
M/s	Meter per Second
M ³	Meter Cube
Meq	Milliequivalent
Mg	Milligramme
Mg/Kg	Milligramme per Kilogramme
Mg/l	Milligramme per Litre
ml	Millilitre
Mm	Millimetre
NTU	Nephelometric Turbidity Unit
O/oo	Parts per thousand
ON	Degree North
PH	Hydrogen ion concentration
Ppb	parts per billion
Ppm	parts per million
°C	Degrees Celsius



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EXECUTIVE SUMMARY

ES.01 Background Information

In fulfillment of the African Development Bank Standards and the Federal Government of Nigeria Policies that guarantee safeguarding lives, and properties and good environmental management practices in Nigeria, an Environmental and Social Impact Assessment (ESIA) of the proposed Agro Cargo Terminal at Sultan Abubakar III International Airport, Sokoto have been undertaken by ENARMAC Nigeria Limited on behalf of the proponent (Sokoto State Government). The study leveraged on the EIA for the construction of 200,000tpa Fertilizer Blending Plant Project at Kalambiana, in Wamakko Local Government Area Sokoto State. The project which was finalised 2021 was used to support the one season data collected between 20-25 September 2021 to establish the environmental baseline condition of the study area.

Specifically, the ESIA was conducted in compliance with the Federal Ministry of Environment (FMEnv) Environmental Impact Assessment Act 86 of 1992 (codified as EIA Act CAP E12 LFN2004), the EIA Procedural Guideline (1995) and Sectoral Guideline on Infrastructure (1995) and the requirement of the extant laws for any development approval.

ESO.2 Project Location

The project will be located in Wamako Local Government Area of Sokoto State, Nigeria. The proposed site lies between geographic latitude 13° 03' N and longitude 5° 14' E. The total land take for the project is over 20 hectares. The site is also bounded by Sultan Abubakar III International Airport, Sokoto to the south.

ES0.3 Objectives of the ESIA

In line with the statutory requirements for environmental protection in Nigeria, the ESIA Study is being carried out to:

- Satisfy Federal, State and Local Governments as well as stakeholders, that proactive environmental actions shall be incorporated in the project design, installation, construction, and operation phases.
- Ensure proper consultations with the communities within the project area in line with regulatory requirement.
- Provide all necessary answers to stakeholders, assessors, host community, regulators, financiers, pressure groups and other interested parties.
- Establish existing baseline (biological, physical, and socio-economic) conditions of the project location.
- Identify all environmental and social aspects of the proposed project that may interact positively or negatively with the environment.



- Make appropriate recommendations to prevent, reduce or control identified potential and other associated negative impacts, and Identify opportunities to enhance positive impacts and project benefits.
- Develop environmental, social management plan (ESMP) and procedures for effective and proactive environmental management of the environment throughout the project life cycle; and
- Provide all necessary data, information and objective evidence required for developing an Environmental Impact Statement (EIS) for the proposed Project.

ES0.4 Legal and Institutional Framework

This section identifies the environmental performance standards that will be used in the environmental analysis to assess changes in the existing condition of resources due to the proposed project. The regulatory agencies and their corresponding jurisdictional limits regarding the project were reviewed. Some of the laws includes states, national and international laws and conventions that are relevant to the proposed project activities and environment especially the AfDB Integrated Safeguards System.

The highlights of some of the laws are as follows.

- The Environmental Impact Assessment Act CAP E12 LFN 2004
- National Environmental Protection (Pollution Abatement in Industries and Facilities Generating Waste) Regulation (S.I.9) of 1991
- Federal Ministry of Environment (FMEnv) National Guidelines for Environmental Audit in Nigeria 1999.
- Federal Airport Authority of Nigeria (FAAN) Act 1996 Cap F5
- Nigerian Civil Aviation Authority (NCAA) Repeat and Re-enactment Act 2006
- National Environmental (Construction Sector) Regulations, 2010. S.I. 19
- Standards Organisation of Nigeria Act, 2015
- Forestry Law, CAP 51, 1994
- Employee's Comprehension Act, 2010
- Land Use Act CAP 202 LFN 1990
- Nigeria's National Health 2014 Act 2014 (NHA)
- National Environmental Standards and Regulation Enforcement Agency (NESREA) Act 25 of 2007
- National Policy on the Environment Revised 2016
- Sokoto State Environmental Protection Agency (SEPA)

The following international requirements and standards have been considered within the ESIA process and are described below:

- Equator principles (EP)
- World Bank's environmental and social safeguard policies.



- IFC Performance Standards on Environmental and Social Sustainability
- United Nations Guiding Principles on the Human Environment
- The Rio Declaration on Environment and Development
- World Bank Group General Environmental, Health and Safety Guidelines (EHS)

ES 0.5 PROJECT JUSTIFICATION

The proposed Agro-cargo terminal at Sultan Abubakar III International Airport, Sokoto is needed to provide access to efficient, speed, reliability, cost effectiveness transportation of perishable commodities under controlled conditions to third party business and end users/ consumers. The State is endowed with huge and fertile arable land that enhanced large production of crops like: Onion, Sesame, Garlic and Livestock. However, some of these items are perishables that easily got damage on transits. With the establishment of the Agro-cargo terminal, this lost would be controlled or significantly minimized. Thus, people from adjoining states and neighboring countries will also get easy distribution of these commodities.

ES.0.6 Value of the Project

The total estimated project cost, net of taxes and duties is USD 24.5 million. This will be financed by an AfDB Loan of USD23.275million constituting 95% of total project costs and State Government contribution in cash or in kind of USD 01.225 million (i.e., 5% of total project costs). This will be discussed and agreed upon during the preparation and/or appraisal missions. Economically and socially, the project is of immense value considering that it has the potential to stimulate growth in the agricultural sector because of assurance of expanded market access. This has the potential of stabilisation of the rural economy thereby reducing rural urban migration and crime potential especially banditry and other petty crimes.

ES.07 Need for the Project

The proposed Agro-cargo terminal at Sultan Abubakar III International Airport, Sokoto is needed to provide access to efficient, speed, reliability, cost effectiveness transportation of perishable commodities under controlled conditions to third party business and end users/ consumers. The State is endowed with huge and fertile arable land that enhanced large production of crops like: Onion, Sesame, Garlic and Livestock. However, some of these items are perishables that easily got damage on transits. With the establishment of the Agro-cargo terminal, this lost would be controlled or significantly minimized. Thus, people from adjoining states and neighboring countries will also get easy distribution of these commodities.

ES.08 Benefits of the Project

The proposed project will among others increase farmers' income, enhance job creation, contribute in poverty reduction, provide export opportunities and reduced vulnerability for smallholder farmers and enhance foreign exchange earnings on sustainable basis.



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As a direct benefit of the project, there will also be an overall increase in revenue generation at the local, state and national level. Various taxes and charges will be paid by passengers, freight, and airline operators to the government, while personnel employed by the proposed project will earn salaries and emoluments, which will increase their purchasing power and lead to improved economic conditions within and around the project area.

As part of project implementation, local personnel will be trained in the operation and maintenance of the aspect of the proposed project, thus, this will lead to the acquisition of new skills by local technicians and engineers, and the eventual transfer of advanced technology. This will improve Nigeria's pool of skilled personnel and prompt development in the country.

As a result of the proposed project, several value-added developments are likely to spring up in the immediate project area. Banks, schools, hospitals, recreational and hospitality facilities etc, will spring up among within and around the project area. In addition, other ancillary facilities that deals in materials that are routinely used in the civil construction sector, including stationeries, household items that are required by project workers, clients etc. will spring up and engender an economic boom within host communities.

ES.0.9 Envisaged Sustainability

The envisaged sustainability of the proposed Agro-cargo terminal at Sultan Abubakar III International Airport is discussed under technical sustainability, social sustainability, Economic sustainability, and Environmental sustainability.

The project shall equally be managed by experienced experts who are well vast in the aviation technology. The installation of equipment will be done following internationally approved standards such that the proposed projects do not have much negative effect on the host community. Furthermore, Sokoto State Government has indicated its desire to technical sustainable of the project by ensuring that Best Available Technology (BAT) is adopted in the design, construction, and operational phases of the project.

The proposed project will achieve social sustainability in that it will not only provide employment for the indigenes of the host communities at the pre- construction, construction, and operation phase, but also create room for the training and retraining of the project personnel. Furthermore, the proposed project will result in the provision of certain social infrastructures and amenities such as road, water, healthcare, and educational support etc. Above all, the engagement doors of the project will be open to all stakeholders at all stages/ phases of the project.

Air Cargo globally is seen as a very efficient option to other modes of transport especially when it comes to perishable commodities such as vegetables, root, and tuber crops. Whereas transportation by sea will take several weeks before arrival, air movement is guaranteed within hours. Sokoto State is



one of the major perishable crops producing states in Nigeria especially through the various irrigation schemes spread across the state. This guarantees that there will always be cargo available for transportation out of the state to other destinations within and around the Nigerian nation. This means that the project will in no distant time recover its cost, thus confirming its economic sustainability.

The project will be implemented and operated in accordance with guidelines and recommended best practices of the Federal Ministry of Environment (FMEnv), Federal Ministry of Aviation, and that of other international environmental organizations such as United Nations Environment Programme (UNEP), Intergovernmental Panel on Climate Change (IPCC), Global Environment Facility (GEF) and so on. The environmental aspects of the project shall be given accurate attention to ensure the environment is protected during the project implementation and operation. The integration of the findings and recommendations of this ESIA study into the various phases of the project will to a very large extent see to its environmental sustainability.

ES 10 Project Alternatives

Alternative Technology Option

The project will be constructed using modern, locally, and internationally accepted materials by Standards Organization of Nigeria (SON) to achieve public health, safety, security, and environmental aesthetic requirements. Equipment and systems that save resources including energy and use of solar systems, water conservation will be given priority without compromising on cost or availability factors.

Asphalt mixers, crushers and other construction equipment and machineries will be equipped with pollution control devices like dust arrestors/precipitators, emission control, noise abatement devices and desulfurization devices. The equipment and vehicles will have highest levels of combustion efficiency, capability to use cleaner fuels like biodiesel and will have enhanced safety features.

Project Options

In accordance with the requirements of EIA procedural guideline several alternatives have been considered during the conceptualization of the proposed Project design. This section describes the various project concepts that were considered and the rationale for the selected alternatives. This section also discusses the alternatives with respect to location, technical and environmental considerations. The consideration of the main alternatives in respect of the proposed project was undertaken jointly by the respective stakeholder's input and has occurred throughout an extensive and coordinated decision-making process, over a considerable period. Project alternatives analysis in environmental assessment is designed to bring environmental and social considerations into project selection at the early stages of project planning, and the later stages of site selection, design, and



implementation. The project options took cognizance of environmental, safety and operational considerations. These include the no-project option, delayed project, modified project option, and/ or the planned option.

Do Nothing Option

This means the project will not be implemented. This option will reduce and stunt effective economy and Agro allied business development of the state and the nation. The vision of quick intervention in the distribution of some perishable cash crops will not be met. Thus, the "zero action" alternative by not implementing the project will not contribute to the social economic benefits envisaged in the plan.

The 'Delayed' Option

This option implies that the planned project will be delayed until a much later date. Such option is usually taken when conditions are unfavourable to project implementation such as in war situation, or where the host community is deeply resentful of the project. Also, if the prevailing economic climate is not quite favourable to the project, then delayed project option may be feasible. None of these conditions is applicable. Indeed, the social, economic and the political environment are most favourably disposed towards the project. Therefore, the implication of delayed project option will mean that all the preliminary work and associated efforts/ costs incurred would have come to nothing. Also, because of inflationary trends, such a delay may result in unanticipated increase in project costs, which may affect the final profit from the project. These, and other related problems make impracticable to adopt the delayed option. It is therefore unattractive to adopt the "Delayed Project" option.

The Project Option

The proposed Agro-cargo terminal at Sultan Abubakar III International Airport offering enormous support to the agro allied businesses mentioned in section 2.1 above. The option of project development is thus the best of all the possible options considered economically, technologically, logistically, and environmentally. During the proposed project design development, alternatives were considered in compliance with the requirements of Nigeria's EIA procedures together with international best practices.

ES0.11PROJECT DESCRIPTION

The Agro-Cargo Terminal would be constructed within Sultan Abubakar III International Airport, Sokoto. Various state of the art Agro-Cargo facilities would be employed to enhance the transportation of the abundant agricultural products to international markets. Apart from agricultural produce, the



terminal would serve as a means of transporting livestock products. The terminal would be a model in the North for Nigeria and may not only serve for the transportations of agricultural products, but Medicaments especially in this era of COVID-19 pandemic since cool storage facilities are scarce in most Sub-Saharan Africa.

ES.12 Project Components:

This project has four major (4) components that cover its activities, thus:

Establishment of Agro-Cargo Terminal and Warehouse Storage Facilities

Establishment of Agro-Cargo Terminal and Construction and equipping of modern warehouse facilities: This component include activities such as identifying, developing, and establishing the storage facilities in the terminal, cool chain system, procurement of delivery vans, modern warehouse. The Agro-Cargo Terminal would provide the nucleus for the major Value-Chain addition activities of the selected value chain commodities. The terminal would offer associated public economic infrastructure, logistics and specialized facilities and services (e.g., electricity, water, cold-chain facilities, laboratory and certification services, business services, ICT, waste treatment, etc.) required for Agro-Industrial activities.

Support to Enterprises Development and Marketing Strategies:

This component has two sub-components: 2.1) Support for the formation and strengthening of value-chain aggregation centers, 2.2) Support for the identification of markets and ICT development. This includes activities to support MSMEs participation in value-chain activities. The development would enhance productivity and infrastructures at the farm level (agricultural production) infrastructure in agribusiness levels. Essentially this will include sorting, grading and storage systems, development of new and rehabilitation of old storage facilities to guarantee optimum and all-year-round production, development of crop-base farming schemes. targeted policies, laws, rules, and regulations to address the inefficiencies and resultant rent-seeking activities in the supply of authentic quality agricultural products, crop protection products (CPPs), handling and management of products, agricultural working capital, post-harvest handling, storage, transportation, and quality control. Support the building of capacity and skills for agri-business development and support to Climate Smart Agriculture. Training for Small and Medium Enterprises. (c) Support to women and youth.

Capacity Building, Information and Communication

Capacity building training to Project Staff, and other key project Stakeholders. Capacity-building support to farmers, youth, women, and other stakeholders with emphasis on organizing them into viable small farming cooperatives, strengthening linkages between farmers, agro-dealers, processing



firms and other private sector participants to develop contracts for agreed quantity and quality of outputs towards market-oriented production. Provision of capacity building training on agricultural entrepreneurship (crops food processing, packaging, and marketing, among others). The project will deploy and support the use of ICT applications by the youth in accessing production knowledge and output markets of the key selected crops. The component will also use resources to fund group mobilization and sensitization; community relations, training of farmer groups and other stakeholders on facilitation of links between farmer groups and processors, agro-dealers, and other private operators; the project will also fund the provision of media communication production programs, including information on marketing. Partnership with ministry of information/existing communication agencies will be explored.

Project Management:

This component would be responsible for the establishment of enabling institutions, policy, regulatory and business environment framework for agribusiness through the implementation of the following: a) developing/strengthening of enabling policy, legislation, and regulation for Agro-Value Chain addition; b) capacity building (internal and external) for staff of relevant public institutions; c) enabling business environment and relevant incentives to support private sector investments including one-stop shops, infrastructure, customs office, immigration support, etc) in the Agro-Cargo Terminal and day – to – day running of the project (i.e overheads administrative and other logistics). The component will also include Monitoring and Evaluation Unit, Fiduciary Management, and environmental and social safeguards.

ES.13 Project Life Span

It is envisaged that this project will last for 30years when commissioned for use. During this period, if this technology is not overtaken by a more sustainable one, a general technical assessment of the project will be carried out, with recommendations for either decommissioning or a total overhaul.

ES.14 Project timeline

The overall conceptual project implementation schedule for the Pre-construction, Construction and commissioning Phase of the Project is illustrated in the Ganth Chart (see **Table 3.3**): The project construction is expected to last from the third quarter of 2020 to the second quarter of 2021.

ES.15 Baseline Description

The baseline status of the project area was obtained through review of relevant literature and a one season field data gathering. Pre-mobilisation work meetings were held twice; virtual and physical to discuss with the consultants on the scope of work, sampling strategies, remuneration and security issues in the study area. The one season data gathering undertaken between 20-25 September 2021.



Over 38 including controls from 19 locations. 2 groundwater and 19 air/noise. The samples were adequately preserved at taken to Annal Concept laboratory in Port Harcourt for analysis.

Climate encompasses the statistics of temperature, humidity, atmospheric pressure, wind, rainfall, atmospheric particle count and other meteorological elements in each region over long periods of time. The climate of a location is affected by its latitude, terrain, altitude, as well as nearby water body and their currents. Climates can be classified according to the average and typical ranges of different variables, most commonly temperature and rainfall. The climate of Nigeria is characterised by two regimes-the dry season and the wet season. These are dependent on two prevailing air-masses blowing over the country at different times of the year: the north-easterly air mass of Sahara origin (the tropical continental air mass) and the humid maritime air-mass blowing from the Atlantic (the tropical maritime air mass). The two air masses blowing from nearly opposite directions meet along a slanting surface (the Inter-Tropical Front). The area about this front, where the air masses to some extent mix, is called the inter-tropical discontinuity (ITD) or the inter-tropical convergence zone (ITCZ). This zone moves north and south with the front depending on which air mass gains ground over the other. The influence of the north-easterly air-mass causes dry season while that of the humid maritime air-mass causes the rainy season.

The project area is within the tropics, it is dominated by two contrasting seasons, the dry and wet (rainy) seasons. The two season regimes are dependent on the two prevailing air masse blowing across the country at different times of the year, the south-westerly humid maritime air mass blowing from across the Atlantic and the north-easterly air mass of Saharan origin (Harmattan).

The mean concentrations of the air pollutants (CO₂, SO_x, SPM, NH₃, VOC, NO_x, CH₄, and H₂S) and noise levels were measured in the study area within a radius of 1.5km (zone of influence) from the centre of the project site. Measurements were taken during the study period. Generally, measurements indicated that the ambient air was free from pollution by these measured parameters as at time of study.

The mean concentrations of the groundwater parameters measured in the study area within a radius of 1.5km (zone of influence) from the centre of the project site. Samples for the cargo terminal were collected from Rugar Busau community while samples for the warehouse facility were collected from Madorawa community. Measurements were taken during the wet season and the result did not show any form of pollution.

Soil Physico-Chemical Characteristics also slight acidity of the soil with values ranged from 7.1 to 8.38 with a mean value of 7.51 at the topsoil and between 6.17 and 7.93 with a mean value of 7.19 at sub soil. At the Warehouse Facility area, it ranged from 7.01 to 8.38 with a mean of 7.59 at the



topsoil and between 6.17 and 7.93 with a mean value of 7.11. All obtained values compared well with values from a previous study (Fertilizer Blending Plant Project EIA, 2021).

The wildlife species documented in the Project area include some members of the invertebrate, reptiles, birds and mammals. Major threats to wildlife in the area include uncontrolled poaching and clearance of land for pasture.

Socio-Economic Profile and Consultations / Public Participation

Consultation is a tool used to assess stakeholders concerns and expectations of pertinent issues on environmental, social and health concern for integration into the impact prediction, assessment, evaluation, and mitigation. Consultation involved information dissemination and interactions/ dialogues with various stakeholders concerned in the proposed project including professionals/ experts in relevant fields relating to the power project. Consultation was carried out with relevant stakeholders all through the study i.e., during screening, reconnaissance (site) visit, field survey/ data collection, public disclosure, expert review meetings.

Consultations with project stakeholders are still being carried out. Stakeholders 'views and opinions concerning the proposed project and its associated/potential impacts have been integrated into the ESIA process. Consultations will continue throughout the project life cycle and issues raised by concerned and affected parties will be considered. The results of all concluded consultations are included as bases for potential impact assessment and as such have been clearly documented in this ESIA report.

The stakeholders consulted included:

- Federal Ministry of Environment (FMEnv);
- Federal Ministry of Aviation.
- Nigerian Civil Aviation Authority.
- National Environmental Standards & Regulations Enforcement Agency (NESREA);
- Federal Airports Authority of Nigeria (FAAN);
- Sokoto State Ministry of Environment.
- Wamako Local Government Area
- Sokoto State Ministry of Lands and Housing; and
- Sokoto State Surveyor-General etc

Gender, Age and Household Size Distribution

The age distribution data indicated that the percentage of household members 21 years of age and below for the project area is 55%. About 1% of the households are in their 60s and above. The survey further showed that 36% are within the youthful ages of between 22 and 45 years while 7% of the



household members are between the ages of 46 and 60 years. There is strikingly a high percentage of children below 21 years (55%) in the households.

The household size distribution from the survey ranged from a minimum of one person to a maximum of 19 persons in Kassarawa. The average size of households is 6 persons for the project area community. On the extreme household size ends, the project area has 15% of the households with one to two members and 30% of the households with more than 8 persons. About 17% of the households have sizes of 7 or 8 persons while 20% showed sizes of 5 or 6 persons. The data showed 18% households have sizes of between 3 and 4 persons.

Participants' Feedback – Comments and Concerns

The key environmental and social issues and concerns that were raised during the stakeholders' community meetings include:

- Loss of farmland, crop lands and pasture.
- Employment issue and access to drugs when warehouse is operational.
- The proposed project was welcomed 100%

These issues and concerns raised were fully addressed during the community meetings. The specific mitigation measures are also included under the impact's mitigation measures of this ESMP.

Access to Basic Infrastructure

In this aspect the studies examine the nature of infrastructural establishments in Kasarawa. Most of the people of the community interviewed, with a percentage of about 100% shows their support for this project and anticipated to get employment during or after the construction of the warehouse. Most of the local governments in Sokoto state were connected to National grid. However, some villages do not have light. As such outage on power supply is a general phenomenon across the nation.

The survey responses indicated that in the project community, the population of schooling age who never attended school is 20%; 28% had basic primary school education (FSLC), 31% attended Secondary school (SSCE), 12% are Undergraduates, 9% are Graduates and 1% had a post-Graduate degree. The very low literacy level within the project affected area is reflected in the significantly low number of existing educational infrastructure support within the area.

The common diseases communities include diarrhea, malaria, typhoid, pneumonia, cough, skin diseases, deficiency diseases, eye diseases, ear diseases, and waterborne diseases resulting mainly from malnutrition and lack of hygiene. Due to poverty, the quality of the health care services in the



areas is generally poor with most residents patronizing quacks and medicine shops for their medical treatment. It should be anticipated that there will be increased pressure in the demand for health facilities in the communities resulting from influx of persons during the implementation of this project.

ES.16 POTENTIAL AND ASSOCIATED IMPACTS AND MITIGATION MEASURES

The significant impacts were assessed at the various stages of the project implementation. Some of the significant impacts are summarized in the section below.



Final ESIA Report on Agro Cargo Terminal and Warehouse in Sokoto

Summary of significant potential and Associated Impacts and Mitigation measures for the Agro Cargo Terminal and Warehouse Facility Project			
Potential/Associated Impacts	Ranking	Mitigation Measures	Residual impacts
Increased income generation. Improvement in quality of life for adequately compensated individuals	Beneficial	No mitigation measures is required	Enhancement measures require
Exclusion of vulnerable groups from consultations which may lead to strife	High	The Sokoto State Government Shall. Ensure that project will develop a Community Relations /Engagement Plan that identifies fair strategies of engagement for all communities' members.	low
Creation of employment for skilled and unskilled workforce. Skill acquisition and enhancements to local indigenes and workforce. Business opportunities for local contractors through sub-contracting activities	Beneficial	No mitigation measures is required	Enhancement measures require
Risk of terrorist attack and hostage taking leading to injury/death of personnel	High	The Sokoto State Government Shall. <ul style="list-style-type: none"> • Consult with affected communities prior to mobilization to provide useful information that will curtail any breach in security. • Ensure implementation of project security plan. • Maintain ongoing cordial relationships with the stakeholder communities. • Ensure that only approved security companies are used where necessary. 	Medium



Final ESIA Report on Agro Cargo Terminal and Warehouse in Sokoto

Summary of significant potential and Associated Impacts and Mitigation measures for the Agro Cargo Terminal and Warehouse Facility Project			
Potential/Associated Impacts	Ranking	Mitigation Measures	Residual impacts
		<ul style="list-style-type: none"> • Ensure that the management of the Cargo Terminal activate its emergency response procedure when necessary. • Implement effective journey management plan. 	
Risk of injuries from cuts, strip, and fall	High	Sokoto State Government Shall. <ul style="list-style-type: none"> • Ensure that use of appropriate PPE is enforces on all personnel and visitors to site. • Provide First Aid Box at strategic locations to attend to emergency personnel injuries and other medical issues. 	Low
Loss of vegetation in the project site area. Ecosystem fragmentation and loss of wildlife	High	The Sokoto State Government Shall. <ul style="list-style-type: none"> • Ensure that clearing is limited to areas considered necessary for construction activities. • Plants considered rare or endangered are either avoided or carefully removed transplanted in areas considered safe around the project proximate to project location. 	Low
Employment of local labor and skills acquisition for workers taking advantage on new opportunities. Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting Increase in revenue opportunities for local population due to presence of non-resident workers and travelers	Beneficial	No mitigation measures is required	Enhancement measures require
Risk of personnel injuries from electrical shocks, fall and cuts	High	Sokoto State Government Shall. <ul style="list-style-type: none"> • Ensure that appropriate PPE is used on site by all 	Low



Final ESIA Report on Agro Cargo Terminal and Warehouse in Sokoto

Summary of significant potential and Associated Impacts and Mitigation measures for the Agro Cargo Terminal and Warehouse Facility Project			
Potential/Associated Impacts	Ranking	Mitigation Measures	Residual impacts
		<p>workers and visitors</p> <ul style="list-style-type: none"> • Engage qualified personnel for all maintenance work of the terminal and the warehouse. • Ensure a mandatory daily toolbox meeting before the day's task. 	
Waste generation	High	<p>The Sokoto State Government Shall.</p> <p>Ensure that all generated waste is managed in lines with approved waste management protocol.</p>	Low
Availability of land for alternative uses	Beneficial	No mitigation measure is required	Enhancement measures require



ES.17 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The ESMP is essentially a management tool that provides assurance for effective implementation of the mitigation measures developed for the significant impacts of the proposed project (as documented in Chapter Six). It also outlines management strategies for complying with health, safety, and environmental issues from the project.

The ESMP provides assurance that a reliable scheme has been put in place to monitor the interaction between the planned operations and the environment throughout the duration of the project. This ESMP has been developed in accordance with the general requirements of OHSAS 18001 Health and Safety Management System, Equator Principles as well as other national and international regulatory requirements.

ES.18 ESMP Safeguard Guidelines

Mitigation measures are proffered for all significant impacts of the proposed project to avoid, minimize, or reduce expected impacts to as low as reasonably practicable (ALARP). To ensure these measures are achieved, responsibilities have been assigned for each task.

ES.19 Project Grievance Management Mechanism Approach

Grievances are feedback, responds or complaints concerning the way a project is being handled or managed. A grievance mechanism provides a formal and ongoing avenue for stakeholders to engage with the project proponent. Grievance monitoring allows for early warning or signals of any escalating conflicts or disputes. Identifying and responding to grievances supports the development of positive relationships between the proponent and the community, and other stakeholders. A grievance mechanism is not a substitute for a company's community engagement process or vice versa. The two are complementary and should be mutually reinforcing. In line with best practices, it is expected that projects of this magnitude should have this mechanism in place, to accommodate any grievances, complaints or concerns that stakeholders may have.

ES.20 Environmental Monitoring Plan

All contractors shall be required to monitor their performance with respect to environmental and social performance. The HSE Officer shall also undertake monthly, quarterly, and yearly environmental assessment and spot checks throughout the plant project lifecycle. Assessment findings shall be reviewed by the Project Management Team (PMT) and where corrective actions are necessary, specific plans (with designated responsibility and timing) shall be developed to ensure continuous performance improvement.



ES.21 Waste Management Plan

Waste generated shall be managed in accordance with Federal Ministry of Environment guidelines and Sokoto State Approved waste management procedures. The way wastes are to be handled, stored, and disposed is dictated by the nature of the waste. Sokoto State’s Waste Management Plan (WMP) takes into consideration the nature of all wastes that will be generated during the lifetime of the project. The following objectives form the basis for the WMP for the proposed project:

Summary of Expected Wastes Sources and Types

Sources	Waste Category		
	Solid	Liquid	Gaseous
Pre – Construction Phase	Vegetation, excavated materials, topsoil/overburden, wood off-cuts		Particulate matter
Construction phase	Papers, cartons, metal scraps, plastics, cans, packaging materials, food wastes cement packs, wood, caked cement, debris, glass off-cuts, aluminum sheets, excavated, topsoil	Sewage, spent oil, paints and solvents	Emissions from vehicle usage e.g dust CO _x , NO _x , and SO _x , etc Noise and
Operation phase	Packaging materials, papers, domestic wastes, broken bottles/glasses, damage electronics/house appliances, changed part from generators and stationary waste	Sewage, waste water, chemicals etc.	Emissions from different sources (vehicles) e.g dust, CO _x , NO _x , and SO _x , etc.
Administrative offices/shops	Papers, waste packages, plastics, polythene bags, metal scrap, cans, glasses, food wastes etc	Sewage	
Logistic & Stacking Area	Scrap metals, cans, plastics, rags, electronic-waste, copper cores, aluminum, wood scrap, papers, solidified waste paints	Wastewater, chemicals, spent oil, detergents, sewage etc	Fumes from vehicles and other machineries



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Power generating units	Generator/ metal scraps, rags, plastics, electrical cable waste, fire-extinguisher's, cans	Wastewater, grease, spent oil degreasing agent, paint	CO _x , NO _x and SO _x emissions from power generating units
Decommissioning phase	Metal cuttings, rocks, concretes, cables, rejected materials, surplus materials, surplus spoil, excavated materials, broken pipes, among others		Dust, noise, Vibration, CO _x , NO _x . SO _x etc.

ES.22 CONCLUSION

The Environmental and Social Impact Assessment (ESIA) of the proposed Agro Cargo Terminal and Warehouse Project have been carried out to satisfy government, financiers, regulators, and stakeholders that proactive environmental actions have been incorporated into project design/ plan.

The study was carried out in line with regulatory requirements for environmental management in Nigeria. One of such regulation is the Nigerian EIA Act Cap E12 LFN 2004, which stipulates that an EIA is compulsory for projects of this magnitude that have potential for significant environmental impacts.

ESIA process aims at providing detailed information for decision-making and to contribute to environmentally, and socially sound and sustainable development.

Consultations with the host communities and other stakeholders have been carried out and shall continue throughout the project lifecycle. Consultation and engagement meeting ensured that all answers to questions concerning the proposed project were provided to the satisfaction of stakeholders.

Environmental baseline conditions (biophysical and socio-economic) as well as sensitive components of the study area were established through field data gathering/ sampling and complemented with information from literature/ desktop research, maps, and information from articles on the area. The results were all below values within those obtained from the control points.



Final ESIA Report on Agro Cargo Terminal and Warehouse in Sokoto

The overall impacts of the project were localized and reversible. The Environmental, Social Management Plan (ESMP) has been developed during this study to ensure that to manage the adverse impacts of the proposed project

Finally, it is hoped that all necessary information/ evidence contained in this report is sufficient for the issuance of an Environmental Impact Statement (EIS) and acquisition of necessary permits for the operation of the Agro Cargo Terminal and Warehouse project in Sokoto State.



CHAPTER ONE INTRODUCTION

1.1 General

For many decades, the aviation industry has played a significant role in developing economies around the globe. There are over two thousand (2,000) airlines operating more than twenty-three thousand (23,000) aircraft that serves about three thousand seven hundred (3,700) airports around the world. This makes the industry the doorway to any economy aspiring to develop, enabling globalization, trade facilitation and tourism development.

Furthermore, statistics have also shown that from the beginning of the Millennium 2000, there has been a rapid increase in air transportation in Nigeria. This is in the areas of number of departing/arriving passengers, loaded freight, and arriving aircrafts. Presently there are five (5) major International Airports at Abuja, Enugu, Lagos, Kano, and Port Harcourt. Besides these, there are a few other designated international airports that serve non-regular international flights such as the Muslims Lesser Hajj including the Sokoto, Kaduna, Calabar, Asaba, Sam Mbakwe in Owerri, Maiduguri, Dutse, and Kebbi with numerous other domestic airports across the country.

The proposed Agro-cargo terminal at Sultan Abubakar III International Airport, Sokoto would have far reaching impacts on different sectors of the economy in Nigeria and across the neighboring countries. It would attract national and international partnership with Cargo Agencies which will enhance job creation, income and revenue generation for the state and nation at large. Similarly, it will also enhance the participation of Small and Medium Enterprises.

1.2 Project Context

The Sokoto State Government which is the proponent of the proposed development intends to establish an Agro Cargo Terminal at Sultan Abubakar III International Airport, Sokoto. The proposed terminal is expected to attract national and international partnership with Cargo Agencies which will enhance job creation, income and revenue generation for the state and the nation at large. Similarly, it will also enhance the participation of Small and Medium Enterprises engaged in exportation of dry, fresh and semi-processed agricultural commodities cargoes. The proposed terminal will have facilities such as a dry Cargo Terminal Warehouse, Perishable Cargo Terminal with Cool Chain Storage, climate chambers for storage and handling of temperature sensitive products such as fresh agricultural products, Pharmaceuticals, Bonded Warehouse, Transit Zone and Free Port/Foreign Trade Zone, European Union (EU) Border Post, Nigerian



Agricultural Quarantine Service (NAQS), Livestock Handling, Health Officials, and X-Ray Equipment among others.

In fulfillment of the African Development Bank Standards and the Federal Government of Nigeria Policies that guarantee safeguarding lives, and properties and good environmental management practices in Nigeria, an Environmental and Social Impact Assessment (ESIA) of the proposed Agro Cargo Terminal at Sultan Abubakar III International Airport, Sokoto has been undertaken by ENARMAC Nigeria Limited on behalf of the proponent (Sokoto State Government).

Specifically, the ESIA has been conducted in compliance with the Federal Ministry of Environment (FMEnv) Environmental Impact Assessment Act 86 of 1992 (codified as EIA Act CAP E12 LFN2004), the EIA Procedural Guideline (1995) and Sectoral Guideline on Infrastructure (1995) and the requirement of the extant laws for any development approval.

1.3 The Proponent

Sokoto State is one of the 36 States which make up the Federal Republic of Nigeria. The State is located in the extreme northwest of the country sharing the international border with the Republic of the Niger. Its capital and largest city is the city of Sokoto. Sokoto is located near to the confluence of the Sokoto River and the Rima River. As of 2006 census, the State ~~it~~ has an estimated population of more than 5.8 million.

Being the seat of the former Sokoto Caliphate, the city population is predominantly made up of Muslims and an important seat of Islamic learning in Nigeria. The Sultan who heads the caliphate is effectively the spiritual leader of Nigerian Muslims. Sokoto State has a total of 2.66million hectares of land area of which 2.43 million hectares is arable made up of 450,000 hectares irrigable and 1.98 million hectares for upland farming, of which 565 are being cultivated.

To properly harness these agricultural endowments of the State, successive administrations had partnered with the Federal Government to put in place irrigation schemes that support dry season agricultural activities. Some of the schemes are conclave establishment during colonial period, while others were established by the State and Federal Governments. These includes Goronyo, Wurno, Kwakwazo, Taloka and Shagari Dams, among others.

1.4 Project Location

The project will be located in Wamako Local Government Area of Sokoto State, Nigeria. The proposed site lies between geographic latitude 13° 03' N and longitude 5° 14' E (Figure 1-1). The total land take for the project is over 20 hectares. The site is also bounded by Sultan Abubakar III International Airport, Sokoto. See map of Sokoto inserted in the map of the proposed location in Figure 1-1.

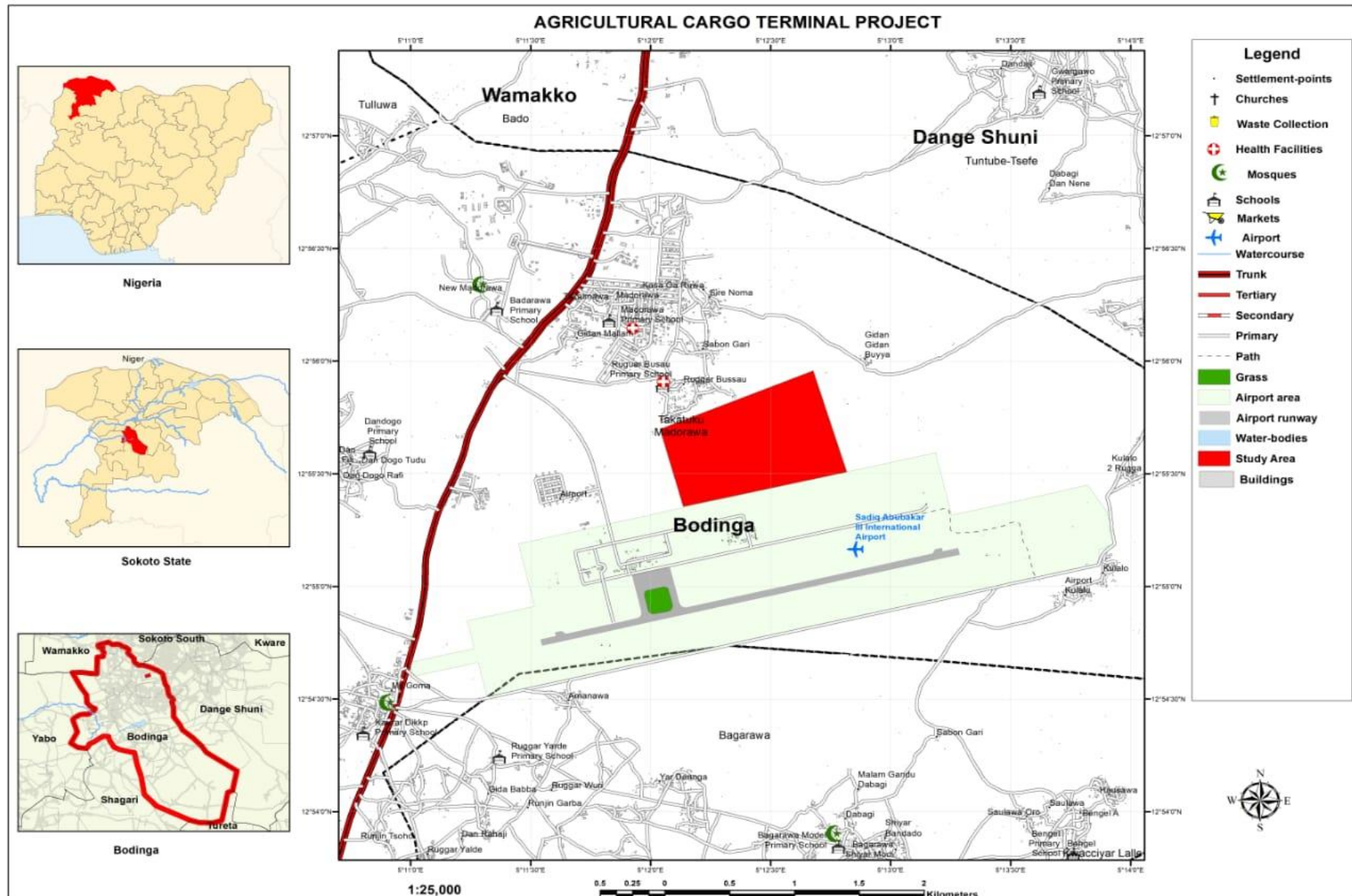


Figure 1-1: Map of the Study Area – location of the Agro Cargo Terminal and Warehouse



1.5 Objectives of the EIA

In line with the statutory requirements for environmental protection in Nigeria, the ESIA Study is being carried out to:

- Satisfy Federal, State and Local Governments as well as stakeholders, that proactive environmental actions shall be incorporated in the project design, installation, construction, and operation phases.
- Ensure proper consultations with the communities within the project area in line with regulatory requirement.
- Provide all necessary answers to stakeholders, assessors, host community, regulators, financiers, pressure groups and other interested parties.
- Establish existing baseline (biological, physical, and socio-economic) conditions of the project location.
- Identify all environmental and social aspects of the proposed project that may interact positively or negatively with the environment.
- Make appropriate recommendations to prevent, reduce or control identified potential and other associated negative impacts, and Identify opportunities to enhance positive impacts and project benefits.
- **Develop** environmental, social management plan (ESMP) and procedures for effective and proactive environmental management of the environment throughout the project life cycle; and
- **Provide** all necessary data, information and objective evidence required for developing an Environmental Impact Statement (EIS) for the proposed Project.

1.6 Scope of the ESIA

The general scope of the ESIA covers all the activity that constitutes this proposed project. It will outline the techniques and methodologies to be used in generating data, including the description of the data sources. The following broad categories will be covered:

- Literature Review;
- Baseline Data Acquisition and Laboratory analysis;
- Prediction and Evaluation of Potential Impacts;
- Determination of Appropriate Mitigation Measures;
- Environmental and Social Management Plan (ESIA);
- Consultation/Stakeholder Engagement;
- Report Preparation.

1.7 ESIA Methodology

EIA Registration and Screening

An EIA registration form for the project was filled and forwarded to the FMEnv and subsequently, a screening process was conducted by FMEnv and the EIA placed in Category One (1), equivalent to Category A for World Bank.



Site Visit and EIA Terms of References

The ESIA terms of reference (ToR) was defined and prepared in line with the EIA Procedural Guidelines (FEPA, 1995). It was submitted to the FMEnv for approval after site visit carried out on the 20th September, 2021. The approved ToR outlined the general scope of the EIA study and requirements for data collection.

Desktop Studies/Literature Review

Desktop studies were undertaken to acquire an environmental database required for the ESIA studies. The literature search included information from previous studies around areas with similar environmental characteristics. Materials consulted include textbooks, articles, reports, maps, and photographs, acquired at state, national and international levels.

Field Research

Field research was undertaken so as to complement/verify information gathered from desktop studies. Specific information on the ecological and socio-economic conditions of the project environment was undertaken by a team of multidisciplinary experts and technical staff of the Sokoto State Government as well as the representative of the federal ministry of Environment. In particular, the survey covered the following environmental components:

- The physical environment – surface and groundwater characteristics, soil characteristics, air quality, noise and potential natural hazards;
- The biological environment – water, and soil microbiology, flora and fauna (particularly rare and endangered species);
- The socio-economic and health environment - population, land-use and patterns of land ownership and tenure, community structure, employment, distribution, public health, cultural heritage, customs, aspirations and attitudes, etc.

Field data gathering campaign was carried out in one season (wet) to acquire information on the baseline condition of the area. Field survey was conducted within FMEnv guidelines and standards. Field survey was carried out in the presence of FMEnv representatives for dry season (between 20th and 25th September, 2021). Sampling requirements investigated include air quality and noise, soil, groundwater as well as socio-economic and health profile of host community.

Data Analysis and Interpretation

Samples collected from the field visit were transferred to Giolee Global Resources Limited, (accredited by Federal Ministry of Environment), located at 18, Oyo Street, Port Harcourt,



Rivers State for analyses. Results obtained were interpreted and used to describe the existing baseline of the study area as documented in Chapter Four of this report.

Consultations Process

Consultation is a tool used to assess stakeholders concerns and expectations of pertinent issues on environmental, social and health concern for integration into the impact prediction, assessment, evaluation and mitigation. Consultation involved information dissemination and interactions/ dialogues with various stakeholders concerned in the proposed project including professionals/ experts in relevant fields relating to the power project. Consultation was carried out with relevant stakeholders all through the study i.e., during screening, reconnaissance (site) visit, field survey/ data collection, public disclosure, expert review meetings.

Consultations with project stakeholders are still being carried out. Stakeholders' views and opinions concerning the proposed project and its associated/potential impacts have been integrated into the ESIA process. Consultations will continue throughout the project life cycle and issues raised by concerned and affected parties will be considered. The results of all concluded consultations are included as bases for potential impact assessment and as such have been clearly documented in this ESIA report. The stakeholders consulted included:

- Federal Ministry of Environment (FMEnv);
- Federal Ministry of Aviation;
- Nigerian Civil Aviation Authority;
- National Environmental Standards & Regulations Enforcement Agency (NESREA);
- Federal Airports Authority of Nigeria (FAAN);
- Sokoto State Ministry of Environment;
- Wamako Local Government Area;
- Nigerian Custom Services;
- Sokoto State Ministry of Lands and Housing; and
- Sokoto State Surveyor-General etc

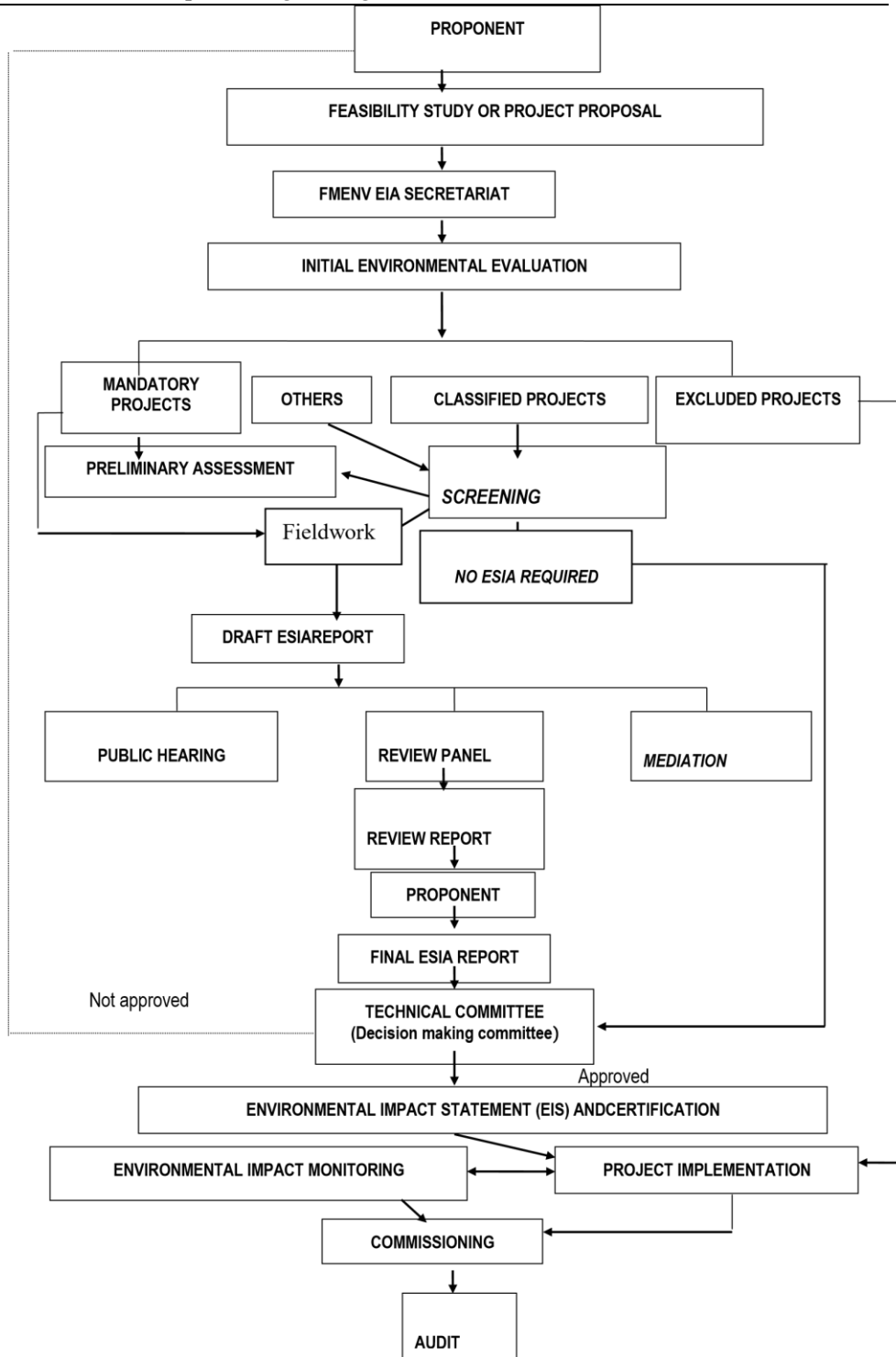


Figure 1-2: Flow Chart of the FMEnv EIA Procedure

(Source: EIA Procedural Guidelines, 1995)

1.8 Legal and Institutional Framework for the EIA

This section identifies the environmental performance standards that will be used in the environmental analysis to assess changes in the existing condition of resources due to the proposed project. The regulatory agencies and their corresponding jurisdictional limits in regard to the project are identified and discussed in the section below.



1.8.1 Federal Regulations/Guidelines

The Environmental Impact Assessment Act CAP E12 LFN 2004

The Environmental Act makes EIA mandatory for all new major public and private projects in Nigeria. It sets out to:

- Consider the likely impacts and the extent of these impacts on the environment before embarking on any project or activity;
- Promote the implementation of appropriate policy in all federal lands consistent with all laws and decision-making processes through which the goal of this Act may be realized; and
- Encourage the development of procedures for information exchange, notification and consultation between organizations and persons when the proposed activities are likely to have significant environmental effects.

National Environmental Protection (Pollution Abatement in Industries and Facilities Generating Waste) Regulation (S.I.9) of 1991

The National Environmental protection (Pollution Abatement in Industries Producing Waste) Regulation of 1991 regulates the release of toxic substances, requirement for pollution monitoring unit, machinery for combating pollution and contingency plan by industries. It also provides that industries producing wastes should submit lists and details of chemicals used by such industries to FMEnv as well as permissible limits of discharge into public drains.

Federal Ministry of Environment (FMEnv) National Guidelines for Environmental Audit in Nigeria 1999.

Guidelines prepared by Federal Ministry of Environment to assist operators, environmentalists and other stakeholders to conduct effective environmental compliance audits. The prescribed emission limits depend on social and political considerations.

Section 3.2 pertains to ambient air standards and states. “Since emissions from industries and other sources have impact on ambient air, it is of utmost importance to prescribe guidelines for safe levels of air pollutants tolerable to humans, aquatic organisms and vegetation”. Guidelines for Nigerian ambient air limits for conventional pollutants and specific substances in the air are listed.

The National Environmental Protection Management of Solid and Hazardous Wastes Regulations (S.I.15, 1991)

Management of Hazardous and solid wastes regulation define the requirements for groundwater protection, surface impoundment, land treatment, waste piles, landfills, incinerators, etc. It also



describes the hazardous chemical products and dangerous waste constituents. This Regulation provides that the objective of solid and hazardous waste management shall be to:

- Identify solid, toxic and extremely hazardous wastes dangerous to public health and environment,
- Provide for surveillance and monitoring of dangerous and extremely hazardous wastes and substances until they are detoxified and safely disposed,
- Provide guidelines necessary to establish a system of proper record keeping, sampling and labelling of dangerous and extremely hazardous wastes,
- Establish suitable and provide necessary requirements to facilitate the disposal of hazardous wastes;
- Research into possible re-use and recycling of hazardous wastes.

Federal Airport Authority of Nigeria (FAAN) Act 1996 Cap F5

The principal functions of the authority shall be:

- To develop, provide and maintain at Airport and within the Nigeria airspace all necessary services and facilities for the safe, orderly, expeditious and economic operation of air transport.
- To provide adequate conditions under which passengers and goods may be carried by air and under which aircraft may be used for other gainful purposes and for profitability the carriage by air of goods of such classes as may be prescribed.
- To prohibit the installation of any structure which by virtue of its high position is considered to endanger the safety of air navigation;
- To charge for services provided by the authority at airports;
- To provide accommodation and other facilities for the effective handling of passenger and freight.
- To develop and provide facilities for surface transport within airports,
- To carry out at airports (either by itself or by an agent or in partnership with any other person) such economic activities as are relevant to air transport.



- To carry out airports (either by itself or by an agent or in partnership with any other person) such other commercial activities which are not relevant to air transport but which is in the opinion of the Authority may be conveniently carried out without prejudice to the functions specified in this subsection.
- To provide adequate facilities and personnel for effective security at all airports; and
- Generally, to create conditions for the development in the most economic and efficient manner of air transport and the services connected with it.
- Without prejudice to subsection 3 of section 1, the Authority may assume the management of any airport in Nigeria in addition to those transferred to it under this Act, but the Authority shall not exercise the power herein described without the consent in writing of the Minister.

Nigerian Civil Aviation Authority (NCAA) Repeat and Re-enactment Act 2006

The principal functions of the authority shall be:

- To ensure that operators and service providers perform their business within mandatory limits of the ICAO standards and recommend practices.
- To set Aircraft safety standards and ensure compliance with the Nigerian Civil Aviation Regulations (NCARs).
- To ensure aviation safety and effective oversight functions through efficient surveillance and adequate licensing of technical personnel and ATO.
- To ensure safety and security in all Nigerian Aeradional in consonance with the relevant standards and recommended practices of ICAO Annexes.
- To oversee the regulation and safety of aircraft operating environment, including Air traffic control (ATC), communication Navigation and surveillance (CNS) standards as well as the planning, design and maintenance of physical structuring and airport ground handling operations airside across the country.
- These include the terminal and landside access at airports, airstrips and other aviation ground facilities from the planning up to the operational stage.



- Set and issue guidelines for the establishment and registration of foreign airlines, cargo consolidators and handling companies and
- Process applications for the establishment and registration of Aviation Training Institutions, Travel Agencies, Agents Foreign Airlines, Cargo Consolidators and Handling Companies.
- Make technical inputs to Bilateral and Multilateral Air services Agreements (BASA/MASA) and commercial agreements etc signed by the Federal Government of Nigeria.
- Liaise with the Ministry of Aviation on the issues of international organizations and cooperation.
Make technical inputs to the issue of tariff, francs and royalties, regarding international operations, and Process applications for international charter operations by foreign airlines.
- To ensure that only medically fit Aircrews and Air Traffic controllers (ATCO's) are licensed to operate in the Nigerian airspace in line with ICAO Annex.

Nigerian Civil Aviation Regulations 2006

Part 2 General information includes the following:

- Purpose and scope of Aerodrome manual.
- Conditions for use of a public/private aerodromes; a statement to indicate that the aerodrome shall always, when it is available to for the take-off and landing of aircraft, be also available to all persons on equal terms and conditions.
- The available aeronautical information system is and procedures for its promulgation.
- Obligations of the Aerodrome operator to the Authority including granting authorized personnel, access to the aerodrome to carry out safety audit inspection, testing and to be responsible for notifying/reporting as prescribed in the Regulation.

Nigerian Civil Aviation Regulations 2006 Part 12: Particulars of the Aerodrome Site

General information includes the following:



- A plan of the aerodrome showing the main aerodrome facilities for the operation of the aerodrome including, particularly, the location of each wind direction indication.
- A plan of the aerodrome showing the aerodrome boundaries.
- A plan showing the distance of the aerodrome from the nearest city, town or other populous cores, and the locations of any aerodrome facilities and equipment outside the boundaries of the aerodrome; and
- If the boundaries of the aerodrome are not defined in the title documents particulars of the title to, or interest in, the property in which the aerodrome is located and a plan showing the boundaries of the position of the aerodromes.

The Civil Aviation Act, 2006

Nigerian Civil Aviation Authority is the regulatory body for aviation in the country. It became autonomous with the passing into law of the Civil Aviation Act 2006 by the National Assembly and assent of the president. The Act not only empowers the Authority to regulate aviation safety without political interference, but also to carry out oversight functions of airports, airspace, meteorological Services, etc., as well as economic regulations of the industry.

National Environmental (Construction Sector) Regulations, 2010. S.I. 19

The purpose of this regulation is to prevent and minimize pollution from construction, decommissioning and demolition project activities to the Nigerian environment.

Standards Organisation of Nigeria Act, 2015

This act saddles the organisation with the responsibility of evaluating quality assurance activities, including certification of systems, products and laboratories throughout Nigeria. The Organisation is to establish an Import and Export Product Surveillance, Certification and Conformity Assessment Scheme to ensure that all products imported and exported are up to the expected standards. It also establishes a mandatory conformity assessment programme for locally manufactured products in Nigeria. The Organisation is also empowered to impose fees, fines or penalties on a person who contravenes any Import or Export Surveillance, Certification or Conformity Assessment Scheme.

Forestry Law, CAP 51, 1994

The Forestry Act 1958 which was amended as the Forestry Law CAP 51 (1994) prohibits any act that may lead to the destruction of or cause injury to any forest produce, forest growth or forestry property in Nigeria. The law prescribes the administrative framework for the management, utilization and protection of forestry resources in Nigeria, which is applicable to the mangrove and other forests of the Niger Delta.



Employee's Compensation Act, 2010

The Employee's Compensation Act repeals the Workmen's Compensation Act, CAP. W6 LFN, 2004. The Act makes provisions for any death, injury, disease or disability arising out of or in the course of employment, and for related matters. According to the Act, employees who suffer any disabling injury arising out of, or in the course of employment, whether or not in a workplace, or while on the way to the place of work shall be entitled to payment of adequate compensation.

Other compensable incidents include;

- Work-related mental stress resulting to or not, an injury.
- Occupational disease resulting to employees' injury or fatality.
- Hearing impairment (partial or total) in the course of employment.

Where the injury results in the death of the employee, the compensation shall be payable to the dependents of the employee.

Land Use Act CAP 202 LFN 1990

The Act makes it public interest that the rights of all Nigerians to use and enjoy land in Nigeria and the natural fruits thereof in sufficient quantity to enable them to provide for the sustenance of themselves and their families be assured, protected and preserved.

Nigeria's National Health 2014 Act 2014 (NHA)

Nigeria's National Health 2014 Act 2014 (NHA) was signed into law on October 31, 2014. It provides a legal framework for the regulation, development, and management of Nigeria's Health System. This study assessed the knowledge and perception of the NHA 2014 by health professionals.

National Environmental Standards and Regulation Enforcement Agency (NESREA) Act 25 of 2007

This National Environmental Standards and Regulation Enforcement Agency was established with the responsibility to ensure the regulated community complies with all environmental laws and regulations in Nigeria.

- **S.1.22 National Environmental (Surface and Groundwater Quality Control) Regulations 2011.**

As the title indicates, it is meant to restore, enhance and preserve the physical, chemical and biological integrity of the Nations water (Surface and groundwater) The waters shall be maintained in a safe and satisfactory condition from all manner of industrial and anthropogenic activities such that the water can be used for various uses spanning from industrial, agricultural, recreation, public water supplies, hydro-energy etc.



- **S.I.28 National Environmental (Sanitation and Waste Control) Regulations 2009**

The purpose of this regulation is to ensure that management of the company applies the regulations in all issues of sanitation and all categories of wastes generated by the project. Secondly ensures the adoption of sustainable and environment friendly practices in environmental sanitation and waste management in order to minimize pollution.

- **S.I.35 National Environmental (Noise Standards and Control) Regulations, 2009**

The Regulation seeks to ensure maintenance of a healthy environment, tranquility of the project surroundings and their psychological wellbeing by: regulating noise levels for optimum standard of living; prescribing maximum permissible noise levels to which persons may be exposed and providing technologies/methods for control, and mitigating measures for reduction of noise.

- National Environmental (**Permitting and Licensing System**) Regulations, 2009. S. I. No. 29. The provision of this Regulation enables consistent application of environmental laws, regulations and standards in all sectors of the economy and geographical region.
- National Environmental (**Ozone Layer Protection**) Regulations, 2009. S. I. No. 32. These provisions seek to prohibit the import, manufacture, sale and the use of ozone-depleting substances.
- National Environmental (**Construction Sector**) Regulations, 2010. S. I. No. 19. The purpose of these Regulations is to prevent and minimize pollution from Construction, Decommissioning and Demolition Activities to the Nigerian Environment.
- National Environmental (**Soil Erosion and Flood Control**) Regulations, 2010. S. I. No. 12. The overall objective of these Regulations is to check all earth-disturbing activities, practices or developments for non-agricultural, commercial, industrial and residential purposes.
- National Environmental (**Control of Vehicular Emissions from Petrol and Diesel Engines**) Regulations, 2010. S. I. No. 20. The purpose of these regulations is to restore, preserve and improve the quality of air. The standards contained herein provide for the protection of the air from pollutants from vehicular emission.

National Policy on the Environment Revised 2016

Development will be meaningful if it does not increase a country's vulnerability to environmental impacts. If a nation's environmental foundations are depleted, its economy may well decline, its social fabric may deteriorate, and its political structure may even become destabilized. The environment is, however, a complex and interactive system consisting of the atmosphere, land surface and bodies of water, as well as living things. The degradation of an element of the environmental system will have positive or negative feedback effects on the others.



Policy Goal

The goal of the National Policy on the Environment is to ‘ensure environmental protection and the conservation of natural resources for sustainable development’.

Strategic Objectives:

The strategic objective of the National Policy on the Environment is to coordinate environmental protection and natural resources conservation for sustainable development. This goal will be achieved by the following strategic objectives:

- Securing a quality of environment adequate for good health and well-being;
- Promoting sustainable use of natural resources and the restoration and maintenance of the biological diversity of ecosystems;
- Promoting an understanding of the essential linkages between the environment, social and economic development issues;
- Encouraging individual and community participation in environmental improvement initiatives;
- Raising public awareness and engendering a national culture of environmental preservation; and
- Building partnership among all stakeholders, including government at all levels, international institutions and governments, non-governmental agencies and communities on environmental matters.

Guiding Principles:

The following principles are central to the attainment of the strategic objectives of this Policy:

The Public Trust Doctrine, which recognizes that the State is a trustee of all-natural resources, the enjoyment of which is subject to a measure of control necessary to protect the legitimate interest of all sections and stakeholders in the larger framework of strategic national interests; Environmental Right, which ensures that every Nigerian has a right to a clean and healthy environment and a duty to safeguard and enhance the environment;

Environmental Offsetting, which requires that where for exceptional reasons of overriding public interest, the general obligation to protect threatened or endangered species and natural systems that are of special importance to sustaining life, providing livelihoods, or general wellbeing cannot be provided, such cost-effective offsetting measures must be undertaken by the proponents of an activity to restore as nearly as may be feasible the lost environmental services to the community;

State Legislations: States Environmental Protection Edicts

In accordance with Section 24 of the FMEnv Act, Chapter 131 of the Laws of the Federal Republic of Nigeria, 1990, the State Environmental Protection Edicts are enacted. The edict empowers the State Environmental Protection Agencies to establish such environmental criteria, guidelines/specifications, or standards for the protection of the state’s air, lands and waters as may be necessary to protect the health and welfare of the people. The functions of SEPAs among others include:



- Routine liaison and ensuring effective harmonization with the FMEnv in order to achieve the objectives of the National Policy on the Environment;
- Co-operate with the FMEnv and other relevant regulatory agencies in the promotion of environmental education;
- Be responsible for monitoring compliance with waste management standards; and
- Monitor the implementation of the EIA and Environmental Audit Report (EAR) guidelines and procedures on all developmental policies and projects within the State.

Generally, State laws on environment are still in the evolving stages. Specifically, for EA, the States rely on the EIA Act 86 of the Federal Government.

Sokoto State Ministry of Environment

Sokoto State Ministry of Environment oversees activities involving the environment in Sokoto State. Among its other mandates, the Ministry supervises the Sokoto State Environmental Protection Agency (SEPA). The ministry has the responsibility of maintaining a clean and healthy environment through provision of sanitation and waste management services as well as oversight of spatial development planning.

Sokoto State Environmental Protection Agency (SEPA)

SEPA is responsible for the protection and improvement of the environment within the State as well as assists in implementation and enforcement of the National Environmental Regulation and Guidelines within Sokoto State. In carrying out its duties of environmental protection, SEPA is required to collaborate with relevant Federal and State Ministries, Local Government Councils, statutory bodies, research and educational institutions. Although the primary regulatory authority overseeing environmental concerns of the proposed project lies with FMEnv, SEPA plays a role as a key stakeholder in environmental management of the state through:

- ✓ Protection of environment and biodiversity conservation and sustainable development in Sokoto State;
- ✓ Conduct research on matters relating to environment;
- ✓ Collaborate with federal government through the Federal Ministry of Environment in conducting public investigation on major environmental problems;
- ✓ Monitor the quality of water, air, land and natural resources in the state; and
- ✓ Promote environmental education and awareness.

1.8.2 International Conventions, Agreements, and Protocols

In addition to the national laws/regulations, Nigeria is signatory to several international conventions and treaties relating to industry, development, and environmental management. In certain cases, conventions and agreements have influenced policy, guidelines and regulations and must be complied with during the planning, construction and operation of the Project. Many of these conventions support the use of environmental studies as key tools for achieving pollution control, sustainable environmental development, and preservation of



habitats of global significance. Some of the more pertinent of these are presented in the table below and briefly described subsequently.

Table 1-1: International Conventions Relating To Industry and Environment

Date of Ratification by Nigeria	Name of Convention	Objective of convention
1994	United Nations (UN) Convention on Biological Diversity (1992)	<ul style="list-style-type: none"> • Conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of benefits arising out of the utilization
1994	Framework Convention on Climate Change (1992)	<ul style="list-style-type: none"> • Stabilisation of greenhouse gas concentrations in the atmosphere at safe level
1988	Convention on the Conservation of Migratory Species of Wild Animals (1979)	<ul style="list-style-type: none"> • Promotion of measures for the conservation (including habitat conservation especially for endangered species listed in Bonn) and management of migratory species.
1987	Montreal Protocol on Substances that Deplete the Ozone Layer	<ul style="list-style-type: none"> • To protect the ozone layer through enhanced international cooperation by taking precautionary measures to control equitably total global emissions of substances that deplete it.
1968	African Convention on Conservation of Nature and Natural Resources (1968)	<ul style="list-style-type: none"> • Adopt the measures necessary to ensure conservation, utilization and development of soil, water, flora and faunal resources in accordance with scientific principles and with due regard to the best interests of the people.

1.8.3 International Best Practice Guidelines and Standards

The following international requirements and standards have been considered within the ESIA process and are described below:



- Equator principles (EP)
- World Bank's environmental and social safeguard policies.
- IFC Performance Standards on Environmental and Social Sustainability
- United Nations Guiding Principles on the Human Environment
- The Rio Declaration on Environment and Development
- World Bank Group General Environmental, Health and Safety Guidelines (EHS)

Equator Principles 2013

Large infrastructure and industrial Projects can have adverse impacts on people and on the environment. As financiers and advisors, we work in partnership with our clients to identify, assess and manage environmental and social risks and impacts in a structured way, on an on-going basis. Such collaboration promotes sustainable environmental and social performance and can lead to improved financial, environmental, and social outcomes.

The Equator Principles Financial Institutions (EPFIs) adopted the Equator Principles in order to ensure that the Projects they finance and advise on are developed in a manner that is socially responsible and reflects sound environmental management practices. They recognise the importance of climate change, biodiversity, and human rights, and believe negative impacts on project-affected ecosystems, communities, and the climate should be avoided where possible. If these impacts are unavoidable, they should be minimised, mitigated, and/or offset.

The Equator Principles are aimed to ensure that prior to agreeing to provide financing, (a) a project has been subject to an appropriate level of environmental and social assessment in accordance with the requirements of the IFC Performance Standards (2006) and (b) that the project will implement appropriate measures for the management of environmental, social and health issues during construction, operation, and decommissioning phases. By adopting the Equator Principles, financial institutions undertake to carefully review proposals for which their customers request project financing. They commit not to provide loans to projects where the borrower will not, or is unable to, comply with the requirements of the IFC Performance Standards. Equator principles are tabulated below.

Table 1-2: Equator Principles

Principle 1	Categorisation of projects
Principle 2	The borrower has to conduct an Environmental and Social Impact Assessment (ESIA)
Principle 3	Applicable Social and Environmental Standards
Principle 4	Action Plan and Management System
Principle 5	Consultation and Disclosure



Final ESIA Report on Agro Cargo Terminal and Warehouse in Sokoto

Principle 6	Grievance Mechanism
Principle 7	Independent Review
Principle 8	Covenants
Principle 9	Independent Monitoring and Reporting
Principle 10	Reporting and transparency

The Equator Principles set out the process for assessing a project in four key phases: Impacts are assessed on their degree of potential impact and are categorised as either A (High), B (Medium) or C (Low).

- **Category A-** Projects with potential significant adverse social or environmental impacts those are diverse, irreversible, or unprecedented.
- **Category B-** Projects with potential limited adverse social and environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and
- **Category C-** Projects with minimal or no social or environmental impacts.

The Equator Principles are intended to serve as a common baseline and framework. EPFIs are committed to implementing the Equator Principles in their internal environmental and social policies, procedures and standards for financing Projects. Project Finance or Project-Related Corporate Loans shall not be provided to Projects where the client will not, or is unable to, comply with the Equator Principles. As Bridge Loans and Project Finance Advisory Services are provided earlier in the Project timeline, it is requested that the client explicitly communicates their intention to comply with the Equator Principles.

1.8.4 World Bank's Environmental and Social Safeguard Policies

The World Bank's 2018 environmental and social safeguard policies are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staff in the identification, preparation, and implementation of programs and projects. These Policies include:

ESSP 1 - Environment Assessment

ESSP 2 - Labour and Working Conditions

ESSP 3 – Resource Efficiency and Pollution Prevention and Management

ESSP 4 - Community Health and Safety

ESSP 5 - Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement



ESSP 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources

ESSP 7 - Indigenous People and People in Sub-Saharan Africa

ESSP 8 - Cultural Heritage

ESSP 9 - Financial Intermediaries

ESSP 10 - Stakeholders Engagement and Information Disclosure

This ESIA has reviewed these policies because they are relevant to the Project as shown in the following sub sections:

ESSP 1 - Assessment and Management of Environmental and Social Risks and Impacts is the overarching standard that provides the procedural basis for an integrated environmental and social assessment of investment projects in a risk-driven, outcome-based, and proportionate manner. It establishes the need to characterize how disadvantaged and vulnerable groups may be affected by projects and how impacts may be addressed. It introduces the concept of ecosystem services and measures to manage risks and impacts related to them. It builds on the existing OP/BP 4.01, Environmental Assessment, and, together with ESS10, applies to all investment projects. It broadens the scope of assessment by adding explicit requirements covering social risks and impacts. It provides clearer project definitions for borrowers and introduces a clear and actionable risk management system.

Under this policy, projects are categorized as category A, B, or C according to type, scale, location, and anticipated severity of environmental impacts. The category indicates the scope and detail required for the ESIA. These categories are presented in Table 1-3.

Table 1-3: Categorization of ESIA

Category	Requirements
A	A full (comprehensive) ESIA is normally required as the project may have significant adverse impacts that may be sensitive, irreversible, and diverse. These are mainly new construction projects.
B	More limited environmental analysis is appropriate, as the project may have specific environmental impacts and mitigation measures can be more easily designed. Projects under this category entail maintenance, or rehabilitation rather than new construction
C	Environmental analysis is normally unnecessary. Projects focus on education, family planning, health, and human resources development

Source: IFC 2012

ESSP 2: Labour and Working Conditions is the World Bank's first proposal to introduce a set of operational policy requirements for labour and working conditions in investment projects.



The standard prohibits child and forced labour and supports freedom of association and collective bargaining. Considering the nature of different types of projects, workers, and suppliers, it includes proportional requirements for community labour projects, the provision of a grievance mechanism for project workers, and requirements relating to occupational health and safety.

ESSP 3: Resource Efficiency and Pollution Prevention and Management incorporate key provisions of OP/BP 4.09, Pest Management, and address the efficient management of energy, water, raw materials, and other resources. It also requires borrowers to characterize and estimate emissions of air pollutants, including project-related greenhouse gas emissions. This project has triggered this policy which has been addressed in the project description (chapter 3), physical and biological components of chapter 4 and the ESMP in Chapter 7. It was further amplified with the consideration of the GHG and climate change.

ESSP 4: Community Health and Safety focuses on projects' risks to and impacts on communities. It incorporates key provisions of OP/BP 4.37, Safety of Dams, and addresses the design and safety aspects of infrastructure, equipment, services, traffic, and hazardous materials. It includes requirements for the deployment of security personnel. Characterization of the project waste streams; traffic studies and the development of high levels traffic and waste management plans satisfy this provision.

ESSP 5: Land Acquisition. Restrictions on land use and involuntary resettlement maintain key provisions of OP/BP 4.12, Involuntary Resettlement, including the principles of compensation at replacement cost and assistance in restoring or improving livelihoods. It gives explicit recognition to the importance of exploring ways for affected people to share in the benefits of the project.

Regarding resettlement, the Bank guidelines prescribe measures to minimize the negative impacts and ensure that the displaced community benefits from the project. Therefore, the Policy requires that displaced person should be:

- Compensated for their losses at full replacement cost prior to the actual move;
- Assisted with the move and supported during the transition period in the resettlement site;
- Assisted in their effort to improve their former living standards, income earning capacity, and production levels, or at least restore them
- Integrated socially and economically in to host communities so that adverse impacts on host communities are minimized. The best way of archiving this integration is for resettlement to be planned through consultation involving affected people and future hosts and affected people



In addition, land, housing, infrastructure, and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities, and pastoralists who may have customary right to the land and other resources taken for the project. The absence of legal title to land by such groups should not be a barrier to compensation. This policy has been triggered since in some areas of the route, physical and economic displacement to allow construction works.

ESSP 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources incorporates key provisions OP/BP 4.04, Natural Habitats, and OP/BP 4.36, Forests, requiring borrowers to assess and take measures to mitigate the impacts of the project on biodiversity, including loss of habitat, degradation, and the introduction of invasive alien species. It also establishes principles to govern the sustainable use of living natural resources, such as forests and fisheries. The policy affirms commitment to the evaluation of the indigenous ecosystem services present in any project area, development of a robust ESMP.

ESSP 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities maintains key provisions of OP/BP 4.10, Indigenous Peoples, while recognizing that some shareholders may use different terms to describe Indigenous Peoples. It requires Free, Prior, and Informed Consent in specified circumstances. For ESS7, consent refers to the collective support of affected Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities. This policy does not apply to the project.

ESSP 8: Cultural Heritage reaffirms the objectives of OP/BP 4.11, Physical Cultural Resources, requiring projects to use chance finds procedures and other approaches to protect cultural heritage, and providing for consultation with affected communities. It broadens the definition and treatment of cultural heritage to include both tangible and, in specified circumstances, intangible cultural heritage.

This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial, or national level, or within the international community.



Cultural resources are important as sources of valuable historical and scientific information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The loss of such resources is irreversible, but fortunately, it is often avoidable.

ESSP 9: Financial Intermediaries requires financial intermediaries (FIs) to put in place an environmental and social management system with associated procedures. ESS9 reflects existing FI requirements under OP 4.01 and OP 4.03, as well as IFC's approach to FI operations.

ESSP 10: Stakeholder Engagement and Information Disclosure consolidates and improves provisions related to borrower engagement with stakeholders, including meaningful consultation, access to information, and grievance redress. It provides for ongoing dialogue between the borrower and stakeholders, including project-affected parties, throughout the life of a project, and lays out requirements for information disclosure and grievance redress. A continuous Stakeholder Engagement Plan has been developed for this project.

1.8.5 International Finance Corporation (IFC) Performance Standards (PS)

IFC is a member of the World Bank Group which provides investment assistance to private sectors in developing countries. IFC applies its PSs to manage social and environmental risks and impacts and to enhance development opportunities in its private sector financing in its member countries eligible for financing. The PSs may also be applied by other financial institutions electing to apply them to projects in emerging markets. Out of the eight IFC's Performance Standards established to enable the clients ensure sustainability in projects throughout the life of an investment by IFC or other relevant financial institution, the following were considered in this ESIA:

Performance Standard 1: Social and Environmental Assessment and Management System

This PS underscores the importance of managing social and environmental performance throughout the life of a project (or business activity that is subject to assessment and management). An effective social and environmental management system is a dynamic, continuous process initiated by management and involving communication between the client, its workers, and the local communities directly affected by the project. Drawing on the elements of the established business management process of "plan, implement, check, and act," the system entails the thorough assessment of potential social and environmental impacts and risks from the early stages of project development, and provides order and consistency for mitigating and managing these on an on-going basis. A good management system appropriate to the size and nature of a project promotes sound and sustainable social and environmental performance, and can lead to improved financial, social and environmental project outcomes. PS1 has the following objectives:



- To identify and assess social and environment impacts, both adverse and Beneficial, in the project's area of influence;
- To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment;
- To ensure that affected communities are appropriately engaged on issues that could potentially affect them;
- To promote improved social and environment performance of companies through the effective use of management systems.

Performance Standard 2: Labour and Working Conditions

Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient to the sustainability of the enterprise. Failure to establish and foster a sound worker management relationship can undermine worker commitment and retention, and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, clients may create tangible benefits, such as enhancement of the efficiency and productivity of their operations.

Performance Standard 3: Pollution Prevention and Abatement

This PS recognizes that increased industrial activity and urbanization often generate increased levels of pollution to air, water, and land that may threaten people and the environment at the local, regional, and global level. On the other hand, along with international trade, pollution prevention and control technologies and practices have become more accessible and achievable in virtually all parts of the world. This Performance Standard outlines a project approach to pollution prevention and abatement in line with these internationally disseminated technologies and practices. In addition, this Performance Standard promotes the private sector's ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources.

The PS3 has the following objectives;

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities;
- To promote the reduction of emissions that contributes to climate change.

Performance Standard 4: Community Health, Safety and Security

This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. However, projects can also increase the potential for community exposure to risks and impacts



arising from equipment accidents, structural failures, and releases of hazardous materials. Communities may also be affected by impacts on their natural resources, exposure to diseases, and the use of security personnel. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety and security that may arise from project activities. The level of risks and impacts described in this Performance Standard may be greater in projects located in conflict and post-conflict areas.

- To avoid or minimize risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine circumstances;
- To ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimizes risks to the community's safety and security.

Performance Standard 5: Land Acquisition and Involuntary Resettlement

Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition. Resettlement is considered involuntary when affected individuals or communities do not have the right to refuse land acquisition that result in displacement. This occurs in cases of: (i) lawful expropriation or restrictions on land use based on eminent domain; and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.

The objectives of this standard are:

- To avoid or at least minimize involuntary resettlement wherever feasible by exploring alternative project designs;
- To mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of land by: (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;
- To improve or at least restore the livelihoods and standards of living of displaced persons; and
- To improve living conditions among displaced persons through provision of adequate housing with security of tenure⁴ at resettlement sites.



Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management

This performance Standard recognizes that protecting and conserving biodiversity the variety of life in all its forms, including genetic, species and ecosystem diversity - and its ability to change and evolve is fundamental to sustainable development. The components of biodiversity, as defined in the Convention on Biological Diversity, include ecosystems and habitats, species and communities, and genes and genomes, all of which have social, economic, cultural and scientific importance. This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote use of renewable natural resources in a sustainable manner. This Performance Standard addresses how clients can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources.

PS 6 has the following objectives:

- To protect and conserve biodiversity; and
- To promote the sustainable management and use of natural resources through the adoption of practices that integrates conservation needs and development priorities.

Performance Standard 7: Indigenous People

This performance Standard recognizes that Indigenous People, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segment of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. Consequently, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases.

This Performance Standard has the following objectives:

- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.
- To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts.
- To promote sustainable development benefits and opportunities for Indigenous



- Peoples in a culturally appropriate manner.
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life cycle.
- To ensure the Free, Prior, and Informed Consent (FPIC) of the affected communities of the Indigenous Peoples when the circumstances described in this Performance Standard are present; and
- To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.

Performance Standard 8: Cultural Heritage

This Performance Standard recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to protect irreplaceable cultural heritage and to guide clients on protecting cultural heritage during their business operations. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. The objectives of this PS are as follows:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation; and
- To promote the equitable sharing of benefits from the use of cultural heritage in business activities.

1.8.6 African Development Bank Integrated Safeguards System.

The adoption of the Operational Safeguards (OS) of the Integrated Safeguards System (ISS) aims at strengthening the capacity of the Bank and borrowers/clients to:

- Better integrate environmental and social impact considerations into the Bank's operations to promote sustainability and long-term development effectiveness in Africa.
- Prevent projects from harming the environment and local communities and, if not avoided, minimize, mitigate and/or compensate for their negative effects, and maximize development benefits.
- Systematically examine the impact of climate change on the viability of investment projects and the contribution of projects to global greenhouse gas emissions.
- Delineate the roles and responsibilities of the Bank and its borrowers/clients in implementing projects, achieving sustainable outcomes, and promoting local participation; and assist regional member countries and borrowers/clients to strengthen their own safeguard systems and capacity to manage environmental and social risks.

ISS OSs are OS 1: Environmental and Social Assessment; OS 2: Involuntary Resettlement: Land Acquisition, Displacement, and Compensation; OS 3: Biodiversity and Ecosystem Services; OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials, and Resource Efficiency; and OS 5: Working Conditions, Health and Safety.



OSs 2-5 support the implementation of OS 1 and set out specific conditions related to various environmental and social issues, including gender and vulnerability, that are triggered if the assessment process reveals that the project may pose a risk.

The selected OSs are summarized below:

- **OS 1: Environmental and Social Assessment** - This umbrella OS governs the process for determining the environmental and social category of a project, and the resulting environmental and social assessment requirements. Requirements include scope, categorization, use of Strategic Environmental and Social Assessment (SESA) and Environmental and Social Impact Assessment (ESIA) where applicable, Environmental and Social Management Plans, climate change vulnerability assessment, public consultation, community impacts, assessment and care of vulnerable groups, and grievance procedures. It updates and consolidates the policy commitments set out in the Bank's Environmental Policy.

The objective of this overarching OS, and the set of OSs that support it, is to integrate environmental and social considerations - including those related to vulnerability to climate change - into the Bank's operations and thereby contribute to sustainable development in the region.

The specific objectives are to:

- Integrate environmental, social and climate change factors into Country Strategy Papers (CSPs) and Regional Integration Strategy Papers (RISPs).
- Identify and assess the environmental and social risks and impacts, including those related to gender, climate change, and vulnerability, of Bank lending and grant operations in their area of influence.
- Avoid or - where avoidance is not possible - minimize, mitigate, and compensate for adverse environmental and community impacts.
- Ensure stakeholder participation during the consultation process so that affected communities and stakeholders have timely access to information about the Bank's operations in appropriate formats and are meaningfully consulted on issues that may affect them.
- Ensure effective management of environmental and social risks of projects during and after implementation; and
- Contribute to the strengthening of Regional Member Countries' (RMCs) systems for environmental and social risk management through the assessment and strengthening of their capacities to meet the AfDB's requirements under the Integrated Safeguard System (ISS)



- **OS 2: Involuntary Resettlement:** Land Acquisition, Displacement and Compensation. This OS consolidates the policy commitments and conditions set out in the Bank's policy on involuntary resettlement and incorporates several improvements to increase the operational effectiveness of these conditions. In particular, the operational safeguard embraces the comprehensive and innovative notions of livelihoods and resources in their social, cultural, and economic dimensions. It also adopts a definition of community and common property that emphasizes the critical need to maintain the social cohesion, community structures, and social interrelationships inherent in the notion of common property.
- The OS confirms the need to provide compensation at full replacement cost, the importance of implementing resettlement that improves living standards, income-generating capacity, and overall livelihoods, and the need to ensure that social considerations-such as gender, age, and issues related to project outcomes-do not disenfranchise particular people affected by the project.
- **OS 3: Biodiversity and Ecosystem Services** - The overarching objective of this OS is to conserve biological diversity and promote the sustainable use of natural resources. It translates the Bank's commitments in its policy on integrated water resources management and to the UN Convention on Biological Diversity into operational safeguard requirements. Safeguard reflects the importance of biodiversity on the African continent and the value of key ecosystems to people. The OS emphasizes the need to "respect, conserve and maintain [the] knowledge, innovations and practices of indigenous and local communities. [and] to protect and promote customary use of biological resources in accordance with traditional cultural practices consistent with conservation or sustainable use requirements"
- **OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency** - This OS covers the full range of pollution, waste and hazardous materials impacts for which there are international conventions as well as comprehensive industry-specific standards that are applied by other MDBs. It also introduces a framework for vulnerability analysis and monitoring of greenhouse gas emission levels and provides a detailed analysis of possible reduction or compensatory measures.
- **OS 5: Working Conditions, Health and Safety** - This OS defines the Bank's requirements of its borrowers or clients with respect to workers' conditions, rights, and protection from abuse or exploitation. It covers working conditions, workers' organizations, occupational health and safety, and the prevention of child or forced labor.

1.8.7 Other Relevant International Conventions

Other conventions, (classified according to their applicability to waste management, marine and biodiversity protections), relevant to the proposed project and to which Nigeria is signatory, but for which enabling legislation may not be in place in all cases, include:



Biodiversity

- Environment of the West and Central African Regions, 1981.
- Convention on the Protection of the World Cultural and Natural Heritage, 1972.
- United Nations Framework Convention on Climate Change (Kyoto Protocol), 1997.
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987.
- Convention on International Trade in Endangered Species (CITES), 1973.
- Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1979.
- United Nations Convention on Biological Diversity (CBD) adopted at the Earth Summit in Rio de Janeiro, 1992.
- The Copenhagen Accord reached by Heads of State, Heads of Government, Ministers and other heads of delegation at the United Nations Climate Change Conference 2009 in Copenhagen, Denmark.

1.9 Structure of the Report

The ESIA report is presented in eight chapters as follows:

- Preliminary Pages contains the Table of Content, list of ESIA preparers, list of abbreviations and acronyms, acknowledgment, executive summary.
- **Chapter one:** is an introduction of the proposed project with background information on the proponent, project key design, project location, objectives, work scope, methodology and a review of the legal and administrative framework/ policies applicable to the project.
- **Chapter two:** discusses the project justification, benefits, sustainability, project options considered.
- **Chapter three:** presents the project description which includes technical details of the proposed project, waste streams and project timeline.
- **Chapter four:** describes the existing environmental condition (geographical and ecological) of the study areas as well as socio-economic and health conditions.
- **Chapter five:** identifies and evaluates the impacts from the project, which includes significant impacts;
- **Chapter six:** contains mitigation measures proffered for identified impacts.
- **Chapter seven:** presents the Environmental Social Management Plan (ESMP) to be adopted throughout the project life cycle;
- **Chapter eight** is the report conclusion.

Other sections of the report are List of references and appendices.



CHAPTER TWO

PROJECT JUSTIFICATION

2.1 Need for the Project

The proposed Agro-cargo terminal at Sultan Abubakar III International Airport, Sokoto is needed to provide access to efficient, speed, reliability, cost effectiveness transportation of perishable commodities under controlled conditions to third party business and end users/consumers. The State is endowed with huge and fertile arable land that enhanced large production of crops like: Onion, Sesame, Garlic and Livestock. However, some of these items are perishables that easily got damage on transits. With the establishment of the Agro-cargo terminal, this lost would be controlled or significantly minimized. Thus, people from adjoining states and neighboring countries will also get easy distribution of these commodities.

2.2 Benefits of the Project

The proposed project will among others increase farmers' income, enhance job creation, contribute to poverty reduction, provide export opportunities and reduced vulnerability for smallholder farmers, and enhance foreign exchange earnings on sustainable basis.

As a direct benefit of the project, there will also be an overall increase in revenue generation at the local, state, and national level. Various taxes and charges will be paid by passengers, freight, and airline operators to the government, while personnel employed by the proposed project will earn salaries and emoluments, which will increase their purchasing power and lead to improved economic conditions within and around the project area.

As part of project implementation, local personnel will be trained in the operation and maintenance of the aspect of the proposed project, thus, this will lead to the acquisition of new skills by local technicians and engineers, and the eventual transfer of advanced technology. This will improve Nigeria's pool of skilled personnel and prompt development in the country.

As a result of the proposed project, several value-added developments are likely to spring up in the immediate project area. Banks, schools, hospitals, recreational and hospitality facilities etc, will spring up among within and around the project area. In addition, other ancillary facilities that deals in materials that are routinely used in the civil construction sector, including stationeries, household items that are required by project workers, clients etc. will spring up and engender an economic boom within host communities.

2.3 Value of the Project

The total estimated project cost, net of taxes and duties is USD 24.5 million. This will be financed by an AfDB Loan of USD23.275million constituting 95% of total project costs and State Government contribution in cash or in kind of USD 01.225 million (i.e., 5% of total project costs). This will be discussed and agreed upon during the preparation and/or appraisal missions. Economically and socially, the project is of immense value considering that it has the potential to stimulate growth in the agricultural sector because of assurance of expanded market access. This has the potential of stabilisation of the rural economy thereby reducing rural urban migration and crime potential especially banditry and other petty crimes.



2.4 Envisaged Sustainability

The envisaged sustainability of the proposed Agro-cargo terminal at Sultan Abubakar III International Airport is discussed under technical sustainability, social sustainability, Economic sustainability, and Environmental sustainability.

2.4.1 Technical Sustainability

The project shall equally be managed by experienced experts who are well vast in the aviation technology. The installation of equipment will be done following internationally approved standards such that the proposed projects do not have much negative effect on the host community. Furthermore, Sokoto State Government has indicated its desire to technical sustainable of the project by ensuring that Best Available Technology (BAT) is adopted in the design, construction, and operational phases of the project.

2.4.2 Social Sustainability

The proposed project will achieve social sustainability in that it will not only provide employment for the indigenes of the host communities at the pre- construction, construction, and operation phase, but also create room for the training and retraining of the project personnel. Furthermore, the proposed project will result in the provision of certain social infrastructures and amenities such as road, water, healthcare, and educational support etc. Above all, the engagement doors of the project will be open to all stakeholders at all stages/ phases of the project.

2.4.3 Economic Sustainability

Air Cargo globally is seen as a very efficient option to other modes of transport especially when it comes to perishable commodities such as vegetables, root, and tuber crops. Whereas transportation by sea will take several weeks before arrival, air movement is guaranteed within hours. Sokoto State is one of the major perishable crops producing states in Nigeria especially through the various irrigation schemes spread across the state. This guarantees that there will always be cargo available for transportation out of the state to other destinations within and around the Nigerian nation. This means that the project will in no distant time recover its cost, thus confirming its economic sustainability.

2.4.4 Environmental Sustainability

The project will be implemented and operated in accordance with guidelines and recommended best practices of the Federal Ministry of Environment (FMEnv), Federal Ministry of Aviation, and that of other international environmental organizations such as United Nations Environment Programme (UNEP), Intergovernmental Panel on Climate Change (IPCC), Global Environment Facility (GEF) and so on. The environmental aspects of the project shall be given accurate attention to ensure the environment is protected during the project implementation and operation. The integration of the findings and recommendations of this ESIA study into the various phases of the project will to a very large extent see to its environmental sustainability.



2.6 Project Alternatives

2.6.1 Alternative Site/Location Option

The selection of the proposed site was based on the consideration of its closeness to the existing airport facility. The site was carefully selected to meet the set-out criteria for project of this magnitude which include minimum possible infringement, availability of adequate space, avoidance of historic sites and environmental sensitive areas.

2.6.2 Alternative Technology Option

The project will be constructed using modern, locally, and internationally accepted materials by Standards Organization of Nigeria (SON) to achieve public health, safety, security, and environmental aesthetic requirements. Equipment and systems that save resources including energy and use of solar systems, water conservation will be given priority without compromising on cost or availability factors.

Asphalt mixers, crushers and other construction equipment and machineries will be equipped with pollution control devices like dust arrestors/precipitators, emission control, noise abatement devices and desulfurization devices. The equipment and vehicles will have highest levels of combustion efficiency, capability to use cleaner fuels like biodiesel and will have enhanced safety features.

2.7 Project Options

In accordance with the requirements of EIA procedural guideline several alternatives have been considered during the conceptualization of the proposed Project design. This section describes the various project concepts that were considered and the rationale for the selected alternatives. This section also discusses the alternatives with respect to location, technical and environmental considerations. The consideration of the main alternatives in respect of the proposed project was undertaken jointly by the respective stakeholder's input and has occurred throughout an extensive and coordinated decision-making process, over a considerable period. Project alternatives analysis in environmental assessment is designed to bring environmental and social considerations into project selection at the early stages of project planning, and the later stages of site selection, design, and implementation. The project options took cognizance of environmental, safety and operational considerations. These include the no-project option, delayed project, modified project option, and/ or the planned option.

2.7.1 Do Nothing Option

This means the project will not be implemented. This option will reduce and stunt effective economy and Agro allied business development of the state and the nation. The vision of quick intervention in the distribution of some perishable cash crops will not be met. Thus, the "zero action" alternative by not implementing the project will not contribute to the social economic benefits envisaged in the plan.



2.7.2 The ‘Delayed’ Option

This option implies that the planned project will be delayed until a much later date. Such option is usually taken when conditions are unfavourable to project implementation such as in war situation, or where the host community is deeply resentful of the project. Also, if the prevailing economic climate is not quite favourable to the project, then delayed project option may be feasible. None of these conditions is applicable. Indeed, the social, economic and the political environment are most favourably disposed towards the project. Therefore, the implication of delayed project option will mean that all the preliminary work and associated efforts/ costs incurred would have come to nothing. Also, because of inflationary trends, such a delay may result in unanticipated increase in project costs, which may affect the final profit from the project. These, and other related problems make impracticable to adopt the delayed option. It is therefore unattractive to adopt the “Delayed Project” option.

2.7.3 The Project Option

The proposed Agro-cargo terminal at Sultan Abubakar III International Airport offering enormous support to the agro allied businesses mentioned in section 2.1 above. The option of project development is thus the best of all the possible options considered economically, technologically, logistically, and environmentally. During the proposed project design development, alternatives were considered in compliance with the requirements of Nigeria’s EIA procedures together with international best practices.



CHAPTER THREE

PROJECT DESCRIPTION

3.1 Projection Overview

The Agro-Cargo Terminal would be constructed within Sultan Abubakar III International Airport, Sokoto. Various state of the art Agro-Cargo facilities would be employed to enhance the transportation of the abundant agricultural products to international markets. Apart from agricultural produce, the terminal would serve as a means of transporting livestock products. The terminal would be a model in the North for Nigeria and may not only serve for the transportations of agricultural products, but Medicaments especially in this era of COVID-19 pandemic since cool storage facilities are scarce in most Sub-Saharan Africa.

3.2 Nature of the Project

The proposed project will involve the construction and operation of an Agro-Cargo Terminal that will involve; Dry Cargo terminal covering an area of about ten (10) hectares. Additional ten (10) ha for Perishable Cargo terminal with cool chain storage, climate chambers for storage and handling of temperature sensitive products such as fresh agricultural products pharmaceutical storage (optional) transit zone and free port/fore-age trade zone, E.U Border post, Animal Quarantine, Fresh meat inspection, live-stock Handling, Health Officials. Warehousing/ storage facility that will be close to the airport for the storage of some key chosen agricultural produce such as Onion, Garlic, Sesame, Chilly, Soya beans and Meat/hide and skin will cover about 5Ha.

The proposed development will also involve; Project Design, Site Preparation, Evaluate project alternatives, civil construction, Electrical and equipment Installation, Commissioning, Description of pollution control/measures, contingency plans and emergency response procedures and Demobilization.

3.3 Project location

3.3.1 General Location/ Layout:

The proposed facility is to be situated at north-east and north-west of the Sultan Abubakar III International airport in Sokoto, Sokoto State. The proposed site is very close to the Airport and easily accessible by road. The Airport The project will be located on a land area covering a total of about 25 hectares.

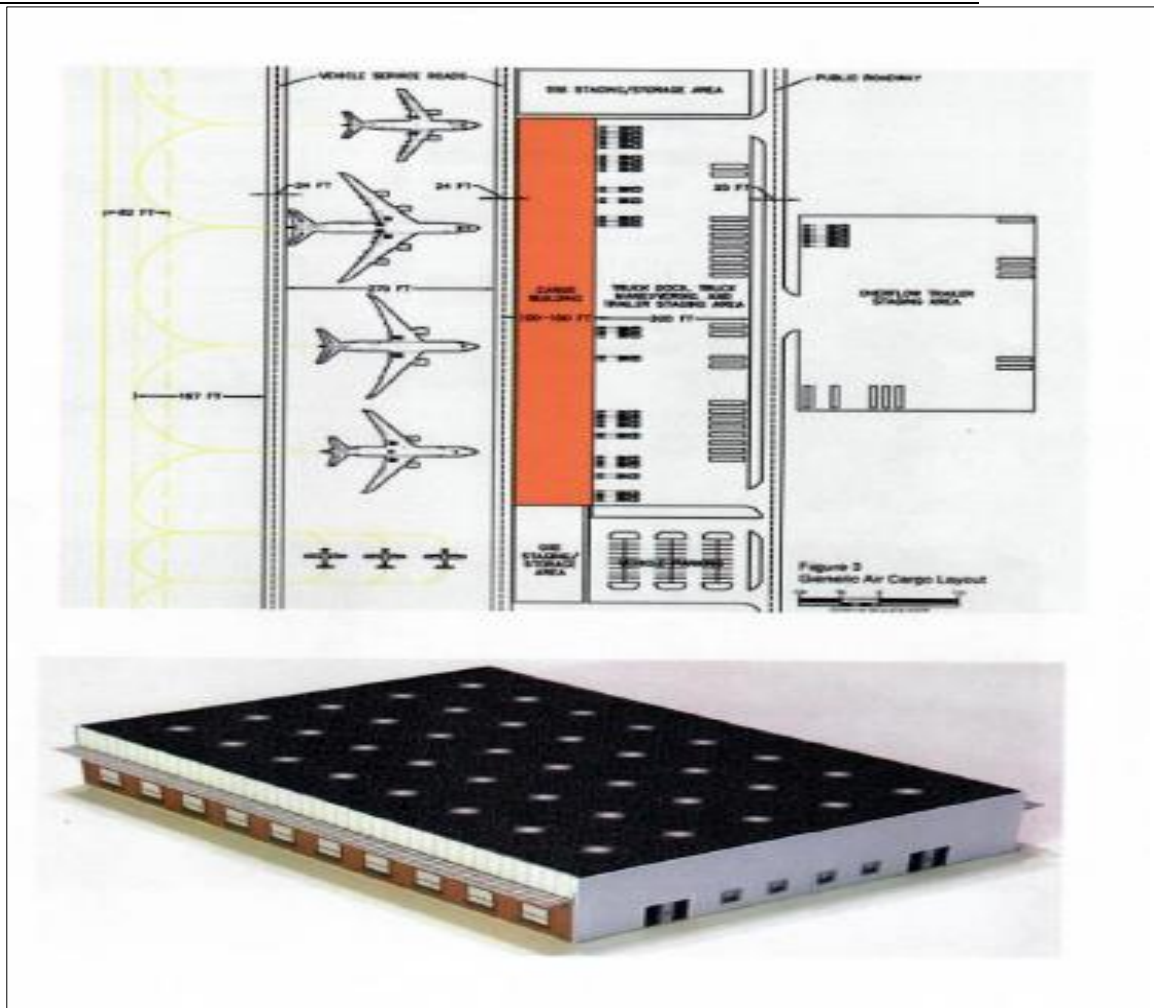


Figure 3-1: General Air Cargo Terminal Layout

Both dry and perishable cargo terminals and the warehouse will be located within proximate distance to each other to allow for synergy and facilitate easy movement of cargo and personnel thereby enhancing the entire Airport efficiency.



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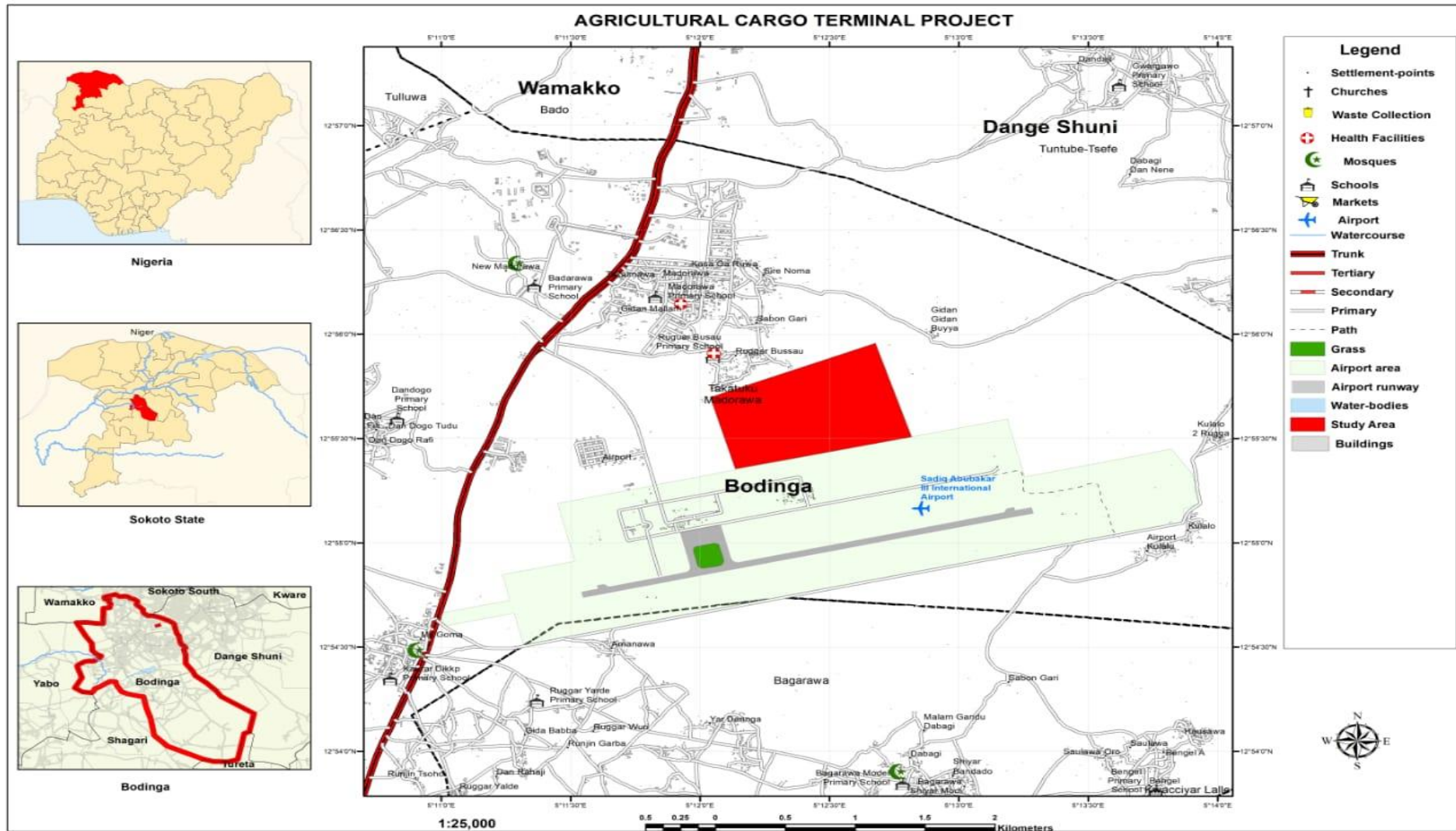


Figure 3-2: Map of the Proposed Project Site



3.4 Project Development Objectives

The main Project Development Objectives (PDO) is: Increase farmers' income, job creation, poverty reduction, export opportunities enhanced and reduced vulnerability for smallholder farmers and foreign exchange earnings on sustainable basis by constructing a national, regional and international Agro-Cargo Terminal at Sultan Abubakar III International Airport that include dry Cargo terminal house, perishable Cargo terminal with cool chain storage, climate chambers for storage and handling of temperature sensitive products such as fresh agricultural products pharmaceutical storage (optional) transit zone and free port/foreage trade zone, E.U Border post, Animal Quarantine, Fresh meat inspection, live-stock Handling, Health Officials. Other specific objectives include the following: -

- Construct ware housing storage facility that is close to the airport for the storage of the key chosen agricultural produce of, Onion, Garlic, Sesame, Chilly, Soyabeans and Meat/hide and skin.
- To provide access to international markets especially for agricultural commodities.
- To boost agricultural value-chain production in the Northwest and Nigeria in general through access to markets.
- To enhance employment generation among the teeming unemployed youth and women through the opportunities available especially in value-chain on agricultural products
- To enhance income and revenue generation to the State and country in general.
- To build the capacity of participants in the Agro-Cargo Terminal through trainings and workshops.

3.5 Project Components:

This project has four major (4) components that cover its activities, thus:

Component 1: Establishment of Agro-Cargo Terminal and Warehouse Storage Facilities

Establishment of Agro-Cargo Terminal and Construction and equipping of modern warehouse facilities: This component include activities such as identifying, developing, and establishing the runaway, storage facilities in the terminal, cool chain system, procurement of delivery vans, modern warehouse. The Agro-Cargo Terminal would provide the nucleus for the major Value-Chain addition activities of the selected value chain commodities. The terminal would offer associated public economic infrastructure, logistics and specialized facilities and services (e.g., electricity, water, cold-chain facilities, laboratory and certification services, business services, ICT, waste treatment, etc.) required for Agro-Industrial activities.



Plate 3-1: A typical Agro-Cargo Terminal Storage Facility to be Sited Close to the Airport

Component 2 – Support to Enterprises Development and Marketing Strategies:

This component has two sub-components: 2.1) Support for the formation and strengthening of value-chain aggregation centers, 2.2) Support for the identification of markets and ICT development. This includes activities to support MSMEs participation in value-chain activities. The development would enhance productivity and infrastructures at the farm level (agricultural production) infrastructure in agribusiness levels. Essentially this will include sorting, grading and storage systems, development of new and rehabilitation of old storage facilities to guarantee optimum and all-year-round production, development of crop-base farming schemes. targeted policies, laws, rules, and regulations to address the inefficiencies and resultant rent-seeking activities in the supply of authentic quality agricultural products, crop protection products (CPPs), handling and management of products, agricultural working capital, post-harvest handling, storage, transportation, and quality control. Support the building of capacity and skills for agribusiness development and support to Climate Smart Agriculture. Training for Small and Medium Enterprises. (c) Support to women and youth.



Plate 3-2: Proposed Agro-Cargo Terminal Storage Facility – Modern Warehouse facility

Component 3: Capacity Building, Information and Communication

Capacity building training to Project Staff, and other key project Stakeholders. Capacity-building support to farmers, youth, women, and other stakeholders with emphasis on organizing them into viable small farming cooperatives, strengthening linkages between farmers, agro-dealers, processing firms and other private sector participants to develop contracts for agreed quantity and quality of outputs towards market-oriented production. Provision of capacity building training on agricultural entrepreneurship (crops food processing, packaging, and marketing, among others). The project will deploy and support the use of ICT applications by the youth in accessing production knowledge and output markets of the key selected crops. The component will also use resources to fund group mobilization and sensitization; community relations, training of farmer groups and other stakeholders on facilitation of links between farmer groups and processors, agro-dealers, and other private operators; the project will also fund the provision of media communication production programs, including information on marketing. Partnership with ministry of information/existing communication agencies will be explored.



Plate 3-3: Assessment of Export Potentials of Some Agricultural Produce in Sokoto State

Component 4: Project Management:

This component would be responsible for the establishment of enabling institutions, policy, regulatory and business environment framework for agribusiness through the implementation of the following: a) developing/strengthening of enabling policy, legislation, and regulation for Agro-Value Chain addition; b) capacity building (internal and external) for staff of relevant public institutions; c) enabling business environment and relevant incentives to support private sector investments including one-stop shops, infrastructure, customs office, immigration support, etc) in the Agro-Cargo Terminal and day – to – day running of the project (i.e overheads administrative and other logistics). The component will also include Monitoring and Evaluation Unit, Fiduciary Management, and environmental and social safeguards.



Plate 3-4: Capacity Building for Stakeholders

3.6 Description of Project Components and Activities

This section presents the description of the project components that may have significant environmental aspect.

The project shall entail the construction of extended facilities, mostly for commercial air transport. The facilities will include Cargo Terminal Custom Channel/Exit, Quarantine Service office, Emergency Exit, Fire Hydrant, General Waiting Room, Male/Female Toilet, Cargo holding bay. The existing Apron and taxiway will be not expanded except traffic increases.

Terminal Building

This is a building where Agro products shall get on and off aircraft, book ticket, pick up luggages etc. storage facilities in the terminal, cool chain system, procurement of delivery vans, modern warehouse. Departure Exit, Emergency Exit, Fire Station, General Waiting Room, International Departure Hall, Luggage Platform, Male & Female Toilet, National Departure Hall, off 001 – 006, Passport Control, Rooms, Security, Store.



Palletization Area and Truck Docking Area

Palletization is the logistics process consisting of placing goods together on top of a pallet to consolidate the load, making it easier for the handling equipment to transport it. As your aim is to provide the goods with stability, the type of pallet you choose is fundamental. The airport will provide adequate space for trucking and stacking of goods.

Maintenance Building

Maintenance building shall be where the performance of task required ensuring the continuing air worthiness of aircraft or aircraft parts are done. This includes overhaul, inspection, replacement, defect rectification, embodiment of modifications, compliance with air worthiness directive and repair.

Car / Vehicle Parking Lot

The parking lot will be in front of the terminal building. Its land take is about 100m length and 50m width with a capacity to take not less than fifty (50) vehicles.

Access Road

Access to the proposed Cargo Air Terminal shall be a key component in the efficient operation of the airport. The access road is about 8km dual carriageway by length and 7.4m width. The existing access road may be expanded if the estimated volume of traffic increases.

3.7 Mobilization Phase

Preconstruction and construction activities for the Agro Cargo Terminal and Modern Warehouse facility are as follows.

Site Clearing and Preparation

Site grubbing, grading and land clearing are essential to the success of a construction project and require careful dedication and precision. The Sokoto State is committed to using the most advanced technology minimized clearing activities to the perimeter fence of the proposed site. The excavated soil will be reused in the site. The aim of the excavation is to achieve levelling of the site.

Building Pad Grading

Building pad means the area occupied by a building or buildings on a building site, including the open area contiguous to and surrounding such buildings and having a slope not greater than ten percent. Building pad means a relatively level site prepared by grading and upon which a building



will be placed. Surveying and leveling will be carrying out using theodolite and master station as well as other surveying equipment.

Construction and Installation of Infrastructure

The terminal will consist of different installations such as water and sewage system, Construction of entrances, roadways, large parking areas and more.

3.8 Equipment and Machinery

The equipment planned for the proposed project is shown in **Table 3-1**.

Table 3.1: Breakdown of Equipment, Machines and Storage/Processing Facilities

S/No	Name of Machines	No.
1	Excavators	4
2	Wheel loader	2
3	Generators	3
4	Pay loaders	3
5	Tower Crane	1

3.9 Personnel Support Strength Construction Phase

The construction will be undertaken by an appointed contractor. It is envisaged that the contractor personnel will include skilled and semi-skilled personnel. A good number of labourers will also be employed from the neighbouring communities. It is estimated that 90% of the construction crew will be Nigerians especially from Sokoto State and other parts of the country.

3.10 Operation Phase

The project will engage a total of 70 persons unskilled and killed during the construction and over 30 persons during the operational phase (within Sokoto State and Nigeria) and in response to the Nigerian Government set minimum local content target of 75%. Sokoto State Government shall ensure that employment is given to host and neighboring communities (where requisite skills are available).

Cargo Handling

All dangerous goods and/or perishable items shall be handled in line with the terminal procedure. The items shall be coded for easy identifications. The unclaimed or leaked cargo shall be returned



to the terminal store. The figure below presents the end-to-end flow for shipment activities at the terminal. The procedures are provided in the subsection below and illustrated in the Figure 3-3a below.

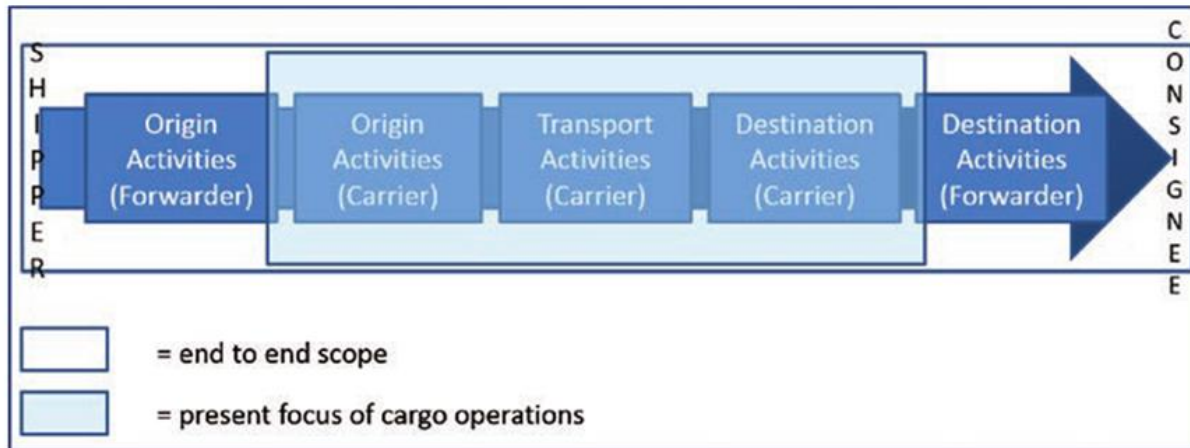


Figure 3-3a: End to end flow for shipment

Booking & Planning Shipments

The process of cargo handling begins with booking and planning shipments, there is much to be done before the shipment even leaves the facility. Having a solid plan of action allows for smooth booking and prevents fewer problems further down the chain of events. It is necessary to follow the steps below to book your shipment properly. These activities also include the steps handled by freight forwarders as listed below:

- Receive shippers' requests and check the security status
- Receive shipper freight information
- Plan the routing-direct or consolidation
- Request capacity against forwarder or carrier inventories
- Confirm capacity
- Arrange pick up of freight
- Picked up from the shipper

How Air Cargo is Received and Accepted for Shipment

The next step in logistics is how air cargo is received and accepted for transport. This is a multi-step process that includes various stockholders including trucking companies, as well as cargo and ground handling service providers amongst others.



Throughout the shipment process, safety remains a priority for all parties of the air cargo supply chain. For instance, it is important to ensure clear and correct labelling and identification of packages. In addition, the packages themselves must be suited to the content and be able to protect the goods from any damage.

Receive Shipments into Carrier Domain

Once the freight forwarding truck arrives at the carrier's domain and the truck driver has informed the Cargo Handling Agent of their arrival, the carrier domain can receive the goods. They should have received the following information in advance, which is why filing electronically is always recommended:

- Electronic air waybill information
- Electronic house waybill information for consolidated shipments
- Truck number and type (if available)
- Estimated arrival time (if available)
- Security screening needs (if known/available)

Once the information has been received, and the truck has arrived, an unloading slot and position will be assigned to the driver. Different slots are given according to needs, such as dangerous goods, live animals, healthcare products, and more.

Accept Shipments as Ready for Carriage

When accepting shipment as ready for carriage, airport cargo and ground handling personnel must take several steps to meet the requirements to ship goods by air. First, they must verify if the shipments are security cleared. Then they must perform a ready-for carriage check. This entails verifying that all the information aligns with the actual shipment and ensuring all embargoes and operational restrictions are applied. Once everything has been checked, the information is validated against the booking and updated. The primary objective is to ensure the consignments follow.

- Carrier requirements
- Local export rules and regulations
- Rules and regulations of the transit airport(s) and air spaces (if any)
- Import regulations of the destination country

Prepare Cargo for Flight

After accepting shipments ready for carriage, airport cargo and ground handling personnel can prepare the air cargo for flight. The goods in transit must be received and security cleared once again. Goods left on the aircraft that are in transit are considered transit cargo. Cargo and ground handling services must give this transit cargo security checks, including x-ray and Explosive Trace Detection screening. A detailed exam of the integrity of the cargo, and piece count is made. Once



the pre-plan details are received from the carrier, a build-up plan must be prepared, which indicates what air cargo is to be built for flight, and the information is sent to the warehouse.

Energy Input

The proposed project shall be connected to the national grid. As alternative source of power, the airport facility shall have installed two (2) 450KVA generators for its power needs. One will serve as a backup plan for the terminal see power distribution plan in Figure 3. 3.

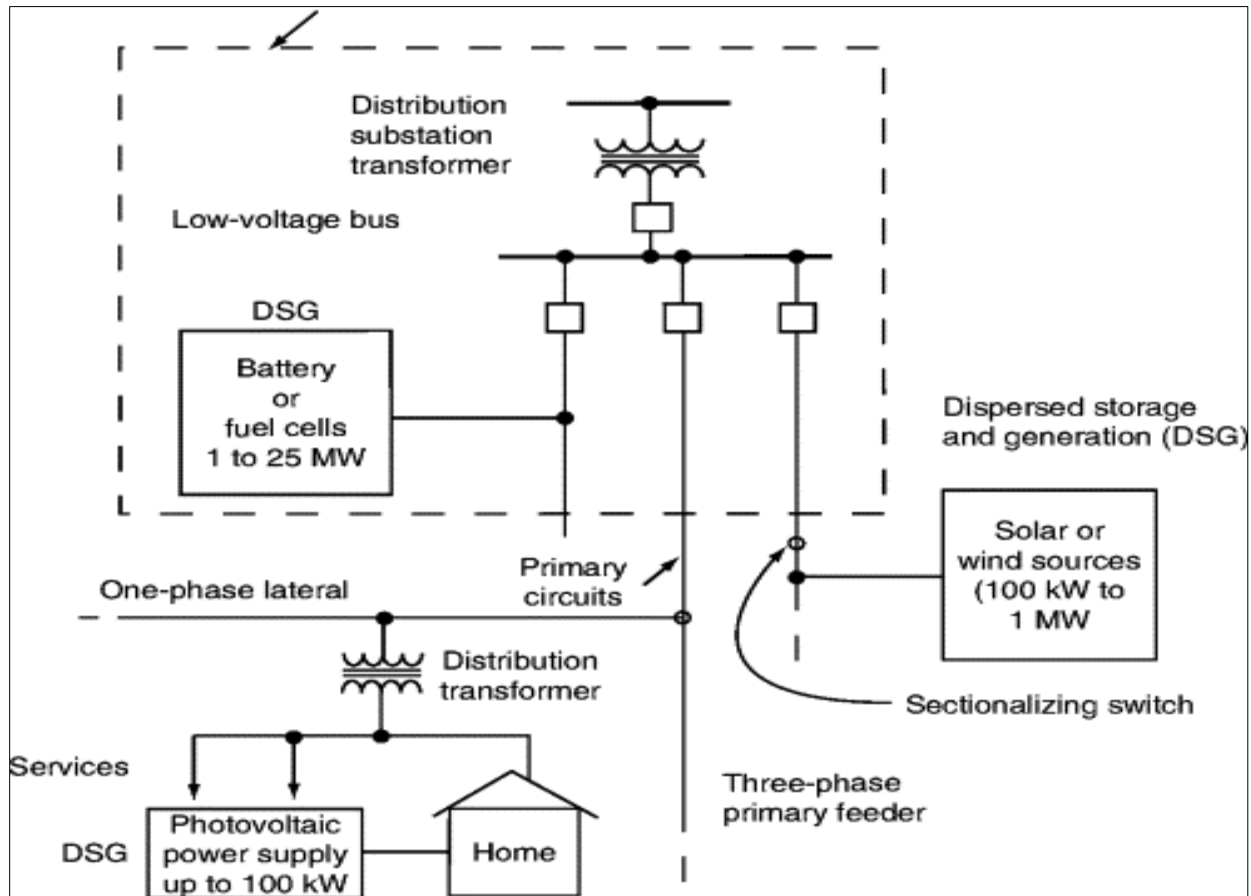


Figure 3-3: Power Distribution Flow Chart

Water Supply

The water requirement for the project is relatively high during construction and minimal during operation. The main consumption of the water during construction is for mixing of cement and concrete. The water requirement during construction is estimated at 10,000 liters per day. During construction, water shall be sourced from water vendors.



Water requirement during the operational phase of Agro Cargo Terminal Airport will be minimal. Water will be used for cleaning; it will also be used at the rest rooms. Water shall be sourced from the borehole which will be drilled on site.

3.11 Waste Management

The waste management for the proposed Agro Cargo Terminal Airport involves a comprehensive description and analysis of activities at preconstruction, construction, operational and abandonment phases of project. It also involves a review of the existing waste management and environmental management system of the proponent.

3.11.1 Solid Stream

The purpose of the waste assessment is to determine the types and management of waste that will be generated from each project phase. The objectives are: to assess the construction activities for the proposed works to identify any potential environmental impacts from the generation of waste associated with the project work; to categorize waste materials where practical, i.e. suitability for re-use/recycling, disposal to public filling areas, disposal to landfill and to recommend appropriate solid waste management options (including waste minimization) on-site, re-use or recycling opportunities and off- site disposal options); to identify site management/mitigation measures that should be implemented to minimize any potential impacts from the generation, handling, storage and disposal measures/routings of waste, in accordance with the current legislative and administrative requirements.

Based on available data from similar projects and research, the following waste types are expected from this project: cut pieces, cotton waste, metal scraps, plastic/ rubber, paper, cardboard, rags, glass, wood, stones, spent chemical/ oil and waste minerals amongst others. The design of solid waste disposal system shall be based on the unit rate of waste generation. The general type of wastes expected from project of this nature is presented in **Table 3-2**.

Table 3-2: Expected Wastes Sources and Types

Sources	Waste Category		
	Solid	Liquid	Gaseous
Pre – Construction Phase	Vegetation, excavated materials, topsoil/overburden, wood off-cuts		Particulate matter
Construction phase	Papers, cartons, metal scraps, plastics, cans, packaging materials, food wastes cement packs, wood, caked cement, debris, glass off- cuts, aluminum sheets, excavated, top soil	Sewage, spent oil, paints and solvents	Emissions from vehicle usage e.g dust CO _x , NO _x and SO _x , etc Noise and



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Operation phase	Packaging materials, papers, domestic wastes, broken bottles/glasses, damage electronics/house appliances, changed part from generators and stationary waste	Sewage, waste water, chemicals etc.	Emissions from different sources (vehicles) e.g dust, CO _x , NO _x and SO _x , etc
Administrative offices/shops	Papers, waste packages, plastics, polythene bags, metal scrap, cans, glasses, food wastes etc	Sewage	
Logistic & Stacking Area	Scrap metals, cans, plastics, rags, electronic-waste, copper cores, aluminum, wood scrap, papers, solidified waste paints	Wastewater, chemicals, spent oil, detergents, sewage etc	Fumes from vehicles and other machineries
Power generating units	Generator/ metal scraps, rags, plastics, electrical cable waste, fire-extinguisher's, cans	Wastewater, grease, spent oil degreasing agent paint	CO _x , NO _x and SO _x emissions from power generating units
Decommissioning phase	Metal cuttings, rocks, concretes, cables, rejected materials, surplus materials, surplus spoil, excavated materials, broken pipes, among others		Dust, noise, Vibration, CO _x , NO _x , SO _x etc.

3.11.2 Solid Waste Minimization

This refers to all the activities generating waste whether residential, logistics, retail or industrial. Waste generators should adopt all practical and feasible efforts to minimize the amount of material to be discarded



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as 'waste'. Basic measures to be taken by waste generators, specifically at the industrial and logistics areas, include:

- Implementing good housekeeping through adopting environmental management systems and standards (EMS) such as ISO 14000 series,
- Conducting regular environmental audits particularly for solid waste involving material flow charts and optimized material balance models as applicable,
- Using recycled material, where applicable,
- Reusing discarded material prior to storage,
- Establishing a waste exchange scheme and reusing material prior to disposal, i.e. taking into consideration that one industry's waste could be the other industry's raw or input material.

3.11.2.1 Solid Waste Types and Sources

Solid wastes will be generated from basically all activities within the Agro Cargo Terminal. The present land use plan depicts various industrial activities with associated logistics and accommodation. Most of these activities will generate mainly solid waste that is typical of the Municipal Solid Waste (MSW) stream, such as accommodation, educational facilities, retail centers, etc. However, specific industrial land uses could, in addition to MSW, also generate industrial wastes which in turn could be non-hazardous and hazardous. The following SW characterization is used for the purpose of this project:

Municipal Solid Waste (MSW): generated from residential and commercial land use areas and may typically contain food waste, paper, cardboard, plastics, uncontaminated textiles, glass, wood, metals, inert debris, yard trimmings, and other bulky items.

3.11.2.2 Solid Waste Management System Basic Concept

Based on the initial assessment of waste characteristics, and at this planning stage where specific function/data regarding the individual industrial activities/facilities is yet to be fully defined, the consultants envisage that the main options for the proposed SWMS should take into consideration the following general planning aspects:

The adequate management of different waste types from different facilities within the project sites encourages the need to establish pertinent Health and Safety operational unit and environmental guidelines for enforcement and monitoring within the industrial districts.

As part of a long-term vision towards achieving sustainable practices, waste minimization measures in the form of applying the 3R's (Reduce, Re-use, and Recycle) are of utmost importance to minimize any



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potential impacts from future operations. In practice, this can be complemented within the industries by establishing a waste exchange policy and programs.

The handling of downstream component (treatment/disposal of the various waste streams) should be incorporated with current approved operations and future set by the SWM relevant authorities.

The management of upstream collection services for all waste types is encouraged to be handled by licensed Contractors under special agreements with tenants and in close coordination with the management authority.

The likely generation of both MSW/INHW as well as an anticipated lesser portion of IHW raises the need to handle such waste types separately.

As part of their duty of care, tenants should be given the responsibility of proper storage and handling of their generated waste within their own premises, in close coordination with/authorization by the Management prior to transfer of MSW to the Transfer Station (TS) or ultimate dispatch of Industrial Waste to offsite approved destination site(s).

3.11.2.3 Wastewater Collection / Disposal System

Waste generated from the construction and operational phase of the project will be collected and disposed of in line with the approved waste management plan. Waste receptacles with different colour codes will be install at strategic locations within the proposed facility. A third-party contractor will be engaged to manage the collection of the waste.

3.12 Decommissioning and Abandonment Plan

Decommissioning after the construction phase

To support site operations/activities during construction, temporary structures (storage yard, site offices, cafeteria, etc.) would be installed. Upon completion of the construction of the power plant, temporary structures areas would be cleared.

Project closure and abandonment

Decommissioning refers to the process of dealing with the operating assets of the project after completion of the operating life cycle. This very last phase of the project is expected to last at least 60 years after operations start-up. Decommissioning procedures at this stage are generic. However, the general process of decommissioning would be as follows:



- Operating processes are systemically shut down in a safe manner.
- Liquid, solid contents and wastes are removed for treatment and disposal
- The fate of the emptied and cleaned structures and equipment are then decided by a feasibility study as part of an “Abandonment Assessment” to determine the best environmental and economic solution consistent with Nigerian regulatory requirements.

The general order decommissioning options available for redundant structures and equipment are as follows:

- **Re-use:** by sale and/or transport to another project or company.
- **Re-cycle:** breaking down structures and equipment for raw materials. This is expected to be the fate of the great majority of metalwork. The break-up of structures can be done on location or after transport to a breaking or salvage yard, dependent upon ease of transport and safety considerations.
- **Disposal:** some materials are not suitable for recycling and must be disposed to a licensed waste management facility.
- **Leave in-situ:** in some cases, the best environmental and economic option may be to leave material in-situ. The most obvious case in this respect is pipelines as once emptied and cleaned empty steel pipes do not impose a significant environmental hazard, however pulling such pipes out would cause additional damage.

There will, however, be certain principles during the de-commissioning, closure and abandoned phase which can be set, such as:

- The decommissioned plant will be cleaned and dismantled, and the site will be thoroughly cleaned.
- Discussions with authorities and landowners would be carried out to assess reuse of the sites; and
- If the site is no-longer to be used, full restoration and landscaping will be carried out.



This would involve consultation with authorities, landowners and re-instatement to the original vegetation type as is practicable.

3.12 Project Life Span

It is envisaged that this project will last for 30years when commissioned for use. During this period, if this technology is not overtaken by a more sustainable one, a general technical assessment of the project will be carried out, with recommendations for either decommissioning or a total overhaul.

3.13 Project Schedule

The overall conceptual project implementation schedule for the Pre-construction, Construction and commissioning Phase of the Project is illustrated in the Ganth Chart (see **Table 3.3**): The project construction is expected to last from the third quarter of 2020 to the second quarter of 2021.



Table 3-3: Project Gantt chart

	2020				2021				2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Feasibility Studies												
EIA Process												
Pre-construction;												
Construction phase												
Commissioning												
Operational Stage												



CHAPTER FOUR

DESCRIPTION OF THE EXISTING PROJECT ENVIRONMENT

4.1 Preamble

This chapter describes the existing environmental condition with respect to relevant environmental and social components (soil, air quality/noise, groundwater, vegetation /wildlife, and socio-economic/health). The analytical data generated from laboratory process were compared with previous studies in the area to achieve seasonal variation and regulatory limits where applicable.

4.2 Study Approach

The baseline status of the project area was obtained through review of relevant literature and a one season field data gathering. Pre-mobilisation work meetings were held twice; virtual and physical to discuss with the consultants on the scope of work, sampling strategies, remuneration and security issues in the study area.

4.2.1 Study Design and Sampling Rationale

This study leveraged on the Fertilizer Blending Plant Project EIA, that was finalised in 2021(dry season) to support the one season data gathering undertaken between 20-25 September 2021 to establish the environmental baseline condition of the study area. The sampling points were properly geo-referenced as presented in Table 4-1 while the sampling map is shown in Figure 4-1.

Table 4-1: Environmental Matrix and Coordinates

Field ID	Description	Latitude	Longitude
Cargo Terminal Area			
SS/AQ1	Air Quality/Noise	5 ⁰ 11' 55.61"E	12 ⁰ 57' 9.11"N
SS/AQ2	Air Quality/Noise	5 ⁰ 11' 54.63"E	12 ⁰ 57' 5.39"N
SS/AQ3	Air Quality/Noise	5 ⁰ 11' 55.67"E	12 ⁰ 57' 9.12"N
SS/AQ4	Air Quality/Noise	5 ⁰ 11' 55.17"E	12 ⁰ 57' 9.51"N
SS/AQ5	Air Quality/Noise	5 ⁰ 11' 55.37"E	12 ⁰ 57' 9.01"N
SS/AQ6	Air Quality/Noise	5 ⁰ 11' 55.17"E	12 ⁰ 57' 9.41"N
SS/AQ7	Air Quality/Noise	5 ⁰ 11' 55.37"E	12 ⁰ 57' 9.17"N
SS/AQ8	Air Quality/Noise	5 ⁰ 11' 55.27"E	12 ⁰ 57' 9.05"N
SS/AQ9	Air Quality/Noise	5 ⁰ 11' 55.48"E	12 ⁰ 57' 9.01"N
SS/AQ10	Air Quality/Noise	5 ⁰ 11' 55.16"E	12 ⁰ 57' 9.10"N
BH	Borehole water	5 ⁰ 11' 55.31"E	12 ⁰ 57' 9.14"N
SS/AQ Ctrl 1	Air Quality/Noise	5 ⁰ 11' 55.24"E	12 ⁰ 57' 9.21"N
SS/AQ Ctrl 2	Air Quality/Noise	5 ⁰ 11' 55.01"E	12 ⁰ 57' 9.51"N
Warehouse			
SS/AQ1	Air Quality/Noise	5 ⁰ 11' 52.41"E	12 ⁰ 57' 9.01"N
SS/AQ2	Air Quality/Noise	5 ⁰ 11' 52.11"E	12 ⁰ 57' 9.34"N
SS/AQ3	Air Quality/Noise	5 ⁰ 11' 52.12"E	12 ⁰ 57' 9.214"N
SS/AQ4	Air Quality/Noise	5 ⁰ 11' 52.33"E	12 ⁰ 57' 9.32"N
SS/AQ5	Air Quality/Noise	5 ⁰ 11' 52.02"E	12 ⁰ 57' 9.26"N
SS/AQ CTRL1	Air Quality/Noise	5 ⁰ 11' 52.14"E	12 ⁰ 57' 9.21"N
SS/AQ CTRL2	Air Quality/Noise	5 ⁰ 11' 52.51"E	12 ⁰ 57' 9.13"N
BH	Borehole	5 ⁰ 11' 52.41"E	12 ⁰ 57' 9.23"N



4.2.2 Field Sampling Techniques for Air/Noise /Groundwater/ Soil

To effectively describe the environment of the study area, the following specific objectives were undertaken:

- To determine the ambient air quality and noise level of the study area.
- To determine the physio-chemical and microbiological characteristics of the soil within the study area.
- To determine the physico-chemical and biological characterisation of groundwater (if any) within the study area.
- To determine contemporary wildlife abundance and diversity of the study area and environs.
- To determine the vegetation characteristics of the area; and
- To establish the socio-economic and health status of the host community.

Soil samples were collected with hand auger at two depth intervals (0-15cm and 15-30cm). These samples were preserved in plastic bags and stored in coolers and transported to Annal Concept Laboratory for Analysis within 24 hours. Sampling was designed to comprehensively capture all the ecological and socio-economic components peculiar to the study area. The samples were collected from locations as presented in Table 4-1 above.

4.2.3 Sample Handling/Preservation and Transportation

After sampling, each sample was properly labelled, arranged, and preserved. The sample label contained the following information:

- Sample Code/I.D
- Name and Location of Site.
- Date and Time of Sampling.
- Name and Signature of Sampler.
- Type of Sample, and
- Type of Preservative used.

4.2.4 Chain of Custody Management

All samples collected on site were recorded in a field notebook or field log. Inventory of samples collected and all necessary information including parameters to analyse, type of sample, date of sampling, etc were recorded in the chain of custody form.

4.2.5 Quality Assurance/ Quality Control

To ensure the integrity of collected samples, the following measures were taken to avoid cross contamination, deterioration, and pollution of samples from the point of collection on the site till the collation of the laboratory results.

We ensured that the samples collected were representative of the materials to be examined by collecting adequate volumes and from points of target as determined.

Ensured adequate volumes of samples collected for laboratory examinations.

- All samples were collected with the appropriate containers and preservatives.



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- All field observations and data were captured and logged in the field logs as timely as required.
- All samples were timely, properly, and completely identified/coded.
- All samples were duly preserved in the cool box fitted with ice packs and delivered to the laboratory same day of collection; and
- All samples were properly analyzed in line with required methods and standards.



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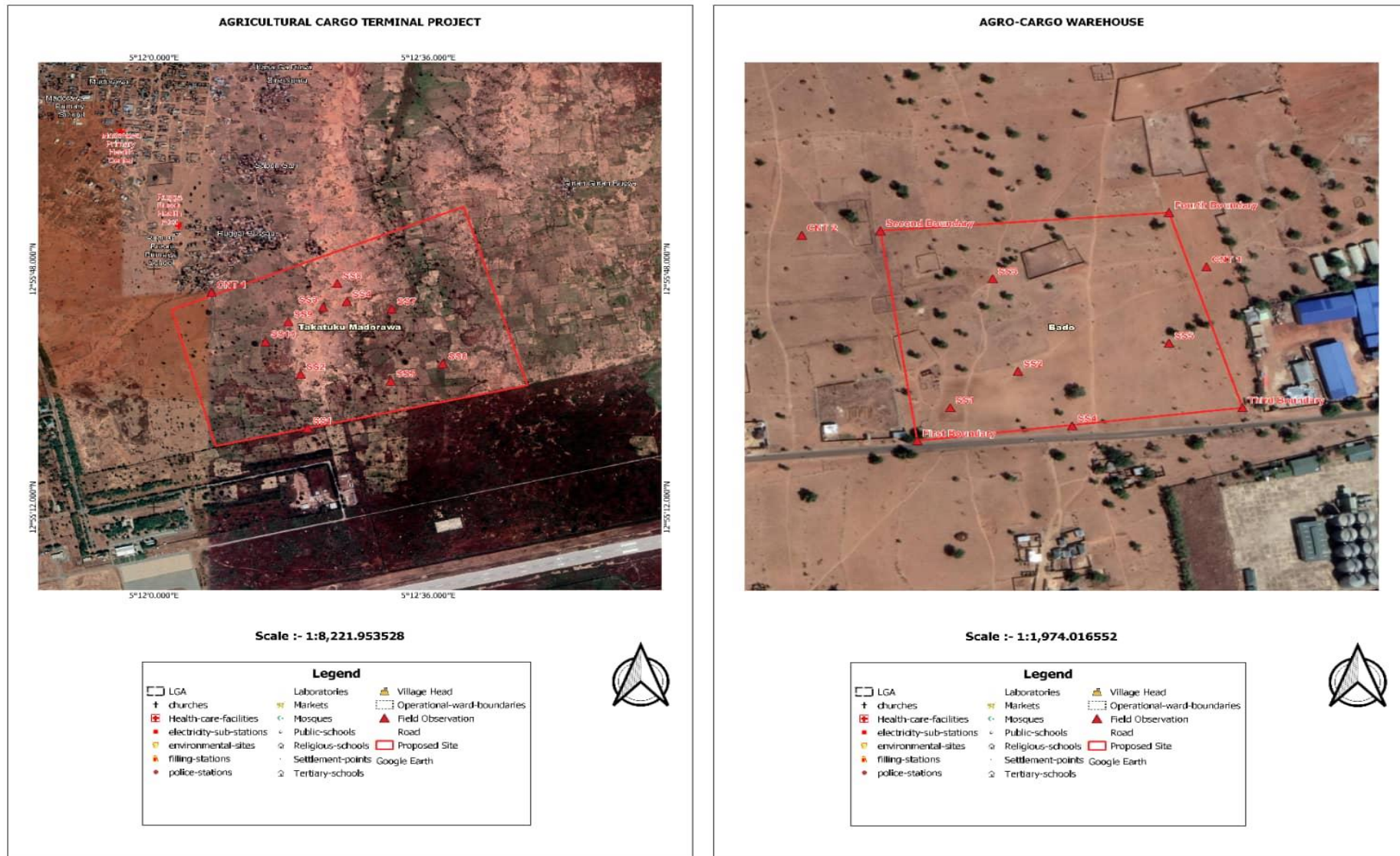


Figure 4-1: Sampling Map of the Study Areas



4.3 Baseline Condition

4.3.1 Climate and Meteorology

Climate encompasses the statistics of temperature, humidity, atmospheric pressure, wind, rainfall, atmospheric particle count and other meteorological elements in each region over long periods of time. The climate of a location is affected by its latitude, terrain, altitude, as well as nearby water body and their currents. Climates can be classified according to the average and typical ranges of different variables, most commonly temperature and rainfall. The climate of Nigeria is characterised by two regimes-the dry season and the wet season. These are dependent on two prevailing air-masses blowing over the country at different times of the year: the north-easterly air mass of Sahara origin (the tropical continental air mass) and the humid maritime air-mass blowing from the Atlantic (the tropical maritime air mass). The two air masses blowing from nearly opposite directions meet along a slanting surface (the Inter-Tropical Front). The area about this front, where the air masses to some extent mix, is called the inter-tropical discontinuity (ITD) or the inter-tropical convergence zone (ITCZ). This zone moves north and south with the front depending on which air mass gains ground over the other. The influence of the north-easterly air-mass causes dry season while that of the humid maritime air-mass causes the rainy season. The summary of climate data of Sokoto State for 1981 – 2010 obtained from WMO 2021 is presented in Table 4-1a.

Table 4-1a: Climate Data for Sokoto (1981–2010)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	32.1 (89.8)	34.8 (94.6)	38.6 (1-0-1.5)	40.6 (105.1)	39.0 (102.2)	36.2 (97.2)	32.8 (91.0)	31.3 (88.3)	32.8 (91.0)	36.0 (96.8)	36.1 (97.0)	32.9 (91.2)	35.3 (95.5)
Daily mean °C (°F)	24.5 (76.1)	27.1 (80.8)	31.2 (88.2)	33.7 (92.7)	33.1 (91.6)	30.9 (87.6)	28.2 (82.8)	27.2 (81.0)	28.0 (82.4)	29.7 (85.5)	28.3 (82.9)	25.3 (77.5)	28.9 (84.1)
Average low °C (°F)	16.9 (62.4)	19.4 (66.9)	23.8 (74.8)	26.9 (80.4)	27.3 (81.1)	25.6 (78.1)	23.6 (74.5)	23.1 (73.6)	23.2 (73.8)	23.4 (74.1)	20.5 (68.9)	17.7 (63.9)	22.6 (72.7)
Average rainfall mm (inches)	0.0 (0.0)	0.1 (0.00)	1.5 (0.06)	4.8 (0.19)	46.5 (1.83)	80.0 (3.15)	186.6 (7.35)	200.5 (7.89)	109.8 (4.32)	17.2 (0.68)	0.0 (0.0)	0.0 (0.0)	647 (25.47)
Average rainy days (≥ 0.2 mm)	0	0	0	1	4	7	11	14	8	2	0	0	47
Average <u>relative humidity</u> (%)	24	19	21	34	50	62	76	83	80	64	36	27	48
Mean monthly <u>sunshine</u> <u>hours</u>	288.3	268.4	275.9	255.0	272.8	279.0	229.4	186.0	237.0	303.8	300.0	300.7	3,196.3
Mean daily <u>sunshine hours</u>	9.3	9.5	8.9	8.5	8.8	9.3	7.4	6.0	7.9	9.8	10.0	9.7	8.8

Source 1: World Meteorological Organization

The project area is within the tropics, it is dominated by two contrasting seasons, the dry and wet (rainy) seasons. The two season regimes are dependent on the two prevailing air masse blowing



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across the country at different times of the year, the south-westerly humid maritime air mass blowing from across the Atlantic and the north-easterly air mass of Saharan origin (Harmattan).

Ambient Air Quality and Noise Level

Air generally contains water vapour, gases, and particulate matter in small but very variable quantities (Oguntoyinbo and Derek, 1987). Air pollution is the presence in the atmosphere of one or more contaminants in such quantities, characteristics, duration as to make them actually or potentially injurious to human, plant, or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life and property.

The mean concentrations of the air pollutants (CO₂, SO_x, SPM, NH₃, VOC, NO_x, CH₄, and H₂S) and noise levels were measured in the study area within a radius of 1.5km (zone of influence) from the centre of the project site. Measurements were taken during the study period. Generally, measurements indicated that the ambient air was free from pollution by these measured parameters as at time of study. The quality of air as tested within the Cargo terminal facility of the study area are presented in Table 4-1 while Table 4.2 presents the quality of air as tested in Warehouse facility. While detailed analytical results are included in Appendix 2.

Table 4-2: Ambient Air Quality /Noise around the Study Area

Parameter/unit	Agro Cargo Terminal (wet season)			Warehouse (wet season)			Fertilizer Blending Plant (dry season) Project EIA, 2021	FMEnv Limits (Daily Average) **
	Min- Max	Mean	Control	Min- Max	Mean	Control		
Noise level, d(B) A	41.3-49.9	44.2	43.65	41.3-44.5	43.19	43.95	38.5-59.6	90
SOX, µg/m ³	0.01	0.01	0.01	0.01	0.01	0.01	0.2-3	26
NOx, µg/m ³	0.01	0.01	0.01	0.01	0.01	0.01	NA	75-113
SPM µg/m ³	9-18	13.4	14	8-17	11.75	12	20-60	250
NH ₃ , µg/m ³	0.01	0.01	0.01	0.01	0.01	0.01	0-3	0.13
CH ₄ µg/m ³	0.01	0.01	0.01	0.01	0.01	0.01	NA	0.01
CO µg/m ³	0.01-0.07	0.026	0.015	0.01-0.07	0.02	0.015	1-4	11.4
H ₂ S, µg/m ³	0.01	0.01	0.01	0.01	0.01	0.01	0-0.1	0.01
Air Temp (oC)	33.14-36.04	34.846	35.525	33.14-36.04	34.55	35.525	NA	NA
Wind Speed (m/s)	0.01-0.07	0.03	0.025	0.01-0.07	0.03	0.025	NA	NA
Relative Humidity (%)	32.1-47.9	41.72	43.3	32.1-47.9	42.29	43.7	NA	NA

Suspended Particulate Matter (SPM) levels around the cargo terminal ranged from 9.0µg/m³ to 18.0 µg/m³ with a mean value of 13.4 µg/m³ during the sampling period which compared well with the control. While that of the warehouse ranged from 8.0µg/m³ to 17.0 µg/m³ with a mean value of 11.75 µg/m³ during the sampling period which compared well with the control. No seasonal variation was observed when compared with Fertilizer Blending Plant Project EIA, 2021.



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Hydrogen Sulphide (H₂S) was generally below detectable level of <0.01µg/m³ at both locations during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of 0.01µg/m³ and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Sulphur Oxides (SO_x) was generally below detectable level of <0.01µg/m³ at both locations during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of 26µg/m³ and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Nitrogen Oxides (NO_x) was generally below detectable level of <0.01µg/m³ at both locations during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of 75µg/m³ and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Ammonia (NH₃) was generally below detectable level of <0.01µg/m³ at both locations in the study area during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of 0.13µg/m³ and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Noise Level

Noise levels in the study area ranged from 41.3 d (B) to 49.9 d (B) (cargo terminal) and ranged from 41.3 d (B) to 44.5 d (B) (warehouse). Values were also below the regulatory limit of 90 d (B) and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Table 4-3: WHO Guidelines for Community Noise

Specific Environment	Critical health effect(s)	LAeq(dB)	Time base (hours)	LAm _{ax} , fast (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors Inside bedrooms	Speech intelligibility and moderate annoyance at daytime and evening.	35	16	
	Sleep disturbance at night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School classrooms and pre-schools, indoors	Speech intelligibility, disturbance of information extraction, message communication	35	During class	-
Pre-school bedrooms, indoors	Sleep disturbance	30	Sleeping time	45
School, playground outdoor	Annoyance (external source)	55	During play	-
Hospitals, ward rooms, indoors	Sleep disturbance at night-time.	30	8	40
	Sleep disturbance at daytime and evenings.			



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Specific Environment	Critical health effect(s)	LAeq(dB)	Time base (hours)	LAm _{ax} , fast (dB)
		30	16	
Hospitals, treatment rooms, indoors	Interference with rest and recovery	#1	-	-
Industrial, commercial shopping and traffic areas, indoors and outdoors	Hearing impairment	70	24	110
Ceremonies, festivals and entertainment events	Hearing impairment (Patrons:<5 times/year)	100	4	110

#1: as low as possible; #2: peak sound pressure (not LAm_{ax}, fast), measured 100mm from the ear.

4.3.2 Geology /Hydrogeology

The Sokoto Basin in northwestern Nigeria is underlain by a sequence of semi consolidated sedimentary rocks which in their surface expression form undulating plains broken but clay hills. Characteristically, the hills are capped by resistant crusts of laterite or ironstone. Generally, the hills are less than 150 feet high, but locally the relief between the stream valley floors and the hilltops reaches 300 feet. One conspicuous feature is the Dange scarp, a resistant cuesta ridge of limestone having local relief up to 150 feet that trends northeast through the central part of the basin. Generally, the groundwater emanates from Gwandu, Wurno, Taloka and Kalam Baina Formations at different depths beneath the area.

The study area which falls within the Wamakko Local Government area, prolific aquifers at shallow, moderate and high depths were found. The shallow aquifers were found at depths ranging between 28 to 43 meters with static water levels ranging between 6 to 17 meters, around Sokoto Guest Inn, Arkilla, Kasarawa, Kontagora Road, Bado Village and Yawuri Secretariat. Such aquifers are not expected to be prolific during the intense dry season. Aquifers at high depths ranging between 96 to 150 meters with static water levels between 45 to 58 meters, were equally found around Bubare, Gwiwa, Bado Quarters, Farfaru and Talata Mafara Road. These aquifers are expected to be prolific throughout the year, especially during intense dry season when water is generally scarce. The aquifers constitute of limestone, of Kalambaina Formation, which is interpreted to be hard and fractures which enables it to store enough underground water.

Hydrology of the Project Area

The project area is drain by River Sokoto. River Sokoto is a tributary of the River Niger and originates from a place close to Funtua in the south of Katsina State about 300 kilometres away from Sokoto. River Sokoto flows north-west passing through Gusau and eventually enters Sokoto where it is joined by River Rima and further down turns south flowing through Birnin Kebbi Town in Kebbi State before reaching its confluence with the River Niger. The plains around River Sokoto are widely cultivated using its water for irrigation. The river is also an important means of transport. Flow in streams of the Sokoto Basin is mostly overland runoff. Only few streams are perennial. Near Sokoto Town, the Rima River flows throughout the year sustained by spring discharge from perched ground water in limestone of the Kalambaina Formation.



4.3.3 Ground Water Quality

The mean concentrations of the groundwater parameters were measured in the study area within a radius of 1.5km (zone of influence) from the centre of the project site. Samples for the cargo terminal were collected from Rugar Busau community while samples for the warehouse facility were collected from Madorawa community. Measurements were taken during the wet season. Result from analyses is summarized in Table 4-4 while detailed analytical results are included in Appendix 2.

Physico-chemical properties of water samples collected from underground sources within the study area are presented in (Table 4-4) while detailed analytical results are included in Appendix 2.

Table 4-4: Summary of Physico-Chemical and Microbiology Result of Groundwater Samples

Parameters	Cargo Terminal (wet season)	Warehouse Facility (wet season)	Fertilizer Blending Plant Project EIA, 2021(dry season)	FMEnv limits
pH	6.675	6.7	7.7	6-9
TEMP (0c)	27.89	28.1	28.55	<40
COND (µs/cm)	75.5	92	252	1000
TDS (mg/l)	36.5	47	84	2000
DO (mg/l)	4.36	4.07	8.29	2-8
TSS mg/l	0.37	0.27	0.00555	30
Turbidity, NTU	1.05	1	0.65	5
BOD (mg/l)	0.5035	0.582	21.2	7.5
COD (mg/l)	1.158	1.164	106.45	30
THC (mg/l)	<0.001	<0.001	NA	NA
Nitrate (mg/l)	0.185	0.15	4.625	<1
Sulphate (mg/l)	45.005	51.7	11.745	500
Ammonium (mg/l)	<0.01	<0.01	0.0045	10
Phosphate (mg/l)	0.34	0.35	0.112	5
Nickel (mg/l)	<0.001	<0.001	0.05	<1
Iron (mg/l)	0.018	<0.001	0.82	1.5
Lead (mg/l)	<0.001	<0.001	0.0055	<1
Copper (mg/l)	<0.001	<0.001	0.1705	<1
Chromium (mg/l)	<0.001	<0.001	<0.001	<1
Zinc (mg/l)	<0.001	<0.001	1.562	3
Cadmium (mg/l)	<0.001	<0.001	0.0455	<1
Barium (mg/l)	<0.001	<0.001	NA	NA
Cobalt (mg/l)	<0.001	<0.001	NA	NA
Arsenic (mg/l)	<0.001	<0.001	NA	NA
Mercury (mg/l)	<0.001	<0.001	NA	NA
Potassium (mg/l)	0.0065	0.006	NA	NA



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Parameters	Cargo Terminal (wet season)	Warehouse Facility (wet season)	Fertilizer Blending Plant Project EIA, 2021(dry season)	FMEnv limits
Sodium (mg/l)	0.234	0.233	NA	NA
Magnesium (mg/l)	0.011	0.01	119.84	NA
Calcium (mg/l)	0.025	0.017	308.16	NA
Microbiology				
Coliforms	11	8	6.6	<1
E. coli	absent	absent	NA	absent
Faecalstreptacocci	absent	absent	NA	absent
Straphylocococciaureus	absent	absent	NA	absent

Source: Field work, 2021. NA: Not Applicable

Physico-Chemical Characteristics

pH values were 6.67 and 6.7 for the Cargo Terminal and Warehouse facility underground water samples collected. These values are tending towards alkalinity and are below the stipulated limits by FMEnv. Conductivity and TDS values were 75.5 μ S/cm and 36.5mg/l respectively for the Cargo Terminal facility while values for the Warehouse facility samples were 92 μ S/cm and 47mg/l respectively. These values complied well with stipulated limits by FMEnv. The values recorded for Total Suspended Solids were respectively 0.37mg/l and 0.27mg/l while those recorded for turbidity were respectively 1.05NTU and 1NTU in the Cargo Terminal and Warehouse facility underground water samples collected which complied well with stipulated limits by FMEnv. Obtained values were also within the range of those obtained from a previous study (Fertilizer Blending Plant EIA, 2021).

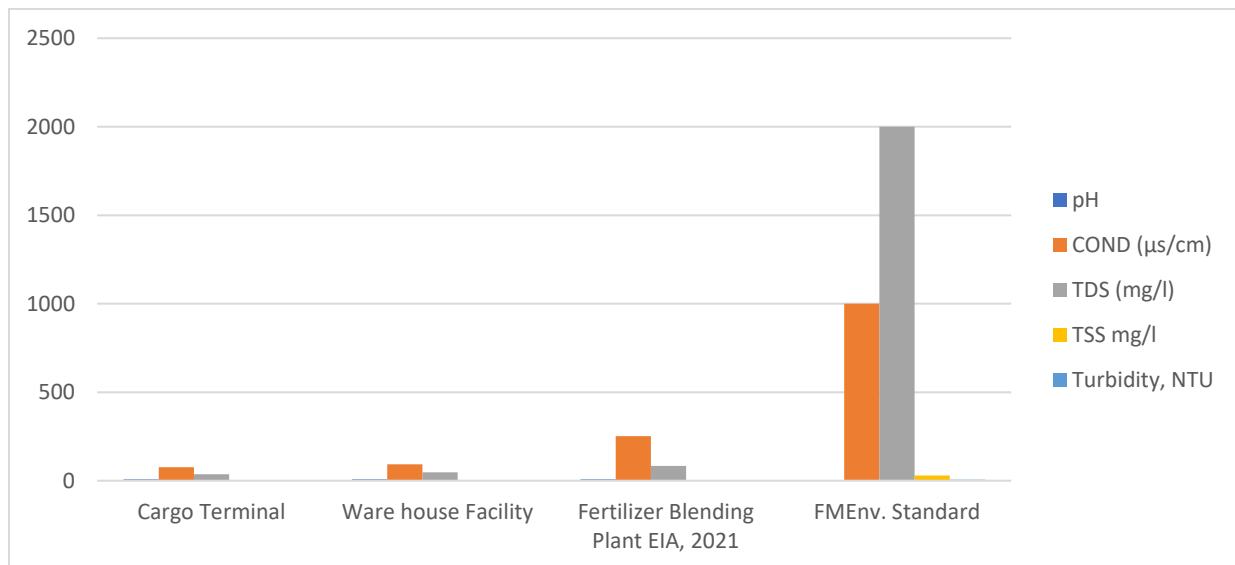


Figure 4-3: pH, Conductivity, Total Dissolved Solids, Total Suspended Solids and Turbidity Levels in Ground water. Source: Fieldwork, 2021



DO, BOD and COD

The Dissolved Oxygen, Biological Oxygen Demand and Chemical Oxygen Demand values obtained in samples collected for the cargo terminal facility were 4.36mg/l, 0.504mg/l and 1.16mg/l respectively. The values obtained in samples collected for the warehouse facility were 4.07mg/l, 0.582mg/l and 1.164mg/l. These values complied well with stipulated limits by FMEnv and were lower than range of values obtained from a previous study (Fertilizer Blending Plant EIA, 2021).

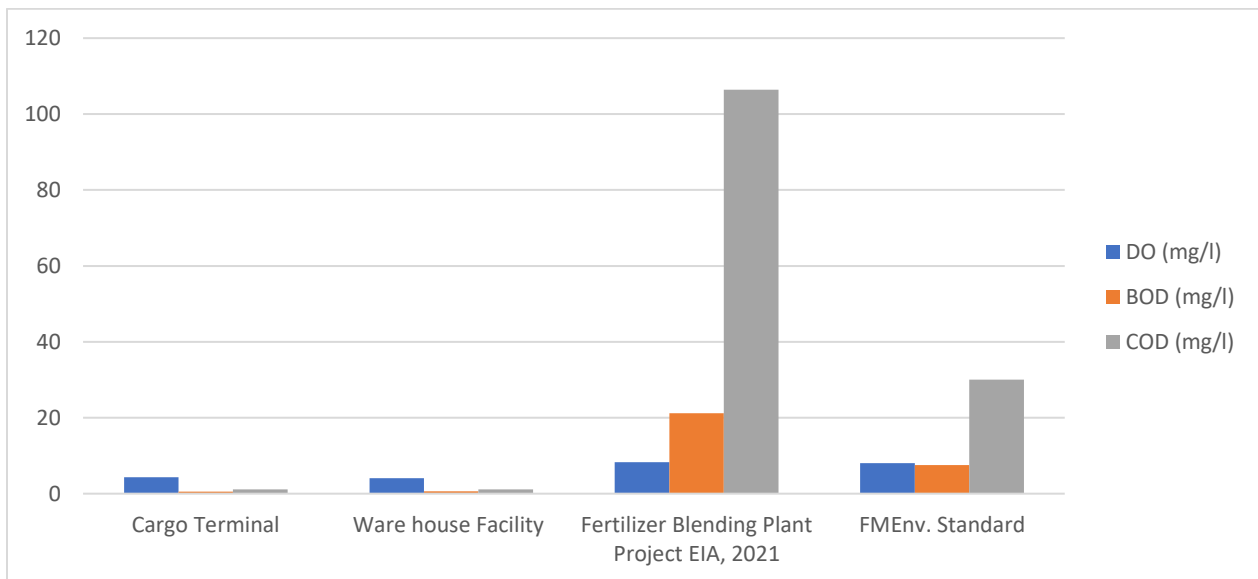


Figure 4-4: DO, BOD and COD Levels in Ground water. Source: Fieldwork, 2021

Total Hydrocarbon Content (THC)

The THC analysed from the ground water samples in the facility areas were below equipment detection limit of <0.001mg/l in all stations. Obtained values complied with the range of those obtained from a previous study (Fertilizer Blending Plant EIA, 2021).

Nutrients

From the Table 4-4 the concentration of sulphate accounted for the larger part of the nutrient content with values of 45.0mg/l and 51.7mg/L for the cargo terminal and warehouse facilities respectively. The order of nutrient concentration present in the samples for the facilities are Sulphate>Phosphate>Nitrate>Ammonium.



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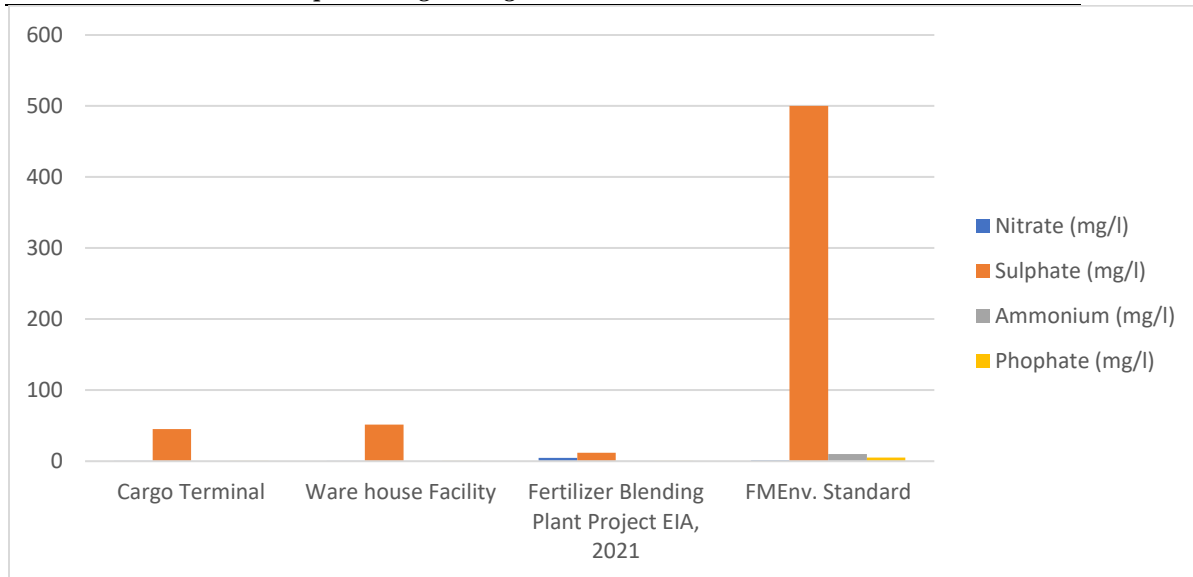


Figure 4-5: Nutrients Levels in Ground water. Source: Fieldwork, 2021

Cations

From the Table 4, the concentration of sodium accounted for the larger part of the cations content with values of 0.234mg/l and 0.233mg/L for the cargo terminal and warehouse facilities respectively. The order of cations concentration present in the samples for the facilities are Sodium>Calcium>Magnesium>Potassium.

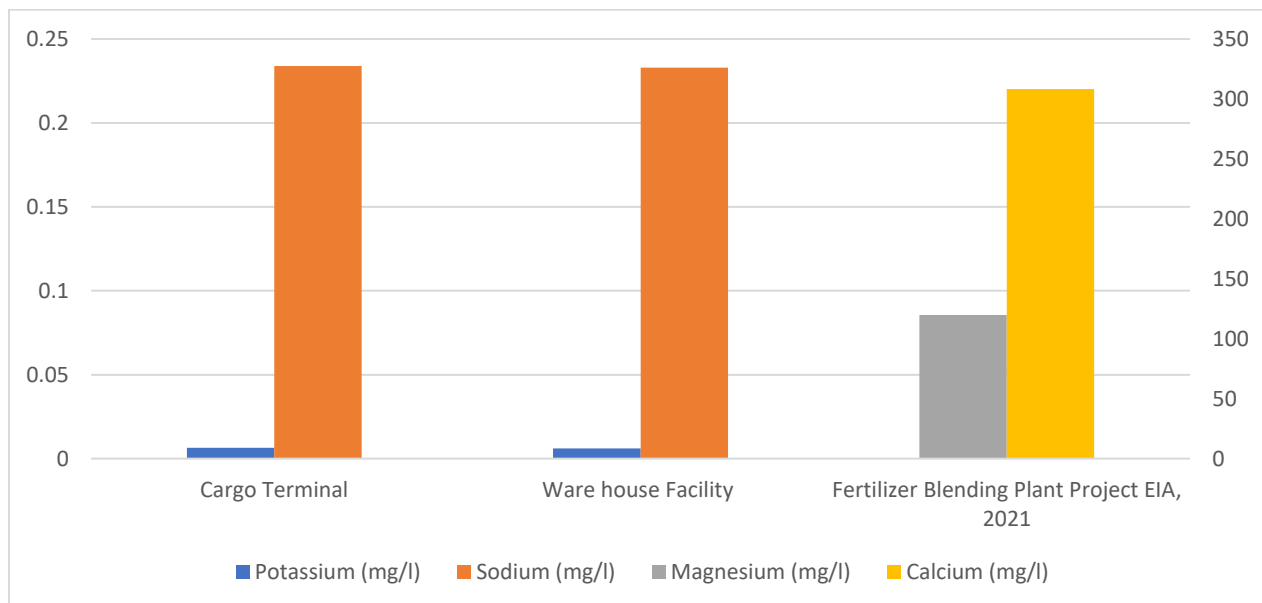


Figure 4-6.: Cations Levels in Ground water. Source: Fieldwork, 2021



Heavy Metals

The heavy metals concentration of the groundwater was generally low and mostly below the detection limit of the atomic absorption spectrophotometer used for the analysis except for Iron which was detected at a concentration of 0.018mg/l in sample collected for the cargo terminal facility. In all, the heavy metals results were below FMEnv limits for heavy metals and were also below values obtained from a previous study.

Ground Water Microbiology

The results of microbial counts in underground water samples collected in the project area are presented in **Table 4-3**. Values were all below equipment detection limit except for coliforms count where a count of 11 and 8 were obtained in the cargo terminal facility and warehouse facility respectively.

4.3.4 Soil Physico-Chemical Characteristics

Soil samples of the proposed project sites were collected for the Cargo terminal and Warehouse facilities. Samples were collected within a radius of 1.5km (zone of influence) from the centre of the project sites. At each station, soil samples were collected from two depth levels: 0 – 15cm, and 15 – 30cm. Result from analyses is summarized in Table 4-4 while detailed analytical results are included in Appendix 2. (See attached A3 map for spatial distribution of sample stations).

pH of the soil sampled were generally varying from basic to moderately acidic. At the Cargo Terminal Facility area, it ranged from 7.1 to 8.38 with a mean value of 7.51 at the topsoil and between 6.17 and 7.93 with a mean value of 7.19 at sub soil. At the Warehouse Facility area, it ranged from 7.01 to 8.38 with a mean of 7.59 at the topsoil and between 6.17 and 7.93 with a mean value of 7.11. All obtained values compared well with values from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Total Organic Carbon

The principal factors responsible for high organic matter in soil include vegetative cover and decay of plant residue. These factors are significantly absent in the proposed project areas. Hence, return of organic matter to the soil is poor. Total organic carbon content in the entire soils was generally low. The result, see (Table 4.). Indicates that at the Cargo Terminal Facility area, the soil had a mean total organic content of 0.016% and 0.025% in top and sub soil respectively. Meanwhile at the warehouse facility area, TOC had a mean value of 0.569% and 0.23% respectively in top and sub soil.

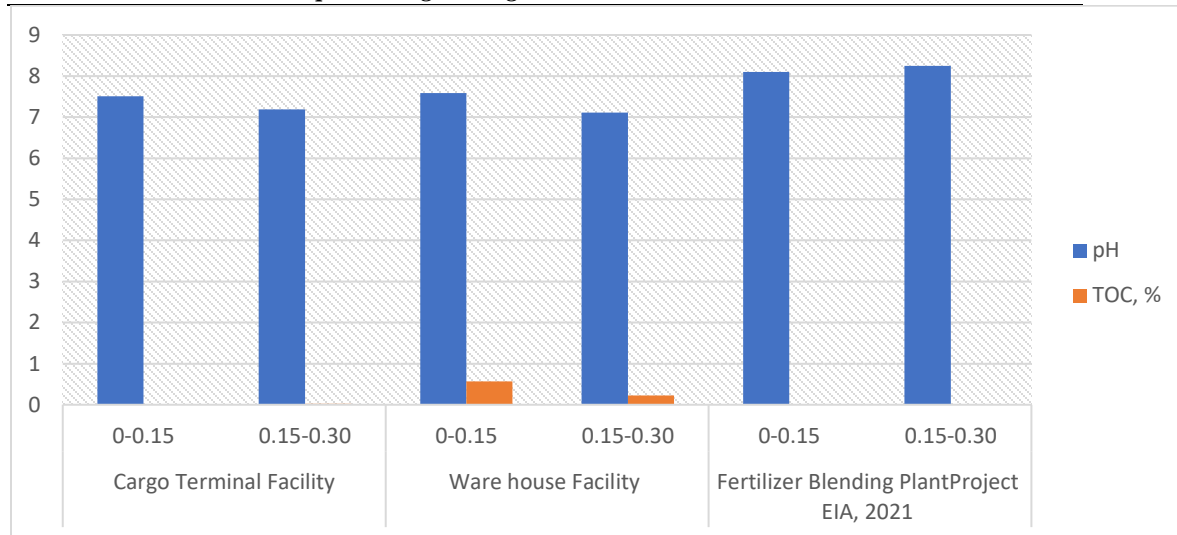


Figure 4-7.: pH and Total Organic Carbon in Soil. Source: Fieldwork, 2021

PSD

Particle-size distributions (PSDs) of soils are often used to estimate other soil properties, such as soil moisture characteristics and hydraulic conductivities. Prediction of hydraulic properties from soil texture requires an accurate characterization of PSDs. The textural composition of soil samples collected from the area was dominantly sand with an admixture of silt and clay. Mean particle size of 64.59% sand, 21.81% silt and 13.59% clay were recorded for topsoil and 75.3% sand, 8.89% silt and 15.8% clay for sub soil at the Cargo Terminal Facility area. On the other hand, mean particle size of 65.66% sand, 17.43% silt and 13.20% clay were recorded for topsoil and 74.93% sand, 9.84% silt and 15.23% clay for sub soil at the Warehouse Facility area. These findings did not corroborate the previous study as the soil was silty (Fertilizer Blending Plant Project EIA, 2021).

Anions Concentration of the Soils

Sulphate: At the Cargo terminal facility area, sulphate values were low with values ranging from 2.33 to 4.1mg/kg and from 2.19 to 3.95mg/kg respectively for top and sub soil. At the Warehouse facility area, sulphate concentration ranged from 2.12 to 4.06mg/kg and 2.91 to 3.95mg/kg respectively for top and sub soil. Values were lower than those obtained from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Ammonia: At the Cargo terminal facility area, ammonia values were low with values ranging from 0.006 to 0.06mg/kg and from 0.006 to 0.087mg/kg respectively for top and sub soil. At the Warehouse facility area, ammonia concentration ranged from 0.04 to 0.36mg/kg and 0.037 to 0.5mg/kg respectively for top and sub soil.



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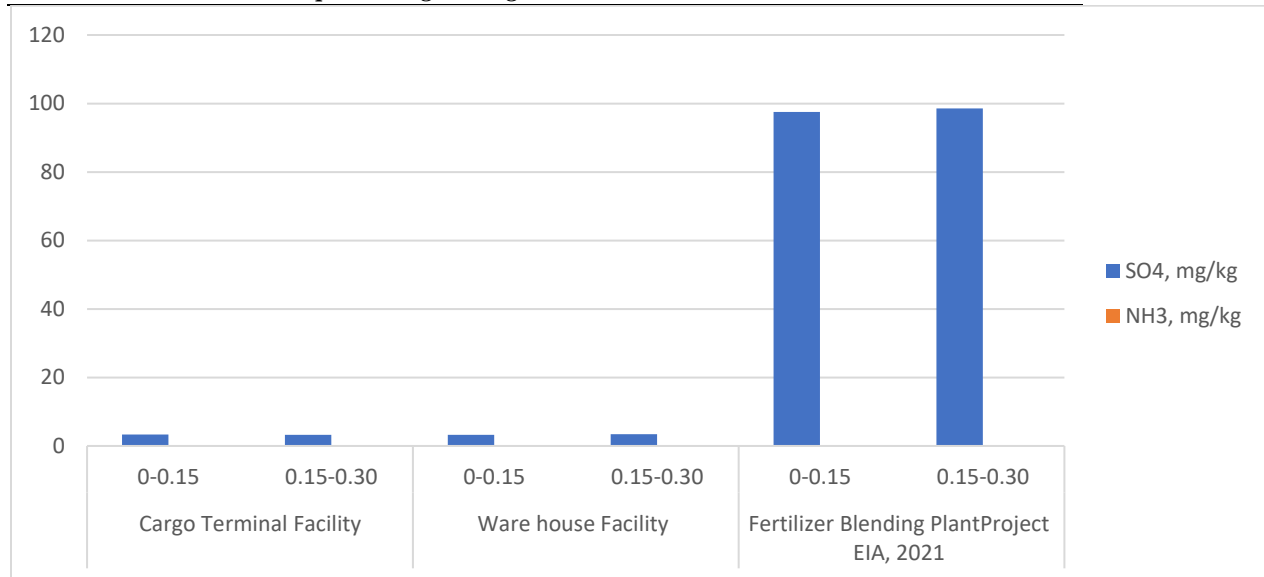


Figure 4-8.: Sulphate and Ammonia in Soil. Source: Fieldwork, 2021

Exchangeable Bases

The exchangeable bases of the soil measured were Na, K, Ca and Mg. In all, sodium dominated the exchange site. Two factors which mainly contribute to Exchange Capacity in soil are organic matter content and clay composition. In the assessment these two parameters were relatively and inherently low which will give rise to generally low CEC of the soils.

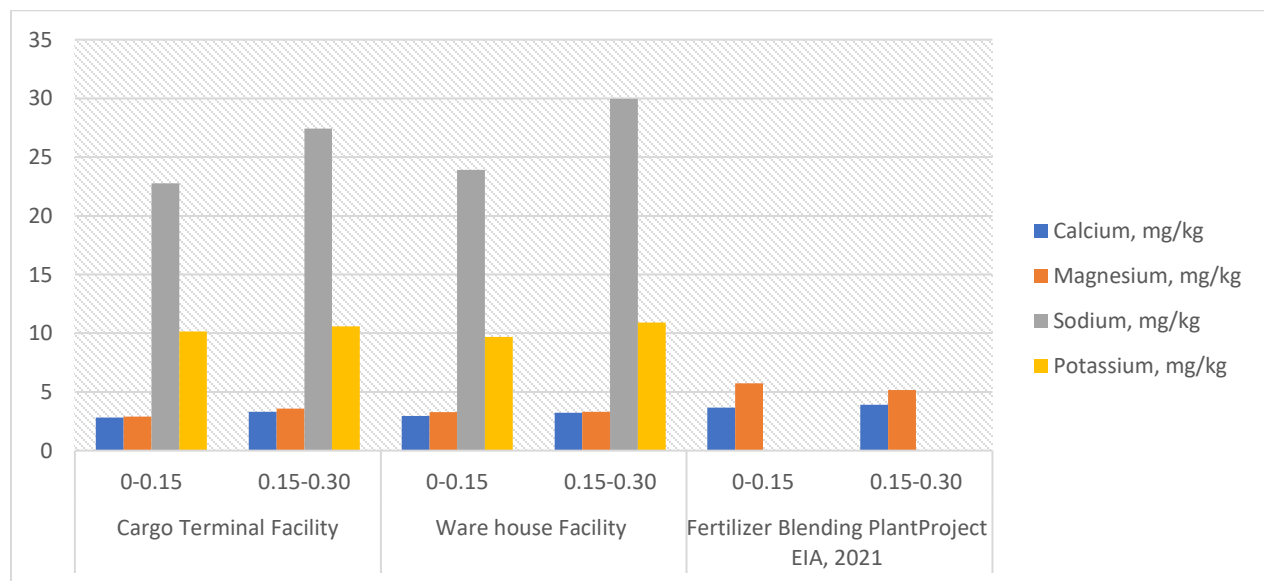


Figure 4-9: Exchangeable Bases. Source: Fieldwork, 2021



Heavy Metals

Human activities have dramatically changed the composition and organization of soils. Industrial and urban wastes, agricultural application and mining activities resulted in an increased concentration of heavy metals in soils. Soils normally contain low background levels of heavy metals. Excessive levels of heavy metals can be hazardous to man, animals, and plants. Heavy metals of greatest concern are iron (Fe), copper (Cu), lead (Pb), nickel (Ni), Zinc (Zn), Chromium (Cr) and Cadmium (Cd). Ecological soil investigation involved sampling of soil (0-15cm and 15-30cm depth) at the designated stations within the study area.

At the Cargo terminal facility area, values obtained were 0.38-2.44mg/kg (top soil) and 1.00-2.16mg/kg (sub soil) for Cu; 0.56-1.88mg/kg (top soil) and 0.44-2.42mg/kg (sub soil) for Pb; 18.26-30.09mg/kg (top soil) and 17.67-31.71mg/kg (sub soil) for Fe; 5.24-11.70mg/kg (top soil) and 5.01-15.08mg/kg (sub soil) for Ni; 0.07-0.14mg/kg (topsoil) and 0.07-0.09mg/kg (subsoil) for Cr; 0.05-0.07mg/kg (top soil) and 0.04-0.08mg/kg (sub soil) for Cd; and 0.23-9.20mg/kg (top soil) and 2.41-9.47mg/kg (sub soil) for Zn.

At the Ware house facility area, values obtained were 1.01-2.44mg/kg (top soil) and 1.01-2.16mg/kg (sub soil) for Cu; 0.56-1.88mg/kg (top soil) and 0.44-1.85mg/kg (sub soil) for Pb; 18.26-24.89mg/kg (top soil) and 18.20-27.79mg/kg (sub soil) for Fe; 5.24-11.70mg/kg (top soil) and 5.24-11.70mg/kg (sub soil) for Ni; 0.07-0.1mg/kg (topsoil) and 0.07-0.09mg/kg (subsoil) for Cr; 0.04-0.07mg/kg (top soil) and 0.05-0.07mg/kg (sub soil) for Cd; and 0.23-9.20mg/kg (top soil) and 3.17-5.04mg/kg (sub soil) for Zn.



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Table 4-5: Summary of Physico-Chemical and Microbiology Result of Soil Samples

Parameters	Cargo Terminal Facility (wet season)				Warehouse Facility (wet season)				Fertilizer Blending Plant Project EIA, 2021 (dry season)		FMEnv. Standard
	0-0.15m		0.15-0.30m		0-0.15m		0.15-0.30m		0-0.15m	0.15-0.30m	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	mean	mean	
pH	7.1-8.38	7.51	6.17-7.93	7.19	7.01-8.38	7.59	6.17-7.93	7.11	8.1	8.25	
TOC, %	0.004-0.031	0.016	0.004-0.048	0.025	0.01-1.61	0.569	0.01-1.02	0.23	NA	NA	NA
THC, mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA
SO4, mg/kg	2.33-4.1	3.37	2.19-3.95	3.23	2.12-4.06	3.23	2.91-3.95	3.4	97.5	98.55	500
NH3, mg/kg	0.006-0.06	0.039	0.006-0.087	0.063	0.04-0.36	0.11	0.037-0.58	0.17	NA	NA	NA
% Sand	29.8-93.4	64.59	48.3-98.2	75.3	29.8-93.4	65.66	48.3-92.3	74.93	10.36	14.195	NA
% Silt	5.0-44.3	21.81	0.2-19.0	8.89	5.0-44.3	17.43	2.6-19.0	9.84	53.89	44.77	NA
% Clay	1.6-27.9	13.59	1.6-46.6	15.8	1.6-25.9	13.2	5.1-46.6	15.23	35.73	41.11	NA
Calcium, mg/kg	2.13-5.97	2.81	2.12-6.07	3.3	2.11-5.92	2.96	2.1-6.0	3.23	3.65	3.91	NA
Magnesium, mg/kg	2.02-5.69	2.91	2.12-6.94	3.59	2.2-5.63	3.27	2.21-6.42	3.32	5.73	5.17	NA
Sodium, mg/kg	14.32-28.60	22.77	10.37-55.38	27.44	17.59-28.6	23.9	10.37-55.37	29.96	NA	NA	NA
Potassium, mg/kg	8.01-14.09	10.15	7.50-16.09	10.58	8.23-12.76	9.68	7.49-16.08	10.9	NA	NA	NA
Copper, mg/kg	0.38-2.44	1.46	1.00-2.16	1.49	1.01-2.44	1.65	1.01-2.16	1.55	1.11	1.17	NA
Lead, mg/kg	0.56-1.88	1.41	0.44-2.42	1.49	0.56-1.88	1.23	0.44-1.85	1.34	0.018	0.27	<1
Iron, mg/kg	18.26-30.09	21.61	17.67-31.71	22.05	18.26-24.89	20.91	18.20-27.79	21.83	6.59	2.31	NA
Nickel, mg/kg	5.24-11.70	9.19	5.01-15.08	8.31	5.24-11.70	8.27	5.01-8.58	7.54	0.015	0.02	NA
Chromium, mg/kg	0.07-0.14	0.09	0.07-0.09	0.08	0.07-0.1	0.08	0.07-0.09	0.08	NA	NA	NA
Cadmium, mg/kg	0.05-0.07	0.06	0.04-0.08	0.05	0.04-0.07	0.05	0.05-0.07	0.06	0.15	0.05	NA
Zinc, mg/kg	0.23-9.20	6.59	2.41-9.47	4.79	0.23-9.20	5.25	3.17-5.04	4.36	2.62	2.67	NA
HUB, CFU/gx104	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA	NA	NA
HUf, CFU/gx103	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA	NA	NA
THB, CFU/gx104	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA	NA	NA
THB, CFU/gx103	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA	NA	NA
E Coli	0-4.03	1.725	0-0.02	0.008	0-4.28	2.92	0-582	85.46	NA	NA	NA

NA: Not Applicable; Source: Fieldwork, 2021

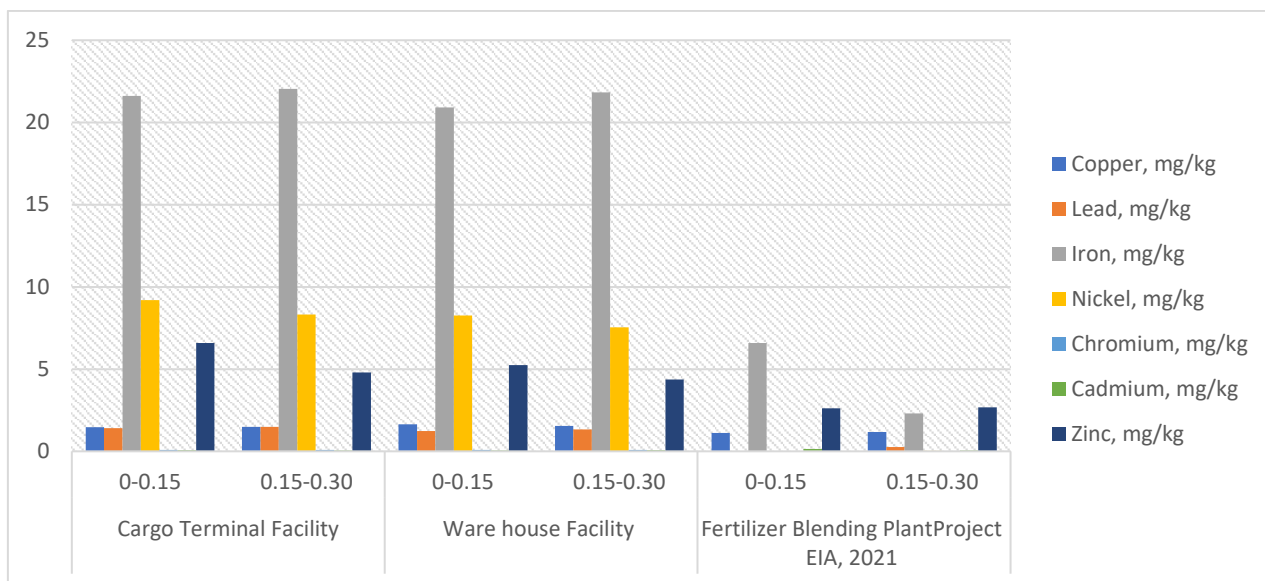


Figure 4-10.: Heavy Metals in Soil. Source: Fieldwork, 2021

Soil Microbiological Characteristics

The two groups of microorganisms studied are fungi and bacteria, which are the most important organic matter decomposers in the soil. Bacteria and fungi (microbes) counts provide information on the level of on-going biochemical activities in the soil. Microbial counts under normal circumstances increases with an increase in soil organic matter. About 1g of fertile soil should contain 1 x 10⁶ to 1 x 10⁸cfu/g bacteria and fungi (Odu et al., 1985). These organisms were not present in the samples collected. However, E Coli in the samples had mean values of 1.75 and 0.008 respectively at the top and sub soil samples for the Cargo terminal facility. On the other hand, mean values of 2.92 and 85.46 respectively were obtained at the top and sub soil samples for the Warehouse facility.

4.3.5 Biodiversity Studies

General

The dryland ecosystem of Sokoto state, in the North-western part of Nigeria has been witnessing gradual loss of vegetation cover in the recent decades caused by natural and human induced drivers of ecosystem change. This negative trend poses great challenges to both the physical environment and the people of the area, particularly due to the fragile nature of the ecosystems in the region and the people over dependence on it for their livelihoods.

4.3.6 Wildlife

The wildlife species documented in the Project area include some members of the invertebrate, reptiles, birds, and mammals. Major threats to wildlife in the area include uncontrolled poaching and clearance of land for pasture.



Invertebrates

The invertebrates documented in the area include gastropoda such millipedes (*Pochybolus* sp), dragon flies and butterflies were observed visiting flowers for pollination

Reptiles

The published works of Nigerian reptiles include works of Child (1974), Dunger (1973), and Grandison (1968). The reptiles documented in the study area include snakes, African Chameleon (*Chameleo senegalensis*), Rainbow Lizard (*Agama agama*), Brooks Gecko (*Hemidactilus brooki*) etc.

Birds

The avifauna of the project area represents the diverse habitat types in the region as birds inhabit vegetation areas that are most suitable for their feeding and nesting habits. Seed and insect eating birds such as barn swallow, doves, pied crows, common thrush etc.

Mammals

The mammals documented in the area are mostly rats, rabbit, and African giant rat.

Table 4-6: Plant species at the Agro Cargo Terminal, Abubakar III International Airport, Rugar Busau, Sokoto

Location: Plants from Agro Cargo Terminal, Rugar Busau, Sokoto				Transect 25m x 25m		
Latitude: 12°55.399'N		Longitude: 005°12.336'E		Time: 10:30am		
S/N	Scientific Name	Plant Common Name	Abundance/population/CS	Family Name	Economic potential	Plant Habit
1	<i>Acacia senegal</i>	Gum Arabic	High/unknown/LC	Fabaceae	Gum Arabic	Tree
2	<i>Azadirachta indica</i>	Neem tree	Low/stable/LC	Meliaceae	Insecticidal	Tree
3	<i>Combretum micranthum</i>	Kinkeliba	High/na	Combretaceae	Herbal tea	Shrub
4	<i>Andropogon gayanus</i>	Gamba grass	High/na	Poaceae	Thatch	Grass
5	<i>Securinega virosa</i>	Carry me seed	High/na	Euphorbiaceae	Diabetes	Shrub
6	<i>Ziziphus abyssinica</i>	Jujube	High/na	Rhamnaceae	Medicine	Shrub
7	<i>Adansonia digitata</i>	Baobab tree	Low/na	Bombacaceae	Kidney	Tree
8	<i>Fhaiderbia albida</i>	Apple ring acacia	High/unknown/LC	Fabaceae	Fodder	Tree
9	<i>Vitellaria paradoxum</i>	Shea butter	High/na	Sapotaceae	Pasteur (oil)	Tree
10	<i>Acacia nilotica</i>	Fodder tree	High/Unknown/LC	Fabceae	Fodder	Tree
11	<i>Hyphaene thebiaca</i>	Dum palm	Low/na	Palmae	Source of timber	Tree
12	<i>Diospyros mespiliformis</i>	Ebony tree	High/na	Ebenaceae	Source of wood	Tree
13	<i>Urena lobata</i>	Caesar weed	High/na	Malvaceae	Fibre	Shrub
14	<i>Senna occidentalis</i>	Coffea senna	Low/NT	Fabaceae	Anti rabbies	Shrub
15	<i>Balanites aegyptiaca</i>	Desert date	High/LC	Balanitaceae	Fruit plant	Tree



Location: Plants from Agro Cargo Terminal, Rugar Busau, Sokoto			Transect 25m x 25m			
Latitude: 12°.55.399'N		Longitude: 005°.12.336'E		Time: 10:30am		
S/N	Scientific Name	Plant Common Name	Abundance/population/CS	Family Name	Economic potential	Plant Habit
16	Leptadenia hastate	Leptadenia	High/na	Asclepiadaceae	For food	Shrub
17	Guiera senegalensis		High/LC	Combretaceae	Medicinal	Tree

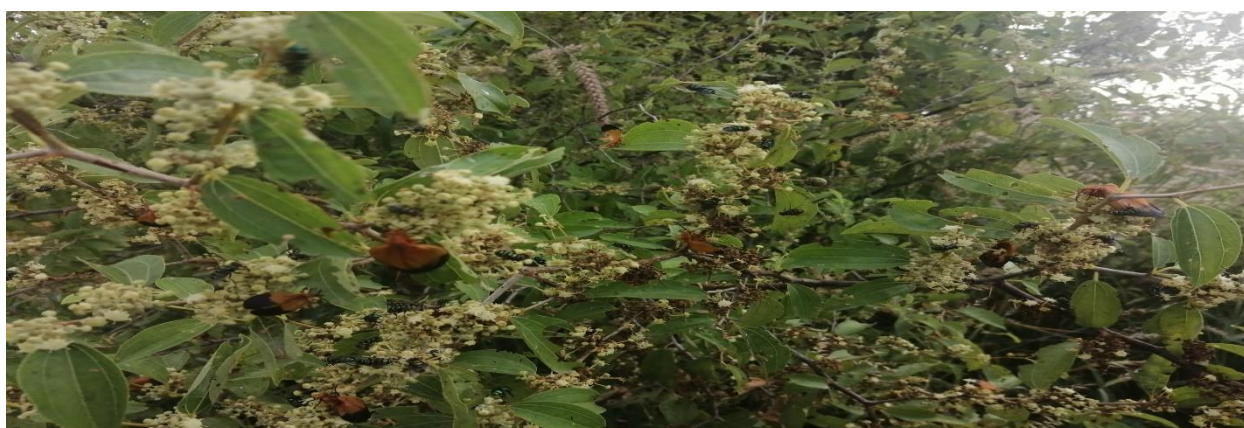


Plate 4-1: Ziziphus abyssinica visited by pollinating insects

Table 4-7: Birds Species at Agro Cargo Terminal, Sokoto Airport, Sokoto

Location: Birds Species at Agro Cargo Terminal, Sokoto Airport, Rugar Busau, Sokoto					
Latitude: 12°.55.399'N		Longitude: 005°.12.336'E		Time: 10:30am	
S/N	Birds Scientific Name	Birds Common Name	Family Name	Conservation Status (Borrow & Demey, 2013)	Population Estimate
1.	Elanus coeruleus	Black shoulder kite	Acciptridae	M/P/R* c	7
2.	Falco tinnunculus	Common Kestrel	Falconidae	R/P/V* f/c LC	2
3.	Polyboroides typus	African harrier hawk	Acciptridae	R c LC	1
4.	Milvus migrans	Yellow billed kite	Acciptridae	M/P/R* c LC	10
5.	Circus macrourus	Pallid Harrier	Acciptridae	Pu/s NT	5
6.	Francolinus bicalcalaratua	Double Spurred francolin	Phasianidae	R c	5
7.	Actophilornis Africana	African Jacana	Jacanaidae	R c	20
8.	Bubulcus ibis	Cattle Egret	Ardeidae	R/M+ c LC	11
9.	Egretta garzetta	Little Egret	Ardeidae	R+/M/Pc LC	30

Source: Field work 2021

Conservation status (CS) key:

Status

R Resident

M Intra-African migrant



-
- P Palearctic migrant (including few species of Nearctic origin)
V Vagrant
* Cape Verde only
+ also Cape Verde

Abundance categories

- c common
f common (=frequent; the category 'not uncommon' in BOWA 2001)
u uncommon
s scarce
r rare
l local (e.g. 'lc' = locally common)
* indicates abundance in Cape Verde only (if very different from elsewhere)

Threat categories

- CR Critically endangered
EN Endangered
VU Vulnerable
NT Near Threatened
DD Data Deficient
LC Least concern

4.4 Socio-Economic Profile and Consultations / Public Participation

An integrated socio-economic survey questionnaire was developed and administered to the project area communities (Kassarawa) particularly households that may be affected directly or indirectly by the project. The questionnaire was administered to provide socio-economic profile of the community, particularly the areas that will potentially be impacted by the project. The census included data on age, gender, occupation, income, sources of livelihood of all persons who live on or derive a living from the area of land as well as information on houses, businesses, and any structures in use in the affected areas. The specimen of the census/socio-economic survey forms adopted for the project areas is included as Appendix 3 while the methodology is shown in Appendix 1.

Besides the quantitative data collection method, several other tools were also used for eliciting information. These tools included Focused Group Discussion (FGD); Community meetings and Key informants' interviews.

Essentially, the comprehensive questionnaire for data collection that was used captured the following information: Household biodata (demographic information); Livelihoods; Inventory of structural and non-structural assets including land, common properties, houses, economic trees, and cash crops.



Public/Stakeholder Consultation:

This was conducted as part of the participatory approach aimed at gaining good knowledge of the social issues/risks associated with the project as perceived by the communities. Public meetings were held as presented in Table 4-8.

Table 4-8: Schedule of Community/Stakeholder Meetings and Socioeconomic Documentation

District/ community	Type of meeting	Location	Date(s) held	No of attendees
Kassarawa COMMUNITY	Community Leadership Consultation	Kassarawa Palace	Sep 20, 2021	123
	Community Sensitization	Kassarawa Palace	Sep 21, 2021	144
	Focal Group Discussions (Men, Women and Youth)	Kassarawa community	Sep 22, 2021	Men-17, Women-12 Youth-14
	Socioeconomic/Census Documentation	Kassarawa Palace	Sep 23, 2021	22
		Kassarawa community	Sep 24, 2021	25

Rationale for Consultation and Disclosure

Consultations and public participation is a requirement by law to generate concerns about environmental impacts of any development project or programme. During the preparation of this ESMP, significant consultations and public participation was carried out. Further consultations are anticipated during the subsequent parts of the project development process especially during the preparation of site-specific environmental and social impact assessments. The public consultation and public participation process is a crucial mechanism that informs the public, key stakeholders, interested parties and those to be affected by the project about the purpose and aims of the project and the key activities that will be carried out during the development and implementation phases of the project.

The objectives of the stakeholders and public participation include among others:

- To provide an opportunity for people to be affected to get clear, accurate and comprehensive information about the proposed project and its anticipated environmental impacts.
- To provide an opportunity for people that will be affected by the project to give their views, raise their concerns regarding the project and also give possible alternative arrangements that may assist in the development of the project in order to avert some of the environmental and social impacts.
- to provide people to be affected with the opportunity of suggesting ways of avoiding, reducing, or mitigating negative impacts or enhancing positive impacts of the proposed project activities.
- To enable the project proponents to incorporate the needs, preferences and values of the project as seen by the stakeholders into the proposed project/programme.



- to provide opportunities to avoid and resolve disputes and reconcile conflicting interests by the stakeholders of the project; and,
- To enhance transparency and accountability in decision making.

Stakeholder consultations and public participation was carried out during the project preparation process and will continue even during the implementation phase to ensure regular communication between the project proponents/implementers and the various stakeholders including project's direct beneficiaries. It will facilitate regular communication and updates that will enable modifications and alterations as well as implementation of proposed mitigation measures. Stakeholder consultations and participation will also be carried out during the preparation of site-specific environmental and social impact assessments. Further consultations will be carried out during the ESMP implementation phase that will include ESMP monitoring based on the concerns that will be raised by the affected communities.

Methodology of Engaging Stakeholders

The stakeholders were engaged through:

Public consultative meetings, particularly with communities and technical officials from the government of Sokoto state;

Interviews with different key informants in relation to the proposed project/programme.

Physical site visits and inspections that also included discussions with community leaders and community members.

Due consideration of gender and various age groups during consultative processes was observed.

Possible key Issues that were considered during Stakeholder Engagements

Several issues were identified that were useful during stakeholder engagements. Some of these were:

Identification of Ecologically Sensitive Sites

This was regarding finding out and identifying areas that are protected by national laws and international conventions such as forest reserves, important migration routes, heritage sites, etc. Again, an initial environmental and social assessments have revealed that the programme will not affect any such sites in the identified location.

Identification of Important Cultural Sites

These usually include lands set aside for cultural ritual sites, cemeteries and special burial sites. Again, the assessment reveals that the ZMW project will not affect any such areas in the identified location.

Identification of Environmental impacts:

These include both negative and positive environmental impacts of the programme. These covered issues such as levels of pollution – air pollution, generation of wastes, destruction



of biodiversity and ecological habitats, etc. These have been identified and remedial measures have been proposed to address them.

Environmental/Biodiversity Issues

These may include issues of destruction of natural environment including damage to vegetation, views from conservationists, and damage to biodiversity of biological and economic importance, biodiversity loss in general, intensity of construction and excavation works, etc. These were identified and mitigation measures have been proposed in this ESMP.

Socio-economic Considerations for the Project

During stakeholder engagements and public consultations, the programme was analysed from its socio-economic impacts. What positive impacts is the project going to have? How is the project going to influence social well-being as well as economic well-being? The project's agribusiness value addition potential? What are the potential complementary initiatives? Employment opportunities that will be created by the project, medical commodities will be readily available. All these were analysed and adequately identified in this ESMP.

Socio-cultural Issues Regarding the Project

Consideration of gender mainstreaming, women and youth empowerments, identification of vulnerable groups such as poor women, the elderly, the people with disabilities, spreading of diseases (especially HIV/AIDS and other communicable diseases as well as uncommunicable disease were of utmost consideration), improvement of life in terms of life quality and the standards of living, etc. Again, the socio-cultural impacts of the programme have been identified and discussed in this ESMP.

Occupational Health and Safety

Possible occupational health challenges and safety of workers during the project construction and operational phases were given great consideration and their importance analysed.

Consultative Meetings held during the Preparation of this ESMP

Consultations with the relevant stakeholders were carried out at the inception of the project and during the field data gathering campaign. This, having been identified as a Category 2 project, the affected communities and stakeholders were mainly consulted with the objective of ensuring that the project has broad community support, and that affected people endorsed the ESMP.

Community Meetings

The ESMP Consultant team met with Kassarawa community groups as presented in Table 3-6 to gain knowledge of the community perspective on the issues associated with the storm water drainage in their respective communities. The initial community meetings



were facilitated by the PIU were held at the Palace of the District Heads. Attendance to the meetings included the District Heads as well as the various Village Heads.

At each of the community meetings, the ESMP Principal Consultant explained the purpose of the meeting and formally introduced members of the study team to the communities. He further provided an overview of the ESMP as related to the zonal medical warehouse project and highlighted the objectives, activities, outputs, and work schedule of the assignment. He called upon the community members to render sustained support by providing any necessary information/data to the Consultant and to other Consultants or Contractors that may be associated with the project implementation. Thereafter, the Consultant called for questions, comments, observations, or suggestions from the respective communities to which answers, and necessary responses were provided.

Participants' Feedback – Comments and Concerns

The key environmental and social issues and concerns that were raised during the stakeholders' community meetings include:

- Loss of farmland, crop lands and pasture.
- Employment issue and access to drugs when warehouse is operational.
- The proposed project was welcomed 100%

These issues and concerns raised were fully addressed during the community meetings. The specific mitigation measures are also included under the impact's mitigation measures of this ESMP.

Disclosures

This ESMP is subject to public review, and it should be disclosed in the state to the public for review and comment at designated locations in Sokoto State and in World Bank Information Website. Display centers will include EA Department of FMEnv, Office of State Commissioner for Environment, LGA Liaison office, Project Community, and Office of the State Commissioner for Local Government matters.

4.4.1 Description of Cultural Environment

Ethnic Groups

The people of Kassarawa consist of one of Nigeria's major ethnic groups – the Hausa/Fulanis. The ethnic group has its unique culture, social organization, and traditions. The social and cultural aspects in the project area are closely intertwined with the ethnic groupings. The Fulanis have elaborate cultural practices that include strong kinship linkages with organizations spanning from localized social groups to strong clan relations. The cultural associations and social interactions are epitomized during cultural and religious ceremonies and festivities.

Kassarawa is essentially urban centers whose residents are generally trading, commercial and agricultural men and women. The local dwellers rear domestic animals such as goats



and sheep and maintain farms lands most of which are cultivated with groundnut, maize, potato, and millet. Each District village traces its origin from genealogical ties. Politics in the communities are done within the framework of clanism. Clans are the basic point of cultural and political identity for the citizens. Clanism and kinship are the elemental forces in control of political and cultural institutions as well as service points. As previously stated, the project areas are significantly urban.

Ethnicity and Religion

Out of the returned eighty questionnaires, more than 99.9% are Muslims, with Hausa/Fulani as their major tribe. Also, in identifying their ideology, a larger percentage of 70% of them were Qadiriyya Sufi brotherhood followers, a sect believed to be of the Usman Danfodio, while 30% are either Tijaniyya or Sunni brotherhood followers.

Land Use Pattern

There are three major types of customary land tenure system in the project area – (1) Individual land ownership; (2) family land ownership; and. (3) communal land ownership. Individual ownership may be for indigenes or for residents of the community. Family lands (as well as individual lands) are inherited from generational relatives. Communities retain family lands which may never be sold. Such family lands are generally retained for communal development and sometimes are rotationally shared among the members of the community for agricultural purposes but are not for sale. The Kassarawa project area can be characterized as a predominantly urban setting and a minor rural section with residential and agricultural properties occupying most sections of the communities and land areas. Over 80% of the land use in project area is fully developed. The remaining land area is committed to agricultural production of food crops. The crops include rice, onions, garlic, maize, millet, groundnuts, tomatoes, potatoes, wheat, sorghum, guinea corn, vegetables, etc.

Cultural Resources

There are no known designated historical or archaeological resources within the project area. However, there may be the existence of several burial grounds & other cultural relics within and near the project area. This ESMP spells out appropriate site-specific mitigation measures for any burial ground and other cultural relics that maybe found during the project implementation

Demographic Profile

Population distribution

Based on the 2006 national population census records and the 3.04% annual population growth factor recommended by the national population commission (NPC), Wamako Local Government Area has a population of 179,619 at the 2006 census. As of 2010 the research conducted by National Bureau of Statistics, the estimated rural –urban migrants in the area is about 4,536 and it's increasing at the rate of 10% annually.



Gender, Age and Household Size Distribution

Both men and women are significantly involved in the general pursuits of livelihoods. The age distribution data indicated that the percentage of household members 21 years of age and below for the project area is 55%. About 1% of the households are in their 60s and above. The survey further showed that 36% are within the youthful ages of between 22 and 45 years while 7% of the household members are between the ages of 46 and 60 years. There is strikingly a high percentage of children below 21 years (55%) in the households.

The household size distribution from the survey ranged from a minimum of one person to a maximum of 19 persons in Kassarawa. The average size of households is 6 persons for the project area community. On the extreme household size ends, the project area has 15% of the households with one to two members and 30% of the households with more than 8 persons. About 17% of the households have sizes of 7 or 8 persons while 20% showed sizes of 5 or 6 persons. The data showed 18% households have sizes of between 3 and 4 persons.

The warehouse will be drug revolving storage for six north western States excluding Kaduna which it got its supply from Abuja due to its closeness. The site as mentioned earlier will be located at Sokoto State at Kassarawa community in Wamako Local government. However, most of the developing partners uses Sokoto to distribute drugs to most of these northwestern States. They included Sokoto, Katsina, Kano, Jigawa and Zamfara. Every two (2) months States in the region sign an order to send for their needs through federal ministry of health-global health supply chain. The proposed medical warehouse is expected to be bigger than the present one.

Youth and Human Capital Development

As a result of the disproportionate development of the rural areas, a large proportion of the population, notably the youth continue to move towards the cities in search of a livelihood. Youth unemployment is high at 29.1% (2018) and well above the national average. Nigeria has one of the highest rates of urbanization in the world (over 4%) and over 50% of the population live in towns. The project will provide economic opportunities for Nigerian youth along the health commodity supply chain.

Respondent and Household Distribution in Project Area

The following Sections show how the residents of the project area responded to the socioeconomic survey administered to them. A total of 25 questionnaires were administered to potential PAPs within the project communities with a 100% return. Based on the survey, the 25 respondents with 25 household members were documented for Kassarawa Districts and some few individuals.

4.4.2 Description of the Socio-economic Resources

Occupation and Micro-economy

The people of Kasarawa are mostly farmers. Fadama farming, which allows growing of crops in the dry season as well as the in the wet seasons, is an important livelihood activity



in Sokoto State. Most are small farmers cultivating plots of less than one hectare but some in larger plots of two to three hectares. It is estimated that at least 70% of the rural communities within Sokoto State depend on subsistence farming for survival. In the proposed Project, host communities as observed during preliminary survey, agriculture which include cultivation of arable crops and livestock rearing forms the major source of livelihood for the communities. The major crops cultivated in the area are rice, millet, ground nut, beans, guinea corn, sugar cane and vegetables. It's important to note that, there are other non-agricultural activities around the proposed project area such as trading, artisan works like leather craft etc., with reasonable proportion of the population working in the private sectors.

Access to Basic Infrastructure

In this aspect the studies examine the nature of infrastructural establishments in Kasarawa. Most of the people of the community interviewed, with a percentage of about 100% shows their support for this project and anticipated to get employment during or after the construction of the warehouse. Most of the local governments in Sokoto state were connected to National grid. However, some villages do not have light. As such outage on power supply is a general phenomenon across the nation.

Electricity

The Power Holding Company of Nigeria (PHCN) accounts for 98% of electricity generated in Nigeria (Oyedepo, 2012). The national grid comprises of 14 generating stations which have a total installed capacity of 8039MW, and the transmission grid is connected across the country either by 330 or 132kv power lines. These stations however operate below their full capacity. It's estimated that between 60-70 percent of Nigerians do not have access to electricity (Oyedepo, 2012). Moreover, there has been a supply and demand gap because of the inadequate development and inefficient management of the energy sector (Oyedepo, 2012). All the communities within the Project's areas have access to electricity and are linked to the National grid. However, the power supply is irregular and rationed among the different communities at different time of the day.

Water Supply

Public water schemes are limited within Sokoto State. However potable water is accessible to larger population within the communities around the Project's communities, with 70% using well and borehole water system, while 70% have access to pipe borne water system. In the project site and surrounding public water supplies are primarily from boreholes and ground (wells).

Telecommunications

The use of mobile phones in Local Government Areas of Sokoto State is influenced by income level of the users as well as membership of cooperative societies (Yakubu *et al.*, 2014). Mobile phones are important tools for improving rural livelihoods. They have great potentials in improving rural livelihoods in the area. However, the Mobile phone users were not taking the full advantage of the mobile phone in establishing business contacts



for greater improvement in their livelihoods. Telecommunications within Sokoto State have improved substantially since 2000. Moreover, Internet access through mobile, fixed wireless or wireless broad band is not available in most of the local governments of Sokoto State. However, accessibility to network such as MTN, Airtel and Etisalat area available within the communities surrounding the project site.

Educational facilities and Literacy

Most of the Local governments in Sokoto State have an average literacy rate of 55 .0% with 40.0 percent of men and 54.5 percent of women being literate respectively (National Literacy Survey, 20 10). It should be noted that a lots of local communities in the villages are desperate to have more post-primary school as well as junior secondary schools in their communities for their children to further their education after they finished primary school. More than 20% of children who finishes primary school were not able to proceed to secondary school, due to the lack of the existence of the post primary school in their community, as such a lots of them cannot endure to go too far places outside their communities to continue but ended up moving out of the village to look for greener pasture in the urban centers.

Housing Patterns and Size of Households

The housing patterns in the study area is of the muds and bricks and of the cement and blocks. Houses in the study area are built for inhabitation by owners and for rent as earlier stated, some of the houses are built in an irregular manner without plan while some are planned. The household sizes in the study area are considerably high as polygamy and given birth to plenty children is the norm. Most of the women are not easily seen, they stay indoors as part of household value system of seclusion and putting them under purdah in the North.

Transportation System

This is another aspect which usually measure the economic well-being of the communities, by assessing their means of transport system in their localities.

60.00%.....	Motorcycle
50.00%.....	Cars
40.00%.....	Buses
30.00%.....	Trucks and Lorries
20.00%.....	Domestic animals

Sanitation and Waste Disposal

The community is generally clean with just a few litters of non-biodegradable and biodegradable materials from trees, waste in the study area has been disposed in the community refuse disposal dumps. While some of them have a large collection point at the backyard for subsequent disposals to their farmlands as another means of manure in



enriching the fertility of their farmlands for agricultural economic. About 80% have pit latrine toilet system, while 20% have a water system toilet in their houses.

Means of Livelihood within the Project Area

The means of livelihood in the study area is generally farming though there are other form of livelihood such as petty trading, hunting, fishing, civil servants, Transportation Business, handcraft, large scale businesses, but these means of livelihood serves as secondary source, as most of them have their farms as the major source of income. The Monthly income distribution Income distribution is highly dependent on the occupation and much money an individual earns. According to the data collected on site the monthly income for the majority in the community falls within the rage of N 1,000 to N95, 000 and just a few of them earn about N96, 000 and above this data was not too comprehensive as majority of the people do not take in to account the subsistent farming which produce is used for the feeding of their different families therefore a lot of the correspondents gave an estimate of the inflow of the physical cash.

Table 4-9: Monthly Income of some Respondents during Interviews and Focus Group Discussions in the Study Area

Monthly Income	Percentage %
<NGN 1,000	19.5
1,000 - 10,000	10.7
11,000 - 20,000	19.7
31,000 - 40,000	12.7
41,000 - 50,000	11.7
61,000 - 70,000	8.2
71,000 - 80,000	6.6
81,000 - 95,000	5.8
>96,000	5.1
Total	

Access to Education

The survey responses indicated that in the project community, the population of schooling age who never attended school is 20%; 28% had basic primary school education (FSLC), 31% attended Secondary school (SSCE), 12% are Undergraduates, 9% are Graduates and 1% had a post-Graduate degree. The very low literacy level within the project affected area is reflected in the significantly low number of existing educational infrastructure support within the area.

Desirability of the Project

All the respondents in the survey (100%) indicated immense desirability for the project to proceed. Many of them expressed a clear wish for the project to proceed before the next round of rainfall.



Potential Security Risk Challenges

As severally indicated, implementation of the project will result in an influx of persons seeking gainful employment with the project contractors or providing social services of various types or to gain any social privileges within the project communities. Different types of persons, including criminals of sorts, may be expected to find their ways into the project communities within this time. Such movement of persons will inevitably increase the potential for criminal activities within the project communities. It should therefore be anticipated that there will be increased pressure in the demand for police services and other security issues in the project area. Additionally, the cumulative unemployment levels in communities resulting from the influx of employment seeking persons to the area will pose its own security risks for both the communities and the security institutions.

Conflict Resolution

All respondents in the survey (100%) prefer and find it most convenient to have conflicts resolved through informal traditional modes of conflict resolution which currently exist within the communities. The court system is seen as an alternative means to resolve issues, but no respondent favored it as a means of resolving conflict. None of the respondents was indifferent to the preferred approach.

Health Institutions

Healers and patent medicine vendors that provide care. Free maternal and child health services are provided in all the Sokoto State local governments including Primary health facilities belonging to the Local Government. Furthermore, drugs worth millions of Naira are procured by government, sometimes through the drug revolving fund program. However, 90% of the respondent communities know nothing about the benefit of drug revolving program in their hospitals. The most prevalent disease in the area is malaria. Other common diseases are typhoid, cholera and diarrhea caused by poor hygiene among residence of the community.

Access to Healthcare Infrastructure

The common diseases communities include diarrhea, malaria, typhoid, pneumonia, cough, skin diseases, deficiency diseases, eye diseases, ear diseases, and waterborne diseases resulting mainly from malnutrition and lack of hygiene. Due to poverty, the quality of the health care services in the areas is generally poor with most residents patronizing quacks and medicine shops for their medical treatment. It should be anticipated that there will be increased pressure in the demand for health facilities in the communities resulting from influx of persons during the implementation of this project.



CHAPTER FIVE

POTENTIAL AND ASSOCIATED IMPACTS

5.1 Preamble

There are several approaches and techniques developed for evaluating associated and potential impacts of any project on the environment. The Overlays techniques (McHarg, 1968); Leopold matrix (Leopold *et al.*, 1971); Battelle Environmental Evaluation System (Dee *et al.*, 1973), Peterson Matrix (Peterson *et al.*, 1974), Rau and Wooten (1980) and ISO 14001 are among the most widely used methods.

The proposed project utilized the ISO 14001 and Risk Assessment Matrix (RAM) methods for the potential and associated impacts while the Leopold matrix was used during the preliminary impact assessment during screening. The cumulative impact assessment was done using Rau and Wooten (1980) methods.

The key objective of an ESIA is to predict changes (adverse or beneficial, whole or partial) in the ecological and socio-economic environment resulting from a proposed development project or activity as well as recommend mitigation measures to minimize, eliminate or offset those aspects that will adversely impact on the environment.

This chapter therefore presents the findings from the overall assessment of the potential and associated environmental impacts of the proposed project to operate in Sokoto State. It includes consideration of potential impacts related to abnormal occurrences in addition to those that might result from normal operations. The rationale used in this impact's evaluation is drawn from FMEnv sectoral guidelines and the World Bank Guidelines/ IFC performance standards.

The assessment process was as follows:

- Identification of the various potential impacts using interaction matrix to show the relationship/ interaction between the project environmental components and planned project activities.
- A screening of potential impacts associated with each phase of the project is performed using a Risk Assessment Matrix; and
- A detailed evaluation of the individual impact producing factors that comprise each aspect of the project phases is then performed. The significances of the potential impacts are quantified using the same rationale as for the screening.

The assessment approach generally involved matching the various activities of the different stages of the proposed project (as described in chapter 3 of this report) with the components of the existing environment. Consequently, the possible changes (and extent of changes) in the environment because of the interactions have been identified/evaluated, hence mitigation measures proffered to reduce, offset or ameliorate such changes.



The potential/ associated adverse and beneficial impacts of the proposed Agro Cargo Terminal and Warehouse project on the existing environment were identified at this stage of the ESIA. The EIA Procedural Guidelines and the World Bank Environmental Assessment Source Book, ISO 14001 approach and the Hazard and Effect Management Process (HEMP) among other references were used in the identification process. The Risk Assessment Matrix (RAM) has been employed in determining risks posed by the identified potential/associated impacts of the project to proffer appropriate mitigation measures. In predicting impacts, the experiential/practical ‘worst case scenario’ approach has been applied to determine the extreme effects of project activities on environmental components, while ‘consensus of opinions’ has been made use of to determine the importance of affected environmental components. The impact evaluation results make up the pedestal for developing the ESMP of the proposed project.

Evaluation of the identified impacts were carried out and compared using specific criterion such as legal/ regulatory requirements, magnitude of impact, risk posed by impact, public perception, and importance of affected environmental component. Results of identification and evaluation are presented in this chapter of the report.

5.2 Identification of Environmental and Socio-economic Aspects and Impacts

5.2.1 Definition of Environmental and Social-economic Aspects

The International Organization for Standardization’s Environmental Management Systems (EMS), ISO 14001, defines an environmental aspect as: “*An element of an organization’s activities, products or services that can interact with the environment.*”

To identify environmental and social aspects of the Project, the planned project activities were considered in terms of their direct or indirect potential to:

Interact with the existing natural environment including its physical and biological elements; Interact with the existing socio-economic environment; and Breach relevant policy, legal and administrative frameworks including national legislation, relevant international legislation/conventions, standards and guidelines, and corporate environmental policy and management systems.

5.2.2 Definition of Impacts

ISO 14001 defines an environmental impact as: “Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization’s activities, products or services.” An environmental or socio-economic impact may result from any of the identified environmental aspects.

5.2.3 Potential Impact Characteristics

The criteria applied to the screening of various activities were:

- i. Negative: An impact that is considered to represent an adverse change from the baseline or to introduce a new undesirable factor.



- ii. Positive: An impact that is considered to represent an improvement to the baseline or to introduce a new desirable factor.
- iii. Direct: Impacts that result from the direct interaction between a planned project activity and the receiving environment.
- iv. Indirect: Impacts that result from other activities that are encouraged to happen because of the Project.
- v. Temporary: Temporary impacts are predicted to be of short duration, reversible and intermittent/occasional in nature.
- vi. Short-term: Short term impacts are predicted to last only for a limited period but will cease on completion of the activity, or because of mitigation measures and natural recovery.
- vii. Long-term: Impacts that will continue for the life of the Project but cease when the project stops operating.
- viii. Permanent: Potential impacts that may occur during the development of the Project and cause a permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime.
- ix. On-site: Impact that is limited to the Project site.
- x. Reversible: An impact that the environment can return to its natural state.
- xi. Irreversible: An impact that the environment cannot return to its original state, e.g., the extinction of an animal or plant species.
- xii. Cumulative: Potential impacts that may result from incremental changes caused by other past, present, or reasonably foreseeable actions together with the Project.
- xiii. Residual: Both environmental and social impacts that will remain after the application of mitigation measures to project impacts during each of the Project phases (pre-construction, construction, commissioning, operation, decommissioning).

5.2.4 Screening and Scoping for Potential Impacts

In assessing the impacts of the proposed project, the following information was used:

- a. Knowledge of the proposed project activities, equipment types, procedures, and Abandonment programme,
- b. The results of the environmental baseline studies (biophysical, socio-economic and health).
- c. Findings of other ESIA studies on similar areas and projects and other literature findings; on the primary project activities.



- d. Comparison with FMEnv/ UNEP/WHO/World Bank guidelines and standards,
- e. Environmental audit reports (secondary data) on similar existing projects,
- f. Series of resource persons (ESIA Preparers) discussions.
- g. Experience on other ESIA projects by the ESIA preparers.

5.3 Potential Impacts of Proposed Agro Cargo terminal and Warehouse Project

Impact of the additional well drilled was accessed using ISO 14001 methodology. Table 5-1 presents the project phases and activities used for impact assessment, while Table 5-1. Presents the impacts indicators.

Table 5-1: Project Phases and Activities for Proposed Agro Cargo terminal and Warehouse Project

Project Phases	Project Activities
Pre-Construction	Land take and stakeholders' consultation
	Surveying and Geotechnical investigation
	Movement of personnel and equipment
	Building of site Camp and employment,
Construction	Vegetation clearing, leveling soil and stabilization etc
	Excavation, civil construction (block work, concrete mixing, plastering e.t.c) and installation of facilities (electrical works, plumbing, woodwork e.t.c) and employment opportunities
	Waste generation and management
Operation	Agro-Cargo Terminal and Warehouse Storage facilities
	Handling and management of agro-commodities operation of cargo handling equipment, store/ staking area management (washing, cleaning and periodic fumigation), transportation, and quality control e.t.c
	Capacity building training to facility staff and other key stakeholders
Facility maintenance	Periodic Maintenance works including repairs, painting e.t.c
	Waste Management
Decommissioning	Demolishing of existing structure
	Removal of debris
	Site clearing and restoration

The associated impacts indicators were identified and are listed in Table 5.2 below.



Table 5.2: Impactable Components and Associated Impact Indicators

Environmental Receptor	Comment	Impact Indicators
Physical		
Air Quality	Ambient air quality within the Project site and its area of influence	Increased concentration of gaseous and particulate pollutants (such as NO _x , SO _x , CO, VOC, PM10, PM2.5, CO ₂)
Noise and Vibration	Ambient noise and vibration level within Project site and its area of influence	Increased ambient noise and vibration level, night and day-time disturbance, hearing loss, communication impairment etc.
Soil	Soil environment within the Project site and its area of influence	Changes in physical, chemical and biological properties, loss of soil ecology and fertility, compaction, erosion etc.
Underground water/aquifers	Underground water resources within the Project site and its area of influence	Change in underground water/aquifer reservoir level, underground water quality and availability
Landscape/topography	The geomorphological landforms and terrain of the Project site and its area of influence	Alteration in drainage pattern, changes in landscape.
Biological		
Terrestrial Flora and habitats	Plant species within the Project site and its area of influence	Loss of terrestrial flora, introduction of new species. Plant species diversity and abundance.
Terrestrial Fauna including avifauna	Terrestrial fauna and avifauna within the Project's area of influence	Loss of terrestrial fauna;
Aquatic organisms	Aquatic organisms (e.g., phytoplankton, zooplankton, benthos, and fishes)	Loss of aquatic organisms; involuntary migration.
Socio-economic Environment		
Land use	Existing land use within the Project site and its area of influence	Loss of existing land value for farming activities



Environmental Receptor	Comment	Impact Indicators
Visual prominence	The aesthetic quality of the project on the surrounding visual catchment.	The compatibility of the Project with the character of the locality.
Demography	Demography of communities in the Project's area of influence	Changes in total population, gender ratio, age distribution, socio-economic structure etc.
Infrastructure (Utilities)	The existing utilities (e.g. power supply, water, sewerage services) in the Project's area of influence	Changes in existing utilities, damage to public utilities e.g. roads, electric poles, pipes, cables.
Cultural values	Cultural sites within the Project's area of influence	Damage to cultural sites within the Project's area
Employment/income	The employment situation in the Project's area of influence	Opportunities for local and national employment; changes in income level
Others (Health and Safety)		
Construction workers	Workers' health and safety	Accidents, injury, fatality, exposure to nuisance (dust, noise), fire etc.
Workplace health and safety	The health and safety of employees involved with the plant operation.	Accidents, injury, exposure to nuisance (dust, noise), fire, explosion.
General public	Community health and safety	Exposure to road accident, fire, explosion, etc.

5.4 Scoping

Scoping identifies the various aspects (activities) of the proposed project that could have significant impact on the environment. Scoping also enables proffering solutions to issues such as.

- What are the potential impacts from the execution of the project?
- What will be the magnitude, extent, and duration of the impacts?
- Of what relevance are the impacts on the environment within local, national, and international contexts? and
- What mitigation or ameliorative measures can be put in place to reduce or avoid the adverse impacts or to enhance and maximize positive impacts?



Consequently, scoping of the proposed Agro Cargo Terminal and warehouse project was used to identify the components of the environment that will be significantly impacted to include air quality/climatic conditions, soil/Agriculture, vegetation/wildlife (biodiversity, surface/ground water, noise level, health and safety, socio-economic activities.

5.4.1 Scope of the Study (Spatial/Temporal)

Based on the identified activities likely to cause adverse significant impacts, the various indicator environmental parameters as presented in Table 5-2, the status of the environment was evaluated by overlaying the existing baseline to assess the impacts.

Air Quality/Climate

The air quality and climatic parameters of the proposed project area that were evaluated include particulates, SO_x, NO_x, CO, H₂S, and SPM.

Soils

The soil physico-chemical and microbial properties of the proposed project area were evaluated. These included pH, textural classification, Metals/Heavy metals, Conductivity, soil micro fauna.

Groundwater

Ground water from boreholes was sampled/analyzed and the following parameters evaluated: Dissolved/suspended solids, Dissolved Oxygen, nutrients, Heavy metals, salinity, pH, Conductivity.

Vegetation/ Wildlife (Biodiversity)

The various vegetation types, their structure, and economic uses in the proposed project area were evaluated. Also, the various species of wildlife in the area were studied and evaluated.

Ambient Noise

The ambient noise level of the proposed projected area was evaluated. Noise is of importance in the assessment because of its immediate effects on wildlife as well as the nuisance, impaired hearing and discomfort it causes to humans.

Socioeconomics and Health Conditions

The socio-economic and health conditions of the proposed project area host/beneficial community was evaluated. Particularly the perceptions of the various groups in the community towards the proposed project were also noted and evaluated. The consultation and discussions held with the various stakeholders were noted with the backdrop of gauging the perception and importance attached to the proposed project.



Waste Management

The various waste types, handling and disposal methods in the proposed project area was evaluated.

5.5 Impacts Identification

The anticipated associated and potential impacts of the proposed project activities on the biophysical, social, and human health environment were identified based on the interaction between project activities and environmental sensitivities identified in the baseline (Table 5-2). The interactions among the environmental sensitivities were also considered for impact evaluation and categorization (See Table 5-4).

The Leopold's Interactionmatrix was subsequently assessed to identify every possible case of activity-receptor interaction. Using the above documentation, the checklist of potential/associated impacts for the project phases/activities of the project is presented in Table 5-3 below.



Table 5-3: Screening Matrix for Potential Biophysical and Social Impacts

Project Phases and Activities	Biophysical Impact Indicators						Social Impact Indicators								
	Geology	Air	Groundwater	wildlife	Vegetation	Noise	Population	Infrastructure	Macro and micro economics	Social and Income level	Cultural and Archaeological	Transportatio	Education		
Site preconstruction and Construction –															
Land take, stakeholders’ engagement movement of Equipment and Materials to Site	-	1	-	-	-	1	1	1	1	1	1	1	-	--	
Transportation of Workers and Materials	-	-	-	-	-	-	-	-	1	1	1	-	1	-	
Physical Site Clearing	1	1	-	1	12	1	-	-	1	1	1	1	1	-	
Construction Works	1	1	-	1	1	-	-	-	1	1	1	1	1	-	
Wastes and Emissions Handling and Disposal	-	1	-	-	-	1	-	1	-	-	-	-	-	-	
Installation, Commissioning and Operations															
Wastes and Emissions Handling and Disposal	-	-	-	-	-	-	-	1	1	-	1	-	-	-	
Agro-Cargo Terminal and Warehouse Storage facilities	1	1		1	1	1	1		1	1	1	1	1	1	
handling and management of products, agricultural working capital, post-harvest handling, storage, transportation, and quality control	-	1	-	-	-	1	1	1	1	1	1	1	1	1	
Capacity building training to Project Staff, and other key project Stakeholders	-	1	-	1	1	1	1	1	1	1	1	1	1	-	
Decommissioning and maintenance /upgrade															



Periodic Maintenance	1				1	1	1	1	1	1	1	1	1	1
Upgrade of the existing facility	1				1	1	1	1	1	1	1	1	1	1
Removal of existing installation	1				1	1	1	1	1	1	1	1	1	1
Wastes generation	-	-	-	-	-	-	-	1	1	-	1	-	-	-



Table 5-4: Associated and Potential Impacts for the Proposed Agro Cargo Terminal and Warehouse Project

Project Phase	Project Activities	Potential/Associated Impacts
pre-construction	consultation with stakeholders and land take as well as survey	<ul style="list-style-type: none"> • Community agitation over compensations, land disputes, wrong stakeholder identification, leadership tussles etc • Lobbying, agitations/feuds for contractual agreements/ jobs by local workers. • Compensation for farm/tree crops. • Increased income generation. • Improvement in quality of life for adequately compensated individuals • Exclusion of vulnerable groups from consultations which may lead to strife
	Employment of skilled and unskilled labour	<ul style="list-style-type: none"> • Creation of employment for skilled and unskilled workforce. • Skill acquisition and enhancements to local indigenes and workforce. • Business opportunities for local contractors through sub-contracting activities • Conflicts/community agitations over employment issues (quota and methods)
	Construction of workers camp, access roads and mobilization of equipment & personnel to site	<ul style="list-style-type: none"> • Increase of dust particles and vehicular emissions • Nuisance (noise and vibrations) due to movement from heavy duty equipment and vehicles affecting site workers • increased pressure on existing social infrastructure
Construction		<ul style="list-style-type: none"> • Increase of communicable diseases due to influx of people • Increase in social vices (like theft, prostitution etc.) resulting from increased number of people • Increased traffic during mobilization on road with risk of accidents leading to injury/death and loss of asset • Risk of terrorist attack and hostage taking leading to injury/death of personnel
		<ul style="list-style-type: none"> • Reduction in environmental aesthetics value due to indiscriminate deposition of base camp-associated wastes.



Project Phase	Project Activities	Potential/Associated Impacts
	Clearing of vegetation and other debris	<ul style="list-style-type: none"> • Loss of vegetation in the project site area. • Loss of habitat for wildlife
		<ul style="list-style-type: none"> • Exposure of soil surface to the elements that can trigger erosion. • Soil degradation e.g., compaction of soil as a result of the movement of earth moving equipment • Exposure of soil surface to wind and sheet erosion.
		<ul style="list-style-type: none"> • Injuries from wildlife attacks (snakes bites and insects stings). • Injuries from machete and other equipment during vegetation clearing. • Waste generation.
		<ul style="list-style-type: none"> • Flora/habitat loss and disturbance through vegetation clearing and earthworks within project site and access roads.
		<ul style="list-style-type: none"> • Loss of individual or localized population of fauna • Loss of wildlife habitat and emigration of wildlife.



Project Phase	Project Activities	Potential/Associated Impacts
<p>Construction</p>	<p>Civil works activities such as construction of buildings, factories Installation of ancillary facilities, Installation of electricity power infrastructure, etc.</p> <p>Civil works activities such as construction of terminal buildings, Installation of ancillary facilities, Installation of electricity power infrastructure, Painting etc</p>	<ul style="list-style-type: none"> ✓ Employment of local labour and skills acquisition for workers taking advantage on new opportunities. ✓ Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting ✓ Increase in revenue opportunities for local population due to presence of non-resident workers and travelers.



Project Phase	Project Activities	Potential/Associated Impacts
		<ul style="list-style-type: none"> • Workplace accidents from burns, cuts, bruises, trips and falls, object at height leading to injury of fatalities. • Risks injury/death and loss of assets resulting from accidents associated with road transportation to and fro construction sites • Risks injury/death and loss of assets resulting from accidents associated with road transportation to and fro construction sites • Inhalation by onsite workers of cement dust and toxic fumes during foundation works and welding of material components • Traffic congestion during transportation of demobilized equipment and personnel • Potential collapse of buildings/structures on land as a result of unstable geotechnical conditions • restriction of access roads to prevent unauthorized uses
		<ul style="list-style-type: none"> • Reduction in wildlife population as a result of poaching due to easier access created by project site clearing. • Noise nuisance (including impulsive noise) from construction activities, resulting to temporal migration of sensitive mammals and rodents
		<ul style="list-style-type: none"> • leakages and spill of hazardous substances (diesel, lubricants, hydraulic oil etc)



Project Phase	Project Activities	Potential/Associated Impacts
		<ul style="list-style-type: none"> • Generation of dust and automobile/heavy duty equipment emissions. • Decrease in air quality as a result of emissions from vehicles and equipment. • Increased ambient noise level from heavy equipment and machinery, vehicular movement, and civil work activities.
		<ul style="list-style-type: none"> • Reduction in environmental aesthetics value due to indiscriminate disposal of wastes. • Visual intrusion as a result of alterations from accidental ignition of onsite diesel storage tanks
		<ul style="list-style-type: none"> • Soil degradation and possibly accelerated erosion • Reduction in structural stability and percolative ability of the soil. • loss of soil dwelling organisms
Operations	Agro-Cargo Terminal and Warehouse Storage facilities; handling and management of products, agricultural working capital, post-harvest handling, storage, transportation, and quality control;	<ul style="list-style-type: none"> • Injuries/fatalities of personnel due to road accidents during facility inspection and checks • Explosion and fire hazards at the facilities.
	Capacity building training to Project Staff, and another key project	<ul style="list-style-type: none"> • Emission from equipment and machines • Increase in noise level during operation hours.
	Stakeholders, on site works and associated Occupational health issues.	<ul style="list-style-type: none"> • Increased business opportunities and quality of life (Small, medium and large scale) • Unchecked encroachment on the project site, leading to land-use conflicts and accident • Enhanced aesthetic appeal due to presence and eventual operation of many facilities in the project site



Project Phase	Project Activities	Potential/Associated Impacts
		<ul style="list-style-type: none"> • Fauna disturbance and displacement as a result of migration away from demolition activity area (this includes impacts on birds)
Decommissioning and Abandonment	Demolishing of civil structures (Terminal building and warehouse) Removal of existing installation	<ul style="list-style-type: none"> • Loss of employment • Availability of land for alternative uses <hr/> <ul style="list-style-type: none"> • Increased noise level • Generation of dust and automobile/heavy duty equipment emissions • Solid Waste Generation (debris, scarp metals, wood etc.) <hr/> <ul style="list-style-type: none"> • Risk of accident and injury to workers during demolition of structures • Traffic obstruction from transportation of decommissioned structures and equipment



5.6 Impacts Quantification, Determination and Ranking

Impact Risk Assessment

The Risk that an impact poses is determined using the Risk Assessment Matrix (RAM) shown in Figure 5.1. The Environmental Consequences in the figure are defined in Table 5.2. The Impact Risk is rated as:

1= Low risk

3 = Medium/intermediate risk

5 = High risk

Consequences					Increasing Likelihood				
					A	B	C	D	E
Severity	People	Assets	Environment	Reputation	Never heard of in the industry	Heard of in the industry	Has happened in the Organization or more than once per year in the industry	Has happened at the location or more than once per year in the Organization	Has happened more than once per year at the Location
0	No injury or health effect	No damage	No effect	No impact					
1	Slight injury or health effect	Slight damage	Slight effect	Slight impact		Low			
2	Minor Injury or health effect	Minor damage	Minor effect	Minor impact		Risk			
3	Major Injury or health effect	Moderate damage	Moderate effect	Moderate impact			Medium		
4	PTD or up to 3 fatalities	Major damage	Major effect	Major impact			Risk	High	
5	More than 3 fatalities	Massive damage	Massive effect	Massive impact				Risk	

Figure. 5.1: Risk Assessment Matrix



Table 5-5: Definition of Consequence in the Risk Matrix (RAM)

Severity	Potential Impact	Definition
0	Zero effect	No environmental damage. No change in the environment. No financial consequences.
1	Slight effect	Local environmental damage within the fence and within systems. Negligible financial consequences.
2	Minor effect	Contamination, damage sufficiently large to affect the environment. Single exceedance of statutory or prescribed criteria, single complaint. No permanent effect on the environment
3	Localized effect	Limited loss of discharges of known toxicity. Repeated exceedance of statutory or prescribed limit. Affecting neighborhood
4	Major effect	Severe environmental damage. The company is required to take extensive measures to restore the contaminated environment to its original state. Extended exceedance of statutory or prescribed limits
5	Massive effect	Persistent severe environmental damage or severe nuisance extending over a large area. In terms of commercial or recreational use or nature conservancy, a major economic loss for the company. Constant high exceedance of statutory or prescribed limits.

Source: SIEP (1996).



Determination of Impact Rating and Significance

The ISO 14001 methodology, for determining potential impact rating and significance, is adopted in this study. The criteria employed in evaluating the potential impacts are:

- Legal/regulatory requirements (L);
- Risk factor (R);
- Frequency of occurrence of impact (F);
- Importance of impact on an affected environmental component (I); and
- Public perception/interest (P).

Each of the criteria is weighted on a scale of 0, 1, 3 and 5 depending on the perceived significance of the impact under consideration. This is a modification of the arbitrary scale proposed by Vesilind, *et al.* (1994). The weightings are described below and are adapted from The International Organization for Standardization ISO 14001 – Environmental Management System Approach.

Legal/Regulatory Requirements (L) – Is there a legal/regulatory requirement or a permit required?

- 0 = There is no legal/regulatory requirement
- 3 = There is legal/regulatory requirement
- 5 = There is a legal/regulatory requirement and permit required

Risk Factor (R) – What is the risk/hazard rating based on the Risk Assessment Matrix (RAM)?

- 1 = Low risk
- 3 = Intermediate risk
- 5 = High risk

Frequency of Impact (F) – What is the frequency rating of impact?

- 1 = Low frequency (rare)
- 3 = Intermediate frequency (likely)
- 5 = High frequency (very likely)

The frequency of occurrence of each impact was determined from historic records and consensus of experts' opinion.

Public interest/perception (P) – What is the public perception and interest in the proposed project and impacts based on consultation with stakeholders?

- 1 = Low interest/perception
- 3 = Intermediate interest/perception
- 5 = High interest/perception

The perception of the general public on each potential impact and were determined through consultation and consensus of opinions of environmental professionals.



Importance of affected environmental components and impacts (I) – What is the rating of importance based on consensus of opinions? Will the impact be localized or spread to cover greater areas of the environmental component?

- 1 = Low
- 3 = Medium
- 5 = High

The importance of affected environmental component was determined through consultation and consensus of opinions.

This approach combines the following factors in assessing the overall rating of the potential impacts of the proposed project on the environment:

- The sensitivity/vulnerability of the ecosystem components;
- The productivity evaluation/rating of the ecosystem components;
- Knowledge of the possible interactions between the proposed project and the environment;
- Envisaged sustainability of the project environment;
- The economic value of the proposed project activities; and
- Projected duration of the impact of each project activity on various environmental components.

The overall impact significance rating is determined as shown in **Table 5-5**. The potential and associated impacts of the project are presented in **Table 5-6**. All impacts with the Medium and High Ranking are considered significant and will require mitigation measures. Impacts with Low ranking will be addressed by application of the safety Policy. Impacts rated as positive do not require mitigation and are considered Beneficial.



Table 5-6: Impact Value and Rating

Impact value	Cut off values	Impact Rating	Impact Significance
L+R+F+I+P	<8	Low	Not Significant
L+R+F+I+P	≥8 but <15	Medium	Significant
L+R+F+I+P	≥15	High	
F + I	≥6		
P	= 5		
Positive		Positive	Beneficial



Table 5-7: The Potential and Associated Impacts of the Agro Cargo Terminal and Warehouse Facility Project

Project Phase	Project Activities	Potential/Associated Impacts	B/A	ST/LT	R/IR	L	R	F	I	P	F+I	L+R+F+I+P	Ranking
Pre-Construction	Consultation with Stakeholders and land take	Community agitation overcompensations, land disputes, wrong stakeholder	A	L T	R	3	5	3	5	5	8	21	High
		Identification, leadership tussles etc Lobbying, agitations/feuds for contractual agreements/ jobs by local workers.	A	L T	R	3	5	3	5	5	8	21	High
		Compensation for farm/tree crops. Increased income generation. Improvement in quality of life for adequately compensated individuals	B	S T	R	0	5	5	5	5	10		Beneficial
		Exclusion of vulnerable groups from consultations which may lead to strife	A	L T	R	3	5	3	5	5	8	21	High
	Employment of skilled and unskilled labour	Creation of employment for skilled and unskilled workforce. Skill acquisition and enhancements to local indigenes and workforce. Business opportunities for local contractors through sub-contracting activities	B	S T	R	0	5	5	5	5	10		Beneficial
Conflicts/community agitations over employment issues (quota and methods)		A	L T	R	3	5	3	5	5	8	21	High	



Project Phase	Project Activities	Potential/Associated Impacts	B/A	ST/LT	R/IR	L	R	F	I	P	F+I	L+R+F+I+P	Ranking
Construction	Construction of workers camp, access roads and mobilization of equipment & personnel to site	Increase of dust particles and vehicular emissions	A	S T	R	0	3	1	3	1	4	8	Low
		Nuisance (noise and vibrations) due to movement from heavy duty equipment and vehicles affecting site workers	A	S T	R	0	3	1	3	1	4	8	Low
		Influx of population and increased pressure on existing social infrastructure	A	S T	R	0	3	1	3	1	4	8	Low
		Increase of communicable diseases due to influx of people	A	S T	R	0	3	1	3	1	4	8	Low
		Increase in social vices (like theft, prostitution etc) resulting from increased number of people	A	S T	R	0	3	1	3	1	4	8	Low
		Risk of terrorist attack and hostage taking leading to injury/death of personnel	A	L T	R	3	5	3	5	5	8	21	High
		Increased traffic during mobilization on road with risk of accidents leading to injury/death and loss of asset and wildlife crossing	A	S T	R	3	1	1	3	1	4	9	Medium
		Reduction in environmental aesthetics value due to indiscriminate deposition of base camp-associated wastes.	A	S T	R	0	3	1	3	1	4	8	Low
	Clearing of vegetation and excavation and geotechnical investigation	Loss of vegetation in the project site area. Ecosystem fragmentation and loss of wildlife	A	L T	R	3	5	3	5	5	8	21	High
		Exposure of soil surface to the elements that can trigger erosion.	A	S T	R	0	3	1	3	1	4	8	Low



Project Phase	Project Activities	Potential/Associated Impacts	B/A	ST/LT	R/IR	L	R	F	I	P	F+I	L+R+F+I+P	Ranking
	Excavations, constructions of terminal building runway, warehouse and installations of other infrastructure such as ICT, Electrical Lighting points,	Soil degradation e.g., compaction of soil as a result of the movement of earth moving equipment	A	S T	R	0	3	1	3	1	4	8	Low
		Exposure of soil surface to wind and sheet erosion.	A	S T	R	0	3	1	3	1	4	8	Low
		Employment of local labor and skills acquisition for workers taking advantage on new opportunities. Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting Increase in revenue opportunities for local population due to presence of non-resident workers and travelers	B	S T	R	0	5	5	5	5	10		Beneficial
		Workplace accidents from burns, cuts, bruises, trips and falls, object at height leading to injury of fatalities.	A	S T	R	0	3	1	3	1	4	8	Low
		Risks injury/death and loss of assets resulting from accidents associated with road transportation to and fro construction sites	A	S T	R	0	3	1	3	1	4	8	Low



Project Phase	Project Activities	Potential/Associated Impacts	B/A	ST/LT	R/IR	L	R	F	I	P	F+I	L+R+F+I+P	Ranking
		Inhalation by onsite workers of cement dust and toxic fumes during foundation works and welding of material components Traffic congestion during transportation of demobilized equipment and personnel Potential collapse of buildings/structures on land as a result of unstable geotechnical conditions Restriction of access roads to prevent unauthorized uses	A	S T	R	0	3	1	3	1	4	8	Low
		Generation of dust and automobile/heavy duty equipment emissions. Decrease in air quality as a result of emissions from vehicles and equipment. Increased ambient noise level from heavy equipment and machinery, vehicular movement, and civil work activities.	A	S T	R	3	1	1	3	1	4	9	Medium
	Civil works activities such as construction of buildings, factories Installation of ancillary facilities, Installation of electricity power infrastructure, Painting and runways, transportation and logistics etc.	Reduction in environmental aesthetics value due to indiscriminate disposal of wastes. Visual intrusion as a result of alterations from accidental ignition of onsite diesel storage tanks	A	S T	R	3	1	1	3	1	4	9	Medium
		Soil degradation and possibly accelerated erosion Reduction in structural stability and percolative ability of the soil.	A	S T	R	3	1	1	3	1	4	9	Medium
		Loss of soil dwelling organisms	A	L T	R	3	5	3	5	5	8	21	High



Project Phase	Project Activities	Potential/Associated Impacts	B/A	ST/LT	R/IR	L	R	F	I	P	F+I	L+R+F+I+P	Ranking
Operation	Agro-Cargo Terminal and Warehouse Storage facilities; handling and management of products, agricultural working capital, post-harvest handling, storage, transportation, and quality control; Capacity building training to Project Staff, and other key project Stakeholders, on site works and associated Occupational health issues	Injuries/fatalities of personnel due to road accidents during facility inspection and checks	A	S T	R	0	3	1	3	1	4	8	Low
		Explosion and fire hazards at the facilities.	A	S T	R	0	3	1	3	1	4	8	Low
		Emission from equipment and machines Increase in noise level during operation hours.	A	S T	R	0	3	1	3	1	4	8	Low
		Fauna disturbance and displacement as a result of migration away from proposed site (this includes impacts on birds)	A	S T	R	3	1	1	3	1	4	9	Medium
Decommissioning and Maintenances and upgrade	Periodic Maintenance Upgrade of the existing facility Removal of existing installation	✓ Availability of land for alternative uses	B	L T	IR	0	3	1	3	1	4	8	Beneficial
		✓ Increased noise level and generation of dust and automobile/heavy duty equipment emissions	A	S T	R	0	3	1	3	1	4	8	Low
		✓ Risk of accident and injury to workers during demolition of structures	A	S T	R	0	3	1	3	1	4	8	Low
		✓ Waste generation	A	L T	R	3	5	3	5	5	8	21	High
		✓ Loss of employment	A	L T	R	3	5	3	5	5	8	21	High



5.6 Description of Impacts

5.6.1 Pre-construction

Impacts of Site Clearing/Preparation Activities

Cleared topsoil will be stockpiled and reused for landscaping. Excess topsoil, if any, will be moved to a stockpile to be used at other locations or used to reclaim existing swamps in the study area. Vegetation and other material which have no re-use value will be burnt on site or reuse as manure. Associated and potential impacts related to site clearing activities are related to the physical clearing process, the alteration of the landscape and conversion of lands (land takes). The overall impact significance is therefore moderate.

Impact on Human Movement

During the mobilization activities, portions of the sites will be blocked to restrict public access for safety and security purposes. Although most of the project sites will be acquired by the proponent contractors, any regular transport and traffic routes (foot paths and road tracks) that cross the sites could be cut off, requiring diversions or the use of alternative routes. These disruptions will negatively impact human movement and could affect social, economic and livelihood networks in the study area. Overall impact significance is low.

Physical and Economic Displacement

Land-take and site clearing will not lead to the physical displacement of communities that live within and in close proximity to the project site. Some land users will be economically displaced because farming and foraging are key sources of livelihood in the study area and some farmers will no longer have access to sections of this zone which they currently rely on. The overall impact significance is moderate.

5.6.2 Construction phase

Air Pollution

Construction works involving excavations, site preparation and construction traffic will generate substantial dust. Other possible sources of air pollution will arise from exhaust and engine emissions, construction machinery, aggregate crushers and asphalt plants. Air emissions including dust, is regarded as a nuisance when it reduces visibility, soils private property, is aesthetically displeasing or affects palatability of pastures and is also a health hazard. Overall impact significance is therefore moderate.



Noise Pollution

Site preparation works for project of this nature require the use of heavy machinery, and although these activities may be intermittent and localized, they nevertheless contribute tremendous amounts of sustained noise during equipment operation. These can degrade the human welfare, health and disrupt activities within noise sensitive areas like schools and hospitals. The elevated noise and vibration levels within the site can variously affect the project workers and the residents, passers-by, wildlife and domestic animals, within the vicinity. All these disturb the natural surroundings; on the other hand, significant vibrations may also affect the nearby structures such as roads. Overall impact significance is therefore moderate.

Soil Erosion

Construction works usually expose soils to agents of erosion. Use of heavy machinery and equipment also compact soil hence inability to support plant growth leaving the soils bare and exposing them to erosion agents. Side drains, especially outfalls/perimeter drains may increase soil erosion on cultivated fields. Land clearance needed will uproot trees and crops as well as displace topsoil. The clearing of natural vegetation cover could lead to increased soil erosion. This impact is rated significant.

Risks of Accidents and Injuries to Workers

During construction activities including metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result to trip and falls, injuries from hand tools and equipment cuts from sharp edges of metal sheets among others. This impact is rated moderate.

Topsoil Contamination

Construction equipment generates large amounts of waste oil which have potential of soil contamination. This will have adverse impact on soil quality leading to poor harvest in agricultural land. There is therefore the need to ensure its proper handling in this project. Considering the nature and location of the project, this impact is going to be low during construction stage.

Solid Waste

Construction will result in the creation of various solid wastes, principally surplus earth (spoil) and rock (soil debris), metal scraps, plastics (wrappings and containers), cardboard, paper, wood, kitchen (canteen) wastes, workshop wastes including e.g. used oil filters, and waste concrete. This can be a nuisance and the site should therefore be kept clean, neat and tidy at all times. No



burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted. The Contractor shall implement measures to minimize waste. Overall impact significance is therefore moderate.

Employment Opportunities

Creation of employment opportunities has both economic and social benefits. During the construction period, new jobs will be created in the form of skilled and unskilled labour. A majority of unskilled labour will be sourced from the local residents. Indirect employment will be in the form of suppliers and other forms of sub-contracted works that will be required for construction. Support businesses such as food kiosks may also grow near the project site and along the road leading to the location corridor. This is a major positive impact.

Discrimination on Employment Opportunities

Most of the skilled labourers will have to be brought in from outside the project area, and this may cause some resentment among the local people. Generation of employment opportunities by the project could result into conflict between residents and newcomers or outsiders, if not appropriately managed. A concern expressed during consultations was that unskilled labour may be available to men more than women leading to gender discrimination. Overall impact significance is therefore moderate.

Occupational Health and Safety

Construction phase may involve employment of hundreds of workers in site, increasing chances of workplace accidents, injuries, and illnesses. It will thus be paramount that the contractor adheres to best practices in occupational health and safety. Overall impact significance is therefore moderate.

Impact on Infrastructure

The influx of engaged workers and job seekers will lead to increased demand for goods and services and will cause some pressure on existing infrastructure such as housing, roads, hospitals, and others in the study area. As has been observed similar projects in Nigeria, residents may lease their houses to migrants leading to increase in rent. In addition, there will be an increase in vehicular road traffic, which will further put some pressure on the existing roads. Overall impact significance is therefore moderate.



Gains in the Local and National Economy

There will be gains in the local and national economy because of the construction of this proposed Project, through consumption of locally available materials including timber, metals, and cement. The consumption of these materials in addition to fuel oil for the machines to be used at the site and others will attract taxes including Value Added Tax (VAT) and Income Tax which will be payable to the government. The cost of the materials will be payable directly to the suppliers. This is a major positive impact.

5.6.3 Operation

Employment Opportunities

Some people will be employed by the project as management and enforcement agents, cleaners, security personnel and technicians for streetlights, drainages, and plumbers. This is a positive significant impact.

Infrastructure

This project has the tendency of improving the infrastructure existing in the study area. The proposed development will stimulate growth in other sectors such as agriculture and housing which will ultimately add to development in the area. This is a major positive impact.

Air Emissions

Air emissions during operations will include nitrogen oxides, sulphur oxides, carbon monoxide, volatile organic carbons (VOC) and some particulates. The modelling considered emissions from the project which are identified as the main sources of criteria air pollutants in the proposed project. Criteria pollutants modelled for the ground level concentrations include: carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons (HC) and total suspended particulate (PM) due to the characteristics of the fuel to be used during operation. The overall impact significance is therefore low.

Sanitary and Solid Waste Health Effects

While the project will implement a program to manage solid and liquid wastes, increased population in some settlements as a result of in-migration will cause an increase in sanitary waste discharges and effluents. Untreated sanitary waste and other effluents as well as solid waste can



increase the existing prevalence of water and vector borne diseases (e.g., typhoid and diarrhea) and other disease vectors in the project area.

The magnitude of the potential impact is low since anticipated population increase in affected communities during the site clearing and construction phases of the project would be generally low for most communities. Overall impact significance is therefore moderate.

Noise and Vibration Impacts

There will be an increase in noise and vibration during the implementation of various activities associated with the Air Cargo Terminal. Increased noise and vibration will be associated with vehicular movement and honking, workshops, and other installed components. Overall impact significance is therefore High.

5.7 Cumulative Impacts

Cumulative impacts are changes to the environment that are caused by certain activity in combination with other past, present, and future human activities. The concept of cumulative effects is an important one. It holds that while impacts may be small individually, the overall impact affecting the receptors taken together can be significant. When a resource is nearing its tolerance threshold, a small change can push it over. The objective of the cumulative impact assessment is to identify the environmental and/or socio-economic aspects that may not on their own constitute a significant impact but when combined with impacts from past, present, or reasonably foreseeable future activities associated with this and/or other projects result in larger and more significant impacts. Cumulative impacts on noise and vibration arising from the existing Sokoto Airport is expected to be higher than surround areas.



CHAPTER SIX

MITIGATION MEASURES FOR ASSOCIATED AND POTENTIAL IMPACTS

6.1 Introduction

This Chapter is designed to ensure that suitable procedures or mitigation measures are provided to corresponding manage/reduce the identified associated and potential impacts of the proposed project to a level as low as reasonably practicable throughout the life cycle of the project. The identified potential and associated impacts of the proposed Agro Cargo Terminal and Warehouse Project have been identified and evaluated along with the impact’s significance (adverse and beneficial), which has also been discussed in chapter five. Consequently, the mitigation and enhancement measures for the adverse and beneficial impacts of the proposed project are presented in this chapter. This chapter therefore presents the mitigation, enhancement and/or alternative measures or the adverse and beneficial impacts of the proposed project.

6.2 Mitigation Hierarchy

Mitigation Measures come in variety of levels, and these are commonly called “mitigation hierarchy. “The mitigation hierarchy consists of steps aimed at preventing, eliminating, or minimizing the environmental and social impacts of a proposed project to levels that are considered as low as reasonably practicable (ALARP). In proffering mitigation measures, the primary objectives are summarized in Table 6-1 below:

Table 6-1: The Mitigation Hierarchy	
Step	Focus
Avoidance	Methods aimed at impeding the occurrence of negative impacts, and/or preventing such occurrence from having harmful environmental/ social outcomes.
Minimize	Impact cannot be completely side-stepped; so, take steps to ensure minimal damage is done to the environment.
Rectify	Implies that the impact has already happened so do damage control



Reduce	Reduce the extent of the impact through management practices and/or change
Environmental Offset	Actions taken outside of the development site to compensate for the impacts in the development site. In effect, this means that the development undertaker carries out environment conservation activities to compensate for what they do in order to achieve “no net environment loss”, or more specifically “no net biodiversity loss”.

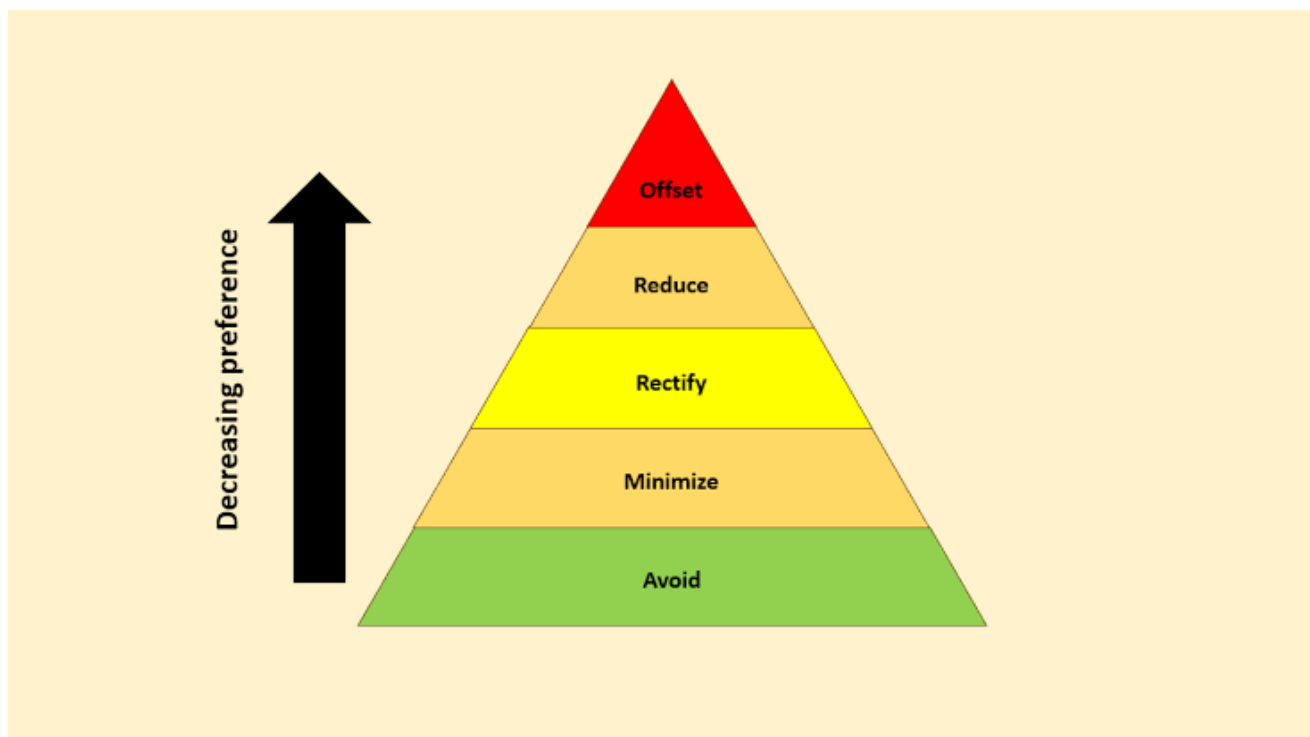


Figure 6-1: The Elements of Mitigation

The framework for determining the form of mitigation measures to be applied for the significant impacts identified for the project is shown in Figure 6-1 above. The frequency, severity, sensitivity, scale, magnitude and nature of the impacts were taken into consideration in the assessment.



Figure 6-2 illustrate the applications of sound judgment and best practice in mitigating the impacts of the proposed project activities on the environment.

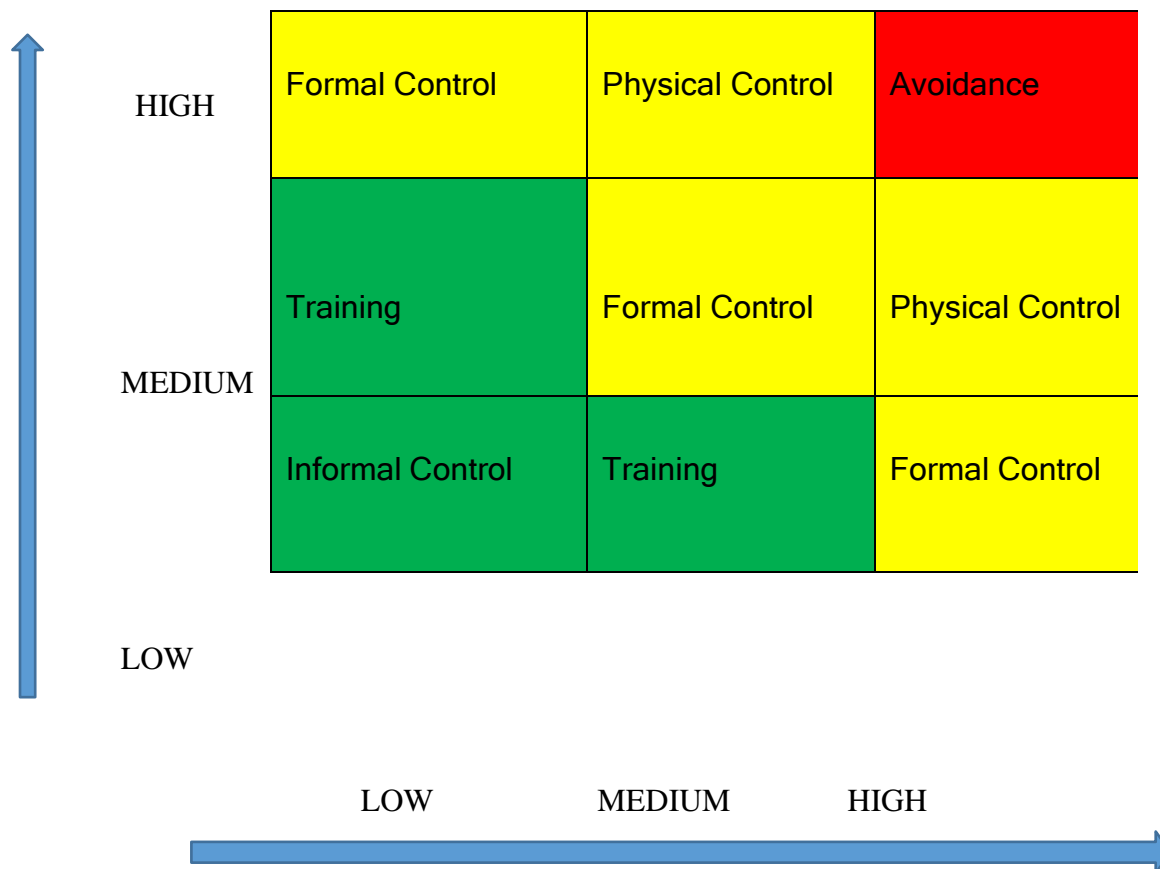


Figure 6-2: Mitigation Definition Criteria

Formal Control

This involves the application of documented policy, process, or procedure in mitigating the impacts of the project activities. It ensures that residual associated impacts are reduced to an acceptable level.

Physical Control

This involves the application of physical processes, barriers, or instruments (pegs, fence, gates, signpost etc.), not necessarily requiring any special technology in order to mitigate the impacts of the project.

Training

This involves regular training of personnel on identifying anticipated impacts and how to apply the right mitigation where such impacts manifest. To ensure training is effective, it shall be conducted regularly at all phases of the project.



6.3 Proffered Mitigation Measures

Accordingly, this section presents the mitigation measures proffered for the identified impacts of the proposed project. The measures also considered the environmental laws in Nigeria, and internationally and the principles of sustainable development and best available technology. Most of the likely impacts due to the proposed project have been considered in the design and selection of equipment. The mitigation measures recommended in this section may not be exhaustive. However, they are considered adequate to effectively ameliorate or in some cases, eliminate the negative impacts that may arise in this project. From the assessment undertaken, if the measures are applied, all minor and moderate negative impacts will be reduced significantly and will leave, in most cases, negligible and minor residual impacts. However, for accidental occurrences such as fire outbreak and electrocution, the residual impact would remain major, given the costly and sometimes irreversible effect of its occurrence. In order to verify these assertions, and to ensure that the measures are effective, it is necessary to have in place a sound and cost-effective Environmental and Social Management Plan (ESMP), presented in Chapter Seven of this report. The proffered mitigation measures for the identified potential and associated impacts are presented in Table 6-1 below.



Table 6-2: The Potential and Associated Impacts and Mitigation measures for the Agro Cargo Terminal and Warehouse Facility Project

Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
Pre-Construction	Consultation with Stakeholders and land take	Community agitation overcompensations, land disputes, ineligible stakeholder involvement.	High	<p>The Sokoto State Government Shall.</p> <ul style="list-style-type: none"> • Ensure that all relevant stakeholders are identified • Ensure that early stakeholders' engagement sessions are held, and all agreed issues properly documented and signed by parties concerned. • Ensure the development of a community relations and engagement plan that identifies fair strategies of engagement for all project affected communities • Develop and publicize grievance procedure. • Ensure that stakeholders (communities, institutions, landowners, etc.) are adequately consulted and relevant issues addressed. • Ensure that agreed rates for compensation are paid to identify owners promptly. 	Low



Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
		Increased income generation. Improvement in quality of life for adequately compensated individuals	Beneficial	No mitigation measures is required	Enhancement measures require
		Exclusion of vulnerable groups from consultations which may lead to strife	High	The Sokoto State Government Shall; Ensure that project will develop a community relations and engagement plan that identifies fair strategies of engagement for all communities	low
	Employment of skilled and unskilled labour	Creation of employment for skilled and unskilled workforce. Skill acquisition and enhancements to local indigenes and workforce. Business opportunities for local contractors through sub-contracting activities	Beneficial	No mitigation measures is required	Enhancement measures require
		Conflicts/community agitations over employment issues (quota and methods)	High	The Sokoto State Government Shall; <ul style="list-style-type: none"> Ensure that as much as possible persons from the surrounding communities are 	Low



Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
				given priority for employment in all phases of the project development.	
Construction		Risk of terrorist attack and hostage taking leading to injury/death of personnel	High	<p>The Sokoto State Government Shall;</p> <ul style="list-style-type: none"> • Consult with affected communities prior to mobilization to provide useful information that will curtail any breach in security. • Ensure implementation of project security plan. • Maintain ongoing cordial relationships with the stakeholder communities. • Ensure that only approved security companies are used where necessary. • Ensure that the management of the Cargo Terminal activate its emergency response procedure when necessary. • Implement effective journey management plan. 	Medium
		Increased traffic during mobilization on road with risk of accidents leading to injury and fatalities in humans and animals crossing road along the	Medium	<p>The Sokoto State Government Shall;</p> <ul style="list-style-type: none"> • Ensure adequate road traffic management procedure is put in place throughout the period. • Ensure all road safety measures are adhered to including no-night-time driving policy. 	Low



Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
	Equipment and tools handling during construction works	Risk of injuries from cuts, strip and fall	High	Sokoto State Government Shall; <ul style="list-style-type: none"> Ensure that use of appropriate PPE is enforces on all personnel and visitors to site. Provide First Aid Box at strategic locations to attend to emergency personnel injuries and other medical issues. 	Low
	Clearing of vegetation and excavation and geotechnical investigation	Loss of vegetation in the project site area. Ecosystem fragmentation and loss of wildlife	High	The Sokoto State Government Shall; <ul style="list-style-type: none"> Ensure that clearing is limited to areas considered necessary for construction activities. Plants considered rare or endangered are either avoided or carefully removed transplanted in areas considered safe around the project proximate to project location. 	Low
	Excavations, constructions, warehouse and installations of other infrastructures	Employment of local labor and skills acquisition for workers taking advantage on new opportunities. Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting Increase in revenue opportunities for local population due to presence of non-resident workers and travelers	Beneficial	No mitigation measures is required	Enhancement measures require



Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
		<p>Generation of dust and automobile/heavy duty equipment emissions.</p> <p>Decrease in air quality as a result of emissions from vehicles and equipment.</p> <p>Increased ambient noise level from heavy equipment and machinery, vehicular movement, and civil work activities.</p> <p>Reduction in environmental aesthetics value due to indiscriminate disposal of wastes.</p>	Medium	<p>The Sokoto State Government Shall;</p> <ul style="list-style-type: none"> • Ensure that contractor develop an acceptable Construction Management Plan (CMP) which includes all sustainability issues and safety issues • Ensure that camp site is located far from community resources, schools, etc • Ensure that operational areas sited away from human settlements. • Ensure that equipment yard and personnel camps are of exact size needed • Sites and camps are well delineated • Ensure contracting documents with contractors include specifications relating to type, weight and operation of heavy machinery • Raise public awareness of unusual activity • Plan activities such that Regulatory requirements are not exceeded • Ensure that noise attenuation measures such as installation of acoustic mufflers on large engines are provided. • Use fuel efficient and well-maintained haulage trucks with proper exhaust system. 	Low
		<p>Visual intrusion as a result of alterations from accidental ignition of onsite diesel storage tanks</p>	Medium		Low



Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
		Soil degradation and accelerated erosion Reduction in structural stability and percolation ability of the soil.	Medium	The Sokoto State Government Shall; Ensure that excavation works are limited to the area of interest.	Low
		Loss of soil dwelling organisms	Medium	The Sokoto State Government Shall; Ensure that exaction works are limited to the area of interest. And all endangered species will be protected	Low
Operation	Storage, handling and general management of agricultural produce.	Increased domestic and general organic waste generation form human activity and expired or rotten agro-commodities at the terminal and storage areas respectively	Medium	The Sokoto State Government Shall; <ul style="list-style-type: none"> • Ensure the provision of sufficient waste handling/ collection containers at strategic locations for use by staff and other clients. • Ensure regular clean-up and removal of waste from the affected areas to approved disposal centres. • Employ the services of accredited waste collection vendors for effective waste collection and disposal. • 	Low
		Risk of spread of insects and diseases from farms to the terminal and warehouse from harvested commodities	High	Sokoto State Government Shall; <ul style="list-style-type: none"> • Ensure regular fumigation of the affected buildings. • Work with the NAQS to ensure that commodities are certified safe at the point of arrival to the warehouse or the terminal building. 	Low



Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
		Risk of fire outbreak from faulty equipment	Medium	Sokoto State Government Shall; <ul style="list-style-type: none"> Ensure routine checks and installation of smoke detectors in strategic points within the buildings. 	Low
	Periodic Maintenance and upgrade of the existing facilities	Risk of personnel injuries from electrical shocks, fall and cuts	High	Sokoto State Government Shall; <ul style="list-style-type: none"> Ensure that use of appropriate PPE is enforces on all personnel and visitors to site. Engage qualified personnel for all maintenance work of the terminal and the warehouse 	Low
		Waste generation	High	The Sokoto State Government Shall; Ensure that all forms of waste are managed in lines with approved waste management protocol.	Low
Decommissioning	Demolishing of civil structures, facilities and installations	Availability of land for alternative uses	Beneficial		Enhancement measures require
		Waste generation	High	The Sokoto State Government Shall; <ul style="list-style-type: none"> Ensure that all waste is managed in lines with approved waste management protocol. 	Low
		Loss of employment	High	The Sokoto State Government Shall; <ul style="list-style-type: none"> Ensure skills acquisition and enhancement programs to further empower the workforce for meaningful employment opportunities after the project 	Low



Project Phase	Project Activities	Potential/Associated Impacts	Ranking	Mitigation measures	Residual impacts
				<ul style="list-style-type: none"> Establish and publicize grievance procedure Pay due wages for worked period and settle all financial commitments to workforce before demobilization 	



6.4 Conclusion

In summary, the mitigation measures recommended in this section are deemed adequate to effectively ameliorate the negative impacts that may attend this project. From the assessment undertaken, when the measures are applied, all high and medium negative impacts will be reduced significantly and will leave, in all case, only negligible residual impacts. To ensure sustainability and effectiveness of these measures, it is necessary to have in place a sound cost-effective and fit-for-purpose Environmental and Social Management Plan (ESMP). This is presented in the next section of this report.



CHAPTER SEVEN

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

7.1 Introduction

This chapter presents the Environmental, Social and Management Plan (ESMP), developed for the proposed Agro Cargo Terminal and Warehouse Project. The ESMP is essentially a management tool that provides assurance for effective implementation of the mitigation measures developed for the significant impacts of the proposed project (as documented in chapter **six**). It also outlines management strategies for complying with health, safety, and environmental issues from the project.

The Sokoto State Government has documented goals and policies as part of this ESMP to achieve a conserved, safe and healthy environment. The ESMP provides assurance that a reliable scheme has been put in place to monitor the interaction between the planned operations and the environment throughout the duration of the project. This ESMP was developed in accordance with the general requirements of OHSAS 18001 Health and Safety Management System, Equator Principles as well as other national and international regulatory requirements.

This document has been developed to be a stand-alone environmental management tool to ensure effective implementation of the mitigation measures through the various project phases.

7.2 ESMP Objectives and Guiding Principles

The main objective of the ESMP is to ensure that all significant impacts of the proposed project are either prevented or reduced to acceptable limits.

Specifically, the ESMP will:

- ensure that all project activities with regards to the environment are executed and managed in compliance with applicable legislation/ guidelines and relevant policies.
- Ensure that all mitigation/ enhancement measures prescribed in the ESIA document for eliminating or minimising all negative impacts of the project are fully implemented.
- Ensure that appropriate recovery preparedness is in place if control is lost during the implementation of the proposed project.



- Present an effective monitoring plan that would be used for assuring the effectiveness of mitigation measures and for identifying unforeseen impacts arising during the project; and
- Provide feedback for continual improvement in environmental performance.

These objectives shall be achieved by:

- Ensuring compliance with all stipulated legislation on protection of the environment and with national and local environmental policies.
- Integrating environmental, health, safety, security, and social issues fully into the project development and operational philosophies.
- Continuous consultations with the relevant regulatory bodies (Federal Ministry of Environment, Sokoto State Ministry of Environment etc.), community leaders (District Head, village heads, group heads, family heads, landlords, etc.), women group, community-based organizations (CBOs), and other stakeholders throughout the project lifecycle.

7.3 Project Management and Responsibilities

Site Project Manager

The overall management of the proposed project from site preparation through construction, to operation and decommissioning is the sole responsibility of the Site Project Manager (SPM). The SPM supervises all activities during the project and reports to the Project Director.

Site Health, Safety Environmental Officer

The Site Health, Safety and Environmental (HSE) Officer is to report directly to the SPM. He/ she shall ensure that all safety, health and environmental policies and standards are kept and adhered to during the project execution. As a minimum, the Site HSE officer shall ensure all requirements of the ESMP are met.

Federal Ministry of Environment and the State Counterpart

The Federal Ministry of Environment (FMEnv) is saddled with the responsibility of enforcing national and international environmental laws which Nigeria subscribed to. As part of this project, the FMEnv would:

- serve as a regulatory oversight body in the implementation of this ESMP.



-
- in coordination with the Sokoto State Ministry of Environment ensure that technical team periodically make available, documentations in form of monthly/quarterly reports or as may be designed in the monitoring plan
 - Technical Team shall work closely with the Federal and State Ministry of Environment to ensure that all environmental standards are upheld as agreed.

7.4 ESMP Safeguard Guidelines

Mitigation measures are proffered for all significant impacts of the proposed project to avoid, minimize or reduce expected impacts to as low as reasonably practicable (ALARP). To ensure these measures are achieved, responsibilities have been assigned for each task as presented in **Table 7-1**. As part of the Environmental, Social and Management Plan for the project, the following guidelines have been developed to meet both national (FMEnv) and international (World Bank/ IFC) requirements.



Table 7-1: The Environmental and Social Management Plan (ESMP) for the Agro Cargo Terminal and Warehouse Facility Project

Project Phase	Project Activities	Potential/Associated Impacts	Mitigation measures	Responsible Parties
Pre-Construction	Consultation with Stakeholders and land take	Identification, leadership tussles etc Lobbying, agitations/feuds for contractual agreements/ jobs by local workers.	<p>The Sokoto State Government Shall.</p> <ul style="list-style-type: none"> • Ensure that all relevant stakeholders are identified • Ensure that early stakeholders’ engagement sessions are held, and all agreed issues properly documented and signed • Ensure that project will develop a community relations and engagement plan that identifies fair strategies of engagement for all communities • Establish and publicize grievance procedure. • Ensure that stakeholders (communities, Govt., landowners, etc.) are adequately consulted and relevant issues addressed • Ensure that agreed fair compensation for land are paid to identify owners promptly as per set standards. 	Sokoto State Project Team/ Community Liaison Officer
		Compensation for farm/tree crops. Increased income generation. Improvement in quality of life for adequately compensated individuals	No mitigation measures is required	Sokoto State Project Team/ Community Liaison Officer



Project Phase	Project Activities	Potential/Associated Impacts	Mitigation measures	Responsible Parties
		Exclusion of vulnerable groups from consultations which may lead to strife	The Sokoto State Government Shall. Ensure that project will develop a community relations and engagement plan that identifies fair strategies of engagement for all communities	Sokoto State Project Team/ Community Liaison Officer
	Employment of skilled and unskilled labour	Creation of employment for skilled and unskilled workforce. Skill acquisition and enhancements to local indigenes and workforce. Business opportunities for local contractors through sub-contracting activities	No mitigation measures is required	Sokoto State Project Team/ Community Liaison Officer
		Conflicts/community agitations over employment issues (quota and methods)	The Sokoto State Government Shall. Ensure that as far as possible employ persons from the surrounding communities during the construction phase of the development to reduce the numbers of persons that will immigrate into the area seeking employment.	Sokoto State Project Team/ Community Liaison Officer



Project Phase	Project Activities	Potential/Associated Impacts	Mitigation measures	Responsible Parties
<p>Construction</p>		<p>Risk of terrorist attack and hostage taking leading to injury/death of personnel</p>	<p>The Sokoto State Government Shall.</p> <ul style="list-style-type: none"> • Consult with affected communities prior to mobilization to provide warnings and alternatives • Ensure implementation of project security plan during decommissioning • Maintain ongoing cordial relationships with the stakeholder communities. • Certify government approved security guards are used on demobilization vehicles when warranted • When necessary HIL shall activate its emergency response procedure • Implement effective journey management plan. 	<p>Site HSE / Security Officer</p>
		<p>Increased traffic during mobilization on road with risk of accidents leading to injury/death and loss of asset and wildlife crossing</p>	<p>The Sokoto State Government Shall.</p> <p>Ensure adequate road traffic management during the period of mobilisation and demobilization</p> <p>Ensure all road safety measures are adhered to including nighttime driving</p>	<p>Site HSE Officer</p>
	<p>Clearing of vegetation and excavation and geotechnical investigation</p>	<p>Loss of vegetation in the project site area. Ecosystem fragmentation and loss of wildlife</p>	<p>The Sokoto State Government Shall.</p>	<p>Sokoto State Project Team</p>



Project Phase	Project Activities	Potential/Associated Impacts	Mitigation measures	Responsible Parties
	<p>Excavations, constructions of runway, warehouse and installations of other infrastructure such as ICT, Electrical Lighting points,</p>	<p>Employment of local labor and skills acquisition for workers taking advantage on new opportunities. Increased business and economic activities as well as diversification of income sources due to supply contracting and sub-contracting Increase in revenue opportunities for local population due to presence of non-resident workers and travelers</p>	<p>No mitigation measures is required</p>	<p>Sokoto State Project Team</p>
	<p>Civil works activities such as construction of buildings, factories Installation of ancillary facilities, Installation of electricity power infrastructure, Painting and runways,</p>	<p>Generation of dust and automobile/heavy duty equipment emissions. Decrease in air quality as a result of emissions from vehicles and equipment. Increased ambient noise level from heavy equipment and machinery, vehicular movement, and civil work activities. Reduction in environmental aesthetics value due to indiscriminate disposal of wastes. Visual intrusion as a result of alterations from accidental ignition of onsite diesel storage tanks</p>	<p>The Sokoto State Government Shall:</p> <ul style="list-style-type: none"> • Ensure that contractor should develop an acceptable Construction Management Plan (CMP) which includes all sustainability issues and safety issues • Ensure that camp siting should be away from community resources, schools, etc • Ensure that operational areas shall be sited away from human settlements. • Ensure that equipment yard and personnel camps should be in exact size needed • Sites and camps should be well delineated • Ensure contracting documents with contractors include specifications relating to type, weight and operation of heavy machinery • Raise public awareness of unusual activity 	<p>Site Project Manager/ Site HSE Officer</p> <p>Site Project Manager/ Site HSE Officer</p>



Project Phase	Project Activities	Potential/Associated Impacts	Mitigation measures	Responsible Parties
	transportation, and logistics etc.		<ul style="list-style-type: none"> Plan activities such that Regulatory limits are not exceeded Ensure that noise attenuation measures such as installation of acoustic mufflers on large engines Use fuel efficient and well-maintained haulage trucks with proper exhaust system. 	
		Soil degradation and possibly accelerated erosion Reduction in structural stability and percolative ability of the soil.	<p>The Sokoto State Government Shall:</p> <p>Ensure that exaction works are limited to the area of interest.</p>	Site Project Manager/ Site HSE Officer
		Loss of soil dwelling organisms	<p>The Sokoto State Government Shall:</p> <p>Ensure that exaction works are limited to the area of interest. And all endangered species will be protected</p>	Site Project Manager/ Site HSE Officer
Operation	Agro-Cargo Terminal and Warehouse Storage facilities; handling and management of products, agricultural working capital, post-harvest handling, storage, transportation, and quality control; Capacity building	Fauna disturbance and displacement because of migration away from proposed site (this includes impacts on birds)	<p>The Sokoto State Government Shall:</p> <ul style="list-style-type: none"> Ensure inclusion of threatened and endangered species management strategies in the site-specific Environmental Management Plan to be developed by EPC contractors to ensure appropriate flora and fauna management. Ensure that vegetation clearing will be limited to minimum area required for work Utilization of existing accessible tracks as 	Site Project Manager/ Site HSE Officer



Project Phase	Project Activities	Potential/Associated Impacts	Mitigation measures	Responsible Parties
	training to Project Staff, and other key project Stakeholders, on site works and associated Occupational health issues		much as possible	
Decommissioning and Maintenances and upgrade	Periodic Maintenance Upgrade of the existing facility Removal of existing installation	Availability of land for alternative uses	No mitigation measures is required	Sokoto State Project Team
		Waste generation	The Sokoto State Government Shall: <ul style="list-style-type: none"> • Ensure that all waste is managed in lines with approved waste management protocol. 	Site Project Manager/ Site HSE Officer
		Loss of employment	The Sokoto State Government Shall: <ul style="list-style-type: none"> • Ensure skills acquisition and enhancement programs to further empower the workforce for meaningful employment opportunities after the project • Establish and publicize grievance procedure • Pay due wages for worked period and settle all financial commitments to workforce before demobilization 	Sokoto State Project Team/ Community Liaison Officer



7.5 Training and Awareness Plan

At the construction phase of the project, the following environmental awareness and trainings programs shall be conducted:

Induction Training

An induction training program shall be a requirement for every construction worker to be engaged in the project and shall be provided by the contractors. The training shall include:

- The proposed tasks for new worker;
- Safe work procedures;
- Use of personal protective equipment;
- Emergency responses and warning notices;
- Personal hygiene and site sanitation;
- Environmental protection; and
- Hazard recognition and incident reporting.

Weekly Safety and Environmental Forum

There shall be a weekly environmental and safety awareness forum for construction workers during the construction activities at the project site. The safety officer shall be responsible for coordinating these meetings. At the operation phase of the project, the safety officer shall educate all its workers on environment, health, and safety issues using the following means to disseminate information to staff and workers:

- Staff and workers meetings;
- Local area network (intranet)/ the internet; and

7.6 Public Participation/ Involvement Plan

The Project Technical Director (Sokoto State) shall welcome suggestions and information from relevant stakeholders, contractors, visitors and the general public, which shall help improve its operations in order to minimize impact on the environment and worker health and safety. The office of the Site Manager/ Community Liaison Officer shall be open to the general public for complaints and suggestions.

Complaints received from the public shall be documented and follow-ups made to ensure that such grievances are addressed accordingly and in line with the Project Technical Committee's (Sokoto State) grievance redress mechanism. A grievance or complaint register would be developed for this purpose.

Project Grievance Management Mechanism Approach

Grievances are feedback, responds or complaints concerning the way a project is being handled or managed. A grievance mechanism provides a formal and ongoing avenue for stakeholders to



engage with the project proponent. Grievance monitoring allows for early warning or signals of any escalating conflicts or disputes. Identifying and responding to grievances supports the development of positive relationships between the proponent and the community, and other stakeholders. A grievance mechanism is not a substitute for a company's community engagement process or vice versa. The two are complementary and should be mutually reinforcing. According to World Bank Standard (i.e. OP 4.12), it is expected that projects implement a Grievance Mechanism, in order to accommodate any grievances, complaints or concerns that stakeholders may have.

The Project Technical Committee's plans to employ a Community Liaison Officer (CLO) who will serve to meet all community liaison responsibilities and related assignment. He shall also ensure the effectiveness in implementation of the grievance mechanism. The grievance mechanism will be advertised and announced to affected stakeholders so that they are aware of their rights to submit comments and how to go about it.

7.7 Regulatory Compliance Plan

The HSE Officer shall identify and develop a comprehensive checklist of every HSE-related regulation applicable to the proposed project including those contained in this ESIA report. The specific requirements of each of the regulations, standards, or codes shall also be clearly defined in a checklist. Project-specific compliance requirements shall be interpreted and documented into a Regulatory Compliance Plan (RCP), which will be approved by the Project Technical Team and then incorporated into the detailed project design.

7.8 Project Design Guidelines

The specifications to be used for the design, construction, and operations of the proposed project are based on applicable regulations, industry standards and codes that are in agreement with standard power and electrical industry practices. Applicable requirements to be incorporated into the project design would be clearly approved national and international project specifications and standards.

7.9 Project Execution Guidelines

Vegetation Clearance

All clearance works at the construction site shall be carried out within defined perimeters and only when necessary. Clearing of vegetation shall be kept to the minimum necessary to permit safe operations. Trees felled from site shall be re-utilised for the benefit of the neighboring communities or as otherwise desired by the project technical team in consultation with the communities. Areas cleared in excess of operational requirements shall be reinstated with indigenous topsoil and vegetation. A buffer zone or green belt shall be achieved to incorporate environmental conservation practices and improved aesthetic quality at the site.



Use of Public Access Roads

All transportation, construction, installation and surfacing works shall be executed in such a manner that will ensure that interference with the use of public access roads is minimal. However, if operational safety demands the blockade of public roads, then the Site HSE and Community Liaison Officers after due consultation from relevant State Government approving authorities, may approve such operation only when temporary traffic control and diversion arrangements have been provided. Dumping or storage of litter/debris, tools and equipment in public or private roads shall be prohibited. Contractors shall develop road-clearing strategies to ensure that public roads are kept clear, safe, passable, and free of traffic.

7.10 Inspection and Maintenance Plan

To maintain technical integrity of the facility upon completion, a well-defined inspection and maintenance management system shall be activated to ensure compliance. The maintenance programme shall deal with establishing processes to develop and sustain necessary maintenance procedures. The system shall identify what procedures are required, classifying procedures to their impact on operating integrity, controlling deviations from procedures, and updating of procedures to capture lessons learned. It will also address training and verifying competency for facility-specific procedures.

The Site Project Manager will develop a comprehensive Maintenance and Inspection Programme (MIP) for all equipment and machinery before commencement of operations. The programme will cover routine equipment checks; inspection of wastewater discharge units, emissions monitoring; inspection and maintenance of corrosion protection system in serviceable condition; plant component servicing and inspection; and general inspection and maintenance of the turbine generators and diesel tanks; etc. The maintenance and inspection schedule contained in the programme will be designed in line with manufacturer's specifications for each of the equipment and in compliance with specific guidelines as contained in relevant national and international guidelines.

7.11 Risk Assessment and Management Plan

Risk assessment and management shall be an integral part of the proposed project's execution. Risks related to project execution and operations shall be identified by a structured approach. Risk assessments shall be planned and conducted in advance of appropriate activities to allow resolution of risk without schedule interruption. Competent personnel shall be included in risk assessments to ensure that risks are correctly identified and assessed.

The responsibility of risk management in the proposed project lies with the contractor. Monitoring by the Project Technical Team will ensure that contractor processes are being implemented fully and effectively.



7.12 Worker Safety and Health Plan

Operations within the work site shall be subject to industry policies and IFC Environmental, Health, and Safety Guidelines. All Project Technical Team and contractor staff shall be well informed and trained on the policies and guidelines. Facility will be designed to enhance safety planning. Contractors shall provide adequate health services as well as first aid services for its workforce. The first aid services shall be extended to visiting personnel and temporary (casual) workers. All construction activities shall be properly managed through careful planning and application of relevant HSE policies including the following:

- Use of permit-to-work;
- Job hazard/ safety analysis and toolbox meetings;
- Use of PPE in designated hazard areas;
- Prohibition on drinking of alcohol during work hours and at work sites and within facilities;
- Prohibition to night trips;
- Regular emergency drills; and
- Prohibition to smoking in fire hazard areas.

Integrity of Workplace Structures

- All structures and installations would be design to enable easy cleaning and repair, and limit the accumulation of hazardous compounds;
- Buildings will be structurally safe, provide appropriate protection against climate change and have acceptable light and noise conditions;
- Facility design would ensure that fire resistant, noise-absorbing materials are used, to extent feasible, on ceilings and walls;
- Floors would be level, even, and non-skid to prevent trips and fall; and

Workspace and Exit

- Space to be provided for each worker would be adequate for safe execution of all activities, including storage of materials and products; and
- All emergency exits route would be always unobstructed. Exits would be clearly marked. The number and capacity of emergency exits would be sufficient for safe and orderly evacuation of the people during emergency situations.

Fire Precautions

- the technical team shall equip the facility with fire detectors, alarm systems, and fire-fighting equipment. The equipment would be maintained in good working condition and be readily accessible; and



- Provision of manual fire-fighting equipment that is easily accessible and simple to use.
- Other requirements include:
- Water supplied for food preparation or for the purpose of personal hygiene (washing or bathing) would meet national and international drinking water quality standards;
 - Equipment and installations requiring servicing, inspection, and/or cleaning would have unobstructed, unrestricted, and ready access;
 - Hand, knee and foot railings would be installed on stairs, platforms, permanent and interim floor openings, offices and plant building;
 - Ensure that well equipped first-aid is provided at designated areas at site. First-aid stations would be easily accessible throughout the place of work;
 - Eye-wash stations and/or emergency showers would be provided close to all workstations as first-aid response;
 - Sufficient fresh air (ventilation) would be supplied for indoor and confined work spaces;
 - Temperature in office areas would, during service hours, be maintained at a level appropriate for the purpose of the facility;
 - Fall prevention and protection measures would be implemented whenever a worker is exposed to the hazard of falling height;

7.13 Pollution Control Guidelines

Noise Pollution

The contractor shall comply with all noise control requirements pertaining to FMEnv and IFC standards. All equipment shall be maintained at optimal working conditions and recommended work practices shall be employed to minimise noise. Ear defenders shall be provided for all workers and any other person present within the vicinity of high noise generating equipment or operations. Noise pollution will be significant mostly during construction phase. If noise level at any time gives rise to public complaint, the issue shall be treated, as public nuisance and project technical team will take appropriate measures to resolve the problem. Safe separation distances and buffer zones shall be established between facilities, work sites and neighboring communities to reduce the impact of high noise levels from the facilities.

The Sokoto State Government intends to manage impact from noise by ensuring:

- Equipment with lower sound power levels are used;
- Project executions are done during the day so as to limit noise impact at night;
- Noise control by installing suitable mufflers on engine exhausts.
- Acoustic enclosures are installed for equipment radiating noise.



- Installation of vibration isolation for mechanical equipment.
- Reduced project traffic routing through community areas wherever possible.
- The re-location of noise sources to fewer sensitive areas within the site to take advantage of distance and shielding
- That noise levels from the facility do not exceed IFC noise limit of 70dB(A); and
- Continuous noise monitoring is carried out to check levels of noise all through the project phases (see **Table 7.2**).

It should be noted that the ambient noise baseline level recorded during the study were following the FMEnv/ IFC-WHO noise limit as discussed in **chapter 4**.

7.14 Emergency Response Plan

The project technical team and contractors will demonstrate that all potentially significant hazards and potential impacts of the project activities have been identified, the associated risks evaluated and understood, and that controls and recovery measures to effectively manage these risks and impacts are in place before mobilisation to site. The project technical team will assist the contractors, where necessary, with the provision of a hazard list for guidance.

In case of an emergency during the life span of the project, the Emergency Response Procedure (ERP) will be activated. Its objectives are:

- To ensure no loss of life.
- To ensure that the environment is protected.
- To ensure that manpower, equipment, and funds are available to effectively contain and clean up oil/ chemical spills; and
- To ensure that good record keeping is maintained and accurate information concerning emergencies is disseminated to the workers, public and government.

The ERPs cover the following situations and issues:

- Point and fugitive leakages.
- Isolation of supply points.
- Notification of authorities.
- Fire outbreak/ disasters.
- Safety precautions and environmental protection.



- Repair methods and procedures.
- Emergency repair.
- Contractor arrangements; and
- Re-commissioning and start-up.

The Sokoto State Government and its contractors shall identify all potential emergency situations and develop procedures to use in such scenarios as explosions and/ or fires, medevac, hydrocarbon/ chemical spills, weather related disasters, hostage taking, community disturbance, kidnapping, etc.

7.15 Environmental Monitoring Plan

All contractors shall be required to monitor their performance with respect to environmental and social performance. The HSE Officer shall also undertake monthly, quarterly and yearly environmental assessment and spot checks throughout the plant project lifecycle. Assessment findings shall be reviewed by the Project Management Team (PMT) and where corrective actions are necessary, specific plans (with designated responsibility and timing) shall be developed to ensure continuous performance improvement.

In addition to assessing operational aspects and monitoring, assessments shall also consider compliance with agreed objectives and targets, and the effectiveness of the ESMP and its implementation programs. The ESMP shall, therefore, be subject to ongoing review and development to ensure that it remains appropriate for all aspects of the project. As is typical with all FMEnv approved projects, the ministry will carry out an assessment before the end of the project to confirm compliance of project activities to the terms and conditions of the ESIA approval.

The objectives of the monitoring programme are to:

- Ensure compliance with regulatory emission and discharge limits.
- Monitor changes in existing physico-chemical, biological, and social characteristics of the environment, compared both to the environmental baseline and predicted conditions.
- Ensure continual interactions and flow of information between Technical Team and the stakeholders.
- Determine whether any detected changes in socio-economic and environmental components are caused by the project or by other forces.
- Determine the effectiveness of the control and mitigation/ enhancement measures and provide a basis for recommending additional measures; and



-
- Ensure sustenance of accountability and a sense of local ownership throughout the project lifecycle.

The monitoring programme (including data collection) designed for the proposed project is presented in **Table 7-2** overleaf. The monitoring frequency is subject to review after the first year to determine its effectiveness and possibly include other identified areas of concern.



Indicator Parameters	Impact	Monitoring Method	Location	Frequency	Project Phase	Responsibility
Environment Aspects						
Noise Levels	Noise	Point and ambient measurements	Stations measured in this ESIA	Monthly- construction Quarterly- operation	Throughout the project	HSE Officer/ Regulators
Air Pollutants: NO _x , CO _x , SO _x , H ₂ S, NH ₃ , CXHY and SPM	Air quality	Point measurement	Sample point location in ESIA	Bi-annually- construction	Throughout the project	HSE Officer/ ESIA Consultant Regulators
Soil: Characteristics	Soil	Sample collection using soil auger and analyses	Along sample point location in EIA	3years – after commissioning and every 5 years	Throughout the project	HSE Officer/ Regulators
Social Aspects						
Engagement Issues: (employment,	Socio-economic	Review of MoU, consultation, and	site	Monthly construction	Throughout the project	HSE and CLO Officers
Social Cultural Issues	Socio-economic	Feedback, consultation, and	Site/ community	Quarterly-operation		
Community health: (prevalent diseases in host community)	Socio-economic/ health	Collection of health statics from clinic and hospitals with the LGA	Community/ LGA	Yearly-construction Yearly-operation	Throughout the project	Technical Team / ESIA consultant/regulator

Table 7-2: Recommended Environmental and Social Monitoring Programme



7.16 Waste Management Plan

Waste generated shall be managed in accordance with Federal Ministry of Environment guidelines and Sokoto State Approved waste management procedures. The way wastes are to be handled, stored and disposed is dictated by the nature of the waste. Sokoto State's Waste Management Plan (WMP) takes into consideration the nature of all wastes that will be generated during the lifetime of the project. The following objectives form the basis for the WMP for the proposed project:

- Progressive reduction of wastes with the target to minimize overall emissions/ discharges, which have adverse impact on the environment.
- Meet the environmental requirements of FMEnv and Sokoto State Waste Management Law as well as other international bodies (such as IFC/World Bank) on waste management.
- To establish, implement and maintain waste segregation aimed at enhancing recycling.
- To ensure that Sokoto State and its contractors are responsible for effective waste handling and disposal process.
- To ensure that waste management programme is in line with provisions of the Environmental Management Programme of ISO 14001.

The WMP would be binding on all staff and contractors involved in the proposed project implementation with respect to the:

- Emission or release of air pollutant and fugitive gases.
- Management of spill and untreated liquid effluent from the project site.
- Management of solid wastes from project activities; and
- Generation of noise.

7.17 Sokoto State Waste Management Plan

Sokoto State project technical team has developed a Waste Management Plan/ Policy containing procedures to be followed in the management of wastes and discharges from its facility. The technical team recognizes that her operations produce waste which must be handled from "cradle to grave". The Waste Management Policy is intended to help staff and the public comply with Local, State, Federal and International Regulations on waste management.



Waste Handling

Basic information that must be provided as a minimum for adequate definition of wastes include:

- Waste type identification.
- Proper waste categorization (domestic, office, industrial and hazardous wastes);
- Waste segregation information; and
- Recommended management practices.

Waste Minimisation

Waste minimisation implies reduction, to the greatest extent possible, the volume of waste materials. The four principles of waste minimisation process are **recycled, reduce, reuse, and recover**, and shall be adopted as applicable in this project.

Waste Segregation

Waste segregation and characterisation shall be carried out on wastes that are similar and may be combined to simplify storage, treatment, recycling, and/or effective implementation of appropriate waste disposal methods. Wastes shall be segregated, preferably at source into clearly designated bins at strategic locations within the plant facility. Particular attention shall be given to work area and offices where relatively significant number of wastes including food packaging would be generated. The Site HSE Officer shall be responsible for the maintenance of the waste segregation scheme.

Waste Disposal

All spoil materials, rubbish and debris shall be cleared regularly from the site and disposed of, at designated areas and facilities as specified in PWM guideline. Instructions on material safety handling sheet shall be strictly adhered to and would form basis for the disposal of hazardous wastes. Wastes in transit shall be accompanied and tracked by Waste Disposal Notes.

7.18 Security Plan

The project team led by the Site Project Manager shall ensure that adequate security arrangements are made to handle security-related issues effectively. The project team will identify, evaluate, and manage the risks to personnel and property arising from routine operations, malicious practices, crime, civil disorder, or armed conflict.



7.19 Consultations

The project technical team recognises the importance of consultations in all phases of the proposed project. This is because it involves soliciting people's views on proposed actions and engaging them in a dialogue. It is characterised by a two-way information flow, from the technical team to people/ stakeholders, authorities, and from people to the technical team. The overall aim of the consultation plan for the proposed project, therefore, is addressing the concerns and opinions of the stakeholders with the ultimate view to assuring a smooth project implementation.

7.20 Environmental Audit and Review

The Sokoto State Government will conduct regular audits in conjunction with applicable regulatory agencies to monitor compliance with its project. The scope shall cover the major project activities including the overall ESMP requirements throughout the life of the project. Contractors' performances towards meeting these requirements will be assessed.

Generally, the audit programme will be conducted in line with the relevant regulatory guidelines. It will be conducted annually during construction and every three (3) years during operations. The findings from these audits will be reported to the Commissioner for Environment and Federal Ministry of Environment, and corrective action plans will be developed and followed-up for performance improvement.

7.21 Decommissioning and Abandonment

The design of the facilities shall take due recognition of the need to decommission the project and the ancillary facilities at the end of their operational life. The abandonment plan shall take due note of the current national and international legislative requirements for decommissioning and abandonment.

Decommissioning after Construction Phase

Temporary structures (camp, storage yard, offices, etc.) will be installed at the construction phase to support site operations/ activities. Upon actualization of construction phase, all areas temporarily used will be cleared, cleaned and re-instated.

Decommissioning after Operation Phase



This very last phase of the project is expected to occur after 25-30 years of usage. The following are activities to be carried out:

- Operating processes would be systemically shut down in a safe manner.
- Liquid and solid wastes would be removed for treatment and disposal; and
- fuel storage tanks would be flushed and cleaned to remove oils and gases.

The fate of the emptied and cleaned structures and equipment are then decided by a feasibility study as part of an “Abandonment Assessment” to determine the best environmental and economic solution consistent with Nigerian requirements for decommissioning facility. The general order of preference of decommissioning options available for redundant structures and equipment are as follows:

- **Re-use:** by sale and/ or transport to another project or company.
- **Re-cycle:** breaking down structures and equipment for raw materials. This is expected to be the fate of majority of metalwork used. The break-up of structures can be done on location or after transport to a breaking or salvage yard, dependent upon ease of transport and safety considerations.
- **Disposal:** some materials not suitable for recycling must be disposed to a licensed waste management facility.
- **Leave in-situ:** in some cases, the best environmental and economic option may be to leave material in-situ.

7.22 Cost for ESMP Implementation and Monitoring

Mitigation measures to be adopted for each of the project phases have been presented in Chapter 6 and 7. The Contractor will be directly responsible for financing the implementation of mitigation and monitoring measures from inception to the completion of the project. The cost of impacts mitigation monitoring will be included in the contract value and will be monitored by Technical Team. The Sokoto State Technical Team shall be responsible for auditing the activities of the Contractor, and for the associated funding. During operations, The Consultant will be responsible for financing and managing mitigation measures and monitoring activities in-line with international practices. Part of the conditions for the approval of the ESIA by the Federal Ministry of Environment (FMEnv) is that there will be regulatory monitoring of the approved project impacts mitigations and monitoring measures.



The timing and frequency of the monitoring is determined by the FMEnv the state counterpart to ensure smooth implementation of the ESIA.

Funding of the Impacts Mitigation and Monitoring (IMM) is borne by project Consultant. In the past, FMEnv will request funding for the monitoring while the project is in progress and the monitoring activity will be carried out after payment of the requested fund. Current practice is that FMEnv now issues a pre-approval letter which includes the cost of IMM and other conditions that must be fulfilled prior to the issuance of the approval. Meeting the conditions, along with payment of the funds have therefore become prerequisites to the issuance of the ESIA approval. Payment prior to approval also ensures that the funding for monitoring is secured and the activity effected as at when due. The current cost is about ₦500, 000.



CHAPTER EIGHT

CONCLUSION

The Environmental and Social Impact Assessment (ESIA) of the proposed Agro Cargo Terminal and Warehouse Project have been carried out to satisfy government, financiers, regulators, and stakeholders that proactive environmental actions have been incorporated into project design/ plan. The study was carried out in line with regulatory requirements for environmental management in Nigeria. One of such regulation is the Nigerian EIA Act Cap E12 LFN 2004, which stipulates that an EIA is compulsory for projects of this magnitude that have potential for significant environmental impacts.

ESIA process aims at providing detailed information for decision-making and to contribute to environmentally, and socially sound and sustainable development.

Consultations with the host communities and other stakeholders have been carried out and shall continue throughout the project lifecycle. Consultation and engagement meeting ensured that all answers to questions concerning the proposed project were provided to the satisfaction of stakeholders.

Environmental baseline conditions (biophysical and socio-economic) as well as sensitive components of the study area were established through field data gathering/ sampling and complemented with information from literature/ desktop research, maps, and information from articles on the area. The results were all below values within those obtained from the control points.

The overall impacts of the project were localized and reversible. The Environmental, Social Management Plan (ESMP) has been developed during this study to ensure that to manage the adverse impacts of the proposed project

Finally, it is hoped that all necessary information/ evidence contained in this report is sufficient for the issuance of an Environmental Impact Statement (EIS) and acquisition of necessary permits for the operation of the Agro Cargo Terminal and Warehouse project in Sokoto State



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