FINAL REPORT

THE ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN (ESMP) FOR THE ESTABLISHMENT OF ZONAL MEDICAL WAREHOUSE IN SOKOTO STATE

BY SOKOTO STATE GOVERNMENT

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ABBREVIATIONS AND ACRONYMS	
AfDB	African Development Bank
FMEnv	Federal Ministry of Environment
CMS	Central Medical Stores
DMSMA	Drug and Medical Supplies Management Agency
DRF	Drug Revolving Fund
ERGP	Economic Recovery & Growth Plan
ESIA	Environmental Social Impact Assessment
ESMP	Environmental and Social Management Plan
FEPA	Federal Environmental Protection Agency
FGD	Focused Group Discussion
FGN	Federal Government of Nigeria
FMoH	Federal Ministry of Health
FCT	Federal Capital Territory
GDP	Gross Domestic Product
GF	Global Fund
GBV	Gender Based Violence
GHSC-PSM	Global Health Supply Chain Management- Procurement & Supply Chain Management
HFs	Health Facilities
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
ISDS	Integrated Safeguard Data Sheet
LGA	Local Government Area
M&E	Monitoring and Evaluation
NCDC	Nigeria Center for Disease Control
PHC	Primary Health Care
PIU	Project Implementing Unit
PRSP	Power Sector Reform Program
SCMS	Supply Chain Management System
STDs	Sexually Transmitted Diseases
TVMP	Traffic and Vehicle Management Plan
UN	United Nation
UNICEF	United Nations Children Fund
USAID	United States Agency for International Development
VCBMP	Vegetation Clearing Biomass Management Plan
WB	World Bank
WHO	World Health Organization
WMP	Waste Management Plan
ZMW	Zonal Medical Warehouse

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The Sokoto State Government has embarked on this transformational project for the benefits of all the residents of our dear state and we hereby wish to thank and acknowledge the contributions of our consultants, Carter Consulting Limited and ENARMAC Nigeria Limited for the successful execution of the Environmental Assessment Study.

We also wish to appreciate the support of the State's Technical Committee for their time and contributions throughout the field data gathering and stakeholders' engagements.

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.

EXECUTIVE SUMMARY

ES 0.1 Background Information

The Sokoto State Government plans to establish a Zonal Medical Warehouse (ZMW) at Kassarawa area in Wamako Local Government Area of Sokoto State. The project will be located on a land area covering about 3.8 hectares which has been acquired for this purpose. The zonal medical warehouse will serve as an Integrated Health Commodity distribution hub to other northwestern States including Zamfara, Kebbi and Katsina States.

This proposed project is expected to address the short falls in health commodities supply across public health facilities in the Northwestern States of Nigeria through the provision of adequate warehousing space and distribution services. The COVID-19 pandemic has further exerted strain on the already weak supply chain system in the country making it necessary to provide conducive storage for health commodities to address major health challenges of the population. The stock out rate of essential lifesaving commodities and public health commodities as of May 2021 stands at 55% and 35% respectively across northwestern states according to a study conducted by Carter Consult, 2021.

This intervention project will address the inadequate provision of health commodities for public health programs which is among other factors responsible for poor health indices in the country. This is because of limitation in funding for the procurement and distribution of the public health commodities in addition to the supply chain challenges in the country. To overcome these challenges, the Federal ministry of Health (FMoH) with support from the United States Agency for International Development (USAID), Global Fund (GF) and other donor agencies came up with the Nigeria Supply Chain Management Policy which targets improvement in the provision of public health commodities through effective and efficient coordination of supply chain management activities across the 36 states and the FCT. Through the implementation of this policy, the warehousing of public health commodities for Malaria, HIV/AIDS, Tuberculosis & Leprosy, Reproductive Health and Family Planning, was decentralized with the establishment of six zonal warehouses across the country to reduce the lead time by bringing the health commodities closer to the service delivery points. The policy also led to integration of the warehousing and distribution of these commodities to ensure efficient use of resources and the establishment of the state Logistics Management Coordinating Units under the Department of Pharmaceutical services across the 36 state and the FCT with the aim of putting the government in the driver's seat in the coordination of supply chain activities in the 36 states and FCT.

ES 0.2 Rationale for ESMP

The adoption of the Operational Safeguards (OS) of the Integrated Safeguards System (ISS) aims at strengthening the capacity of the Bank and borrowers. 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.

The focus of the proposed Zonal Medical Warehouse project will involve regular health commodity supply to service delivery points for the different public health programs observing the six logistics rights of delivering the right product, to the right place, at the right time, in the right quantity and right quality at the right cost". These activities will result in several social issues such as disagreement with distribution procedures, employment etc. Consequently, this ESMP is required to provide necessary procedures and criteria that will guide the proposed Zonal Medical Warehouse project in accordance with the World Bank Safeguard Policies and the Nigerian national environmental policies, guidelines, and assessment procedures as well as those of Sokoto State and the local agencies.

ES 0.3 Rationale for Intervention

Effective Supply Chain Management System is the key to successful implementation of various health programs. Nigeria enjoys immense support from donors, development partners, implementing partners and private sector organization in different health interventions. Most of these interventions involve health commodity supply to service delivery points. Over the years there has been poor coordination of the health commodity supply chain which has led to loss of resources through expiries due to overstocking of facilities. There is also the challenge of stock outs due to longer lead times and limited coverage of public health facilities.

The construction of the zonal medical warehouse is closely in line with the state's policies and priorities. The ZMW when fully upgraded and functional will not only create up to 1000 jobs, which will reduce poverty and hunger among those to be employed but will promote efficiency in the distribution and storage of pharmaceuticals products. The project will also be self-sustaining as it is expected to generate revenue from the provision of warehousing and distribution services vis-à-vis the profit from the sale of essential medicines under the drug revolving fund scheme. The employment generation will reduce youth restiveness, arm banditry and kidnapping among other social vices in Sokoto.

ES 0.4 Project Location

The proposed Zonal Medical Warehouse at Kassarawa area in the outskirt of Sokoto metropolis. The project will be located on a land area covering about 3.8 hectares. The surrounding area is dotted with local mud-houses, sparse vegetation and open spaces used for subsistence rain-fed agriculture. The climate is sub-tropical with rainy season between the months of late May and Late September with highest levels recorded in the months of July, and August. Temperature range in the area is between 35°C and 42°C depending on the period of the year. The proposed location is accessible by road within the city of Sokoto and the roads are in relatively good condition.

ES 0.5 Description of the intervention project

The establishment of the Zonal Medical Warehouse is going to involve.

- Construction of 1 No. 3-Bay WIB and 1 No. 2-Bay WIB with a total capacity of 42,808.5m^3 for the provision of adequate warehousing space for public health commodities for distribution to HF in the Northwest region and essential medicines for the DRF scheme in Sokoto state.

- Procurement of 3 No. 20 Tones and 7 No. 10 Tones Pharma-grade vehicles for delivery of health commodities to the last mile.
- Procurement of seed stock of essential medicines worth 2m USD for the DRF scheme.
- Construction of 5 No. rooms self-contained driver's lodge; and
- Printing of DRF NHLMIS tools for supply chain operations in the state.

Generally, the proposed project will involve the construction and operation of a medical warehouse that will serve as a storage facility for medicines and other health care products. 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.

ES 0.6 Policy, Legal and Administrative Framework

This ESMP is guided by the requirements of the World Bank safeguard policies and the relevant and applicable state, national and international regulation, guidelines, conventions, industrial best management practices that are triggered by the proposed zonal medical warehouse project. Based on the environmental and social effects of the project the potentially triggered WB safeguard operational policies (OPs) Environmental Assessment (OP/BP 4.01).

The basic legal framework for the regulation of the environment in Nigeria is braced in the Environmental Impact Assessment (EIA Act CAP E12 LFN, 2004; the National Guidelines and Standards for Environmental Pollution Control in Nigeria (March 1991); the National Environmental Standards and Regulations Enforcement Agency (establishment) Act 2007 (NESREA), as well as the Land Use Act 1978 (modified in 1990). The power to regulate all environmental matters in Nigeria is vested in the Federal Ministry of Environment (FMEnv).

ES 0.7 Institutional Framework

The primary responsibility of the project monitoring and ESMP implementation is on the Project Implementation Unit (PIU) a committee set up by the State Government to oversee the implementation of the proposed project. They work with the consultant on project and facilitate ESMP delivery. Functions included but not limited to creating awareness, mobilization and facilitation, project appraisal, approval & disbursement, capacity building, monitoring & evaluation of all project activities and reporting to the FMEnv and the World Bank.

The key actors in the implementation of this ESMP include:

- The contractor - to be awarded the rehabilitation contract and be required to implement the environmental and social safeguard measures.
- FMEnv - to ensure compliance with the ESMP and other relevantapproval conditions.
- SMEnv - to oversee the effective implementation of the flood control project and related E&S safeguards.

ES 0.8 Existing Safeguard Instruments

This project will adopt the Operational Safeguards (OS) of the Integrated Safeguards System (ISS) of the African Development Bank (AfDB) and other national statutory instruments that may apply to the project.

ES 0.9 Biophysical Environment

The climatic condition of the project area is characterized by uniformly high temperatures and a short seasonal distribution of precipitations. The area falls within the Sahel savanna zone that receives about three months of rain and experiences up to nine months of dry season, which makes it very dry for most part of the year. The temperature in the area varies from 15°C to 42°C and is rarely below 14°C or above 44°C (Ibrahim, A 1990). The hot season in the area last for a little over two months from March to May, while the cool season lasts for about one and half months, usually from December to January of each year. The rainy season usually lasts from June to September, with a peak that occurs in August. The dry season begins from September to June.

Flora and fauna within and around the various project corridors and vicinity were surveyed and characterized to evaluate the health status of the vegetation and the general composition, diversity, and economic values, etc. of existing wildlife in the project area.

Air quality assessment was carried out at several locations where active construction operations are anticipated and where human activities are expected to be high. The analytical results of the baseline air quality indicators within and around the project corridors show concentrations below the regulatory threshold limits. Field (in- situ) air sampling was carried out using the Dragner CMS Gas Analyzer.

The parameters measured as part of the air quality assessment included particulate matter (PM-2.5, PM-10), carbon monoxide (CO), Ammonia (NH_3), hydrogen sulphide (H_2S), sulphur dioxide (SO_2), nitrogen oxides (NOx), hydrogen cyanide (HCN) as well as oxygen (O_2). Analytical results obtained were reviewed against the appropriate regulatory limits to determine any potential health risk levels.

The groundwater conditions were assessed through laboratory analysis of parameters that affect the quality of water in the environment. Physical properties of water quality include temperature and turbidity. Chemical characteristics involve parameters such as pH and dissolved oxygen. Biological indicators of water quality include algae and phytoplankton. The analytical results of the baseline water quality indicators within and around the project areas show concentrations that are either below the regulatory threshold limits or are considered not significant.

Baseline soil parameters indicate the state of soil ecosystem characteristics, which especially reflect productive, buffering, filtering, and other soil functions. Soil quality issignificantly affected by physical, chemical, biological and biochemical properties sensitive to changes in the environment and land management. The analytical results of the baseline soil quality indicators

show concentrations of key soil quality below the regulatory threshold limits.

ES 0.10 Socio-Economic Characteristics

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 are about 4,536 and it's increasing at the rate of 10% annually.

Men and women in the project area are generally mainly involved in farming. 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 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 e.t.c, with reasonable proportion of the population working in the private sectors.

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.

ES 0.11 Public Consultations 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.

ES 0.12 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 AfDB 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.

ES013 Beneficial /Adverse Impacts and Mitigation/Enhancement Measures

This section focuses on the beneficial and adverse impacts of the proposed zonal medical warehouse project. From the expert assessment, the project classified as Category B meaning that the negative impacts are localized and reversible. This is also equivalent to a Category 2 in the Bank's Integrated Safeguard System (ISS).

Basically, this project is aimed at halting or minimizing the environmental and social damages that proposed project would have on the project area and beyond. This is, in the overall a positive impact. The envisaged areas of potential impacts (positive and negative) on the socioeconomic, cultural, and biophysical environments which could result from the proposed project are discussed below:

Pre-construction

Beneficial Impacts

- Provision of temporary job opportunities for both skilled and un-skilled labors and increased revenue for the state
- Improved living condition for citizens

Adverse Impacts

- Traffic congestion around the project site: Movement of heavy-duty vehicles and construction equipment into the project area has the potential of disrupting normal traffic flow and increasing the risk of traffic accidents. A potential impact of the proposed project on traffic is assessed as being of low significance as appropriate mitigation measures will, however, make this impact of negligible significance
- Air quality and noise concern within and around the site
- Banditry and insurgency attacks on workforce.

Mitigation Measures

- The Sokoto Government shall put in place a strategic traffic management plan
- The government shall ensure that all vehicles transporting raw materials especially soil should be covered or avoid overloading to reduce dust emissions; (ii) the workers in dusty

areas should be provided with requisite protective equipment such as dust masks and dust coats for preventive and protection purposes; (iii) the movement and speed of the construction machineries and vehicles should be controlled and properly managed.

- The State Government shall work with community liaison offer to identify the right stakeholders
- The government shall ensure a proper security work plan is signed off before work commences on site

Construction Phase

Beneficial Impacts

- The construction of the zonal medical warehouse will have both direct and indirect impacts on the economic development of the country. Directly, the infrastructures will provide services needed to ease the means of handling and storage of medicine, drugs within the state and the targeted states within the zone. Indirectly, the project is expected to stimulate the participation of private businesses to participate in the transport sector development. Private investments will create employment opportunities which will ultimately create income opportunities and alleviate poverty and consequently improve standard of living of the people. Appropriate improvement or enhancement measures is required.

- The local artisans like the carpenters, masons, welders, will have the opportunity to acquire new trades and skills as well as more experience during the construction phase of the project. Thus, an on-the-job training will enhance their skills and promote them to higher levels in their professions. Potential impact of the proposed project on skills of the local work force is assessed as being of low significance which can however be enhanced to an impact of moderate positive significance

Adverse Impacts

- Potential for transmission of infectious diseases, particularly HIV/AIDS and COVID 19 pandemic contraction and unsafe sexual behavior by construction workers.
- Loss of Biodiversity/Vegetation Removal and reduction of Abundance and Species of Fauna and Flora.
- Air /noise pollution due to vehicular movement of heavy-duty equipment
- Gender Gap – like cultural norms that prevent women from participating in the delivery construction
- Injury and exposure of site workers to reptiles and other dangerous animals and insects such as bees, wax etc

Mitigation Measures

- The government shall ensure a proper security work plan is signed off before work commenced on site and workers identified by the CLO daily.
- The State Government shall conduct mass education on sexual education and NCDC safe

protocol for COVID 19

- The State Government shall ensure camp are built within the site to accommodate site workers where necessary.
- The State Government shall ensure that all vehicles transporting raw materials especially soil should be covered or avoid overloading to reduce dust emissions, workers in dusty areas should be provided with requisite protective equipment such as dust masks and dust coats for preventive and protection purposes; movement and speed of the construction machineries and vehicles should be controlled and properly managed; vegetation clearing shall be limited to the proposed site; most noisy machinery should be fitted with proper silencers to minimise noise emissions; where necessary, good and appropriate selection of construction machinery and equipment; sprinkleking of water in construction yards, on dusty roads and soil heaps to keep down the dust produced

Operational /Maintenance Phase

Beneficial Impacts

- Actualization of the National Strategic Supply Chain Development Plan 2021-2026.
- Provision of cold chain storage and distribution of COVID-19 vaccine logistics.
- Provision of capacity building opportunities for our young generation willing to explore supply chain management.

Adverse Impacts

- Generation of Pharmaceutical waste
- Delay in the delivery of medical commodities

Mitigation Measures

- The State Government shall ensure all medical waste are adequately managed through the proposed medical waste facility which is expected to come with this project

- The Government of the state shall ensure the supply chain management process is adequately reviewed and audited periodically by ISO –SON for continuous improvement

ES 0.14 Environmental and Social Management Plan

This is necessary to achieve the health, safety, and environmental regulatory compliance objectives of the project. The environmental and social management systems/procedures are developed to establish sound basis for mitigation, monitoring and management at the project level. The requirements of this ESMP are strategically integrated into the existing procedures to ensure that project bottlenecks are not created. To this end, the Plan has focused on specific steps to be taken with respect to implementation of the mitigation measures and monitoring activities for the environmental and social impacts identified in Chapter 4. This plan highlights the specific mitigation measures that would be taken and the entities responsible for carrying out the mitigating measures. The ESMP also contains a monitoring plan indicating the responsible parties,

the frequency of monitoring, key indicators, and the reporting format, and provides for necessary capacity building to facilitate the ESMP implementation. Cost estimates for implementation of the various measures, monitoring plan and capacity building are also given. The projected implementation budget will enable the ESMP to be an integral part of financing for the construction and maintenance works in the project.

ES 0.15 Grievance Mechanism and Procedures

The grievance procedures consist of the steps that ensure proper documentation of all grievances, a discussion mechanism for hearing and resolving the grievances, and provisions for appeals in the event of dissatisfaction by any affected persons.

The issues considered include: the project's benefit(s) to the stakeholders; potential changesto the routine activities of the stakeholders that might occur due to the project; and the project activities that might cause damage or conflict for the stakeholders. Any issues that may lead to grievances will be addressed through documented grievance mechanism that takes into consideration the cultural and traditional rights of people avoiding as much as possible potential for legal redress mechanism. The specific objective of the mechanism is to facilitate the process and ensure effective and timely grievance resolution thereby reducing the risk of escalation of conflicts and avoiding unnecessary delays. The grievances and remedial actions shall be carefully documented to enhance accountability and reduce liability.

The community traditional land dispute resolution structure currently constitutes the nucleus of traditional resolution of disputes among community members on matters of land. It is therefore wise and advisable that this structure be necessarily retained in the event of any grievance or dispute relating to the ESMP implementation. Inputs from the leadership may also be limited to providing recommendations as to how a specific dispute is to be addressed. Aside from the traditional structure, Figure 6-1 provides a secondary mechanism for grievance resolution using the Grievance Redress Committee (GRC).

The proposed GRM will also help to achieve the following:

- To serve as the open channel for effective communication together with the identification of emerging environmental and social concerns due to the project.
- To prevent and mitigate any adverse environmental and social impacts because ofany phase of the project.
- Promote harmonious relationship and respect among stakeholders; and,
- Ensure community acceptance of the project.

ES 0.16 Complimentary Initiatives

The PIU in collaboration with the environmental consultant under the Government of Sokoto State will be responsible for the supervisory role in conducting the environmental and social monitoring of the project's environmental activities. The project is envisaged to match the working

relationships among different entities that will be engaged in the implementation of the project. One of the most important complementary initiatives will be the enhanced collaboration among these different consultants especially the project consultant and that of the ESMP. The other complementary initiative of the project will be the capacity building initiatives proposed in the project targeted to train the key officers involved in the project on various aspects of environmental management especially environmental assessment and in understanding the importance of ESMP and Impact Mitigation Monitoring.

The local communities will be involved in a lot of capacity building focusing climate change, protection of biodiversity etc. Mainstreaming public health and HIV/AIDS in the overall operations will help improve social well-being of the project communities.

The project will aim to engage and support some local interventions that will ensure good environmental management in agricultural production as well as increasing the number of players in agricultural produce value chain systems.

ES 0.17 Gender Based Violence/Sexual Exploitation and Abuse of Management Plan

The Gender Based Violence/Sexual Exploitation and Abuse Management Plan (GBV/SEA MP) is required to identify and assess key risks, develop mitigation measures to prevent and respond to sexual exploitation, abuse, and other forms of Gender Based Violence (GBV). Selected Contractor shall prepare and submit for approval, the necessary GBV/SEA MP to be implemented for the project. The GBV/SEA MP will set out a formal system by which the Contractor will carry out mitigation measures that will reduce any impacts relating to Gender Based Violence matters.

Specifically, the GBV/SEA MP will provide details regarding the implementation of avoidance mitigation and management measures for impacts related to the possibility of or any existing risks which may lead to GBV/SEA issues. The scope of the GBV/SEA MP will cover pre- construction, construction and post construction/closure phases of the Project.

The risk indicators to be considered shall include but not limited to:

- Possible pressure and/or additional demand for social services because of an increased family stress and violence.
- Possible sexual harassment (including rape, sexual assault and harassment in all public and private spheres of life).
- Norms, attitudes, and stereotypes around gender in general and violence against women.
- Various forms of structural inequality or institutional discrimination on any gender.

ES 0.18 Traffic and Vehicle Management Plan

Managing traffic at a construction workplace is an important part of ensuring the workplace is

without risks to health and safety. Vehicles including powered mobile plant moving in and around a workplace, reversing, loading, and unloading are often linked with death and injuries to workers and members of the public. Traffic includes cars, trucks and powered mobile plant like excavators or graders, and pedestrians like workers and visitors. The most effective way to protect pedestrians is to eliminate traffic hazards.

Selected Contractor shall be required to prepare and submit for approval, a comprehensive Traffic and Vehicle Management Plan (TVMP). Together with this ESMP, the TVMP will provide the specific and general guide to vehicular movements throughout the project area to protect the community and workforce from accident and safety hazards during construction.

ES 0.19 Waste Management Plan

A waste management plan (WMP) is required to achieve the goals set for managing construction waste. The construction Contractor shall prepare and submit for approval, a comprehensive Waste Management Plan (WMP). The WMP will provide the specific and general guide to the management of solid and liquid wastes throughout the project area and for the duration of the project. The Contractor shall have responsibility for the implementation of the Plan which will include procedures for salvage, reuse, and recycling of materials. The implementation of the WMP will protect the community and workforce from the health hazards of indiscriminate waste disposal during construction.

ES 0.20 Environment and Climate Change

Changes in climatic conditions pose threat to inclusive growth in Nigeria. In 2018 alone, Nigeria experienced flood disasters affecting 12 states and 327,000 people, as well as 60 hectares of farmland. Considering this, the project will integrate elements which enhance climate change adaptation and mitigation in the project design. Concerted attention will be made to ensure that infrastructure developed under the project are adequately climate proofed.

ES0.21 Environmental and Social Management Plan Monitoring

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and are effective. Environmental and social monitoring will also enable response to new and developing issues of concern during the project implementation hence ensuring that project activities comply with and adhere to environmental provisions and standard specifications of the Bank and those of the FMEnv and the State Counterpart.

ES 0.22 ESMP Implementation Schedule

The implementation and management of the ESMP schedule is designed to facilitate any necessary issues associated with the project. The ESMP activities also need to be implemented within an agreed timeframe and budget. Appropriate timing should be adhered to avoid delays in the implementation of the ESMP.

CHAPTER ONE
INTRODUCTION

1.1 Background Information

The Sokoto State Government plans to establish a Zonal Medical Warehouse (ZMW) at Kassarawa area in Wamako Local Government Area of Sokoto State. The project will be located on a land area covering about 3.8 hectares which has been acquired for this purpose. The zonal medical warehouse will serve as an Integrated Health Commodity distribution hub to other north-western States including Zamfara, Kebbi and Katsina States.

This proposed project is expected to address the short falls in health commodities supply across public health facilities in the North-western States through the provision of adequate warehousing space and distribution services. The COVID-19 pandemic has further exerted strain on the already weak supply chain system in the country making it necessary to provide conducive storage for health commodities to address major health challenges of the population. The stock out rate of essential lifesaving commodities and public health commodities as of May 2021 stands at 55% and 35% respectively across north-western states according to a study conducted by Carter Consult, 2021.

This intervention project will address the inadequate provision of health commodities for public health programs which is among other factors responsible for poor health indices in the country. This is because of limitation in funding for the procurement and distribution of the public health commodities in addition to the supply chain challenges in the country. To overcome these challenges, the Federal ministry of Health (FMoH) with support from the United States Agency for International Development (USAID), Global Fund (GF) and other donor agencies came up with the Nigeria Supply Chain Management Policy which targets improvement in the provision of public health commodities through effective and efficient coordination of supply chain management activities across the 36 states and the Federal Capital Territory (FCT). Through the implementation of this policy, the warehousing of public health commodities for Malaria, HIV/AIDS, Tuberculosis & Leprosy, Reproductive Health and Family Planning, was decentralized with the establishment of six zonal warehouses across the country to reduce the lead time by bringing the health commodities closer to the service delivery points. The policy also led to integration of the warehousing and distribution of these commodities to ensure efficient use of resources and the establishment of the state Logistics Management Coordinating Units under the Department of Pharmaceutical services across the 36 state and the FCT with the aim of putting the government in the driver's seat in the coordination of supply chain activities in the 36 states and FCT.

The implementation of this policy will record achievements in public health commodities availability across the country. However, there are still gaps to be bridged (which became more visible during the Covd-19 pandemic) due to limited coverage of the public health facilities by the various public health programs in the states. The major challenges include limited availability of public health commodities, pharma-grade warehouses, and delivery fleet for last mile distribution. This has led several states including Sokoto to come up with interventions to address these major challenges. These include the establishment of the Drug Management Agencies, Contributory Health Care Management Agencies, Revitalization of Drug Revolving Fund (DRF) schemes, improvement in the warehousing infrastructures and provision of delivery fleet for delivery of health commodities to the last mile.

Sokoto State has a projected population of 5.8m people according to the 2006 Census Figure and the State has just established Drug & Medical Supplies Management Agency and is working to revitalize its drug revolving fund scheme as a measure to address limited supply of health commodities to its teeming population. The State has 23 LGAs (out of which 4 are metropolitan), 1 Tertiary, and 21 Secondary and over 800 Primary Health Facilities. In addition to the public healthcare commodities being distributed, the State provides commodities for other diseases under the free Medicare program and the Drugs revolving Fund (DRF). However, due to limitation in funding, this distribution is not regular. This contributes significantly to the poor health indices of the state.

The mission of this project is to ensure regular health commodity supply to service delivery points for the different public health programs considering the six logistics rights of delivering to the right places, at the right time, in the right quantity and right quality at the right cost.

Against this background, ENARMAC Nigeria Limited has conducted this study under the terms of the Nigerian Environmental Impact Assessment Act Cap E12 LFN 2004, and in fulfillment of the African Development Bank /World Bank requirements for financial support. This report, therefore, present the findings of the Environmental Social Management Plan (ESMP) for the proposed Zonal Medical Warehouse Facility at Kassarawa, Sokoto State, Nigeria.

1.2 Objectives of the ESMP

The prime objective of the Environmental and Social Management Plan (ESMP) is to bring the project into compliance with applicable national environmental, social, and legal requirements as well as those of African Development Bank. The ESMP also defines and outlines the mitigation/enhancement, monitoring, consultative and institutional strengthening measures to be undertaken during project implementation and operation to prevent, minimize, mitigate, or compensate for adverse environmental and social impacts. In addition, the ESMP seeks to enhance the project beneficial impacts. Taking the above principles into account, the ESMP for

the ZMW Project has been formulated to address the objectives, actions, strategies, and activity costs of the management plan for all the project phases.

This ESMP is to specifically provide the following:

- Identify, and evaluate the impact of the proposed project on the ecological and socio-economic settings with adequate interfacing and project interaction.
- Identify the existing and expected environmental regulations that will affect the project construction and operation and advise on standards, concepts, and targets.
- Identify any environmental issues and concerns that may affect the successful construction and operation of the project.
- Develop control strategies with a view to mitigating and ameliorating significant negative impacts, while enhancing positive ones.
- Develop an effective Environmental and Social Management Plan (ESMP) to last through the lifespan of the proposed project including compliance-monitoring, auditing, and contingency planning.

1.3 Rationale for ESMP

The adoption of the Operational Safeguards (OS) of the Integrated Safeguards System (ISS) aims at strengthening the capacity of the Bank and borrowers. 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.

The focus of the proposed Zonal Medical Warehouse project will involve regular health commodity supply to service delivery points for the different public health programs observing the six logistics rights of delivering the right product, to the right place, at the right time, in the right quantity and right quality at the right cost". These activities will result in several social issues such as disagreement with distribution procedures, employment etc. Consequently, this ESMP is required to provide necessary procedures and criteria that will guide the proposed Zonal Medical Warehouse project in accordance with the World Bank Safeguard Policies and the Nigerian national environmental policies, guidelines, and assessment procedures as well as those of Sokoto State and the local agencies.

1.4 Scope of ESMP

The scope of work undertaken by the Consultant included the preparation of the ESMP whose purpose was to define and reach an agreement with project sponsors concerning the following:

- Comprehensive literature reviews to generate background information on the environmental characteristics of the study area of the associated substation.

- Review of National and International Environmental regulations.
- One wet season detailed environmental baseline data collection and laboratory analysis to fill information/data gaps.
- Identification of potential and associated impacts.
- Development of effective mitigation, enhancement, and control measures; and
- Monitoring programs.
- Consultations.
- Complementary initiatives.
- Responsibilities and institutional arrangements.
- Estimated costs; and
- Implementation schedules and reporting.

1.5 Approach and Methodology of ESMP

The sequence of the phases of activities conducted broadly included:

- Gathering of site and project information as well as intrusive data acquisition.
- Review of applicable environmental and social regulations and statutory Page 39 requirements including the WB operational policies.
- Stakeholders‟/community consultations and participation.
- Development of potential environmental and social impacts and associated mitigation measures.
- Development of appropriate environmental and social management systems/procedures as well as necessary institutional arrangements.
- Development of budgetary estimates and identification of the sources of funds for implementing the ESMP; and,
- Preparation of the required environmental and social management plan (ESMP) report. The overall study was based on both quantitative data and qualitative inputs collected through research of historical environmental and social data for the project area, and the census/socio-economic survey data (the census questionnaire and socio-economic survey questionnaire has been integrated into one basic document to enhance effectiveness).

Besides the quantitative data collection method, several other tools were also used for eliciting information. These tools will be included

- Focused Group Discussion (FGD).
- Community meetings; and
- Key informants‟ interviews.

1.6 Rationale for Intervention

Effective Supply Chain Management System is the key to successful implementation of various health programs. Nigeria enjoys immense support from donors, development partners, implementing partners and private sector organization in different health interventions. Most of these interventions involve health commodity supply to service delivery points. Over the years there has been poor coordination of the health commodity supply chain which has led to loss of resources through expiries due to overstocking of facilities. There is also the challenge of stock outs due to longer lead times and limited coverage of public health facilities.

The construction of the zonal medical warehouse is closely in line with the state's policies and priorities. The ZMW when fully upgraded and functional will not only create up to 1000 jobs, which will reduce poverty and hunger among those to be employed but will promote efficiency in the distribution and storage of pharmaceuticals products. The project will also be self-sustaining as it is expected to generate revenue from the provision of warehousing and distribution services vis-à-vis the profit from the sale of essential medicines under the drug revolving fund scheme. The employment generation will reduce youth restiveness, arm banditry and kidnapping among other social vices in Sokoto.

1.7 Project Location

The proposed Zonal Medical Warehouse at Kassarawa area in the outskirt of Sokoto metropolis. The project will be located on a land area covering about 3.8 hectares. The surrounding area is dotted with local mud-houses, sparse vegetation and open spaces used for subsistence rain-fed agriculture. The climate is sub-tropical with rainy season between the months of late May and Late September with highest levels recorded in the months of July, and August. Temperature range in the area is between 35°C and 42°C depending on the period of the year. The proposed location is accessible by road within the city of Sokoto and the roads are in relatively good condition. The maps of the Nigeria showing Sokoto and map of the Sokoto state showing the study area are shown in Figures 1-1 and 1-2 respectively. The satellite image of the proposed site is also shown in Figure 1-3 blow.

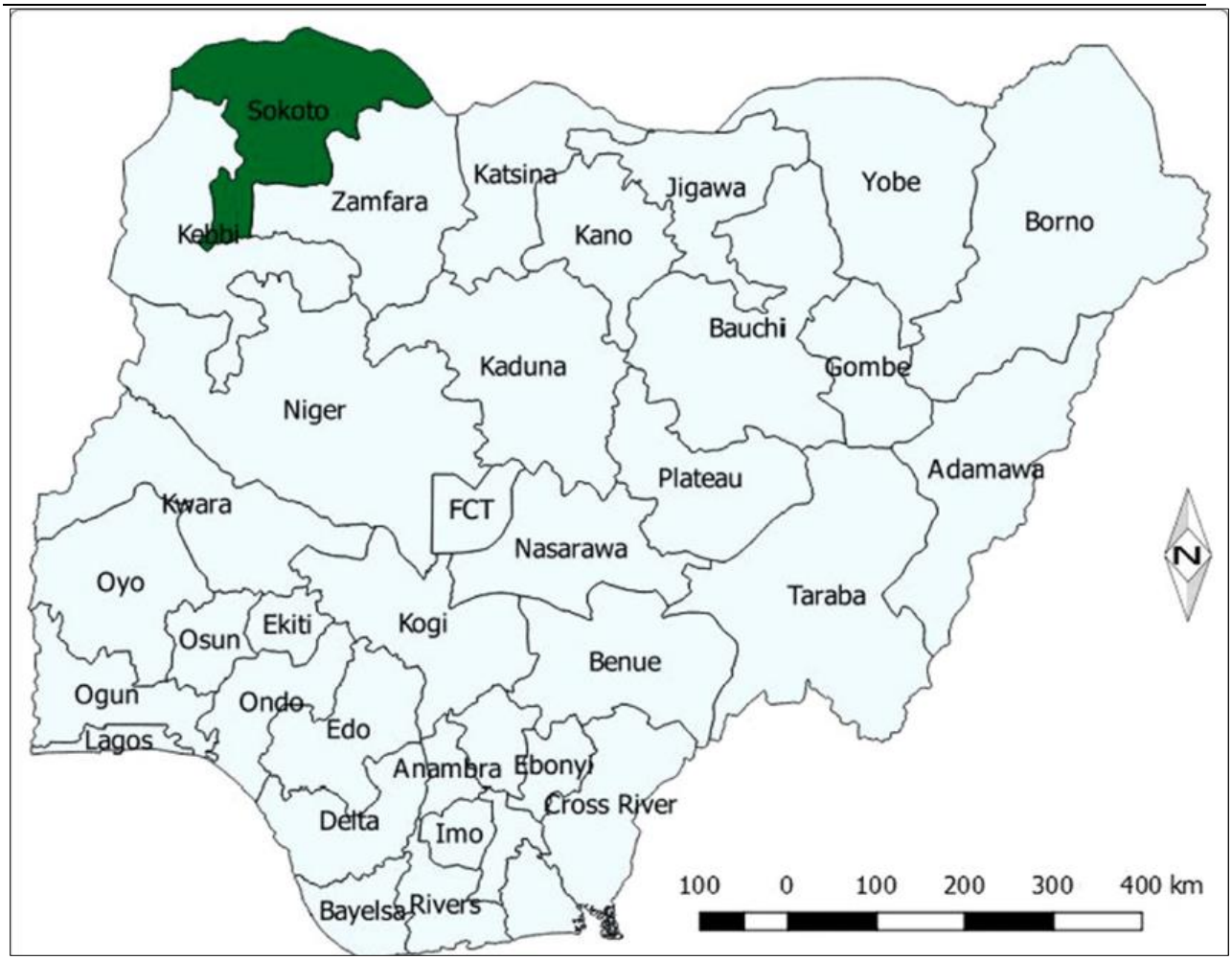


Figure 1-1. Map of Nigeria Showing Sokoto State

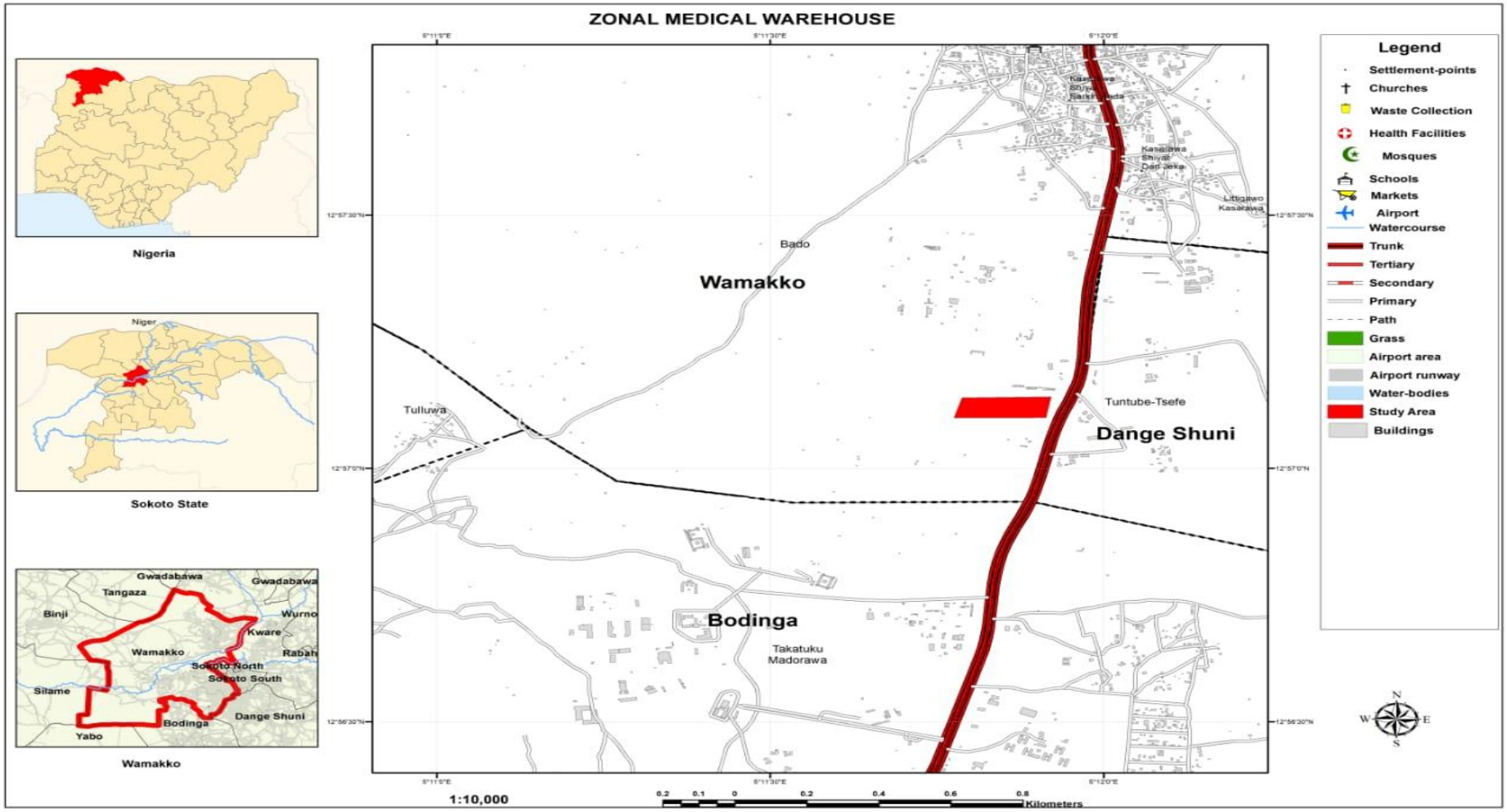


Figure 1-2. Map of Sokoto State Showing the Study Area

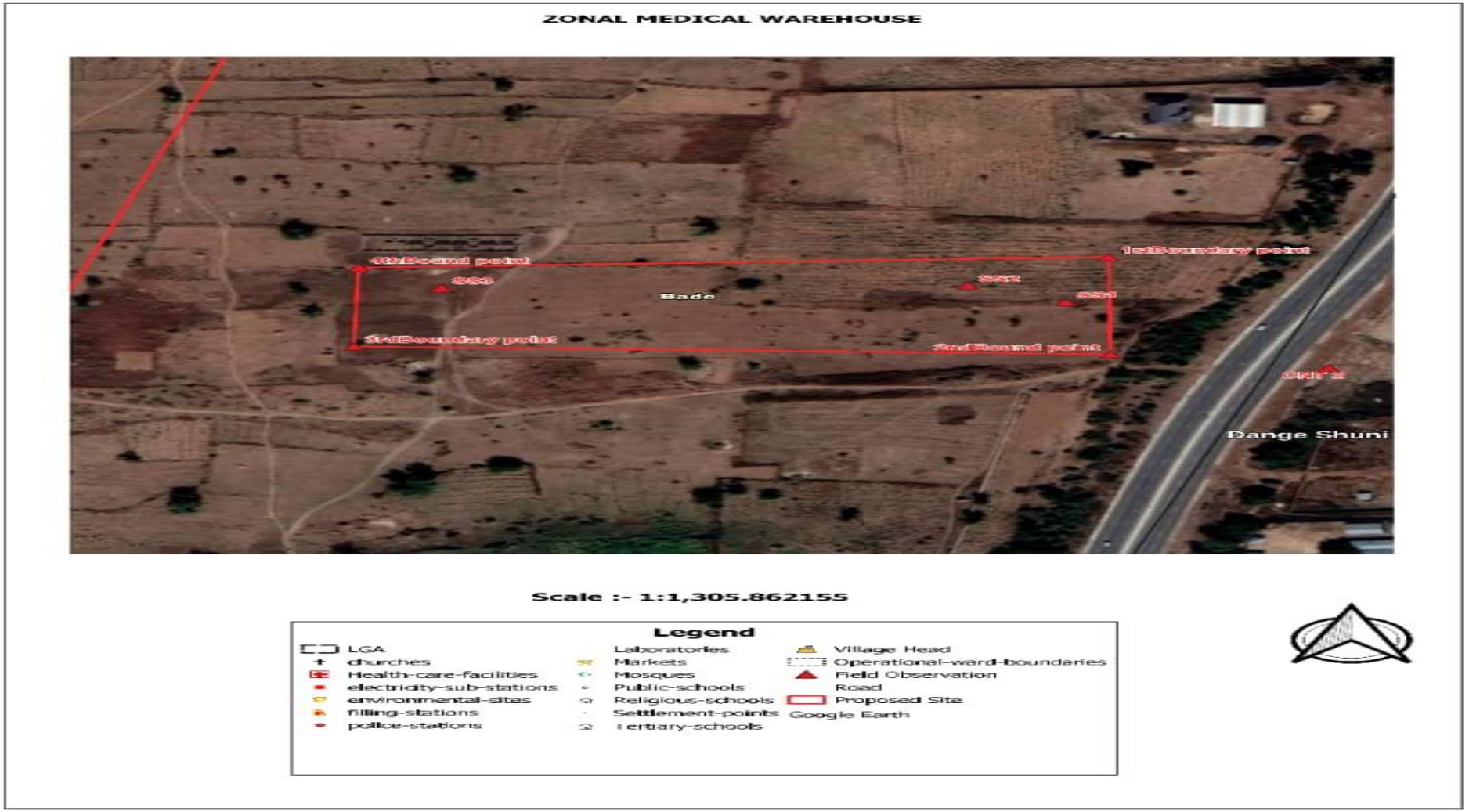


Figure 1- 3: Satellite Image of the Proposed Site

1.6 The Applicant

Sokoto State was carved out of the then North-western State on February 3, 1976, by the former regime of General Murtala Mohammed. It's capital and largest city is Sokoto. The Sokoto State has good human capital, which can be leverage on to achieve a lot in Health and other sectors. However, the state currently has one of the worst indices of health in the country owing to poor service delivery and insufficient health infrastructure. This is compounded by geometric increase in population which keeps rising steadily since record started in the early sixties. In specific terms, the State has experienced a six-fold increase in population since 1960, from 800,000 people to 5.8 million in 2021 (NPoPC). This scenario can potentially have negative consequences on the availability and accessibility of quality health care in the State.

1.7 Methodology

The EIA Methodology for the project followed the below flow chart of Figure 1-3 with submission of letter of intent and proposal by the proponent to the Federal Ministry of Environment. This was followed by site verification, field data and literature collection that were used to compile the draft report after appropriate laboratory analysis. The draft will subsequently be submitted to the FMEnv for review as required following which comments would be raised to be addressed in the final report.

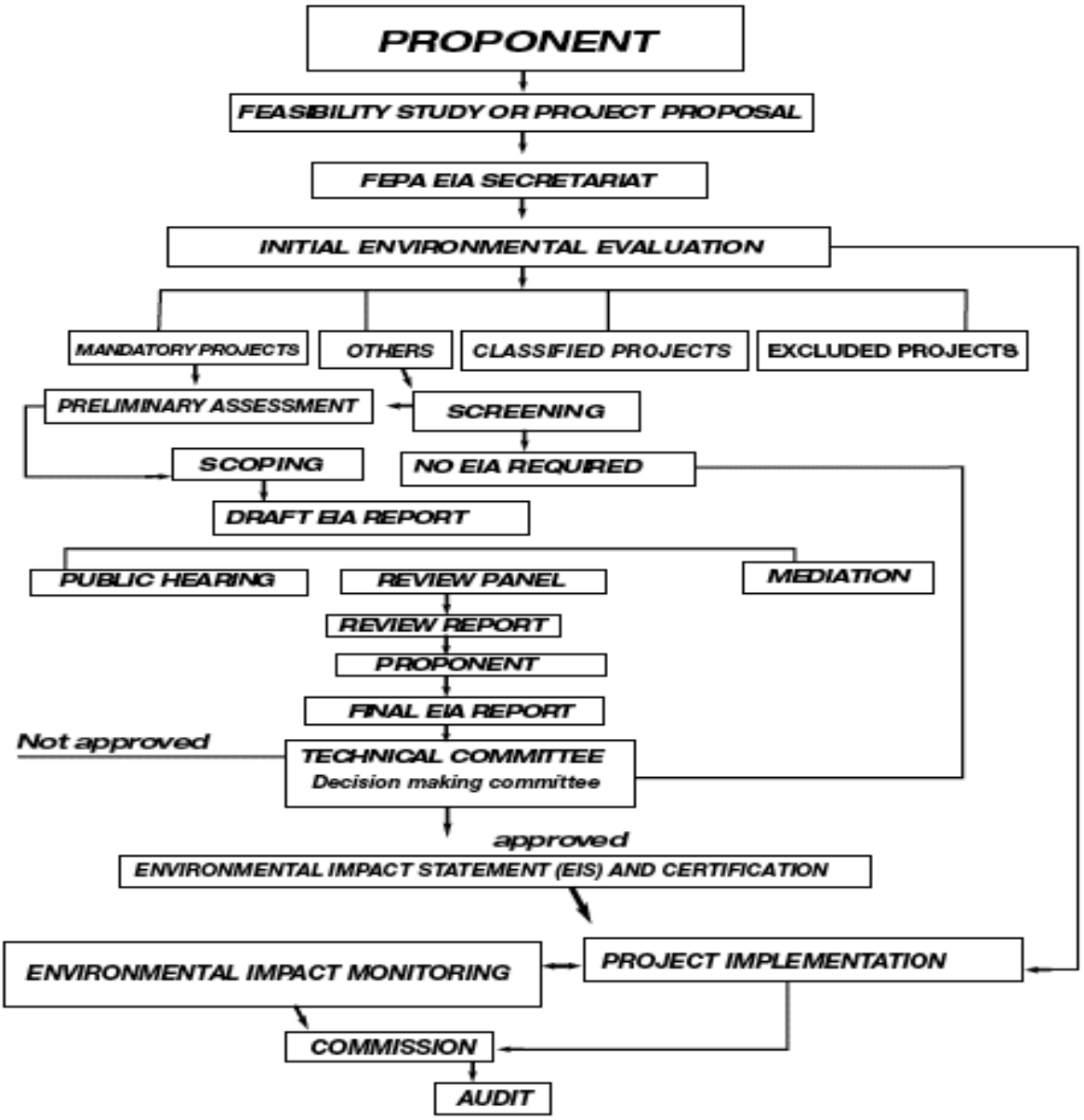


Figure 1-4: EIA Process Flow Chart

Specially, this study involved desktop studies, field research, consultation, impact assessment and proffering of mitigation measures and the development of an Environmental Management Plan (EMP). The approach used involved the use of a blend of multidisciplinary standard methods used in obtaining basic data for impact prediction/identification which was followed up with designing of appropriate mitigation measures. The EMP Methodology adopted for this study is shown in Figure 1-4.

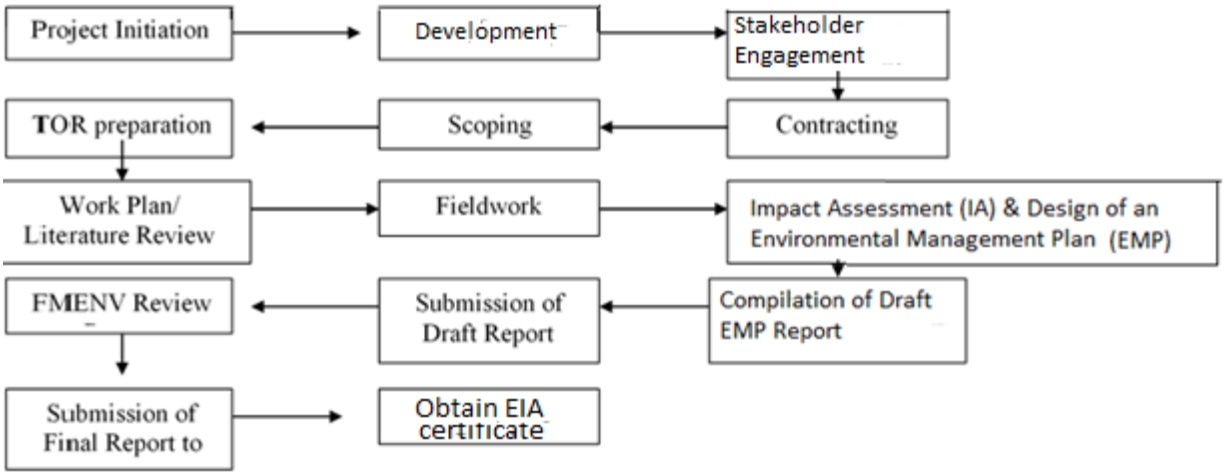


Figure 1-5: EMP Design Methodology

1.7.1 Desktop Studies

Desktop study was undertaken to acquire information on climate, geology, soil, groundwater, socioeconomics, and other environmental components of the proposed project area. 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 in September 2021 to establish the environmental baseline condition of the study area. Other materials consulted included textbooks, articles, and maps

1.7.2 Impact Identification and Evaluation

The potential adverse and beneficial impacts of the proposed project were identified by considering and studying the interactions of the environmental components with the existing environment at the mobilization/site preparation, civil works/construction, and maintenance phases. The EIA Sectoral Guidelines for Infrastructure Projects (FEPA 1995), the World Bank Environmental Assessment Source Book (1991), and the conceptual project description among other sources/references were used in the process. Evaluation of the identified impacts was carried out using such criteria as legal/regulatory requirements in respect of planned activities, magnitude of impact, risk posed by impacts, public perception, and importance of affected environmental components.

1.7.3 Impact Mitigation

In proffering mitigation measures to prevent, reduce or control the adverse impacts of the proposed project, professional judgment (based on scientific deduction), project experience, knowledge of the ecosystem in which the proposed project shall be located and consensus of opinions among others were considered.

1.7.4 Terms of Reference

The Terms of Reference (TOR) used in guiding the execution and implementing the EMP of the proposed fertilizer blending plant is as detailed below:

- ✓ To define relevant framework of legal and administrative requirements for the project.

- ✓ To carry out a detailed one season environmental baseline studies of the project environment.
- ✓ To identify and assess the associated and potential impacts of the proposed project; and
- ✓ To identify appropriate mitigation measures for such impacts; and
- ✓ To develop an effective Environmental Management Plan for the project.
- ✓

1.8 Federal Policy, Legal, Regulatory and Administrative Frameworks

Pursuant to Section 20 of the Nigerian 1999 Constitution, the state is empowered to protect and improve the environment and safeguard the water, air, and land, forest, and wildlife of Nigeria. The power to regulate all environmental matters in Nigeria is vested in the Federal Ministry of Environment (FMEnv) — a mandate that previously rested with the now defunct Federal Environmental Protection Agency (FEPA) set up by Federal Act 88, of 1988.

This ESMP is guided by the requirements of the relevant and applicable state, national and international regulation, guidelines, conventions, industrial best management practices including the World Bank safeguard policies that are triggered by the project.

Nigeria subscribes to several international regulations and convections relating to Environmental Protection. The assessments and management standards of these international development partners/agencies, such as World Bank and other financialorganizations, must be compiled with by project proponents before these institutions will invest in the projects. These guidelines/conventions/treaties to which Nigeria is a signatory are summarized below.

1.8.1 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. This was triggered, thus a full ESIA was required.

  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. No OS 2 activities were triggered as the proposed project will be sited on a vast land already acquired by the state.

- 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 3 was also not triggered as the proposed site mostly existing fallowed farmland owned by the state.

- 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. Waste generated will be managed in line with approved procedure.

- 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 labour.

Environmental and Social Assessment (ISS OS 1)

An EA is conducted to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision- making is improved through appropriate analysis of actions and of their likely environmental impacts. Any World Bank project that is likely to have potential adverse environmental risks and impacts in its area of influence requires an EA indicating the potential risks, mitigation measures andenvironmental management framework or plan.

The Basel Convention on the Control of Trans boundary Movement of Hazardous Waste and Disposal, 1989

The convention focuses attention on the hazards of the generation and disposal of hazardous wastes. The convention defines the wastes to be regulated and controls their trans-boundary movement to protect human and environmental health against their adverse effects.

UN Framework Convention on Climate Change – Kyoto Protocol (1992)

To achieve sustainable social and economic development, energy consumption for developing countries needs to grow considering the possibilities for achieving greater energy efficiency and for controlling greenhouse gas emissions in general. This also includes the application of new technologies on terms which make such an application economically and social beneficial, determined to protect the climate system for present and future generations.

Agenda 21 - UN Conference on Environment and Development

At the United Nations Conference on Environment (also the Earth Summit) — held in Rio de Janeiro (1992), with recommendations from the WHO Commission, more than 150 member states adopted Agenda 21 - an action plan to guide future strategies for health and environment activities on a national and international level. This fact provided the background for FEPA‟s EIA framework to ensure environmental sustainability of all types of activities in the oil and gas industry (FEPA, 1995).

Public Health Legislations and regulations

Several countries have legislation and regulations that stipulate the administrative and policy framework for conducting health impact assessment for a development project, whether as part of an EIA or a standalone study. In addition, several international agencies have endorsed this process, such as the World Banks, Asian Development Commission, and the World

Health Organizations. In Nigeria, the Public Health Law (L.N47 of 1955, Cap 103) provides justification for the execution of developmental projects under guidelines that promote health by protecting the environment and safeguarding the health of humans.

WHO Health and Safety Component of EIA, 1987

WHO in its report on health and safety component of environment impact assessment (EIA) to protect human health indicates that?

i. One of the fundamental considerations in the approval of projects, policies and plans should be the health of communities affected by them; greater consideration should be given to the consequence of development policies/programs for human health.
ii. Environmental Impact Assessment should provide the best available information on the consequence for health of projects, policies, and plan; and
iii. Information on health impact should be available to the public.

Convention on Conservation of Migratory Species of Wild Animals, Bonn, 1979

The Bonn convention concerns the promotion of measures for the conservation (including habitat conservation especial for endangered species and management of migratory species).

United Nations Guiding Principle on the Human Environmental

The United Nation (UN) published the concept of guiding principles on the Human Environment in 1972. Ten of these Guiding Principles were defined as formal declarations that express the basis on which an environmental policy can be built,and which provide a foundation for action.

The Rio Declaration on Environmental and Development

The UN Conference on Environment and development met at Rio de Janeiro in June 1992, at which time it reaffirmed the 1972 declaration on the Human Environment and sought to build upon it. This was done with the goal of establishing a new and equitable global partnership through the creation of new levels of cooperation among states, key sectors of societies and people. It was also to aid work towards international agreements, which respect the interest of all, protect the integrity of the global environmental development system, and recognize the integral and interdependent nature of the earth.

Other relevant international conventions include:

- Africa Convention on the Conservation of Natural Resources of 1969
- Convention on the Law of the Seas of 1982
- The Ramsar Convention on Wetlands of 1971

1.8.2 National Policy on Environment

The national policy on environment, 1989 (revised 1999), provides for “a viable national mechanism for cooperation, coordination and regular consultation, as well as harmonious management of the policy formulation and implementation process which required the establishment of effective institutions and linkages within and among the various tiers of

government — federal, state and local government". The defined guideline and strategies provide for the effective management of the environment in the following 14 major areas:

Human population; Land use and soil conservation; Water resource management; Forestry; Wildlife and protected areas; Marine and coastal area resources; Toxic and hazardous substances; Energy production and use; Air pollution; Noise pollution; Toxic and hazardous substances; Recreational space;Greenbelts movements; and Cultural property.

The Environmental Impact Assessment Act CAP LFN E12 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.

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.

Approved National Forestry Policy 2006

The extant national forest policy which is included within the document "Agricultural Policy for Nigeria" published by the Federal Ministry of Agriculture in 1988 recognized forestry as the management and utilization of forests as renewable natural resources. The policy overall objective is to achieve sustainable forest management that would ensure sustainable increases in the economic, social, and environmental benefits from forests and trees for the present and future generation including the poor and the vulnerable groups.

The Forest Policy encourages and supports an aggressive establishment of plantations of economic trees of both exotic and indigenous species. It provides for the preservation of forest and the setting up of forest reserves, and provides goals, targets and implementation strategies for the management, development and use of forests and their resources and products. Nigeria is at present a wood deficit nation. The policy on forest resources management and sustainable use is aimed at achieving self-sufficiency in all aspects of forest product using sound forest management techniques as well as the mobilization of human and material resources. The overall objectives of forest policy are to prevent further deforestation and to recreate forest cover, either for productive or for protective purposes, on already deforested fragile land.

The national biodiversity conservation strategy continues to be based on a system of Protected Areas, including Forest Reserves, National Parks and Game Reserves. In recognition of the fact that the local communities must share from the benefits of these Protected Areas, there must be a meaningful participation of these communities in their management. Efforts to safeguard biodiversity in private forests and to improve agricultural biodiversity through farm forestry initiatives must besupported.

Government has signed several international agreement and conservators that are relevant to the forestry development. It is obligatory that Government should honour these agreements and instruments through domestic legislation, and action. Intergovernmental, bilateral, and multilateral cooperation will be upheld to promote sustainable development of forest resources

Employee's Comprehension 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 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.

Penal Code Act CAP 53 LFN 1990

The Nigerian Criminal Code makes it an offence punishable with up to 6 month's imprisonment for any person who:

- ✓ Violates the atmosphere in any place to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhood, or passing along a public way; or
- ✓ Does any act which is, and which he knows or has reason to believe to be, likely to spread the infection of any disease dangerous to life, whether human or animal.

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.

NESREA Establishment Act, 2007

The National Environmental Standards and Regulations Enforcement Agency (NESREA) has responsibility for the enforcement of the environment regulations and biodiversity conservation, including coordination and liaison with relevant stakeholders within and outside Nigeria on matters of enforcement of environmental standards, regulations, rules, laws, policies, and guidelines.

The following NESREA National Environmental Regulations are considered relevantin this study:

- National Environmental (Construction Sector) Regulations. 2011.
- National Environmental (Soil Erosion and Flood Control) Regulations, 2011.
- National Environmental (Desertification Control and Drought Mitigation) Regulations, 2011.
- National Environmental (Surface and Ground Water Control) Regulations. 2011.
- National Environmental (Watershed, Mountainous, Hilly and CatchmentAreas) Regulations, 2009.

National Guidelines and Standards for Environmental Pollution (March 2001):

The National Guidelines and Standards for environmental pollution control in Nigeria (March 2001) is the basic instrument for monitoring and controlling industrial and urban pollution.

National Waste Management Regulations of 1991

This regulation which is updated under the National Environmental (Sanitation and Waste Control) Regulations 2009, S.I. No. 28 mandates the collection, treatment, and disposal of

solid and hazardous waste from municipal and industrial sources. It provides the legal framework for the adoption of sustainable and environment friendly practices in environmental sanitation and waste management to minimize pollution.

1.8.3 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 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 CAP E12 LFN, 2004 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.

1.9 The Structure of The Report

The reporting structure is as follows.

- Chapter 1: Introduction.
- Chapter 2: Project Justification.
- Chapter 3: Project/process Description.
- Chapter 4: Description of the existing Environment.
- Chapter 5: potential environmental impacts Assessment
- Chapter 6: Mitigation Measures
- Chapter 7: Environmental and social management plan (ESMP).
- Chapter 8: Conclusions and recommendations.

CHAPTER TWO
PROJECT JUSTIFICATION

2.1 Rationale for Intervention

Effective Supply Chain Management System is the key to successful implementation of various health programs. Nigeria enjoys immense support from donors, development partners, implementing partners and private sector organization in different health interventions. Most of these interventions involve health commodity supply to service delivery points. Over the years there has been poor coordination of the health commodity supply chain which has led to loss of resources through expiries due to overstocking of facilities. There is also the challenge of stock outs due to longer lead times and limited coverage of public health facilities.

The construction of the zonal medical warehouse is closely in line with the state's policies and priorities. The ZMW when fully upgraded and functional will not only create up to 1000 jobs, which will reduce poverty and hunger among those to be employed but will promote efficiency in the distribution and storage of pharmaceuticals products. The project will also be self-sustaining as it is expected to generate revenue from the provision of warehousing and distribution services vis-à-vis the profit from the sale of essential medicines under the drug revolving fund scheme. The employment generation will reduce youth restiveness, arm banditry and kidnapping among other social vices in Sokoto.

2.2 Justification of Bank Intervention

Despite recent improvements in Nigeria's agriculture there is still much more to be done. Against all odds, Nigerian agribusinesses have continued to forge ahead, taking advantage of the improving policies to invest in modern Agro-Industrial activities while confronting the issues that impact on competitiveness with imports. These issues include poor access to quality infrastructure, lack of quality feedstock in the required scheduled quantities and at prices that are reflective of the impact of low yields, high transport costs of feedstock and the scarcity of specific industrial skills. For Nigeria to escape the trap of a mono-economy and diversify its economy, including taking good advantage of AfCFTA, it must develop a competitive edge in its agriculture. It is generally believed that if Nigeria's agriculture is enhanced and linked to agro-based industrialisation, it will propel economic growth, become a pivot in creating massive, decent, and sustainable agro-related jobs, especially for the teeming jobless youth, reduce poverty, promote exports, and ensure the nation's food security.

The Bank's support to this project will help develop infrastructure, create, and maintain enabling environments for private sector investments and provide requisite skills development to ensure the inclusivity of many Nigerians in agricultural value chains through SAPZ activities. In addition, it will support the country to successfully alleviate povertyin rural farming communities, which can help curb high rural-urban drift, reduce dependence on unsustainable food imports, and promote. SAPZ will also enhance national food security, agriculture competitiveness, skills acquisitions and development, youth empowerment and revitalise the use of abandoned economic infrastructure along with fiscal benefits.

2.3 Value of the Project

The total estimated project cost, net of taxes and duties is USD15.5 million. This will be financed by an ADB Loan of USD14.725million constituting 95% of total project costs and Government contribution in cash or in kind ofUSD775,000thousand (i.e.,5% of total project costs). This will be discussed and agreed upon during the preparation and/or appraisal missions.

2.4 Benefits of the Proposed Project

- ✓ To establish zonal medical warehouse for the provision of integrated warehousing and distribution services of health commodities for both public and private sector.
- ✓ To revitalize the Sokoto state drug revolving fund scheme as a sustainable way of ensuring continuous availability of health commodities in both public and private health facilities in the state
- ✓ Operationalize the Sokoto State Drugs and Medical Supplies Management Agency in line with the National Strategic Supply Chain Development Plan 2021-2026
- ✓ To increase the competitiveness and business environment of the Nigerian pharmaceutical sector, through the provision of hard and soft infrastructure that would allow the crowding-in of private investment into the sector, both at the upstream and downstream axes of the value chains. The project interventions would lead to improved job creations amongst the youth, value addition, market access and private sector investment.

2.5 Alternatives Development & Analysis

Generally, the alternatives analysis is intended to address other means of completing the proposed Project that could avoid or minimize adverse impacts that would be associated with the proposed project. Alternatives may include, but are not limited to, location or site alternatives, process or technology alternatives, the no-action alternative, etc. The "No Action" alternative provides the baseline against which the impacts of the other alternatives are compared. Major alternatives addressed for this project are as follows:

- Analysis of alternative site locations
- Analysis of alternative facility layouts and technology
- Analysis of "No Action" alternative

2.6 Analysis of Alternative Site Locations

This section describes the methodology by which alternative site locations were identified and comparatively assessed to determine the most appropriate location that meets requirements for successful implementation of the proposed project. Project alternatives were evaluated as part of the conceptual design process, and alternatives that provided credible environmental protection/management, excellent safety performance, and sufficient security for personnel that will be exposed in the course of work, and that are cost-effective with respect to best available technologies and locations were considered.

The initial site selection process criteria are as follows.

2.6.1 "No Action" Alternative

No action is a possible alternative. In that case, no land interference with the proposed project environment will be done. Anticipated social conflicts due to congregation of people with diverse background, understanding, and perspectives will be eliminated. Potential environmental disturbances that would result from the construction activities and the operations of the plant will also be avoided. "No Action" will prevent the safety and health challenges that could lead to accidents, dusts, and noise, all arising due to heavy traffic associated with the project. In addition, the adverse economic impacts on those who derive their means of livelihood from and within the proposed project area will equally be prevented.

The "No Action" alternative will also imply that the ZMW intervention project will be halted, and its associated benefits will not be delivered as well.

2.6.2 Analysis of Alternative Technology

The proposed project has adopted technologies that are environmentally friendly. The carbon footprints of the proposed project were carefully thought of. the second consideration was on availably of the technology.

2.7 Analysis of Project Options

Usually there are several options to any project. The optionss were based on demand-based; activity-based; location-based; sequencing or phasing; and the "no project" option.

The selection of a particular option is premised on several considerations, including the desirability/acceptability of the project, the government‟ s position or inclinations to the project, the potential environmental and social impacts of the project, the economic viability of the project, etc. For the proposed ZMW intervention project, several options were considered, and these include *delayed project alternative*; *a do-nothing alternative*; and *the planned project alternative.* A summary of these alternatives is presented below:

2.7.1 Delayed Project Option

This option means that the ZMW intervention project will not be implemented at this time; rather, a delay will be in effect until such a time when certain conditions are met, or requirements fulfilled. This kind of option is usually adopted when there are regulatory requirements that need to be met, when the political and economic climate is inclement for project implementation or in a period of war. Presently, the country is not at war neither is Sokoto State. Furthermore, the government of Nigeria is vigorously encouraging and courting foreign direct investment and socio-economic development. The planned project can attract foreign investment, in addition to all the added values indicated earlier. Therefore, delaying the project will in turn delay the realization of the positive benefits expected from the project.

2.7.2 The Do-Nothing (No-Project) Option

This alternative assumes that the entire ZMW intervention project concepts will be cancelled and scrapped. There will be no improvement or changes in the present state of the distribution of pharmaceuticals products. This is an inferior alternative when compared to the option of going ahead with the project. Although if this option is taken, it would mean that the negative environmental and social impacts of the project would be completely avoided; however, not implementing the project will also result in:

(i) Inefficient storage and distribution of pharmaceuticals products within Sokoto State and neighbouring states to meet the National Strategic Supply Chain Development Plan 2021-2026
(ii) Increased pains attributed to death or infant mortality.
(iii) Continued lack of economic empowerment, development, and transformation; and,
(iv) Failure to generate employment opportunities as anticipated.

Therefore, the "Do-Nothing" or No-Project Alternative will worsen the present situation and worsen poverty at the same time. The "Do-Nothing" or No-Project Alternative is therefore not a viable option.

2.7.3 Go Ahead - The Zonal Medical Warehouse Intervention Project (Proposed Project) Option

The project, when fully upgraded and functional will not only create up to 1000 jobs, which will reduce poverty and hunger among those to be employed but will promote efficiency in the distribution and storage of pharmaceuticals products. The project will also be self-sustaining as it is expected to generate revenue from the provision of warehousing and distribution services vis-à-vis the profit from the sale of essential medicines under the drug revolving fund scheme. The employment generation will reduce youth restiveness, arm banditry and kidnapping among other social vices in Sokoto.

This alternative involves a lot of construction work, along with the associated positive and negative impacts. The essence of a project of this nature is to ensure that activities are undertaken in a way that minimizes the negative impacts of the project while enhancing the positive impacts. To this end, there is a need to ensure any activity that can result in negative impacts on the environment (biophysical and socio-economic) are identified and mitigating measures planned for each negative impact.

2.8 Envisaged Sustainability

The envisaged sustainability of the proposed ZMW project will be discussed under Environmental, Technical, Economic, and social basis.

2.8.1 Environmental Sustainability

The project's activities shall be followed through as guided by National and International environmental regulatory guidelines and standards. Also, the Environmental and Social

Management Plan (ESMP) as drawn up and contained in this ESIA document shall be implemented from the construction to the operation phase of the proposed project to guarantee its environmental sustainability. Finally, a project specific waste management plan shall be put in place. The plan shall evaluate the waste streams and prescribe specific sustainable waste management approaches.

2.8.2 Technical Sustainability

The technical sustainability of the proposed project stems from the application of best available technology (BAT). Also, strict adherence to International best practices and relevant engineering codes of practices for the construction of the proposed project. The Best Available Technology and Design not entailing excessive cost shall be adopted to increase the Lifespan of the Project.

2.8.3 Economic Sustainability

The proposed ZMW project shall promote business opportunities and enhance the distribution of drugs within the State and beyond. In addition, the project has local and national economic values in terms of employment opportunities for various categories of Nigerian professionals, skilled and semi-skilled craftsmen, business opportunities and additional revenue for the government.

2.8.4 Social Sustainability

The Sokoto State Government shall set up a robust Memorandum of Understanding detailing issues about Corporate Social Responsibilities, employment, compensation for land, affected farms among other to the Project Host Community. Furthermore, the project will bring about huge infrastructural benefits to the host community(ies) such as good roads, electricity, water, modern healthcare facilities, just to mention a few. All these will engender the social sustainability of this project.

There shall be Grievance Redress Mechanism in place in line with Global Best Practice and Consultation with Host Communities and Relevant Regulators shall be throughout the project's lifespan.

CHAPTER THREE
PROJECT DESCRIPTION

3.1 General

The proposed project will involve the construction and operation of a warehouse that will serve as a storage facility for medicines and other health care products. 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.

3.2 Project Objectives

The overall project development objective is to ensure regular health commodity supply to service delivery points in the Northwest states for the public health programs and provision of sustainable drug revolving fund scheme in Sokoto state.

The project specific objectives are.

- To establish zonal medical warehouse for the provision of integrated warehousing and distribution services of health commodities for both public and private sector.
- To revitalize the Sokoto state drug revolving fund scheme as a sustainable way of ensuring continuous availability of health commodities in both public and private health facilities in the state.
- Operationalize the Sokoto State Drugs and Medical Supplies Management Agency in line with the National Strategic Supply Chain Development Plan 2021-2026; and
- To increase the competitiveness and business environment of the Nigerian pharmaceutical sector, through the provision of hard and soft infrastructure that would allow the crowding-in of private investment into the sector, both at the upstream and downstream axes of the value chains. The project interventions would lead to improved job creations amongst the youth, value addition, market access and private sector investment.

3.3 Nature of the Project and Phases of Activities

The establishment of the Zonal Medical Warehouse is going to involve.

- Construction of 1 No. 3-Bay WIB and 1 No. 2-Bay WIB with a total capacity of 42,808.5m^3 for the provision of adequate warehousing space for public health commodities for distribution to HF in the Northwest region and essential medicines for the DRF scheme in Sokoto state.
- Procurement of 3 No. 20 Tones and 7 No. 10 Tones Pharma-grade vehicles for delivery of health commodities to the last mile.
- Procurement of seed stock of essential medicines worth 2m USD for the DRF scheme.
- Construction of 5 No. rooms self-contained driver's lodge; and
- Printing of DRF NHLMIS tools for supply chain operations in the state.

Generally, the proposed project will involve the construction and operation of a medical warehouse that will serve as a storage facility for medicines and other health care products.

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.

The Project has four broad components:

Component 1– Support the development of enabling infrastructure and management of health commodity supply chain in Nigeria.

This includes activities such as:

- Construction and management of zonal pharma-grade warehouses for storage of public health commodities. The warehouses would provide adequate storage space for public health commodities and essential medicines and would serve as a hub for supply chain activities thereby creating jobs. The hub would offer associated public economic infrastructure, logistics and specialized facilities and services (e.g., cold-chain facilities, quality control laboratory, pharmaceutical waste management, innovative delivery of health commodities with drones for delivery to hard-to-reach areas, inventory management using electronic inventory Management software etc.) required for health supply chain management.

- Provision of enabling infrastructure for value chain development. These will include provision of drivers' lodge, lecture halls, meeting rooms and pharma-grade delivery vehicles of different capacities; and

- Support Private Sector engagement in management and operation of Warehouse-In-A-Box through an MoU.

Component 2 –Enhance the provision of health commodity at public health facilities and increase the performance DRF scheme in Nigeria which include activities such as.

- Review and printing SOPs for the Operations of the Warehouse-In-A-Box and Guidelines for DRF operations.
- Support the operations of the Northwest regional warehouse, state warehouses and establishment of the 2 state zonal stores for DRF operations in the future.
- Support the operations and performance of the DRF scheme in the state; and
- Facilitate Community engagement through creating awareness and promoting community ownership of the DRF scheme in the state.

Component 3 –Support Institutional Capacity Development.

This will include:

- Technical assistance and capacity building for staff at the state, LGAs and HFs level in the state.

- Enabling conducive environment and provision of relevant Incentives to support the implementation of the DRF scheme and warehouse operations.

Component 4 - Project Coordination and Management. This will include:

Enabling institutions, policy, regulatory and business environment framework for health supply chain management and supporting the establishment of structures required for project implementation and coordination through the implementation of the following:

- The adoption/ strengthening of enabling Policy, Legislation and Regulation for Health Commodity Supply Chain.
- Set up of the Project Implementation Unit; and
- Development of monitoring and evaluation framework

3.4 Phases of Intervention Works:

The proposed project scope of work can generally be divided into three phases,namely:

1. Pre-construction phase.
2. Construction phase; and,
3. Post-construction (maintenance) phase.

3.4.1 Pre-construction Phase

This involves preparation of this ESMP, site surveying for the purpose of land acquisition, budget, planning etc.

Land Surveying

This action was necessary to establish the spatial boundary and the topographic or elevation of the site. Land survey services provide vital support to the construction phase of the projects, most importantly through construction staking. This crucial step can influence whether a project is completed on budget, on time and free from errors.

Plate 3.1: Site Surveying

Design of the Project

In general, the design of the project will tend to essentially optimise the use of best available technology to prevent or minimize potentially significant environmental impacts associated with the project and to incorporate efficient operational controls together with trained staff, to ensure high level business and environmental performances. The project will involve the development of construction and operations of a zonal medical warehouse facility. The other components of the proposed project are discussed in the subsections below.

Procurement Arrangements

Procurement of goods, works and the acquisition of consulting services, financed by the Bank for the project, will be carried out in accordance with the "Procurement Policy and Methodology for Bank Group Funded Operations" dated October 2015. The various items under different expenditure categories and related procurement arrangements will be firmed up at appraisal, including assessment of the capacity and staffing gap of the PCU. Further assessment of the capacity and staffing gap of the PCU will be undertaken at Appraisal to further determine their capacity to undertake procurement in accordance with Bank's Rules and Procedures.

Sourcing and Transportation of Building Materials

Building materials already in use and those to be supplied later are transported to the project site from their extraction, manufacture, or storage points using transport trucks. These are and will continuously be sourced from Sokoto state. Greater emphasis will be laid on procurement of building materials from within the local area, which will make both economic and environmental sense as it will reduce negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles.

Storage of Materials

Building materials are stored on site. Bulky materials such as rough stones, ballast, sand, and steel are carefully piled on site. To avoid piling large quantities of materials on site, the proponent ensures that ordering of bulky materials such as sand, gravel and stones is done in bits. Materials such as cement, paints and glasses among others are stored in temporary storage structures, within the project site.

3.4.2 Construction Phase

This phase cut across the construction and management of zonal pharma-grade warehouses for storage of public health commodities. This will involve some civil construction, Electrical and equipment Installation etc,

Excavation Works

Excavated materials must carefully be disposed of appropriately at the beginning of the work. Other solid wastes, generating from the works can be reused for refilling, other construction works or if not reusable or be summarily disposed of appropriately by a licensed waste disposal company.

Masonry, Concrete Work and Related Activities

The construction of the building walls, foundations, floors, pavements, drainage systems, perimeter fence and parking area among other components of the project involve a lot of masonry work and related activities. General masonry and related activities include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery such as concrete mixers.

Structural Steel Works

The building is reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding, and erection.

Roofing

Roofing activities will include raising the roofing materials such as tiles and structural timber to the roof and fastening the roofing materials to the roof.

Electrical work

Electrical works during construction of the premises include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

Plumbing

Installation of pipe-works for water supply and waste distribution will be carried out within the blocks, factory, and the associated facilities. Drainage of storm water from the rooftops into the peripheral storm water drainage system will be done as well. Plumbing activities will include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others.

Landscaping

To improve the aesthetic value or visual quality of the site once construction ceases, the proponent will carry out landscaping. This may include establishment of flower gardens and grass lawns and will involve replenishment of the topsoil. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping.

3.4.3 Post-Construction (Operations & Maintenance) Phase

Routine visual inspection and maintenance of the medical warehouse and periodic audit which is expected to be conducted on the procured vehicles and other enabling infrastructure.

Occupation

Numerous companies and individuals will acquire the available lettable spaces within the proposed project once their construction is complete. Several commercial and domestic activities such as cooking, washing, use of vehicles will thus accompany occupation. In addition, there will be production of some industrial and sanitary wastes.

Atmospheric Emissions

Gaseous Emissions will primarily result from the combustion of power plant during operation phase. The suspended particles will also be generated during the construction phase.

General Repairs and Maintenance

The proposed facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of leaking water pipes, painting, maintenance of flower gardens and grass lawns, and replacement of worn-out materials among others.

Electrical Work

Electrical work during construction will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

Sources of Power

The power generated from the solar power plant will be transmitted through a 330kV transmission line to the national grid. Same source that supplied the Sokoto International Airport.

Traffic Management

A combination of measures that preserve traffic flow and improve the security, safety and reliability of the overall road transport system will be adopted. These measures make use of Intelligent Transport System (ITS), services and a day-to-day operation that monitors traffic performance.

Manpower Prerequisite

The establishment, construction and development of the project would require at least one prime contractor and multiple subcontractors. The project contractor will work closely with the host communities to identify and maximize sourcing of skilled, semi-skilled and unskilled workers from the communities. Approximately 50 workers would be employed during the peak of the construction period which is expected to last about 6 months. The contractor would provide and maintain a detailed schedule throughout the construction period with construction of the project progressing in an orderly fashion from one end of the project to the other, with each activity taking place sequentially.

Solid Waste and Wastewater Management

The proponent will provide facilities for handling solid waste generated within the facility. These will include dustbin cubicles for temporarily holding waste bins or exhaustible toilets within the premises before final collection and disposal by appropriate contracted firm. Sewage generated from the ZMW will be discharged, while storm water from the project area will be channelled into the created storm water drainages along the boundaries as will be designed by the architect other involved designers and engineers.

Solid Waste

This will include concrete debris, steel cutting and shaping generated wastes such as scrap metals from steel plate cutting and shaping, as well as woods. Welding work will produce used welding rods. Scrap metal and welding rods poses no inherent environmental hazards and can be recycled. However, spent abrasive and paints may be toxic depending on the characteristics of the unwanted coating. Maintenance wastes (oil & fuel/diesel filters, wires etc) generated shall be collected in designated bins and transported to recycling plants.

Liquid Waste

Wastewater and liquid wastes are constantly released from residential sources in the form of blackwater, or wastewater from toilets, and greywater from non-residential commercial sources such as commercial spaces, industries, and hospitals. Wastewater and stormwater contain a surprising number of pollutants that can affect the quality of life of humans and animals, as well as the environment.

3.5 Health Safety and Environment Policy Statement

To meet the requirements, this policy:

- The Contractor and third party shall vigorously pursue all accident prevention programs through a well-structured and effective HSE Management System.

- HSE Management will be given same attention and proper importance as other areas of the business and this obligation shall not be hampered by cost considerations.
- The Contractor and third party shall dedicate total support and compliance to work by obeying Codes of conduct, Standards and Statutory regulations applicable to all its operations
- The Contractor and third party shall Protect the environment and promote the health of its work force as well as to conduct its activities in such a manner not to adversely affect any third parties.
- The Contractor and third party shall suspend work when it is believed that essential safety systems are not in place.
- The Contractor and third party shall ensure that the Health, Safety and Security of all, is not jeopardized through act(s) of omission or commission.
- HSE performance will be included in the appraisal of all workers and appropriate incentives/rewards developed.
- The Contractor and third party shall imbibe a culture in which all workers share in HSE commitment and leadership.

3.6 Project's Decommissioning Activities

Once all the waste resulting from demolition and dismantling works will be removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species. All waste generated during this process will be managed in lines with the Lagos State waste management board.

3.7 Project Timeline

The shopping mall is proposed to commence operation in June 2024 with construction phase expected to last for three (3) years provided no hiccups are experienced along the way. The project schedule is attached as Table 3-1.

Table 3-1: Proposed Project Timeline

	TIME (MONTHS)																				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
	2021				2022				2023				2024				2025				
Preliminary Works																					
EIA Approval																					
Mobilization																					
Site clearing & temporary site set up																					
Land Civil Works																					
Buildings, Storages, infrastructures etc																					
Utilities (Water supply, Power supply, Sewage, Lighting)																					
Mechanical, Electrical & Instrumentation Works																					
Installation of handling & lifting system																					
Installation of cranes																					
Electrical works																					
Instrumentation Works																					
Pre-commissioning																					
Commissioning																					

CHAPTER FOUR
THE EXISTING ENVIRONMENTAL CONDITION

4.1 Preamble

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

4.2 Study Approach

The baseline status of the project area was obtained through review of relevant literature and a one wet 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 in September 2021to 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	Lat	Long
SS1	Air Quality/Noise	5^0 11’ 54.85”E	12^0 57’ 78.74”N
SS2	Air Quality/Noise	5^0 11’ 53.23”E	12^0 57’ 78.63”N
SS3	Air Quality/Noise	5^0 11’ 58.61”E	12^0 57’ 9.04”N
SS4	Air Quality/Noise	5^0 11’ 50.50”E	12^0 57’ 8.04”N
SS5	Air Quality/Noise	5^0 11’ 52.01”E	12^0 57’ 7.26”N
SS6	Air Quality/Noise	5^0 11’ 53.87”E	12^0 57’ 7.86”N
SS7	Air Quality/Noise	5^0 11’ 54.66”E	12^0 57’ 6.89”N
BH	Borehole water	5^0 11’ 46.86”E	12^0 57’ 5.84”N
Ctrl 1	Air Quality/Noise	5^0 11’ 53.24”E	12^0 57’ 6.84”N
Ctrl 2	Air Quality/Noise	5^0 11’ 50.82”E	12^0 57’6.69”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. The Laboratory is in Port Harcourt, Rivers State. Sampling was designed to comprehensively capture all the ecological and socio-economic components peculiar to the study area. The design involved the following:

A total of 9 soil samples including controls samples were collected from the field.

- A total of 9 air/noise samples including controls samples were collected from the field.
- One groundwater sample was collection from an existing borehole at the school.
- Biodiversity studies across the study area.
- Socio-economic study of the immediate host communities.

Figure 4-1: Sampling Map of the Study Area

Plate 4-1: Soil and Air/Noise Sampling

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.
- 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.

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.

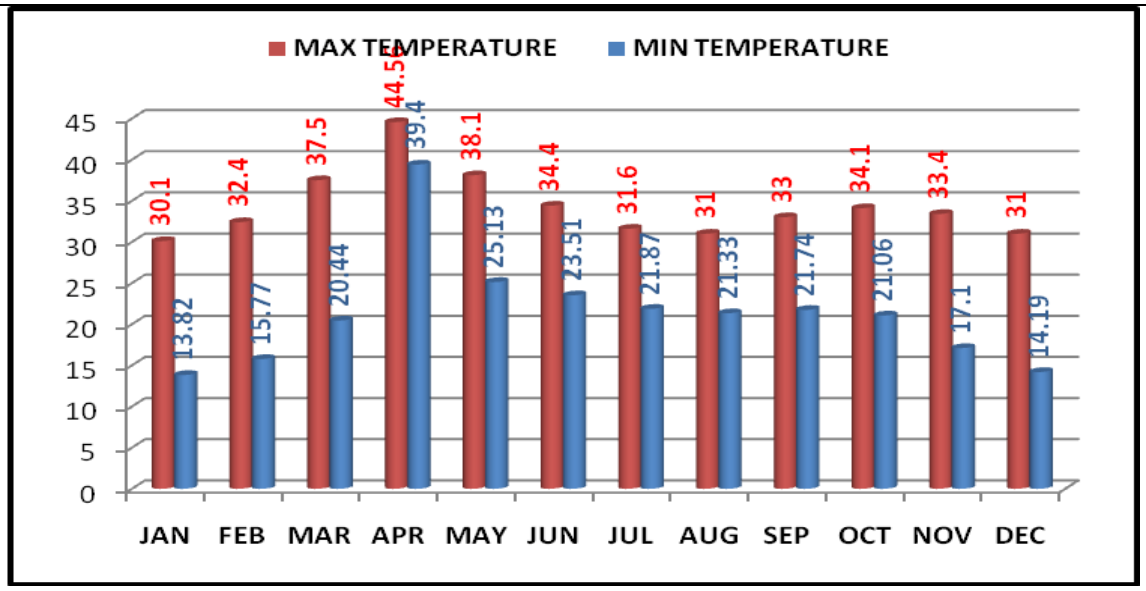
The project area is within the tropics, it is dominated by two contrasting seasons, the dry and wet (rainy) seasons. The two season regimes are dependent on the two prevailing air masse blowing across the country at different times of the year, the south-westerly humid maritime air mass blowing from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

Sunshine

The mean daily sunshine for the months of the year in the project area is between eight (8) and ten (10) hours in the dry season and six (6) and nine (9) hours in the wet season (Federal Surveys, 1978). The study area experiences a mean annual sunshine of 3,048 hours, which represents (31 %) of maximum possible amount of sunshine in the environment. The lowest values of sunshine are recorded in July (about 6 hours) and August (about 7 hours) due to greater amount of cloudiness in the sky (Federal Surveys, 1978).

Temperature

The maximum and minimum temperatures recorded for Sokoto by the Nigerian Meteorological Agency (NIMET) is shown in Figure 4-2 below.



Source: Nigerian Meteorological Agency (NIMET), 1980 -2019

Figure 4-2: Mean Monthly Maximum and Minimum Temperatures

As shown in Figure 4-2 above, the highest mean maximum temperature was recorded during the month of April (44.5°C) while the lowest mean maximum temperature value was recorded in August (31°C). The highest mean minimum temperature value recorded was 39.4°C in April and the lowest was 17.1°C in November.

Atmospheric Pressure

Pressure is the weight of air on the ground. Variations in atmospheric pressure are closely related to air temperature, water vapour content and vertical and horizontal air movements. Cool or cold air subsides; increasing its pressure on the air and the earth beneath it, but warm air expands and rises relative to its surroundings, thus decreasing pressure locally. The highest mean monthly atmospheric pressure was recorded during the month of January while the lowest mean atmospheric pressure value was recorded in April.

Wind Conditions

The most prevalent winds in Nigeria are the north-westerly and south-easterly winds. The former is dominant towards the beginning and end of the dry season while the latter predominates in the peak of the rainy season. These winds are due to the advancement of the Maritime Tropical Air Mass, an extension of the St Helena Anticyclone, and its retreat/replacement by the Continental Air Mass (Sahara) from the North African Anticyclone, with the onset of the dry season (Oguntoyinbo and Dereck, 1987). Winds speed of up to 7.2 metres/second (m/s) and

above were recorded in January, April, May, June, and July for the period, 1980 to 2010. The lowest wind speed recorded (4.6m/s) was in the month of November.

Relative Humidity

Relative humidity is the ratio of the amount of water vapour in the air at a specific temperature to the maximum amount that the air could hold at that temperature, expressed as a percentage. For example, a reading of 100 percent relative humidity means that the air is totally saturated with water vapour and cannot hold any more, creating the possibility of rain. Relative humidity is higher in the wet season than the dry season because of rainfall caused by precipitation of vapour in the atmosphere. The least mean (10.0%) monthly relative humidity was recorded in the month of March while the highest recorded mean monthly relative humidity (61.0%) was in August.

Rainfall

Rain forms because of uplift of the air, thus leading to condensation of water vapour and the creation of cloud, from which the water droplets fall. Some causes of uplift are convection due to the heating of the ground, or the forced ascent of moist air over high ground. Mean monthly rainfall recorded in Sokoto was zero in the months of January, February, March, November, and December and highest in the month of August (214.8mm).

4.3.2 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 (CO_2, SO_X, SPM, NH_3, VOC, NO_X, CH_4, and H_2S) 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 study area are presented in Table 4-2 while detailed analytical results are included in Appendix 2.

Table 4-2.: Summary of Air Quality For Construction Of Medical Warehouse Facility

Parameter/unit	Min	Max	Mean	Control	Fertilizer Blending Plant Project EIA, 2021	FMEnv Limits (Daily Average) **
Noise level, d(B) A	42.10	48.10	45.10	41.00	47.34	90
SO_X, µg/m^3	<0.01	<0.01	<0.01	<0.01	0.89	26
NOx, µg/m^3	<0.01	<0.01	<0.01	<0.01	NA	75-113
SPM µg/m^3	8.00	17.00	12.50	12.00	50	250
NH_3, µg/m^3	<0.01	<0.01	<0.01	<0.01	0.7	0.13
CH_4 µg/m^3	<0.01	<0.01	<0.01	<0.01	NA	0.01
CO µg/m^3	<0.01	0.08	0.04	0.02	2.13	11.4
H_2S, µg/m^3	<0.01	<0.01	<0.01	<0.01	0.01	0.01
Air Temp (ºC)	33.14	36.04	34.59	35.53	NA	NA
Wind Speed (m/s)	<0.01	0.07	0.035	0.03	NA	NA
Relative Humidity (%)	32.90	43.80	38.35	43.55	NA	NA

Source: Field work, 2021. NA: Not Applicable

Suspended Particulate Matter

These are finely divided particles (solid and liquid) of 0.01 to over 100 microns in diameter, suspended in ambient air. These particles existing above tolerable limit in the atmosphere can initiate a variety of respiratory diseases (bronchitis, emphysema, and cardiovascular diseases). Also, fine particulates may cause cancer and aggravate morbidity and mortality from respiratory dysfunctions. The SPM levels in the study area ranged from 8.0µg/m^3 to 17.0 µg/m^3 with a mean value of 12.5 µg/m^3 during the sampling period which compared well with the control. Values were also below the regulatory limit of 250µg/m^3 and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless, and tasteless gas produced by the in complete combustion of carbonaceous materials or fossil fuels – gas, oil, coal and wood. Adverse health effect has been observed with carbon monoxide concentrations of 12 – 17ppm for 8 hours while prolonged (45 minutes to 3 hours) exposure to concentrations of CO between 200ppm and 800ppm often results in severe headache, dizziness, nausea, and convulsions. The recorded level of CO ranged from 0.01µg/m^3 to 0.08µg/m^3 with a mean value of 0.04 µg/m^3 during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of 11.4µg/m^3 and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Hydrogen Sulphide

Hydrogen sulphide is a chemical compound with the formula H_2S. It is a colourless gas with the characteristic foul odour of rotten eggs; it is heavier than air, very poisonous, corrosive, flammable, and explosive. Hydrogen sulphide often results from the bacterial breakdown of organic matter in the absence of oxygen gas, such as in swamps and sewers; this process is commonly known as anaerobic digestion. H_2S also occurs in volcanic gases, natural gas, and in some sources of well water. It is also present in natural halite type rock salts. Hydrogen sulphide occurs naturally and is also produced by human activities. Just a few breaths of air containing high levels of hydrogen sulphide can cause death. Lower, longer- term exposure can cause eye irritation, headache, and fatigue. It is also produced by human and animal wastes. Bacteria found in your mouth and digestive tract produce hydrogen sulphide during the digestion of food containing vegetable or animal proteins. Hydrogen sulphide can also form from industrial activities, such as food processing, coke ovens, paper mills, tanneries, and petroleum refineries. H_2S was generally below detectable level of $<0.01\mu g/m^3$ in the study area during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of $<0.01\mu g/m^3$ and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Sulphur Oxides

SO_x are the group formula for oxides of sulphur such as SO and SO_2 which usually occur as both primary and secondary air pollutants. Power plants and other equipment that burn fossil emit these species as primary pollutants. In addition, biological decay processes and some industrial sources emit H2S which is oxidized to form the secondary pollutant, SO_2. The combustion of fossil fuels containing sulphur yields SO2 in direct proportion to the sulphur content of the fuel.

The primary threat of SO2 to urban atmosphere may arise not from SO_2 itself but from the changes it undergoes in the atmosphere such as the formation of sulphuric acid (H_2SO_4), a reaction which is catalysed by particulate matter, and the formation of sulphate aerosols. SO_2 can also be absorbed on small particles such as the salts of iron, manganese and vanadium present in the atmosphere and thus enter the alveoli of the lungs. SO_x were generally below detectable level of $<0.01\mu g/m^3$ in the study area during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of $26\mu g/m^3$ and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Nitrogen Oxides

Nitrogen oxides (NO_x) consist of nitric oxide (NO), nitrogen dioxide (NO_2) and nitrous oxide (N_2O) and are formed when nitrogen (N_2) combines with oxygen (O_2). Their life spans in the atmosphere range from one to seven days for nitric oxide and nitrogen dioxide, to 170 years for nitrous oxide. Nitric oxide has no colour, odour, or taste and is non-toxic. In the air it is rapidly

oxidized to nitrogen dioxide. Nitrogen dioxide is a reddish-brown gas with a pungent, irritating odour. It absorbs light and leads to the yellow-brown haze sometimes seen hanging over cities. It is one of the important components of smog. Nitrous oxide is a colourless, slightly sweet-smelling, non-toxic gas which occurs naturally in the atmosphere. Man-made nitrous oxide is used as the anesthetic commonly called "laughing gas". Nitrogen oxides occur naturally and are produced by man's activities. In nature, they are a result of bacterial processes, biological growth and decay, lightning, and forest and grassland fires. The primary source of man-made nitrogen oxides is from the burning of fossil fuels. Of the nitrogen oxides emitted, most is nitric oxide, some is nitrous oxide and less than 10 per cent is nitrogen dioxide. The amount of nitrogen dioxide emitted varies with the temperature of combustion as temperature increases so does the level of nitrogen dioxide. Agriculture also plays a role in nitrogen oxide emissions with the use of fertilizers contributing nitrous oxide to the atmosphere.

NO_x was generally below detectable level of <0.01µg/m^3 in the study area during the sampling period. These obtained values compared well with control readings. Values were also below the regulatory limit of 75µg/m^3 and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Ammonia

Most people are exposed to ammonia from inhalation of the gas or vapors. Since ammonia exists naturally and is also present in cleaning products, exposure may occur from these sources. The widespread use of ammonia on farms and in industrial and commercial locations also means that exposure can occur from an accidental release or from a deliberate terrorist attack. Ammonia interacts immediately upon contact with available moisture in the skin, eyes, oral cavity, respiratory tract, and particularly mucous surfaces to form the very caustic ammonium hydroxide. Ammonium hydroxide causes the necrosis of tissues through disruption of cell membrane lipids (saponification) leading to cellular destruction. As cell proteins break down, water is extracted, resulting in an inflammatory response that causes further damage.

NH_3 was generally below detectable level of <0.01µg/m^3 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/m^3 and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

4.3.3 Noise Level

Noise is a periodic fluctuation of air pressure causing unwanted sound. Apart from causing disturbance to the affairs of man, long term exposure to excessive noise can damage health and have psychological effects. The effects of noise on residents generally relate to the annoyance/nuisance caused by the short- and long-term high noise levels. Also, disturbance to wildlife is significant especially during breeding seasons and/or when rare species are present.

The rate at which these fluctuations of air pressure occur is the frequency, expressed in hertz (cycles per second). The range of sound pressures encountered is very large and to keep numbers in manageable proportions, noise levels are measured in decibels (dB), which have a logarithmic scale. Most legislation and measurements refer to the 'A' frequency weighting, dB (A) which covers the range audible to the human ear. A 10dB (A) increase typically represents a doubling of loudness.

Noise levels are usually altered with the introduction of power plants. The regulatory limit for noise provided by the FMENV is specific to the workplace (90dB (A)). However, noise due to construction of the power plant infrastructure and associated facilities is expected to rise. Hence, the WHO Guidelines for Community Noise have been provided in Table 4-3 as a benchmark for noise levels in areas other than the workplace. oise levels in the study area ranged from 42.1 d(B) to 48.1 d(B) with a mean value of 44.41 d(B) during the sampling period which compared well with the control. Values were also below the regulatory limit of 70 d (B) and compared well with readings from a previous study (Fertilizer Blending Plant Project EIA, 2021).

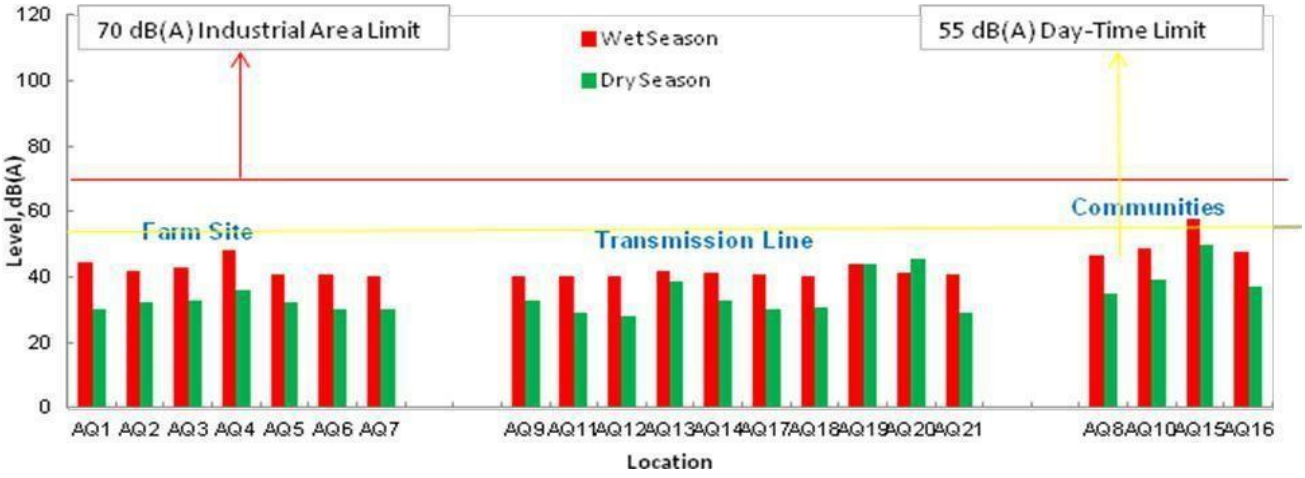


Figure 4-3: Noise Level in Air. Source: Fieldwork, 2021

Table 4-3: WHO Guidelines for Community Noise

Specific Environment	Critical health effect(s)	LAeq(dB)	Time base (hours)	LAmax, fast (dB)
Outdoor living area	Serious annoyance, daytime a n d evening Moderate annoyance, daytime, and evening	55 50	16 16	- -
Dwelling, indoors Inside bedrooms	Speech intelligibility and moderate annoyance at daytime and evening. Sleep disturbance at night-time	35 30	16 8	 45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School classrooms and pre-	Speech intelligibility, disturbance of	35	During class	-

Specific Environment	Critical health effect(s)	LAeq(dB)	Time base (hours)	LAmax, fast (dB)
schools, indoors	information extraction, message communication			
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. Sleep disturbance at daytime and evenings.	30 30	8 16	40
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
Public addresses, indoors and outdoors	Hearing impairment	85	1	110
Music through headphones/earphones	Hearing impairment (Free-field value)	85#4	1	110
Impulse sounds from toys, fireworks, and firearms	Hearing impairment (adults) Hearing impairment (children)	-	-	140#2 120#2
Outdoors in parkland and conservation areas	Disruption of tranquillity	#3		

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

4.3.4 Geology /Hydrogeology

Investigation of groundwater resources of Sokoto State of Nigeria shows existence of prolific aquifers of high yield in the different parts of the State. Generally, the groundwater emanates from Gwandu, Wurno, Taloka and Kalambaina 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.

4.3.5 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.

4.3.6 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 medical warehouse facility were collected from the study area. Measurements were taken during the wet season. Physico-chemical properties of groundwater samples collected from underground sources within the study area are presented in Table 4-4 while detailed analytical results are included in Appendix 2. – Analytical results and change of custody

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

Parameters	Min	Max	Mean	Fertilizer Blending Plant Project EIA, 2021	FMEnv. Standard
pH	7.50	7.89	7.70	7.7	6-9
TEMP (^{0}c)	28.18	28.60	28.39	28.55	<40
COND (µs/cm)	166.00	185.00	175.50	252	1000
TDS (mg/l)	131.00	142.00	136.50	84	2000
DO (mg/l)	4.17	4.55	4.36	8.29	2-8
TSS mg/l	0.33	0.41	0.37	0.00555	30
Turbidity, NTU	5.10	6.00	5.55	0.65	5
BOD (mg/l)	0.56	1.45	1.00	21.2	7.5
COD (mg/l)	1.16	3.16	2.16	106.45	30
Organic					
THC (mg/l)	<0.001	<0.001	<0.001	NA	NA
Nutrient					
Nitrate (mg/l)	1.17	1.20	1.19	4.625	<1
Sulphate (mg/l)	35.01	55.00	45.01	11.745	500

Parameters	Min	Max	Mean	Fertilizer Blending Plant Project EIA, 2021	FMEnv. Standard
Ammonium (mg/l)	<0.001	<0.001	<0.001	0.0045	10
Phophate (mg/l)	0.27	0.41	0.34	0.112	5
Heavy Metals					
Nickel (mg/l)	<0.001	<0.001	<0.001	0.05	<1
Iron (mg/l)	1.02	2.02	1.52	0.82	1.5
Lead (mg/l)	<0.001	<0.001	<0.001	0.0055	<1
Copper (mg/l)	<0.001	<0.001	<0.001	0.1705	<1
Chromium (mg/l)	<0.001	<0.001	<0.001	<0.001	<1
Zinc (mg/l)	<0.001	<0.001	<0.001	1.562	3
Cadmium (mg/l)	<0.001	<0.001	<0.001	0.0455	<1
Barium (mg/l)	<0.001	<0.001	<0.001	NA	NA
Cobalt (mg/l)	<0.001	<0.001	<0.001	NA	NA
Arsenic (mg/l)	<0.001	<0.001	<0.001	NA	NA
Mercury (mg/l)	<0.001	<0.001	<0.001	NA	NA
Cations					
Potassium (mg/l)	2.00	2.01	2.01	NA	NA
Sodium (mg/l)	3.22	5.25	4.23	NA	NA
Magnesium (mg/l)	4.01	5.01	4.51	119.84	NA
Calcium (mg/l)	1.03	3.02	2.03	308.16	NA
Microbiology					
Coliforms	1.00	4.00	2.50	6.6	<1
E. coli	0.00	0.00	0.00	NA	absent
Faecalstreptacocci	absent	absent	absent	NA	absent
Straphylococcociaureus	absent	absent	absent	NA	absent

Source: Field work, 2021. NA: Not Applicable

Physico-Chemical Characteristics

pH mean value was 7.70 (7.50-7.89) for the underground water samples collected within the study area. These values are tending towards alkalinity and are within the stipulated limits by FMEnv. Conductivity and TDS mean values were 175.5µS/cm and 136.5mg/l respectively. These values complied well with stipulated limits by FMEnv. The mean value recorded for Total Suspended Solids was 0.37mg/l while the value recorded for turbidity was 5.55NTU in the 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).

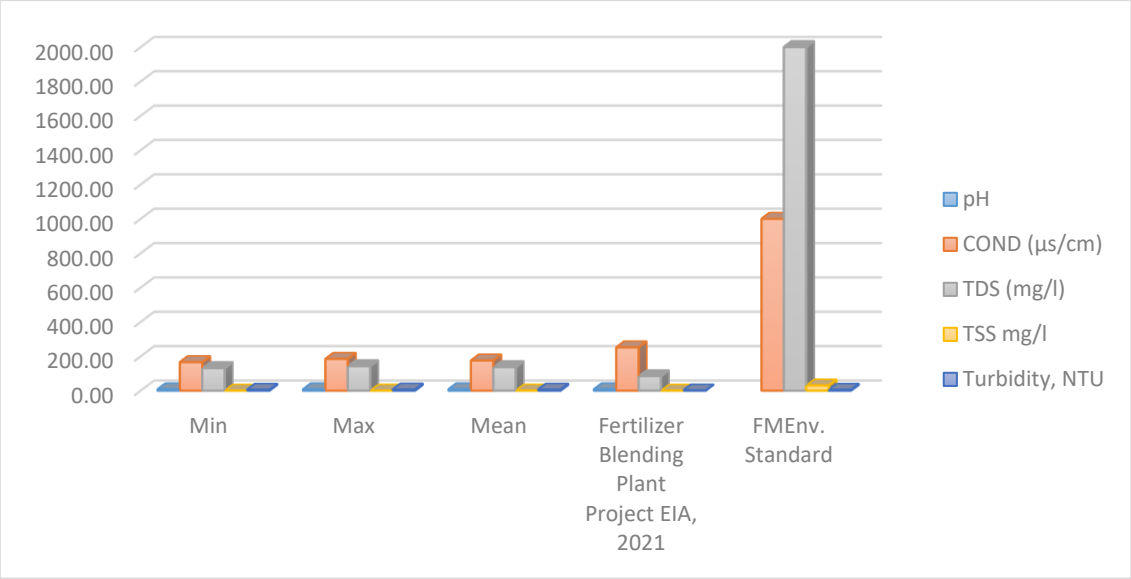


Figure 4-4: pH, Conductivity, Total Dissolved Solids, Total Suspended Solids and Turbidity Levels in Ground water. Source: Fieldwork, 2021.

DO, BOD and COD in Groundwater

The Dissolved Oxygen, Biological Oxygen Demand and Chemical Oxygen Demand mean values obtained in samples collected for the medical warehouse facility were 4.36mg/l, 1.00mg/l and 2.16mg/l respectively. 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).

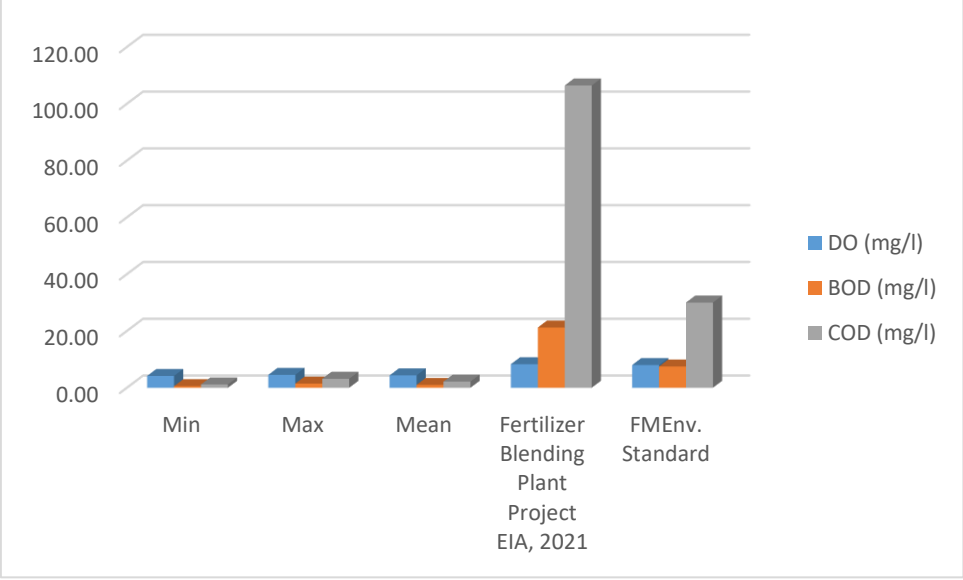


Figure 4-5.: DO, BOD and COD Levels in Ground water. Source: Fieldwork, 2021

Total Hydrocarbon Content (THC) in Groundwater

The THC analysed from the ground water samples in the proposed 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 in Groundwater

From the Table 4-3, the concentration of sulphate accounted for the larger part of the nutrient content with mean value of 45.0mg/l. The order of nutrient concentration present in the samples for the facilities are Sulphate >Nitrate>Phosphate> Ammonium.

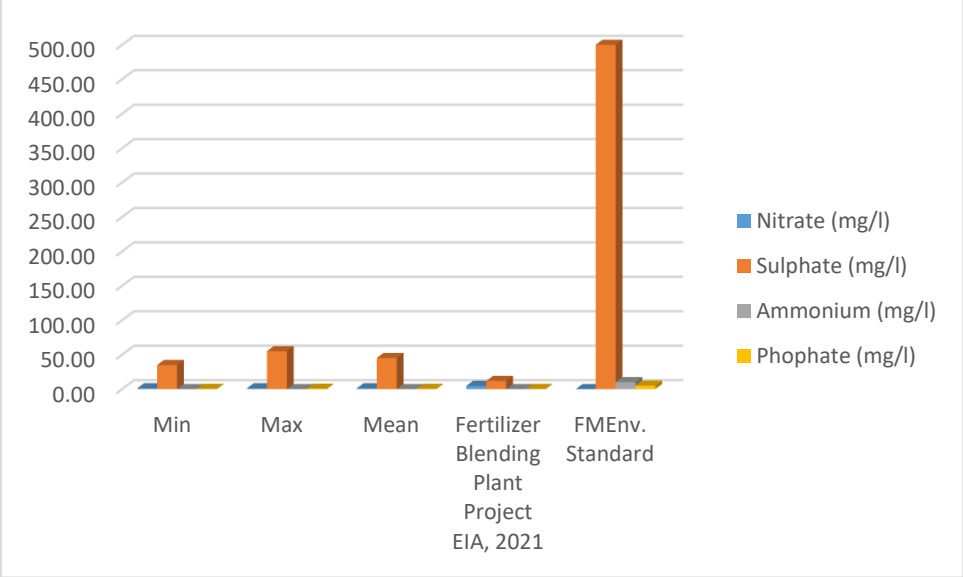


Figure 4-6.: Nutrients Levels in Ground water. Source: Fieldwork, 2021

Cations in Groundwater

From the Table 4-3, the concentration of magnesium accounted for the larger part of the cations content with a mean value of 4.51mg/l (35.01mg/l-55.00mg/l). The order of cations concentration present in the samples for the facilities are Magnesium>Sodium>Calcium> Potassium.

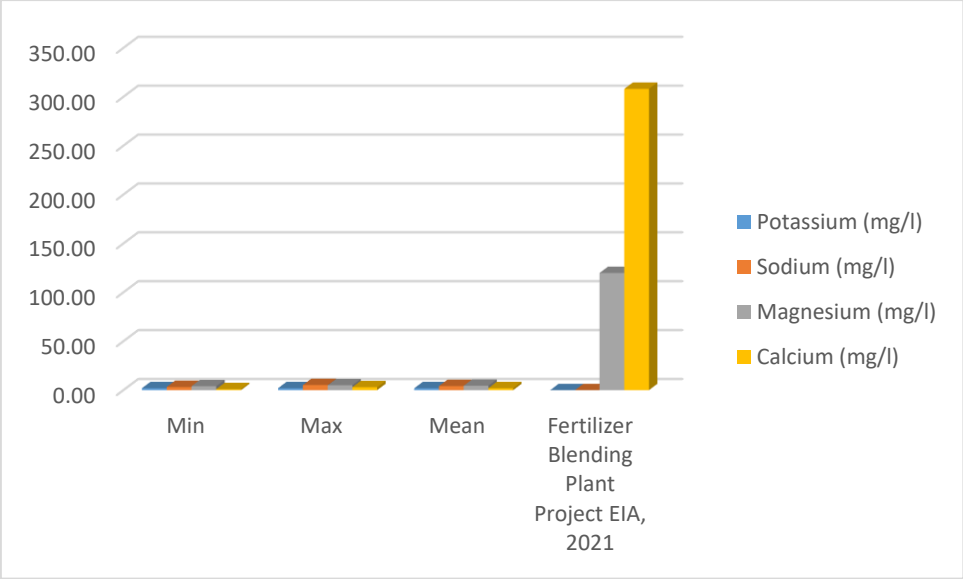


Figure 4-7: Cations Levels in Ground water. Source: Fieldwork, 2021

Heavy Metals in Groundwater

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 an average concentration of 1.52mg/l (1.02mg/l-2.02mg/l) in samples collected. In all, the heavy metals results were below FMEnv limits for heavy metals and were also below values obtained from a previous study (Fertilizer Blending Plant EIA, 2021).

Groundwater Microbiology

The results of microbial counts in underground water samples collected in the project area are presented in Table 4-3, where values were all below equipment detection limit except for coliforms count where an average count of 2.50 was obtained.

4.3.7 Soil Physico-Chemical Characteristics

Soil samples of the proposed project sites were collected for the medical Warehouse facility area. 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.

Soil pH

Soil pH or soil reaction is an indication of the acidity or alkalinity of soil and is measured in pH units. Soil pH is defined as the negative logarithm of the hydrogen ion concentration. The pH scale goes from 0 to 14 with pH 7 as the neutral point. As the amount of hydrogen ions in the soil

increases, the soil pH decreases thus becoming more acidic. From pH 7 to 0 the soil is increasingly more acidic and from pH 7 to 14 the soil is increasingly more alkaline or basic.

pH of the soil sampled were generally varying from basic to moderately acidic. At the study area, it ranged from 7.01 to 8.18 with a mean value of 7.33 at the topsoil and between 6.17 and 7.29 with a mean value of 6.78 at sub soil. All obtained values compared well with values from a previous study (Fertilizer Blending Plant Project EIA, 2021).

Total Organic Carbon in Soil

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. Indicates that at the medical warehouse facility study area, the soil had a mean total organic content of 0.74% and 0.30% in top and sub soil respectively.

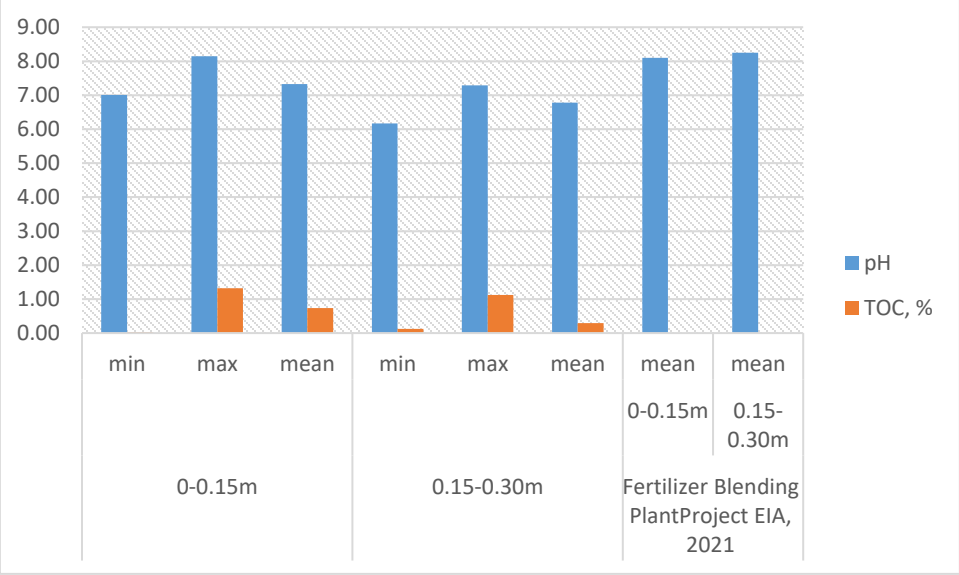


Figure 4-8: pH and Total Organic Carbon in Soil. Source: Fieldwork, 2021

Total Hydrocarbon Content (THC)

Hydrocarbons are a common and natural occurrence in the environment and varying concentrations in soils are not unusual. Microbes in the soils and water have a natural ability to breakdown many of these compounds and any hydrocarbon which is exposed to the air will also have an affinity to volatilize. As well, reactions including photochemistry and the various transformations of the hydrocarbon through these reactions can enhance the hydrocarbon decomposition. Industrial processes and man induced activities often result in the increased

loading of hydrocarbons in soil. The natural abilities of the soil to decompose the hydrocarbons become overwhelmed.

The THC analysed from the soil samples during the study were below equipment detection limit of <0.01mg/kg in all stations. These values were all below the natural background concentration of 50mg/kg for standard soils (SIEP, 1995).

Soil 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 68.67% sand, 15.33% silt and 13.00% clay were recorded for topsoil and 76.06% sand, 10.32% silt and 13.62% clay for sub soil at the medical warehouse facility study 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 medical warehouse facility area, sulphate values were low with values ranging from 2.12 to 5.04mg/kg (mean=3.29mg/kg) and from 2.91 to 3.95mg/kg (mean=3.27) 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 study area, ammonia values were low with values ranging from 0.03 to 0.38mg/kg (mean=0.10mg/kg) and from 0.02 to 0.58mg/kg (mean=0.25mg/kg) respectively for top and sub soil.

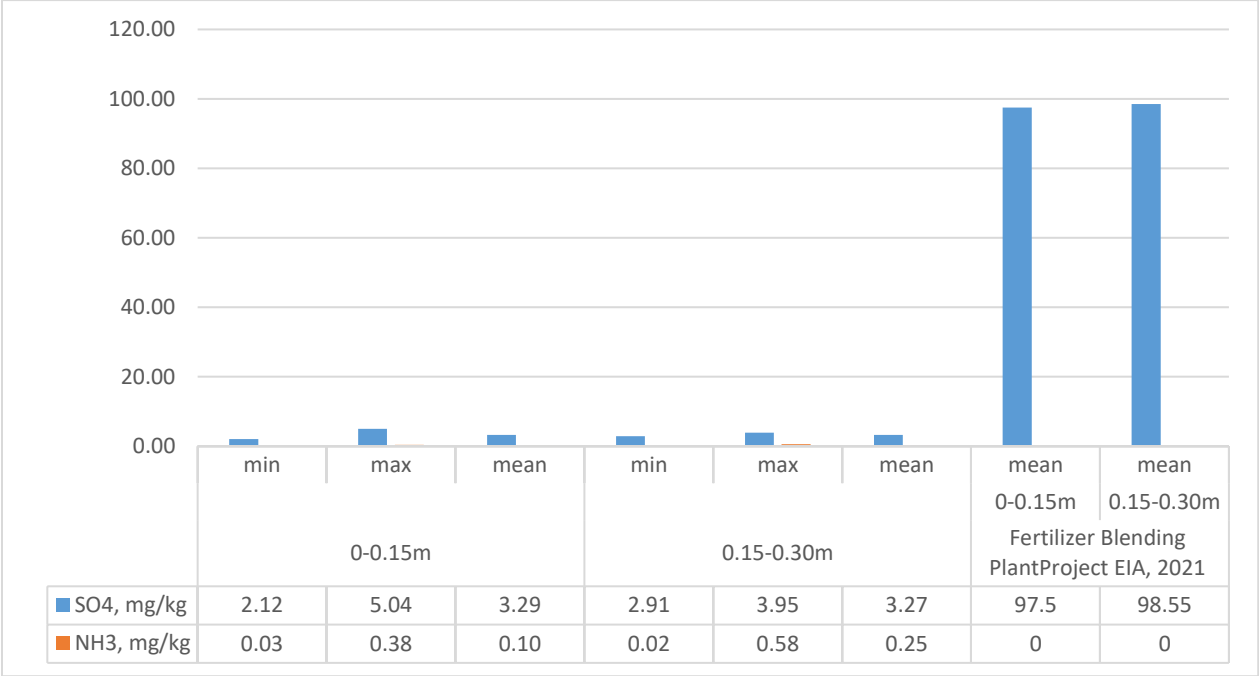


Figure 4-9: Sulphate and Ammonia in Soil. Source: Fieldwork, 2021

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

Parameters/units	Current Study, 2021						Fertilizer Blending Plant Project EIA, 2021		FMEnv Standard
	0-0.15m			0.15-0.30m			0-0.15m	0.15-0.30m	
	min	max	mean	min	max	mean	mean	mean	
pH	7.01	8.15	7.33	6.17	7.29	6.78	8.1	8.25	
TOC, %	0.03	1.32	0.74	0.12	1.12	0.30	NA	NA	NA
THC, mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	NA	NA	NA
SO4, mg/kg	2.12	5.04	3.29	2.91	3.95	3.27	97.5	98.55	500
NH3, mg/kg	0.03	0.38	0.10	0.02	0.58	0.25	NA	NA	NA
% Sand	29.80	93.40	68.67	48.30	92.30	76.06	10.36	14.195	NA
% Silt	5.00	44.30	15.33	2.60	19.00	10.32	53.89	44.77	NA
% Clay	1.60	25.90	13.00	5.10	46.60	13.62	35.73	41.11	NA
Calcium, mg/kg	1.12	3.14	2.05	1.01	2.61	1.97	3.65	3.91	NA
Magnesium, mg/kg	1.60	5.23	2.93	2.11	6.42	3.07	5.73	5.17	NA
Sodium, mg/kg	16.23	28.61	21.90	10.17	54.52	29.37	NA	NA	NA
Potassium, mg/kg	8.03	12.46	9.43	7.43	14.08	10.63	NA	NA	NA
Copper, mg/kg	1.00	2.48	1.58	1.01	2.23	1.72	1.11	1.17	NA
Lead, mg/kg	0.37	1.75	0.96	0.44	1.57	1.31	0.018	0.27	<1
Iron, mg/kg	18.66	24.88	20.86	18.20	27.76	21.47	6.59	2.31	NA

Parameters/units	Current Study, 2021						Fertilizer Blending Plant Project EIA, 2021		FMEnv Standard
	0-0.15m			0.15-0.30m			0-0.15m	0.15-0.30m	
	min	max	mean	min	max	mean	mean	mean	
Nickel, mg/kg	5.24	11.70	7.98	5.24	8.58	7.69	0.015	0.02	NA
Chromium, mg/kg	0.06	0.10	0.08	0.07	0.18	0.09	NA	NA	NA
Cadmium, mg/kg	0.04	0.07	0.06	0.04	0.07	0.06	0.15	0.05	NA
Zinc, mg/kg	0.23	9.20	4.61	3.17	5.24	4.43	2.62	2.67	NA
HUB, CFU/gx104	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA
HUf, CFU/gx103	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA
THB, CFU/gx104	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA
THB, CFU/gx103	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	NA
E Coli	Nil	4.03	1.82	Nil	3.02	1.34	Nil	Nil	NA

NA: Not Applicable; Source: Fieldwork, 2021

Exchangeable Bases in Soil

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.

The mean values of Na, K, Ca and Mg in the topsoil were 21.90mg/kg, 9.43mg/kg, 2.05mg/kg and 2.93mg/kg respectively. In sub soil, these values were 29.37mg/kg, 10.63mg/kg, 1.97mg/kg and 3.07mg/kg respectively.

***Heavy Metals* in Soil**

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 medical warehouse facility study area, values obtained were 1.00-2.48mg/kg (top soil) and 1.01-2.23mg/kg (sub soil) for Cu; 0.37-1.75mg/kg (top soil) and 0.44-1.57mg/kg (sub soil) for Pb; 18.66-24.88mg/kg (top soil) and 18.20-27.76mg/kg (sub soil) for Fe; 5.24-11.70mg/kg (top soil) and 5.24-8.58mg/kg (sub soil) for Ni; 0.06-0.10mg/kg (topsoil) and 0.07-0.18mg/kg (subsoil) for Cr; 0.04-0.07mg/kg (top soil) and 0.04-0.07mg/kg (sub soil) for Cd; and 0.23-

9.20mg/kg (top soil) and 3.17-5.24mg/kg (sub soil) for Zn. Values were within the range of those obtained from a previous study (Fertilizer Blending Plant Project EIA, 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 10^6 to 1 x 10^8cfu/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 1.82 and 1.34 respectively at the top and sub soil samples collected within the study area.

4.3.8 Biodiversity Studies

General

Sokoto State is situated in the North-western part of Nigeria. It is located between latitudes 11° 30" to 13 ° 50" N and longitudes 4° 00'' to 6° 00''E. The state shares common boundaries with the republic of Niger to the North and West, Zamfara State to the East and Kebbi State to the South. The area is characterized by tropical continental climate with a very fragile ecosystem. Temperatures are high throughout the year while rainfall, low and erratic which barely lasts for more than five months in a year. Average annual rainfall barely exceeds 629 mm while temperatures could be as high as 39° C or even higher, particularly during the month of April which usually records the highest of temperature. The area is also characterized by Sudan Savannah type of vegetation dominated by short grasses interspaced by short woody trees and shrubs. Grasses looks green during the rainy season, but eventually withered and die during the dry season (Adamu, 2007). Ecosystem services provided by plants include protection of soil loss against wind and water erosion, humus accumulation, nitrogen fixation, and nutrient supply from deeper layers. Moreover, plants stabilise regional and global climate, provides for pollution control and act as carbon sink (Botkin and Keller, 1998; Alonso *et al.,* 2001; Adamu, 2007). Vegetation patches also yield utilitarian products/services such as fuelwood, nuts vegetable, gum, spices, dyes, medicinal products, fodder for grazing and browsing by wildlife and livestock. They also serve as avenues for recreation while crown of trees and shrubs offer shade (in hot weather) (GFA, 2001; Adamu, 2007). Hence, these environmental and utilitarian services underscore the importance of vegetation patches not only in Sokoto metropolis but in all cities and towns in Nigeria. 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 ecosys-

tems in the region and the people over dependence on it for their livelihoods. The method is provided in Appendix 2.

Plate 4-2. *G. senegalensis* stands

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 as 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.

Table4-6: Plant species at the proposed Medical Warehouse

Location: Plant species at the proposed Medical Warehouse, Sokoto Transect 25m x 25m Latitude: 12°.57.094'N Longitude: 005°.11.891'E						
S/N	Scientific Name	Plant Common Name	Abundance/population/CS	Family Name	Economic potential	Plant Habit
1	*Acacia senegal*	Gum Arabic	High/unknown/LC	Fabaceae	Gum Arabic	Tree
2	*Azadirachta indica*	Neem tree	Low/stable/LC	Meliaceae	Insecticidal	Tree
3	*Combretum micranthum*	Kinkeliba	High/na	Combretaceae	Herbal tea	Shrub
4	*Andropogon gayanus*	Gamba grass	High/na	Poaceae	Thatch	Grass
5	*Securinega virosa*	Carry me seed	High/na	Euphorbiaceae	Diabetes	Shrub
6	*Ziziphus abbysinica*	Jujube	High/na	Rhamnaceae	Medicine	Shrub
7	*Adansonia digitata*	Baobab tree	Low/na	Bombacaceae	Kidney	Tree
8	*Fhaiderbia albida*	Apple ring acacia	High/unknown/LC	Fabaceae	Fodder	Tree
9	*Vitellaria paradoxum*	Shea butter	High/na	Sapotaceae	Pasteur (oil)	Tree
10	*Acacia nilotica*	Fodder tree	High/Unknown/LC	Fabceae	Fodder	Tree
11	*Hyphaene thebiaca*	Dum palm	Low/na	Palmae	Source of timber	Tree
12	*Diospyros mespiliformis*	Ebony tree	High/na	Ebenaceae	Source of wood	Tree
13	*Urena lobata*	Caesar weed	High/na	Malvaceae	Fibre	Shrub
14	*Senna occidentalis*	Coffea senna	Low/NT	Fabaceae	Anti rabbies	Shrub
15	*Balanites*	Desert date	High/LC	Balanitaceae	Fruit plant	Tree

Location: Plant species at the proposed Medical Warehouse, Sokoto Transect 25m x 25m Latitude: 12°.57.094'N Longitude: 005°.11.891'E						
	aegyptiaca					
16	*Leptadenia hastate*	Leptadenia	High/na	Asclepiadaceae	For food	Shrub
17	*Guiera senegalensis*		High/LC	Combretaceae	Medicinal	Tree

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.

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 usedcaptured the following information:

a) Household biodata (demographic information);
b) Livelihoods.
c) Inventory of structural and non-structural assets including land, commonproperties, 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 4-7.

Table 4-7: 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 are 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.
- A total of 53 questionnaires were administered to potential PAPs within the project communities with a 100% return. Based on the survey, the 253 respondents with 1574 household members were documented for Kassarawa District.
- Only Kassarawa District was consulted

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 about 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 Nasarawa 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 respectivecommunities. 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 also 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 communitymeetings. 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 ethic 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 epitomizedduring 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 itsorigin from genealogical ties. Politics in the communities are done within the framework of clannism. Clans are the basic point of cultural and political identity for the citizens. Clannism and kinship are the elemental forces in control of political and cultural

institutions as well as service points. As previously stated, the project areas æ 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 that followed by 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 infrastructurally. 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 burial grounds & other cultural relics near the project area.

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 are about 4,536 and it's increasing at the rate of 10% annually.

Gender, Age and Household Size Distribution

The survey data indicated male/female distribution of 53/47% for households in Kassarawa. Men and women in the project area are generally mainly involved in farming. 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 gets 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 use Sokoto to distribute drugs to most of these northwestern States. The states include, Kebbi, 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 Carter, 2020. 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 53 questionnaires were administered to potential PAPs within the project communities with a 100% return. Based on the survey, the 253 respondents with 1574 household members were documented for Kassarawa Districts.

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 e.t.c, 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 national grid comprises of 14 generating stations which have a total installed capacity of 8039M W, 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 i n 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 I0). 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 centres.

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.

35.00%.....Motorcycle

40.00%..... . Cars

20.00%.....Buses

5.00%.....Domestic animals

Sanitation and Waste Disposal

The community is generally clean with just a few litters of non-biodegradable and biodegradable materials. Waste in the study area is being disposed in the community refuse disposal dumps. While some of them have large collection points at the backyard for subsequent disposals to their farmlands as manure increasing the fertility of their farmlands. About 80% have pit latrine toilet system, while 20% have a water-system toilets in their houses.

Means of Livelihood within the Project Area

The means of livelihood in the study area is general l y farming, though there are other forms of means of livelihood such as petty trading, hunting, fishing, civil service, transportation business, handcraft, large scale businesses. These means of livelihood serve as secondary sources of income, as most of the people have farms as their major sources. The Monthly income distribution is highly dependent on the occupation. According to the data collected on site the monthly income for the majority in the community falls within the rage of N 20,000 to N95, 000 and just a few of them earn about N96, 000 and above. The field data is not totally realistic as majority of the respondents did not consider their subsistent farming, produce from which they use for the feeding of their families. This therefore means that a lot of the respondents gave an estimate of their monthly inflow of physical cash.

Table 4-8: Monthly Income of some respondents during interviews and focus group discussions in the study area

Monthly Income	Percentage %
1 ,000 - 10,000	10.7
I 1 ,000 - 20,000	19.7
3 1 ,000 - 40,000	12.7
41 ,000 - 50,000	11.7
6 1 .000 - 70,000	8.2
7 1 ,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. (Figure 3-10). 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.

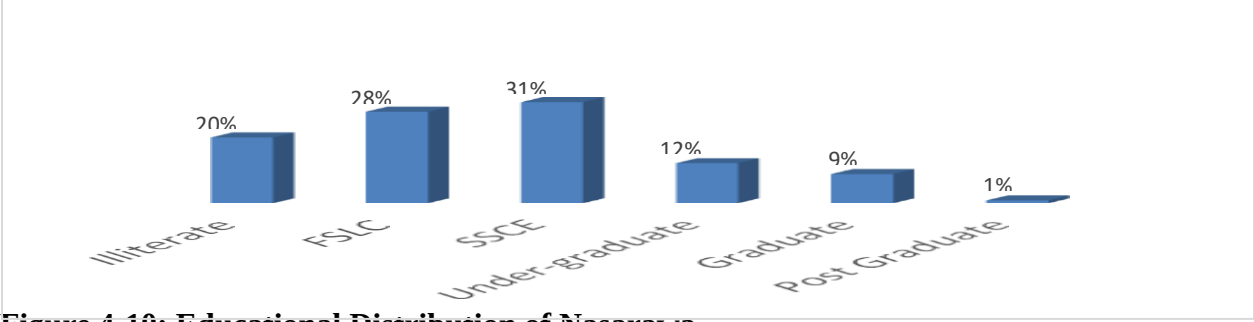


Figure 4-10: Educational Distribution of Nasarawa

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 securityinstitutions.

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 provide healthcare. Free maternal and child health services are provided in all the Sokoto State Local Governments Areas, including Primary Health facilities belonging to the Local Governments. Furthermore, drugs worth millions of Naira are procured by the State Government, sometimes through the Drug Revolving Fund program. However, 90% of the respondent communities know nothing about the benefits of the 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
BENEFICIAL /ADVERSE IMPACTS AND MITIGATION/ENHANCEMENT MEASURES

5.1 General

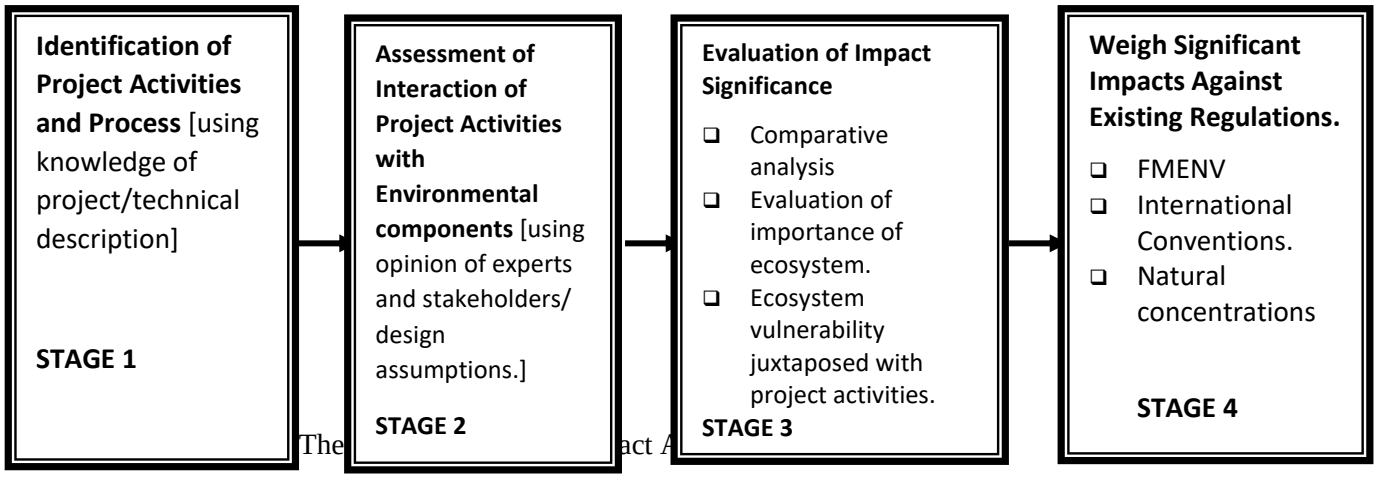
This chapter focuses on the beneficial and adverse impacts of the proposed zonal medical warehouse project. From the expert assessment, the project classified as Category B meaning that the negative impacts are localized and reversible. This is also equivalent to a Category 2 in the African Development Bank's Integrated Safeguard System (ISS). The impact assessment methodology adopted for this ESMP was descriptive largely based on field assessment and consultation with relevant stakeholders as well as professional judgment. Other factors in predicting the potential impacts include the results of public consultations. The potentially significant environmental and social impacts of the project as well as the suitable mitigation measures are discussed below.

Basically, this project is aimed at halting or minimizing the environmental and social damages that proposed project would have on the project area and beyond. This is, in the overall a positive impact. The envisaged areas of potential impacts (positive and negative) on the socioeconomic, cultural, and biophysical environments which could result from the proposed project are discussed in Table 5-1:

Principles of Impact Prediction and Evaluation

The prediction and evaluation are usually based on the following methodological framework.

- The overall prediction and evaluation process
- Choice of prediction technique
- Criteria for evaluating significance
- The design of mitigation measures
- Indirect impacts, long range impacts and uncertainty



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5.2 Impact Identification Methodology

The Potential and Associated impacts for the proposed road rehabilitation project activities were identified using the following approach:

- ISO 14001 environmental assessment and evaluation tool.
- Impact/ Risk assessment Matrix, modified after Leopold et al (1971)
- Field data gathering exercise
- Understanding of the baseline environmental characteristics, such as ecological, socio-economic and health conditions of the project area.
- Knowledge of the activities as well as various equipment that will be used for the implementation of the project.
- Knowledge of potential impacts of similar projects.
- Review of the Environmental Impact Assessment Reports of similar projects.
- Concerns raised at the stakeholders' engagement forum
- Expert/ professional judgment.

The biophysical, social and health components of the study were integrated to allow for effective impact evaluation. The impact assessment process is broadly categorized into following main steps:

1. Establishing the basis for the impact assessment
2. Preliminary Identification of Impacts
3. Impact Assessment/ Evaluation (qualification, quantification, and significance rating)

5.2.1 Step 1 – Establishing the Basis for the Impact Assessment

5.2.1.1 Gathering Environmental Baseline Data

Environmental (biophysical, socioeconomic and health) baseline data of the project area was collected through field sampling exercise, laboratory analyses and data interpretation, leading to the preparation of an integrated environmental baseline report. Previous EIA reports around the

study area were reviewed, and there was ground-trotting for more data, where gaps were observed. These provided an understanding of the existing natural and social environment. The baseline information on the recipient environment has been described in detail in Chapter 4 of this report.

5.2.1.2 Determination of Project Activities

Determination of planned project activities to be undertaken in the various project phases, which will interact with the social and natural environment. These activities are presented and describes in Chapter 3 of this report.

5.2.1.3 Determination of Sensitivities

The project's ESIA team used their knowledge of the baseline data collection exercise to determine the sensitive components that characterize the natural and social environment of the project area. These identified sensitive components are listed below. Table 5.1 lists the identified environmental components that are likely to be impacted by each of the project phases, as well as the associated impact indicators for the various environmental components. The impact assessment process assumed that the impact indicators will register changes in the environment, mainly because of the proposed project activities.

Sensitive Environmental Components are as follows:

Biophysical Components

- Air quality/noise
- Groundwater quality
- Soil quality
- Vegetation /Wildlife

Socio-economic Components

- Demography/ Local population
- Social Infrastructure/ Government services
- Income/Opportunities for economic enhancement (employment, contracting, procurement, etc)
- Skills Acquisition
- Community Relations
- Vehicular Traffic Analysis
- Change in livelihood pattern
- Safeguarding of traditional occupations
- Traditional value of land
- Functioning of family structure and traditional institutions
- Morals and family values
- Respect for human rights
- Promoting equal opportunities and opportunities for representation
- Lifestyle (use of alcohol, drugs, physical activities etc.)
- Cultural values and languages

- Youth restiveness
- Workers' safety

Health Component

- Demographic profile of the Communities (Population, fertility rate, crude birth rate (CBR), life expectancy)
- Access to Healthcare facilities
- Nutritional Status of Under-fives and the general population.
- Maternal and Child Health
- Environmental health factors (Housing and living conditions, Quality of, and access to clean drinking water, Exposure to nuisance (dust, noise), etc)
- Level of disease and disease vectors (including STDs)
- Knowledge, Attitude Practice and Behaviour (KAPB)

Table 5.1: Environmental Components and Potential Impact Indicators

Environmental Components	Impact Indicators
Air Quality	SPM, NO_X, SO_X, CO_2, CO, VOC, H_2S, NH_3
Soil/Land Use	Drainage/ Discharge, Hydrologic pattern, Sedimentation, Erosion and Topography, soil fertility, soil profile, Physico-chemical Characteristics, Land use Pattern and fish and fisheries
Groundwater	Solids (Dissolved solids and suspended solids), Turbidity and hydrocarbons, nutrients, DO, Electrical Conductivity, pH, Organics
Vegetation/ Wildlife	Biodiversity density, environmentally sensitive areas. Wetland/Swamps
Socio-economic and Community Health	Population, income, Settlement pattern, health, safety and security, infrastructure change, Cultural sites and relics, etc
Noise and vibration	Day and Night disturbance, Hearing impairment, Communication interference, etc

5.2.2 Step 2 – Preliminary Identification and Prediction of Potential Impacts

The aim of preliminary impact identification is to account for all potential and associated bio-physical, social and health impacts, ensuring that both significant and insignificant impacts are accounted for. The anticipated impact of the proposed project was determined based on the envisaged interaction between the individual project activities and environmental sensitivities.

5.2.2.1 Identified Potential and Associated Impacts from Proposed Project

The potential and associated impacts of the project were identified and listed according to the phase(s) of the project in which they are likely to occur (see Table 5.2).

5.2.2.2 Impacts Characterization

Identified potential and associated impacts of the proposed project were characterized/ classified based on the FMEnv criteria (FEPA, 1995). This was to enable further description of the nature of project impacts on environmental components. The impact characterisation is interpreted as follows:

- Direct impacts: These are impacts resulting directly (direct cause-effect consequence) from a project activity.
- Indirect/ Secondary Impacts: These are impacts that are at least one step removed from a project activity. They do not follow directly from a project activity.
- Adverse Impacts (-): Adverse impacts are those that would produce negative effects on the biophysical, health or socio-economic environment.
- Beneficial Impacts (+): These are impacts that would enhance the quality of the environment.
- Cumulative Impacts: These are impacts resulting from interaction between project activities with other activities, taking place simultaneously.
- Residual Impacts: These are impacts that would remain after mitigation measures have been applied.
- Immediate Impacts: These impacts occur immediately a project activity is executed.
- Long term Impacts (>3months): Those predicted adverse impacts which remain after mitigating measures have been applied.
- Short term Impacts (<3months): Impacts that are removed after mitigating measures have been applied.
- Reversible Impacts: These are impacting whose effects on the environmental component can revert to previous conditions on application of adequate mitigation measures.
- Irreversible Impacts: Impacts whose effects are such that the impacted component cannot be returned to its original state when the activity causing the impact is terminated, even after adequate mitigation measures are applied.

5.2.3 Step 3 – Impact Evaluation: Qualification, Quantification, Significance Rating

5.2.3.1 Integration of Identified Impacts

Impact assessment methodology involved quantification/ evaluation to determine whether the impact is Significant. Significant impacts of the project were identified using information from previous steps and expert opinions. Environmental Impact Assessment methodologies include interaction matrices, checklist, overlay mapping and simulation models. In this study, the Interaction Matrix Method was adopted. The use of the matrix involved the characterisation of the impacts. An (√) was used to indicate these classifications. A checklist of all likely project activities and a qualitative description of the impact they are expected to have on the environment are presented in Table 5.2.

5.2.3.2 Impact Evaluation

Significance of impacts was evaluated based on internationally accepted standard methods (ISO 14001), using the background and full understanding brought about by the processes above. The criteria and weighting scale used in evaluating this significance are as follows:

- 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).

The quantification scale of 0, 1, 3 and 5 was used. This is a modification of the arbitrary scale proposed by Vesilind, et al. (1994). The criteria and ratings for identifying significant environmental impacts of the project are as described below and are adapted from The ISO 14001:2004 – Environmental Management System Approach. These criteria and ratings are described as follows:

- Legal/ Regulatory Requirements (L) – The project activities that would result in the potential and associated impacts were juxtaposed with existing legal/ regulatory provisions highlighted in Chapter 1. The HSE-related legal/ regulatory requirements affecting the proposed project were also identified.

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) – The criteria used to categorise the risk posed by adverse impacts of the proposed project, combined the consequent severity/ magnitude and likelihood of occurrence, to evaluate and categorise the risks posed by the impacts into “high”, “Medium”, and “low” risk, as shown in the Risk Assessment Matrix in Figure 5.2. It considered all HSE threats and reputation issues, including injury, disease, and ecological or economic loss arising from a hazard. The assessment is based on experience and is indicative of the likelihood of undesired consequences materialising.

What is the risk/ hazard rating based on the Risk Assessment Matrix?

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

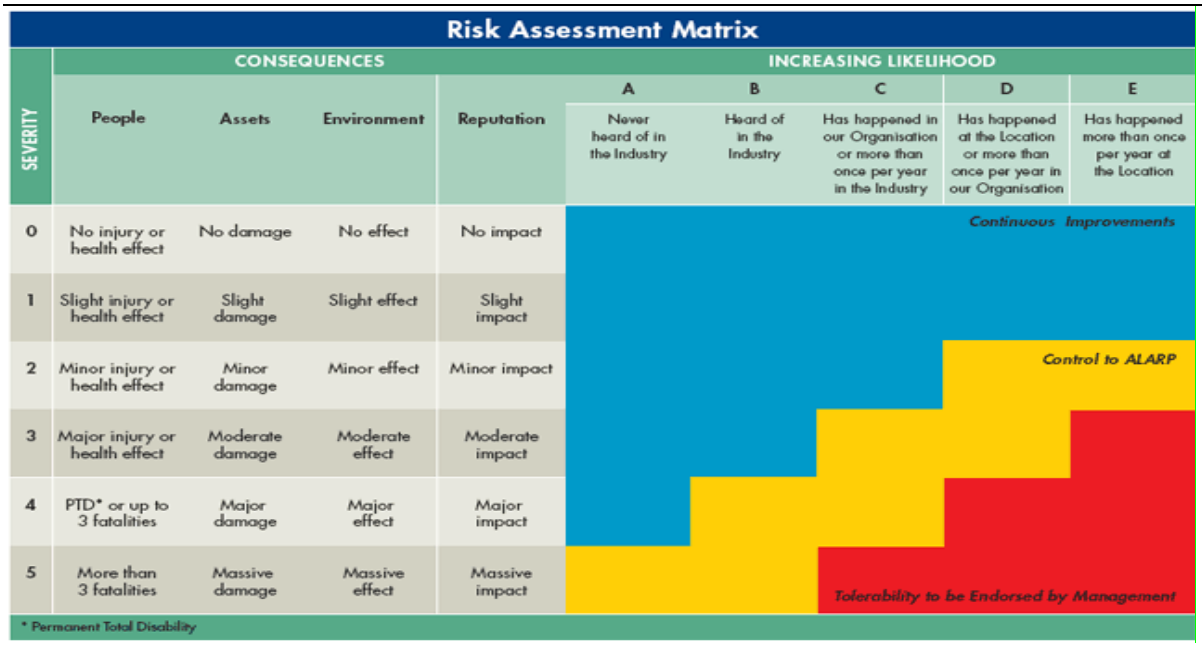

Figure 5-2: Risk Assessment Matrix

- Frequency of Impact (F) – Frequency of occurrence was rated based on the historical records of accidents/ incidents, consultation with experts and professional judgment.

What is the frequency rating of impact based on the Risk Assessment Matrix?

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

- Public interest/perception (P) – The perception of the public on the proposed project and the identified impacts were determined, through consultation with stakeholders and consensus of opinions of environmental professionals.

What is the rating of public perception of the proposed project and its impacts?

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

- Importance of affected environmental components (I) – The importance of affected environmental components was also determined through consultation with the host communities and consensus of opinions of environmental professionals.

What is the rating of importance based on consensus of opinions?

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

For this study, all the parameters were judged to be important indicators of the impacts. Determining the significance of the impact was therefore based on the sum of "L+R+F+I+P"; with the maximum possible value of 25. Impact rating criteria is summarised as follows:

Table 5.1a: Colour Indicators

	Beneficial Positive Impact	Impacts not quantified
	Negative Impact of Low Significance	Impacts for which: (L + R + F + I + P) <8
	Negative Impact of Medium Significance	Impacts for which: (L + R + F + I + P) ≥ 8 but <15
	Negative Impact if High Significance	Impact for which:(L + R + F + I + P) ≥ 15 or (F + 1) ≥ 6 or P = 5

Where: L = Legal/ Regulatory requirement
P = Public Perception/ Interest
R = Risk posed by impact
I= Importance of Environmental Impact
F = Frequency of impact

All negative impacts with the 'Medium' and 'High' Ranking were considered Significant and will require mitigation. Positive impacts were considered 'Beneficial' and do not require mitigation but will require enhancement. This follows best professional practice (Cox and Guy, 2002). Table 5.2 highlights the various project activities, the impact qualification and assessment of the potential and associated impacts of the project.

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
Pre-construction	Movement of personnel and heavy equipment to site	Traffic congestion around the project site: Movement of heavy-duty vehicles and construction equipment into the project area has the potential of disrupting normal traffic flow and increasing the risk of traffic accidents. A potential impact of the proposed project on traffic is assessed as being of low significance as appropriate mitigation measures will, however, make this impact of negligible significance.	A	LT	R	0	5	3	1	3	4	12	Medium
		Air quality and noise concern within and around the site	A	LT	R	0	5	3	1	3	4	12	Medium
	Surveying, Land take and stakeholder engagement	Dissatisfaction from compensation offer and social crisis due to engaging the wrong stakeholders.	A	LT	R	0	5	3	1	3	4	12	Medium
		Banditry and insurgency attacks on workforce.	A	LT	R	0	5	5	5	5	10	20	HIGH
		Provider of temporary job opportunities for both skilled and un-skilled labors *and increased revenue for the state*	B										B

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
		Improved living condition for citizens											
Construction	Influx of people (especially the young male population)	Infiltration of the young male population with bandit and other violet groups from neighbouring countries.	A	LT	R	0	5	3	1	3	4	12	Medium
		The influx of people into the project areas may result in increased infections of diseases, particularly HIV/AIDS. During project implementation activities such trade and employment are also likely to increase hence increased interactions consequently leading to increased infections.	A	ST	R	0	5	3	1	3	4	12	Medium
		Increase in the spread and contraction of COVID 19 pandemic	A	LT	R	0	5	5	5	5	10	20	HIGH
		Also, influx of people could also result in pressure on the existing infrastructure.	A	ST	R	0	5	3	1	3	4	12	Medium
		Air quality and noise concern	A	ST	R	0	5	3	1	3	4	12	Medium

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
		within and around the site											
		Waste Management	A	ST	R	0	5	3	1	3	4	12	Medium
	Vegetation clearing	Loss of Biodiversity/Vegetation Removal. There is anticipated increase in clearing of vegetation when constructing proposed ZMW project and its access roads. The project areas are mostly characterized by natural grassland vegetation basically used for crop cultivation and grazing activities. These proposed developments will thereby lead to de-vegetation. The cutting of indigenous trees may interfere with some cultural values of the local communities as some trees have medicinal value and have been used for treatment purposes. The clearing of vegetation and the subsequent changes may result loss of biodiversity and habitats especially of organisms.	A	ST	R	3	1	1	3	1	4	8	LOW

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
	Excavation and soil compartment destabilisation of the geological balance	The use of heavy machineries during the construction work is likely to cause to compaction of the soil structure which may lead to reduced soil infiltration capacities and subsequently resulting in increased run-off and soil erosion.	A	ST	R	3	1	1	3	1	4	7	LOW
		Construction and vehicular activities at the site can cause noise pollution to surrounding offices and residential areas as a community was seen 250 meters to the south to the site. This may cause related health hazards and distress and nuisance to the surrounding residents, workers and people working in offices around the site areas. This will be described as moderate as communities and offices were seen within 250m south of the proposed site. The existing daytime ambient noise levels in the nearby communities	A	ST	R	3	1	1	3	1	4	7	LOW

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
		were within the daytime acceptable limit (70 dBA). The main potential noise sources during construction are construction machinery, which are known to generate noise at levels from 76 dB (A) to 98 dB (A) measured 5 m from running machines. At about 100 m, the noise levels are expected to reduce to levels within the daytime national noise standards of 70 dB (A). Other sources of noise pollution will be vehicles transporting construction materials to the construction area											
		The construction activities mostly the excavation of the construction materials is likely to generate a significant amount of dust which may be blown by the wind and construction vehicles. Construction vehicles and other machinery could emit smoke and fumes engines leading to air pollution. The dust and the fumes when inhaled could	A	ST	R	0	5	3	1	3	4	12	Medium

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
		lead to adverse effects to residents, especially to young children. Climate change adaptation strategies will be adopted											
		During construction, workers will be exposed to injury from equipment and dangerous animal during vegetation clearing.	A	ST	R	0	5	3	1	3	4	12	Medium
		Enhanced skills for Local Artisans The local artisans like the carpenters, masons, welders, will have the opportunity to acquire new trades and skills as well as more experience during the construction phase of the project. Thus, an on-the-job training will enhance their skills and promote them to higher levels in their professions. Potential impact of the proposed project on skills of the local work force is assessed as being of low significance which can however be enhanced to an	B										Beneficial

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
		impact of moderate positive significance.											
	Construction and building of the warehouse and other installations such as electrical, water etc	Generation of solid waste from construction materials, vegetation, sewage from construction yard	A	ST	R	0	5	3	1	3	4	12	Medium
		Gender gaps exist across the local communities which could further compound project impacts for women as a social group. These gaps include cultural norms which prevent women from participating in the delivery construction projects as well as community level decision making processes. Interactions with construction workers are more detrimental to women and girls, who could easily be exposed to casual sex and its attendant risks of STDs and HIV/AIDs.	A	ST	R	3	1	1	3	1	4	7	LOW
		Temporary Employment and Increase in Income Recruitment of construction employees (male) in the	B										Beneficial

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
		preconstruction phase will provide temporary employment and increased income to several people including those in the project area which may be employed as unskilled workers for example as watchmen and in the construction of camps to accommodate construction employees during the construction phase. This impact is rated as being of negligible significance which can however be enhanced to an impact of low significance											
Operational /maintenance Phase	Use of medical warehouse and its maintenance	efficient storage and distribution of pharmaceuticals products within Sokoto State and neighbouring states to meet the National Strategic Supply Chain Development Plan 2021-2026	B										Beneficial
		Provision of cold chain storage and distribution which is coming handy as the world is challenged with the COVID-19 vaccine logistics.	B										Beneficial
		Provision of state-of-the-art warehouses to ensure the integrity	B										Beneficial

Table 5.2: Adverse and Beneficial Impacts of the Proposed ZWM Project

Project Phase	Project Activity	Description of Impact	IMPACT RANKING CRITERIA										
			Beneficial /Adverse	Long Term	Reversible/ Irreversible	L	R	F	I	P	F+I	L+R+F+I+P	Overall Ranking
		of health commodities for public use which will provide cost savings due to proliferation of sub-standard and fake medicines in circulation											
		Provision of capacity building opportunities for our young generation willing to explore supply chain management.	B										Beneficial
	Generation of Pharmaceutical waste	Installation Pharmaceutical waste management facility which will save our environment from chemical degradation	B										Beneficial
	Breakdown of equipment and	Delay in the delivery of medical commodities	A	ST	R	0	5	3	1	3	4	12	Medium
	Expiry of health commodity	Possible loss in profit	A	ST	R	0	5	3	1	3	4	12	Medium

CHAPTER SIX
MITIGATION MEASURES/ALTERNATIVES

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 Project construction have been identified and evaluated while the impacts significance (adverse and beneficial) have 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 for the adverse and beneficial impacts of the proposed Project.

6.2 Mitigation Hierarchy

Mitigation Measures come with a 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 carried out environment conservation activities to compensate for what they do to achieve "no net environment loss", or more specifically "no net biodiversity loss".

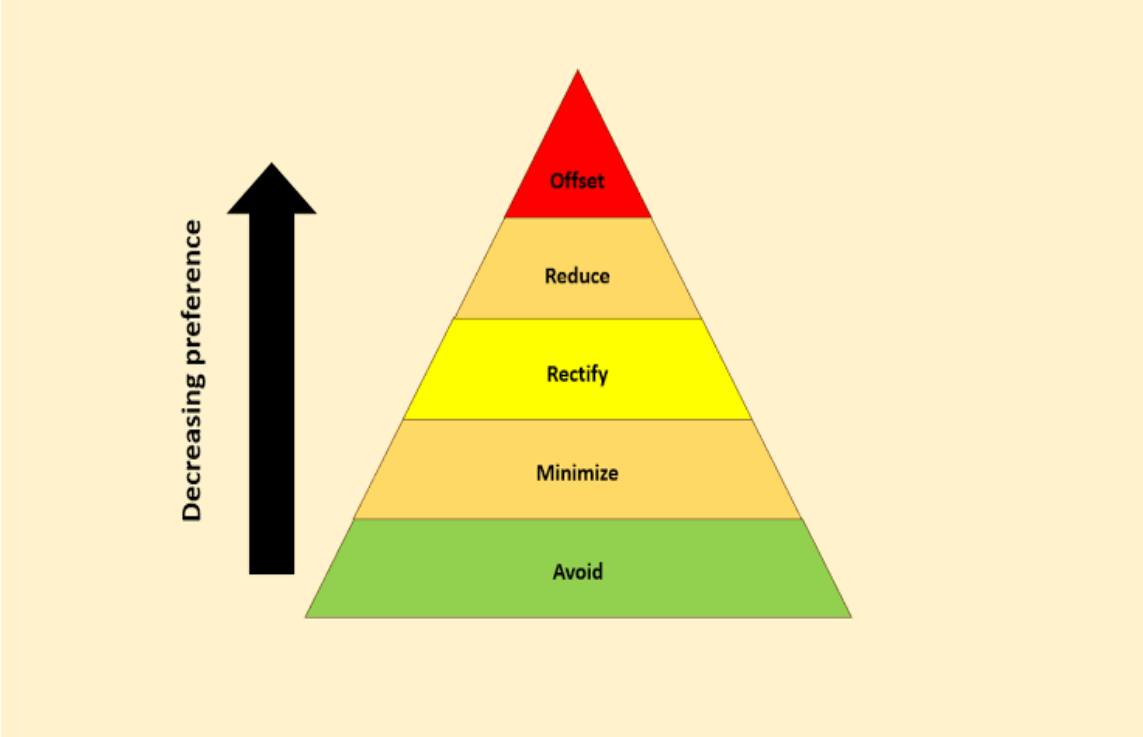

Figure 6.1: The Elements of Mitigation

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. 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 (EMP), presented in Chapter Seven of this report. The proffered mitigation measures for the identified potential. Table 6.1 presents the mitigation measures for the proposed project.

Table 6-1: Environmental and Social Impact Mitigation Measures

Project Phase	Identified Impact	Impact before	Mitigation Measures	Impact after
Pre-construction	Provider of temporary job opportunities for both skilled and un-skilled labors *and increased revenue for the state*	Beneficial	No Mitigation impact is required	Beneficial
	Improved living condition for citizens	Beneficial	No Mitigation impact is required	Beneficial
	Traffic congestion around the project site	Medium	Sokoto State Govt shall put in place a strategic traffic management plan	Low
	Air quality and noise concern within and around the site	Medium	Sokoto State Govt shall ensure that all vehicles transporting raw materials especially soil should be covered or avoid overloading to reduce dust emissions; (ii) the workers in dusty areas should be provided with requisite protective equipment such as dust masks and dust coats for preventive and protection purposes; (iii) the movement and speed of the construction machineries and vehicles should be controlled and properly managed.	Low
	Dissatisfaction from compensation offer and social crisis due to engaging the wrong stakeholders.	Medium	Sokoto State Govt shall work with community liaison offer to identify the right stakeholders	Low
	Banditry and insurgency attacks on workforce.	High	Sokoto state Govt shall ensure a proper security work plan is signed off before work commence on site	Medium
Construction	Infiltration of the young male population with bandit and other violet groups from neighbouring countries.	Medium	Sokoto State Govt ensure a proper security work plan is signed off before work commence on site and workers identified by the CLO daily.	
	Transmission of infectious diseases, particularly HIV/AIDS and COVID 19 pandemic due to interactions and unsafe sexual behavior with construction workers.	Medium	Sokoto State Govt shall conduct mass education on sexual education and NCDC safe protocol for COVID 19	
	Employment and Job Creation	Beneficial	No mitigation measures is required	Beneficial
	Air /noise pollution due to vehicular movement of heavy-duty equipment	Medium	Sokoto State Govt shall ensure that (i) all vehicles transporting raw materials especially soil should be covered or avoid overloading to reduce dust emissions; (ii) workers in dusty areas should be provided with	Low

Project Phase	Identified Impact	Impact before	Mitigation Measures	Impact after
			requisite protective equipment such as dust masks and dust coats for preventive and protection purposes; (iii) movement and speed of the construction machineries and vehicles should be controlled and properly managed; (iv) removal of vegetation should be avoided and denuded surfaces should be adequately re-vegetated; (v) most noisy machinery should be fitted with proper silencers to minimise noise emissions; (vi) where necessary, good and appropriate selection of construction machinery and equipment; (vii) sprinklking of water in construction yards, on dusty roads and soil heaps to keep down the dust produced; (ix) the noise levels are kept at the minimum acceptable levels and the construction activities are confined to the working time limits.	
	Injury and exposure of site workers to reptiles and other dangerous animals and insects such as bees, wax	Medium	Sokoto State Govt shall ensure that appropriate PPEs are provided and used on site. Daily toolbox meeting will be held to discuss all inherent hazard in the work process.	Low
	Generation of solid waste from construction materials, vegetation, sewage from construction yard	Medium	Sokoto State Govt shall ensure all waste generated from site are managed in line with the State waste management guideline for the project.	Low
	Gender Gap – like cultural norms that prevent women from participating in the delivery construction	Medium	Sokoto State Govt shall ensure that the women are adequately consulted and prior to project implementation, recruitment team shall remove barriers to women's participation in the execution by having transparent recruitment procedures and ensuring that women are also part of the recruitment process;	Low
Operational /maintenance Phase	Delay in the delivery of medical commodities	Medium	Sokoto State Govt shall ensure the supply chain management process is adequately reviewed and audited periodically by ISO –SON for continuous	Low
	Possible loss in profit	Medium		Low

Project Phase	Identified Impact	Impact before	Mitigation Measures	Impact after
			improvement	
	Actualization of the National Strategic Supply Chain Development Plan 2021-2026.	Beneficial	No mitigation measures is required	
	Provision of cold chain storage and distribution of COVID-19 vaccine logistics.	Beneficial		
	Creation of 1000 jobs and increased revenue for the State	Beneficial		
	Provision of capacity building opportunities for our young generation willing to explore supply chain management.	Beneficial		
	Installation Pharmaceutical waste management facility which will save our environment from chemical degradation	Beneficial		

CHAPTER SEVEN
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

7.1 General

This Environmental and Social Management Plan (ESMP) is necessary to achieve the health, safety, and environmental regulatory compliance objectives of the project. The environmental and social management systems/procedures are developed to establish sound basis for mitigation, monitoring and management at the project level. The requirements of this ESMP are strategically integrated into the existing procedures to ensure that project bottlenecks are not created. To this end, the Plan has focused on specific steps to be taken with respect to implementation of the mitigation measures and monitoring activities for the environmental and social impacts identified in Chapter 4. This plan highlights the specific mitigation measures that would be taken and the entities responsible for carrying out the mitigating measures. The ESMP also contains a monitoring plan indicating the responsible parties, the frequency of monitoring, key indicators, and the reporting format, and provides for necessary capacity building to facilitate the ESMP implementation. Cost estimates for implementation of the various measures, monitoring plan and capacity building are also given. The projected implementation budget will enable the ESMP to be an integral part of financing for the construction and maintenance works in the project.

7.2 Objectives

The Environmental and Social Management Plan for this project aims at ensuring the following:

- That environmental, social, and health & safety factors are carefully managed throughout the project cycle.
- That the project complies with regulatory stipulations and guidelines.
- That there is sufficient allocation of resources on the project budget so that the scale of ESMP-related activities is consistent with the significance of project impacts.
- That environmental performance is verified through information on impacts as they occur.
- That institutional arrangements required to implement the environmental impact mitigation and enhancement measures are specified and include a monitoring program, for selected environmental parameters, to assess the success of the mitigating/enhancement measures, as well as their timely execution; and
- That an implementation schedule for the mitigation measures is provided.

- That all COVID -19 Protocol is strictly adhere to at the various stages of the implementation of the project.

Thus, the implementation of the ESMP for the proposed intervention project are discussed in Table 7-1 and discussions on its specific implementation are provided in the sections below.

Table 7-1: Environmental and Social Management Plan Implementation

Project Phase	Identified Impact	Nature of impact (negative/positive)	Duration of impact	Level of risks associated with the impacts	Scope of impact (Local, regional or global)	Proposed Mitigation Measures	Capacity Building Required	Reporting frequency	Responsible Party
Pre-construction	Traffic congestion around the project site	Adverse and revisable	12 months	Low	Local	The Sokoto Government shall put in place a strategic traffic management plan	Public education and awareness	Weekly	HSE officer and Project Manager
	Air quality and noise concern within and around the site	Adverse and revisable	12-24 months	Low	Local	The government shall ensure that all vehicles transporting raw materials especially soil should be covered or avoid overloading to reduce dust emissions; (ii) the workers in dusty areas should be provided with requisite protective equipment such as dust masks and dust coats for preventive and protection purposes; (iii) the movement and speed of the construction machineries and vehicles should be controlled and properly managed;	Public education and awareness and enforecement of standards	Monthly	Project Implementation Unit (PIU) and Environmental Consultant
	Banditry and insurgency attacks on workforce.	Adverse and revisable	12months	High	Local	The government shall ensure a proper security work plan is signed off before work commence on site	Sensitisation and Public awareness campaigns	Weekly	CLO, PIU and Security Team
Construction	Infiltration of the young male population with bandit and other violet groups from neighbouring countries.	Adverse and revisable	The entire lifespan of the project and after the project	High	Regional	The government shall ensure a proper security work plan is signed off before work commence on site and workers identified by the CLO daily.	Sensitisation and Public awareness campaigns	Weekly	CLO, PIU and Security Team
	Transmission of infectious diseases, particularly HIV/AIDS and COVID 19	Adverse and revisable	The entire lifespan of the project and after the	High	Regional	The State Government shall conduct mass education on sexual education and NCDC safe protocol for COVID 19	Public education and awareness	Monthly	HSE officer and PIU

Project Phase	Identified Impact	Nature of impact (negative/positive)	Duration of impact	Level of risks associated with the impacts	Scope of impact (Local, regional or global)	Proposed Mitigation Measures	Capacity Building Required	Reporting frequency	Responsible Party
	pandemic due to interactions and unsafe sexual behavior with construction workers.		project						
	Pressure on existing basic infrastructure	Adverse and revisable	12 months	Low	Local	The State Government shall ensure camp are built within the site to accommodate site workers where necessary.	Public education and awareness	Monthly	HSE officer and PIU
	Employment and Job Creation	Positive	The entire lifespan of the project and after the project	None	Local	No mitigation measures required		Quarterly	HSE officer and PIU
	Loss of Biodiversity/Vegetation Removal and reduction of Abundance and Species of Fauna and Flora.	Adverse and revisable	One-Two years	Moderate	Local	The State Government shall ensure vegetation clearing are limited to the perimeter fence of the site	Awareness and enforcement of regulatory standards	Annually	HSE officer and Environmental Consultant
	Compaction of the soil structure which may lead to reduced soil infiltration capacities and subsequently resulting in increased run-off and soil erosion.	Adverse and revisable	12 – 24 months	Low	Local	The State Government shall (i) avoid moving machineries and other equipment anyhow and away from from designated transport routes; (ii) unnecessary vehicular and machinery movements shall be avoided as much as possible; (iii) reclaim and re-vegetate once work is completed to reduce run off.	Awareness and enforcement of regulatory standards	Annually	HSE officer and Environmental Consultant
	Air /noise pollution due to vehicular movement of heavy duty equipment	Adverse and revisable	12 – 24 months	Low	Local	The State Government shall ensure that (i) all vehicles transporting raw materials especially soil should be covered or avoid overloading to reduce dust emissions; (ii) workers in dusty areas should be provided	Awareness and enforcement of regulatory standards	Weekly	HSE officer and Environmental Consultant

Project Phase	Identified Impact	Nature of impact (negative/positive)	Duration of impact	Level of risks associated with the impacts	Scope of impact (Local, regional or global)	Proposed Mitigation Measures	Capacity Building Required	Reporting frequency	Responsible Party
						with requisite protective equipment such as dust masks and dust coats for preventive and protection purposes; (iii) movement and speed of the construction machineries and vehicles should be controlled and properly managed; (iv) removal of vegetation should be avoided and denuded surfaces should be adequately re-vegetated; (v) most noisy machinery should be fitted with proper silencers to minimise noise emissions; (vi) where necessary, good and appropriate selection of construction machinery and equipment; (vii) sprinklking of water in construction yards, on dusty roads and soil heaps to keep down the dust produced; (ix) the noise levels are kept at the minimum acceptable levels and the construction activities are confined to the working time limits.			
	Injury and exposure of site workers to reptiles and other dangerous animals and insects such as bees, wax	Adverse and revisable	12 months	low	Local	The Government of the State shall ensure that appropriate PPEs are provided and used on site. Daily toolbox meeting will be held to discuss all inherent hazard in the work process.	Daily Toolbox meeting and Job Hazard Analysis	Monthly	HSE officer
	Generation of solid waste from construction materials, vegetation, sewage from construction yard	Adverse and revisable	12 months	Moderate	Local	The Government of the State shall ensure all waste generated from site are managed in line with the State waste management guideline for the project.	Waste management awareness program	Monthly	HSE officer
	Gender gap – like	Adverse and	12 months	High	Local	The government of the state shall ensure	Awareness	Monthly	CLO and PIU

Project Phase	Identified Impact	Nature of impact (negative/positive)	Duration of impact	Level of risks associated with the impacts	Scope of impact (Local, regional or global)	Proposed Mitigation Measures	Capacity Building Required	Reporting frequency	Responsible Party
	cultural norms that prevent women from participating in the delivery construction	revisable				that the women are adequately consulted and prior to project implementation, recruitment team shall remove barriers to women's participation in the execution by having transparent recruitment procedures and ensuring that women are also part of the recruitment process;	and engagement of the women forks		
Operational /maintenance Phase	Generation of Pharmaceutical waste	Adverse and revisable	The entire lifespan of the project	Moderate	Local	The State Government shall ensure all medical waste are adequately managed through the proposed medical waste facility which is expected to come with this project.	Awareness on the project goals and objectives	Monthly	HSE officer and Environmental Consultant
	Delay in the delivery of medical commodities	Adverse and revisable	The entire lifespan of the project and after the project	Low	Local	The Government of the state shall ensure the supply chain management process is adequately reviewed and audited periodically by ISO –SON for continuous improvement	Awareness on the project goals and objectives	Quarterly	Project Team lead
	Possible loss in profit	Adverse and revisable	The entire lifespan of the project and after the project	Low	Local		Awareness on the project goals and objectives	Quarterly/Annually	PIU
	Actualization of the National Strategic Supply Chain Development Plan 2021-2026.	Positive	The entire lifespan of the project and after the project	None	Local	No mitigation measures required	Awareness on the project goals and objectives	Quarterly/Annually	PIU
	Provision of cold chain storage and distribution of COVID-19 vaccine logistics.	Positive	The entire lifespan of the project and after the project	None	Local	No mitigation measures required	Awareness on the project goals and objectives	Quarterly/Annually	PIU

Project Phase	Identified Impact	Nature of impact (negative/positive)	Duration of impact	Level of risks associated with the impacts	Scope of impact (Local, regional or global)	Proposed Mitigation Measures	Capacity Building Required	Reporting frequency	Responsible Party
	Creation of 1000 jobs and increased revenue for the State	Positive	The entire lifespan of the project and after the project	None	Local	No mitigation measures required	Awareness on the project goals and objectives	Quarterly/Annually	PIU
	Provision of capacity building opportunities for our young generation willing to explore supply chain management.	Positive	24 months	None	Local	No mitigation measures required	Awareness on the project goals and objectives	Quarterly/Annually	PIU
	Installation Pharmaceutical waste management facility which will save our environment from chemical degradation	Positive	24 months	None	Local	No mitigation measures required	Awareness on the project goals and objectives	Quarterly/Annually	PIU

7.3 Institutional Arrangements/ Capacity Building for Environmental and Social Management

Responsibilities for Environmental and Social Management and Monitoring

The overall responsibilities of coordination of this ESMP lies in the Project Implementing Unit (PIU) of the State Government under the environmental laws, policies, and regulations. Technical experts who are well-trained and highly qualified with the capacity to implement the Environmental and Social Management Plan (ESMP) will be recruited. The project will have a Project Coordinator working together with PIU staff and the contractor who will be appointed by government for the construction of the zonal medical warehouse project. Also, the issue of environmental permits and to ensure that monitoring and reporting are done in accordance with both the provisions of the EMSP and the standards and regulations set by NESREA. NESREA's mandates on the other hand include taking actions that may be needed to ensure environmental quality standards are not breached and permit requirements are maintained.

Monitoring and Evaluation of the intervention Project

Monitoring, evaluation and reporting on environmental issues will be part of project implementation processes and reporting systems. Contractors as well as the implementing agency will be required to keep records of all activities that will be undertaken under each project site, which will be compiled and used in enhancing environmental sustainability of the project sites. The responsible entities will regularly generate environmental reports to be shared with the federal environment authorities and the AfDB's Safeguard systems.

Capacity building and training needs identified

The PIU which was put together by the State Government will drive all the awareness campaign. This will be done in collaboration with some identified community-based group, NGOs and Youth and Students groups. They will be responsible for the sensitization and mobilization of the locals on subject like environmental management strategies and climate change action.

Specific responsibilities of project stakeholders are as outlined in the following sections.

The Resident Engineer

- ✓ The Engineer is to design the project with minimum negative environmental impacts using environmentally friendly operations and equipment.
- ✓ Ensure that his detailed design conforms to the concept design approved.
- ✓ Prescribe feasible safety measures for project implementation.
- ✓ Select construction materials with least negative environmental impacts.
- ✓ Design appropriate functional transmission and substation systems.

- ✓ Insert all suitable clauses that stipulate that the contractor must execute all project works with due diligence and application of environmentally friendly construction methods.
- ✓ Monitor and supervise all construction works to ensure that the contractor conforms to environmental clauses inserted into contract documents; and
- ✓ Monitor the overall environmental impacts of the project and recommend additional mitigation measures for implementation

The Contractor

- ✓ Prepare a detailed Environmental and Social Management Plan to be approved by PIU and FMEnv as stated in the contract documents.
- ✓ Ensure that his detailed design conforms to the concept design already carried out and approved by PIU and FMEnv.
- ✓ Ensure that the project manager as well as site managers and foremen are well informed about all environmental issues relevant to the project.
- ✓ Ensure that all site managers and foremen are trained in appropriate and environmentally harmless construction methods.
- ✓ Ensure that all equipment to be employed in construction work are environmentally sound.
- ✓ Establish, operate and rehabilitate an appropriate and environmentally responsible construction camp.
- ✓ Establish a waste management plan covering all types of wastes.
- ✓ Always ensure hazard-free and safe operating environment for all workers and visitors.
- ✓ Execute all works in compliance with all environmental requirements of the contract documents.
- ✓ Inform PIU and site contractor whenever any unforeseen negative environmental impact occurs.
- ✓ Ensure hazard-free flow of traffic around or through the work sites.
- ✓ Ensure that all workers at the construction camp maintain harmonious relationships with the communities in the project area; and
- ✓ Ensure that all project areas are cleared of construction waste, graded and re-vegetated

Environmental and Social Officer

An Environmental and Safety Officer (ESO) is to be appointed by the Contractor to monitor and review the implementation of the ESMP. The ESO shall be on site daily throughout the duration of the project construction works. His responsibilities will include the following:

- ✓ Assist in making sure that the necessary environmental permits are obtained by the Contractor.

- ✓ Open and maintain communication lines between the Employer, Contractor, Consultant, and relevant institutions on environmental matters.
- ✓ Monitor project activities to always ensure compliances with the ESMP.
- ✓ Take appropriate corrective actions whenever the ESMP is violated.
- ✓ Assist the Contractor in finding solutions to environmental problems.
- ✓ Plan and carry out safety and environmental training for new project personnel reporting for work.
- ✓ Ensure that employees are provided Personal Protective Equipment.
- ✓ Advise on the removal of person(s) and/or equipment not complying with environmental specifications.
- ✓ Recommends penalties for contraventions of the ESMP.
- ✓ Keep detailed records of all project activities that may impact on the environment.
- ✓ Continuously review the ESMP and recommend modifications when necessary; and
- ✓ Prepare and submit, to the employer, a final audit report regarding the ESMP and its implementation during the construction and operational phases of the project

The General Public

The public has no formal responsibility for the implementation of the ESMP for this project. However, they are major stakeholders as far as potential impacts are concerned. Project impacts may certainly affect them in various ways. These negative impacts may include water, air and noise pollutions, loss of land, traffic accidents etc. The project host communities must express their concerns over unforeseen impacts or whenever project impacts take different forms or become of higher significance than anticipated. The public has an informal obligation to inform the Supervising Engineer or the Contractor about new developments or other issues of concern to them as early as possible. The public is also the target of awareness campaigns to be carried out to mitigate negative impacts associated with the project.

Community Liaison Committees

Project host communities in the project area will be required to form Community Project Liaison Committees to collaborate with the Project Management on issues of concern to the communities. The Committees will be established with the facilitation of the traditional rulers in the communities. Members of the Committees will be drawn from a wide cross section of the community to include local elders, landowners, institutions, trade associations, vulnerable groups, youth, etc. The Committee will comprise of a Chairman and a Secretary and will register with the Resident Engineer and the Contractor. The committee is to resolve problems including the following:

- ✓ Land acquisition and relocation issues.
- ✓ Health and safety.

- ✓ Impacts on resources and amenities.

Change/Modification of Project Design

If a certain aspect of the design for the project is to be changed or modified, the potential environmental and socio-economic consequences of such changes/modifications must be determined, and mitigation and enhancement measures determined and communicated to the project proponent for vetting and approval by FMEnv, before the contemplated change/modification.

7.4 Grievance Mechanism and Procedures

The grievance procedures consist of the steps that ensure proper documentation of all grievances, a discussion mechanism for hearing and resolving the grievances, and provisions for appeals in the event of dissatisfaction by any affected persons.

The issues considered include: the project's benefit(s) to the stakeholders; potential changesto the routine activities of the stakeholders that might occur due to the project; and the project activities that might cause damage or conflict for the stakeholders. Any issues that may lead to grievances will be addressed through documented grievance mechanism that takes into consideration the cultural and traditional rights of people avoiding as much as possible potential for legal redress mechanism. The specific objective of the mechanism is to facilitate the process and ensure effective and timely grievance resolution thereby reducing the risk of escalation of conflicts and avoiding unnecessary delays. The grievances and remedial actions shall be carefully documented to enhance accountability and reduce liability.

The community traditional land dispute resolution structure currently constitutes the nucleus of traditional resolution of disputes among community members on matters of land. It is therefore wise and advisable that this structure be necessarily retained in the event of any grievance or dispute relating to the ESMP implementation. Inputs from the leadership may also be limited to providing recommendations as to how a specific dispute is to be addressed. Aside from the traditional structure, Figure 6-1 provides a secondary mechanism for grievance resolution using the Grievance Redress Committee (GRC). The proposed GRM will also help to achieve the following:

- To serve as the open channel for effective communication together with the identification of emerging environmental and social concerns due to the project.
- To prevent and mitigate any adverse environmental and social impacts because ofany phase of the project.
- Promote harmonious relationship and respect among stakeholders; and,

- Ensure community acceptance of the project.

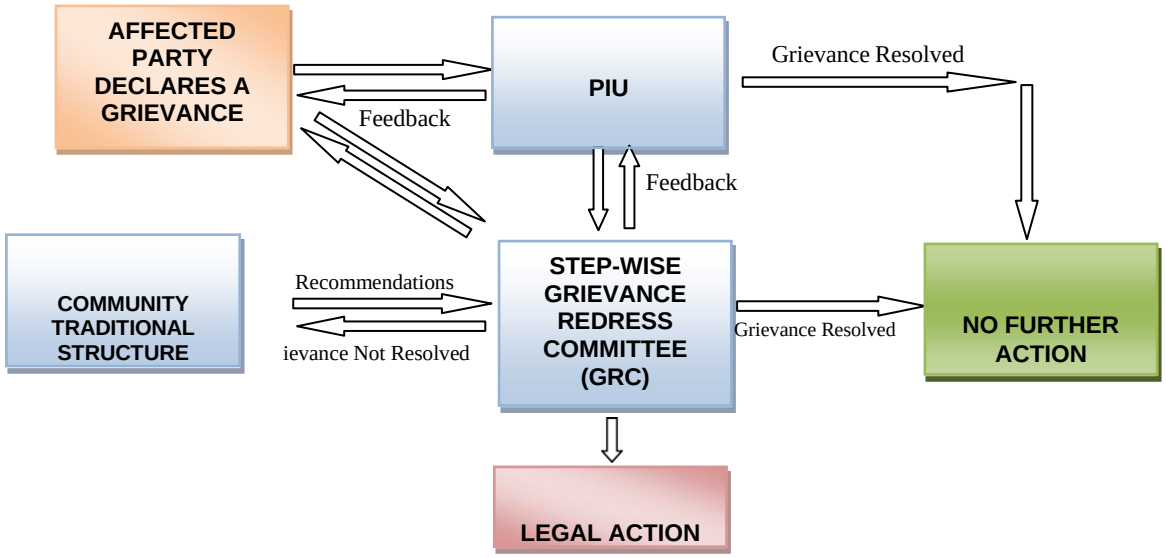

Figure 7-1: Grievance Redress Procedure

Formation of Grievance Redress Committee (GRC)

The objective of the GRC is to respond to the complaints relating to the project in a timely and transparent manner and to provide a mechanism to mediate conflict and cut down on lengthy litigation, which often delays projects. It will also provide people who might have objections or concerns about their assistance a public forum to raise their objections and through conflict resolution, address these issues adequately. The committee will provide ample opportunity to redress complaints informally, in addition to the existing formal administrative and legal procedures.

The major grievances that might require mitigation include:

- PAPs not listed.
- Use of local workforce.
- Losses not identified correctly.
- Inadequate assistance.
- Dispute about ownership.
- Delay in disbursement of assistance and improper distribution of assistance.

First Level: Community Grievance Redress Committee (COM-GRC)
Second Level: PIU Grievance Redress Committee (PIU-GRC)
Third Level: Technical Committee (State-GRC)
Fourth Level: The Courts

All grievances will first be addressed at the First Level. It will only move on to Second Level if the first level agreement was not accepted by the party involved and then to third and forth under similar situations. If negotiated settlement of grievances cannot be achieved through the normal procedural steps outlined in the grievance mechanism, the complainant has the right to approach the courts.

7.5 Complimentary Initiatives

The PIU in collaboration with the environmental consultant under the Government of Sokoto State will be responsible for the supervisory role in conducting the environmental and social monitoring of the project's environmental activities. The project is envisaged to match the working relationships among different entities that will be engaged in the implementation of the project. One of the most important complementary initiatives will be the enhanced collaboration among these different consultants especially the project consultant and that of the ESMP. The other complementary initiative of the project will be the capacity building initiatives proposed in the project targeted to train the key officers involved in the project on various aspects of environmental management especially environmental assessment and in understanding the importance of ESMP and Impact Mitigation Monitoring.

The local communities will be involved in a lot of capacity building focusing climate change, protection of biodiversity etc. Mainstreaming public health and HIV/AIDS in the overall operations will help improve social well-being of the project communities.

The project will aim to engage and support some local interventions that will ensure good environmental management in agricultural production as well as increasing the number of players in agricultural produce value chain systems.

7.6 Occupational/Public Health, Safety and Security Management Plan

Selected Contractor shall be required to develop and implement an occupational and community health and safety plans that contributes to a healthy workforce and local community. The health and safety plan shall be submitted to the PIU for necessary approvals prior to implementation. In

developing the Plans, the Contractors shall evaluate possible hazards that may be associated with the project activities.

Selected Contractor shall fully comply with Environmental, Social, Health and Safety (ESHS) standards and bear the cost of implementation. Community Health, Safety and Security assessment will identify potential negative risks related to the different phases of the project.

Some of the significant risks to be considered include:

- Possible pressure and/or additional demand on community health services associated with the influx of workers from outside the project area.
- Possible pressure and/or additional demand on utility services including water and wastewater system associated with the influx of workers from outside the project area.
- Possible pressure and/or additional demand for social services because of an increased family stress and violence.
- Possible sexual harassment and gender-based violence.
- Possible illicit drug use and alcohol.
- Possible crime and criminal activities.
- Possible change in community wellness because of alcohol, and substance abuse associated with the influx of workers from outside the project area.
- Possible change in Community Health because of sudden spread of communicable and non-communicable diseases including sexually transmitted diseases (STDs) associated with the influx of workers from outside the project area; Possible pressure on traffic and transportation network associated with construction and operations activities; and
- Possible change in water and air quality associated with construction and operations activities.

7.7 Gender Based Violence/Sexual Exploitation and Abuse Management Plan

The Gender Based Violence/Sexual Exploitation and Abuse Management Plan (GBV/SEA MP) is required to identify and assess key risks, develop mitigation measures to prevent and respond to sexual exploitation, abuse, and other forms of Gender Based Violence (GBV). Selected Contractor shall prepare and submit for approval, the necessary GBV/SEA MP to be implemented for the project. The GBV/SEA MP will set out a formal system by which the Contractor will carry out mitigation measures that will reduce any impacts relating to Gender Based Violence matters.

Specifically, the GBV/SEA MP will provide details regarding the implementation of avoidance mitigation and management measures for impacts related to the possibility of or any existing risks which may lead to GBV/SEA issues. The scope of the GBV/SEA MP will cover pre-construction, construction, and post construction/closure phases of the Project.

The risk indicators to be considered shall include but not limited to:

- Possible pressure and/or additional demand for social services as a result of an increased family stress and violence.
- Possible sexual harassment (including rape, sexual assault and harassment in all public and private spheres of life).
- Norms, attitudes, and stereotypes around gender in general and violence against women.
- Various forms of structural inequality or institutional discrimination on any gender.

7.8 Vegetation Clearing and Biomass Management Plan

The Contractor shall be required to prepare and submit for approval, a comprehensive Vegetation Clearing and Biomass Management Plan (VCBMP). Together with this ESMP, the VCBMP will provide the specific activities to be carried out to protect the natural biodiversity of the project area as well as maintain appropriate public access.

The specific objectives of the Plan are to:

- Identify appropriate, ecologically sustainable, and spatially explicit management actions, such as re-vegetation with native plant species, based on biological and hydrological factors, as well as the reasonableness of costs, local community expectations, and other key considerations.
- Develop monitoring methods to evaluate progress toward Plan objectives, to apply adaptive management to enhance the likelihood of achieving those objectives, and toincrease understanding of water and ecosystem interactions.
- Prepare for anticipated changes to the system, such as climate change and land-use changes.
- Prepare for implementation of rapid, active ecological restoration and other management strategies for threatened, endangered, and other native wildlife species potentially displaced by construction activities, and to enhance pollinator habitat.

- Provide consideration of proper implementation techniques, implementation costs, short- and long-term maintenance needs, water use/savings, and wildfire control.

The approved Plan shall form part of the construction documents and requirements for Contractor implementation through the project.

7.9 Air Quality Management Plan

Air quality plans identify potential control measures and strategies, including rules and regulations that could be implemented to reduce air pollutant emissions from construction equipment, on and off-road motor vehicles, and other sources. The Contractors shall be required to prepare and submit for approval, a comprehensive Air Quality Management Plan (AQMP). The Contractors shall implement these strategies through rules and regulations, public education and outreach, and partnerships with other agencies and stakeholders.

7.10 Emergency Response and Incident Plan

The Contractor shall be required to prepare and submit for approval a comprehensive Emergency Response and Incident Plan (ERIP). The Plan will describe the set of necessary actions to be taken in response to defined circumstances, across all hazards, and through the phases of mitigation, preparedness, response, and recovery duringthis project.

The Plan will provide necessary guidance for how to organize assets to respond to an incident (system description) and processes to manage the response through its successive stages (concept of operations). The Plan will document the combination of facilities, equipment, personnel, procedures, and communications existing within the Contractor‟s organizational structure and designed to help in the management of resources during incident response.

The activities contained in the Plan will address the phases of mitigation, preparedness, response, and recovery and will identify potential hazards, assess their likelihood of occurrence, their potential impact, and the organization's vulnerabilities to the impact, and provide a basis for understanding how the hazard likelihood and organizational vulnerabilities can be addressed.

For the Plan to be effective, the emergency incident must be formally defined so that there is clarity and consistency as to what is being managed. This may be best accomplished by defining the incident response through delineation of response goals and objectives, and by explaining response parameters through the Emergency Response and Incident Plan (ERIP).

7.11 Traffic and Vehicle Management Plan

Managing traffic at a construction workplace is an important part of ensuring the workplace is without risks to health and safety. Vehicles including powered mobile plant moving in and around a workplace, reversing, loading, and unloading are often linked with death and injuries to workers and members of the public. Traffic includes cars, trucks and powered mobile plant like excavators or graders, and pedestrians like workers and visitors. The most effective way to protect pedestrians is to eliminate traffic hazards.

Selected Contractor shall be required to prepare and submit for approval, a comprehensive Traffic and Vehicle Management Plan (TVMP). Together with this ESMP, the TVMP will provide the specific and general guide to vehicular movements throughout the project area to protect the community and workforce from accident and safety hazards during construction.

7.11.1 Waste Management Plan

A waste management plan (WMP) is required to achieve the goals set for managing construction waste. The construction Contractor shall prepare and submit for approval, a comprehensive Waste Management Plan (WMP). The WMP will provide the specific and general guide to the management of solid and liquid wastes throughout the project area and for the duration of the project. The Contractor shall have responsibility for the implementation of the Plan which will include procedures for salvage, reuse, and recycling of materials. The implementation of the WMP will protect the community and workforce from the health hazards of indiscriminate waste disposal during construction.

The waste management plan should cover the following:

i. Specify who is responsible for managing waste on site.
- Establish goals and objectives.
- Estimate the waste types and amounts involved.
- Set targets for reducing the amount of each waste sent to the waste disposal site.
- Describe recycling/reuse methods for each material.
- Identify the waste destinations and transport modes, including what materials arebeing segregated on site for reuse or recycling.
- Track progress.
- Describe special measures for material use and handling.
- Describe communication and training to support and encourage participation fromeveryone on site.

7.11.2 Environmental and Social Management Plan Monitoring

The overall objective of environmental and social monitoring is to ensure that mitigation measures are implemented and are effective. Environmental and social monitoring will also enable response to new and developing issues of concern during the project implementation hence ensuring that project activities comply with and adhere to environmental provisions and standard specifications of the Bank and those of the FMEnv and the State Counterpart.

The overall responsibility of the environmental and social monitoring will lie with the Project Implementation Unit and the State Government. The AfDB using their environmental experts will also follow up to ensure adherence to environmental and social safeguards, especially during the various implementation phases of the proposed intervention project.

The whole exercise of ESMP monitoring will involve monitoring compliance with regulations, managing worksites, executing specific environmental and social works, and seeking solutions to emerging environmental problems. The ESMP monitoring team will ensure regular reporting, which will be on a monthly, quarterly biennially or annually basis depending on the aspects being monitored to avoid any serious environmental consequences. Among the key issues to be monitored will be:

(i) The status of the ecological conditions.
(ii) Status of the physical works.
(iii) The technical and environmental problems encountered.
(iv) Proposed solutions to the problems encountered; and,
(v) The effectiveness of environmental and social measures adopted.

The ESMP monitoring programme is proposed compliance with agreed upon local environmental standards under the laws of Eritrea. The monitoring will involve:

(i) Reviewing the contractor's detailed worksite ESMP or ESIA and its specific procedures.
(ii) Ascertaining mitigation of the negative impacts identified.
(iii) Ascertaining the effectiveness of proposed measures.
(iv) Studying specific applicability conditions for the proposed measures.
(v) Monitoring the implementation of measures during the works.
(vi) Monitoring the recommended measures.
(vii) Proposing remedies in the event of occurrence of major impacts; and
(viii) Conducting environmental compliance and assessment at the end of the project.

Table 7-2: The ESMP Monitoring Schedule

No.	Aspects to be Monitored	Project Phase (construction, operational & maintenance	Location	Monitoring Indicators	Frequency of Monitoring	Institution/Agency to Monitor
01	Development of the ESMP	Project Appraisal phase	National Exercise	ESMP prepared	Once	PIU / FMEnv
03	Environmental conditions during the infrastructure development ▪ Status of the biophysical conditions ▪ Assessing the status of the physical works ▪ Follow up on mitigation measures ▪ Assess effectiveness of environmental and social mitigation measures adopted	Construction and operational phases	Project sites	Number of meetings planned and held. Record of meetings that took place	Monthly/biannually/annually	PIU / FMEnv
04	Occupational health issues and safety	During construction and operational phase	Project localities	Unsafe act, unsafe condition and general HSE report	Monthly/biannually/annually	PIU / safety Officer
04	Environmental conditions during the operational phase of the project.	Operational phases	Project localities	Number of meetings planned and held. Record of meetings that took place	Monthly/biannually/annually	PIU / safety Officer

7.12 Climate Change Adaptation Mechanism

Changes in climatic conditions pose threat to inclusive growth in Nigeria. In 2018 alone, Nigeria experienced flood disasters affecting 12 states and 327,000 people, as well as 60 hectares of farmland. Considering this, the project will integrate elements which enhance climate change adaptation and mitigation in the project design. Concerted attention will be made to ensure that infrastructure developed under this project are adequately climate proofed.

7.13 ESMP Implementation Schedule

The implementation and management of the ESMP schedule is designed to facilitate any necessary issues associated with the project. The ESMP activities also need to be implemented within an agreed timeframe and budget. Appropriate timing should be adhered to avoid delays in the implementation of the ESMP. The proposed scheduled is provided below in Table 7-3.

Table 7-3: Proposed ESMP Implementation Schedule

DESCRIPTION OF ACTIVITY	DURATION IN MONTHS																								
	2021			2022												2023									
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	
Disclosure of ESMP Report																									
Formation of Project Grievance Redress Committee (GRC)																									
Review and Approval of Contractor‟s ESMP and Health, & Safety Plan																									
Hold Stakeholders Meetings and Consultations																									
Execute Capacity Building Programmes																									
Implementation of Mitigation Measures																									
Supervision of ESMP Implementation																									
Monitoring & Reporting on ESMP Implementation																									
Conduct ESMP Implementation Audit																									

CHAPTER EIGHT
CONCLUSIONS AND RECOMMENDATIONS

8.1. Conclusions

This ESMP has been prepared based on environmental and social assessments conducted to equip the Government of Sokoto State as well as several other interested agencies, local administrative agencies plus all stakeholders with relevant and sufficient environmental information about the proposed zonal medical Warehouse project. It is hoped that the State Government will use this information to evaluate the environmental viability and sustainability of the proposed project. The project has environmental impacts, but which do not have long term and cumulative nor significant impacts. The proposed development project explains the various economic and social benefits not only to the local communities within the project areas, but to the entire nation. The negative environmental impacts that have been identified and are associated with the implementation of this project are minimal and could be addressed by implementing the mitigation measures proposed to ensure that they pose no threat to the environment and to the communities. These measures are part of the projects' component and will bring no added cost in the implementation process.

8.2. Recommendations

Even though the project focuses on Medical Warehouse, it is a multi-sectoral and a multi-disciplinary project. As such, it is important that during the implementation, relevant line ministries and other stakeholders are effectively involved to address some of the cross-cutting issues such as environmental management. The multi-disciplinary approach will ensure that emerging issues and challenges are not only adequately addressed but the addressing is done timely and appropriately. The contractors and the project proponents should take into consideration all the legislative measures put in place to ensure the due process is followed. The mitigation measures provided are based on the recommendations of this ESMP and they should be followed to address the environmental issues that may arise during the implementation of this project.

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APPENDIX 1: METHODOLOGY

1.1 INTRODUCTION

The Sokoto State Government plans to establish a Zonal Medical Warehouse (ZMW) at Kassarawa area in Wamako Local Government Area of Sokoto State. The project will be located on a land area covering about 3.8 hectares which has been acquired for this purpose. The zonal medical warehouse will serve as an Integrated Health Commodity distribution hub to other north-western States including Zamfara, Kebbi and Katsina States.

Thus, ENARMAC Nigeria Limited has conducted this study under the terms of the Nigerian Environmental Impact Assessment Act Cap E12 LFN 2004, and in fulfillment of the African Development Bank requirements for financial support. This report, therefore, present the methods and materials deployed during the field data campaign which took place between September 20 -25, 2021.

1.2 Objectives of the Fieldwork are:

- To collect samples that shall be representative of the environmental components
- To handle and preserve all samples in a manner that will guarantee their integrity and the quality of the results of analysis.
- To carry out *in-situ* analysis of all parameters with short holding time
- To carry out the analysis of all samples in the laboratory in accordance with methods approved by FMENV
- To geo-reference the sampling points using hand-held GPS

1.3 The Study Area

The proposed Zonal Medical Warehouse at Kassarawa area in the outskirt of Sokoto metropolis. The project will be located on a land area covering about 3.8 hectares. The surrounding area is dotted with local mud-houses, sparse vegetation and open spaces used for subsistence rain-fed agriculture. The climate is sub-tropical with rainy season between the months of late May and Late September with highest levels recorded in the months of July, and August. Temperature range in the area is between 35°C and 42°C depending on the period of the year. The proposed location is accessible by road within the city of Sokoto and the roads are in relatively good condition.

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2.0 MOBILISATION ACTIVITIES

2.1 Sampling activities

A brief toolbox meeting was held to discuss the approved sampling protocol/Term of reference issued by FMEnv and other issues such as security safety others. Attendance was also taken.

Plate1: Toolbox Meeting with cross section of Consultants and Regulators

2.2 Field Materials and Equipment Inspection

Before mobilization, quality checks were carried out on all the field sampling equipment. This involved calibration, testing and confirmation to ensure that none was malfunctioning. This check was conducted prior to field work. The sampling containers including glass, plastic and polythene bags among others were also sighted by the regulators.

3.0 MOBILISATION

3.1 Sampling Design

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 in September 2021to establish the environmental baseline condition of the study area. The sampling points were properly geo-referenced as presented in Table 1 while the sampling map is shown in Figure 3-1.

Table 1: Environmental Matrix and Coordinates

Field ID	Description	Lat	Long
SS1	Air Quality/Noise	005^0 57' 08.35''	12^0 57' 08.35''
SS2	Air Quality/Noise	005^0 11' 54.62''	12^0 57' 05.87''
SS3	Air Quality/Noise	005^0 11' 47.25''	12^0 57' 08.08''
SS4	Air Quality/Noise	005^0 11' 47.20''	12^0 57' 06.07''
SS5	Air Quality/Noise	005^0 11.301'	N 12^0 27.126'
SS6	Air Quality/Noise	005^0 11.307'	N 12^0 27.115'
SS7	Air Quality/Noise	005^0 11.103'	N 12^0 27.137'
BH	Borehole water	005^0 11.801'	N 12^0 27.119'
Ctrl 1	Air Quality/Noise	005^0 11.203'	N 12^0 17.127'
Ctrl 2	Air Quality/Noise	005^0 11.201'	N 12^0 17.116'

3.2.2 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*- Only Kassarawa District was consulted
- *.one groundwater sample was collection from an existing borehole at the school.*

• *Biodiversity studies across the study area.*

- A total of 53 questionnaires were administered to potential PAPs within the project communities with a 100% return. Based on the survey, the 253 respondents with 1574 household members were documented for Kassarawa District.

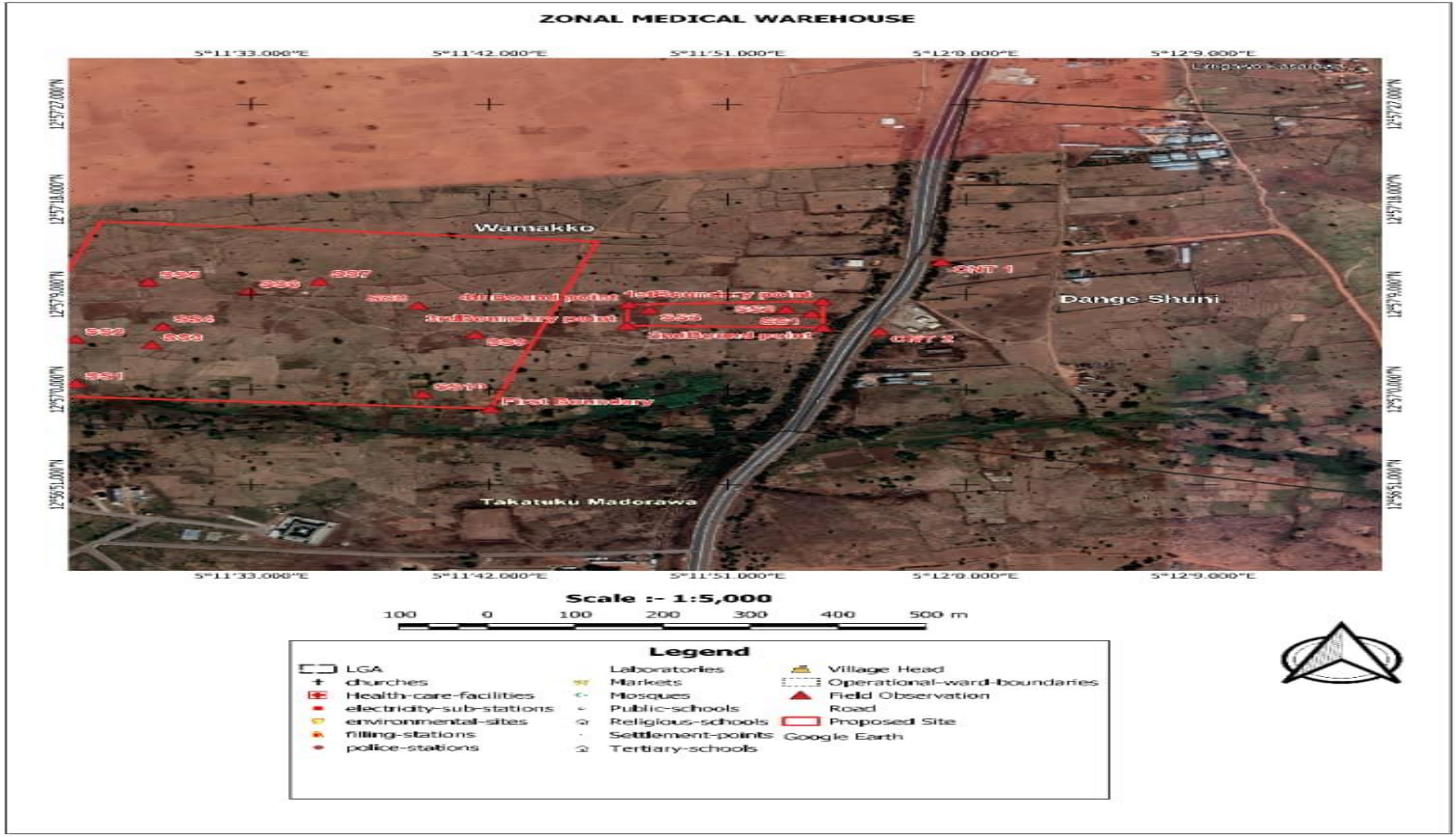

Figure 1: Sampling Design

Soil Sampling

Soil samples were collected with hand auger at two depth intervals (0-15cm and 15-30cm). A total of 9 soil samples including controls samples were collected from the field. 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.

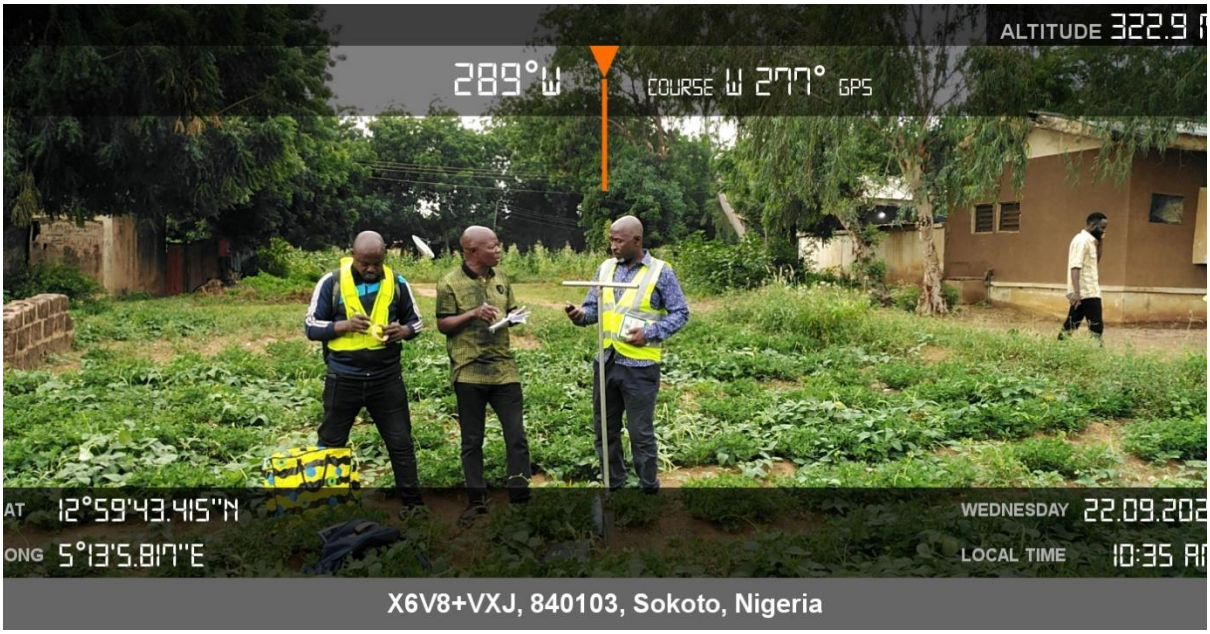

Plate 2: Soil sampling

4.0 SAMPLING TECHNIQUES AND MATERIALS

4.1 Materials

The under listed equipment were used for the survey: -

- Standard Noise Level Metre – ST 8820
- Canomax Gas Meter
- Hanna Multi Parameter
- Plastic and glass containers
- GPS
- Eckman grab
- Plankton net /sieve
- Sampling containers etc

Air quality measurements were taken using highly sensitive digital gas monitor in the upwind and downwind directions. 5 sampling points and two (2) control were sampled. The readings were recorded in notebooks and subsequently transferred into data sheets at the end of the day's work. Noise measurements were also taken at the same stations (equipment used is presented in Table2).

Table 2: Air Quality Equipment

Parameters	Equipment	Range	Alarm Levels
Sulphur dioxide $S0_2$	$S0_2$ gas monitor, Gasman Model 19648H	0-10ppm	2.0ppm
Nitrogen dioxide $N0_2$	$N0_2$ gas monitor Gasman model 19831N	0-10ppm	3ppm
Hydrogen sulphide H_2S	H_2S Gas monitor Gasman Model 1950241	0-50ppm	10ppm
Carbon monoxide CO	CO gas monitor Gasman model 19252H	0-500ppm	50ppm
Ammonia NH_3	NH_3 gas monitor Gasman Model 19730H	0-50ppm	25ppm
VOC (C_xH_y),CH_4	Testo 350-XL/Testo 454 Abgas-Analysegerat; Flue Gas Analyzer	10-40,000ppm	-
SPM	Testo 350-XL/Testo 454 Abgas-Analysegerat; Flue Gas Analyzer	10-40,000ppm	-
			-

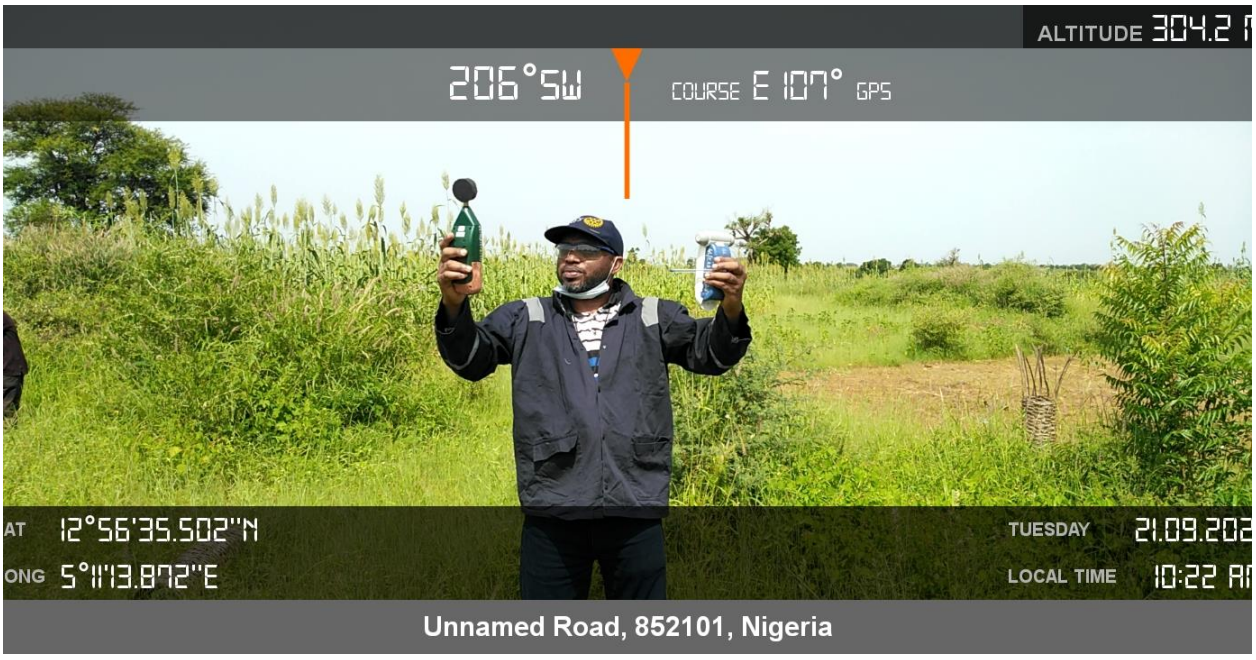

Plate 3: Ambient Air / Noise measurement

Vegetation/Wildlife

The vegetation study of the proposed Project area and adjacent environment were made by taking separate sample quadrants (25m x 25m for trees and shrubs and 4m x 4m for grasses and undergrowth) were measured in the sampling locations, which were selected using stratified random sampling procedures, considering plant species diversity, density, and dominance. Homogenous habitats were identified and sampled. The vegetation of the proposed Project location was characterized in terms of types, density, and profile of the vegetation, economic benefits, regional characteristics, and distribution of ecological zones, environmental sensitivity, and reserve areas. Plant specimens were randomly collected from proposed project location and the communities. The plants were tagged, pressed, and labelled. Initial identification of the plant samples was done using Flora of West Tropical Africa (Hutchinson and Dalziel, 1954, 1958) and Nigerian Trees (Keay et al., 1960, 1964). The scientific names of the identified plants were recorded in the table below. Locals were engaged for the local nomenclature of all identified plant species and their local use.

Plate 4: Biodiversity Study

Data were collected along the established quadrant by using the Line Intercept Methods of Cook and Bonham (1977) at pre-selected points. Each study location (plot) covered an area of 25m x 25m along the direction of transect for assessments. The procedure for the Line Intercept Method consists of recording the plants bisected by the line sometimes referred to as horizontal linear distance for each plant under the line. The total linear measurements for the total intercepts along the line represent the percentage ground covers which were converted to percent species composition as intercepts were recorded by species. However, unidentified plant species and species whose identification were doubted, were collected, given sample location coded numbers and pressed for identification in a herbarium.

5.0 CONSULTATION

5.1 Socio-economic Survey Methodologies

The procedures employed in the socio-economic studies was that public meetings were held with the district head (known as the Uban Kasa), and other groups in the community, FGDs. Data were collected from both primary and secondary sources; household survey and observatory methods were utilized in the study. The population size of each of the communities was determined from the projected population of the 2006 population census figure. A comprehensive questionnaire re designed to capture the following details of respondents: Biodata, religion, ethnicity occupation/ livelihood, infrastructure inventory including social facilities (Health care, Education, Borehole, Electricity), average income per annum among others. Conducting interviews in the affected communities, Households were randomly sampled for even and appropriate representation. Generally, the study was broken into three components involving field survey data collation, analysis, and reporting. Field Notes, Filled Socio-economic questionnaire and Attendance list during Socio-economic baseline data gathering are attached as Appendix to this Report.

A total of 53 questionnaires were administered to potential PAPs within the project communities with a 100% return. Based on the survey, the 53 respondents with 105 household members were documented for Kassarawa Districts.

Focused Group Discussion (FGD) in the Host Communities

The objective of the meeting was to disclose, interact and enlighten them about the proposed enhanced cattle breeding project and its impact on their animals as well as their communities and livelihood. The FGD members were asked questions to gather vital information about how they take care of their animals when they are sick. What volume of milk do they generate daily, and how often they sell their cattle. Virtually all present participated actively, and sufficient time was

allocated to each participant to express his views on the issue at Milgoma village, more especially with regards to the exportation of animals using the Agro-cargo warehouse.

Plate 5: Focal Group Discussion (FGD)

Target Population

The target population for this data was essentially indigenes of the communities, where government have dedicated a proposed grazing reserve as well as pasture developments hectares of land for the project. People from the 15 years above were carefully chosen to capture the groups that would be most directly impacted upon and most active, physically, socially, economically and health wise.

Consultations

Consultation is an important element of this socio-economic assessment and an integral component of the entire EIA process. This is because appropriate and adequate consultations will ensure smooth project implementation and guarantee economic and commercial sustainability of the proposed project. It involves information dissemination and

interaction/dialogues with identified stakeholders (including communities within the project vicinity) on the ElA of the proposed project. Interaction with people and eliciting feedback allows the affected populations to influence the decision-making process by raising issues that should be considered in project of sign; mitigation; monitoring and management plans; and the analysis of alternatives. The overall result would be the optimization of the potentials of the proposed project and maximization of its benefits.

Techniques Analytical

Various statistical techniques and tools are used in this report. The most common are summary statistics like percentages, ratios, and averages. The data are presented mostly in tables and charts. The population figures of the area were projected from the 1991 census figures at 3.4% growth rate per annum using the linear and exponential projection model (Palmore and Gardner, 1983). The formulae are as follows:

I. Population projection using the exponential model

$P_n = P_o (1 + r)^n$; where P_o is population in the base year, r is the estimated annual growth rate of population, and n is time lapse in years.

II. Sex Ratio = $\frac{\text{Number of males in the community X 100}}{\text{Number of females in the community}}$

III. Dependency Ratio = $\frac{\text{Population (0-14years) + 65years and above X 100}}{\text{Population aged 15-64years}}$

IV. Crude Birth Rate (CBR) = $\frac{\text{Number of births in the community in one year X 100}}{\text{Midyear population}}$

6.0 Laboratory Analytical Methods

A summary of the analytical methods, techniques, and the detection limits for the various parameters to be analysed are presented in Table 3. The samples were relinquished to Annal Concept Laboratory located in Port Harcourt, Rivers State. The Laboratory is duly accredited by the federal ministry of Environment. The Official of FMEnv was on ground to participate in the analysis.

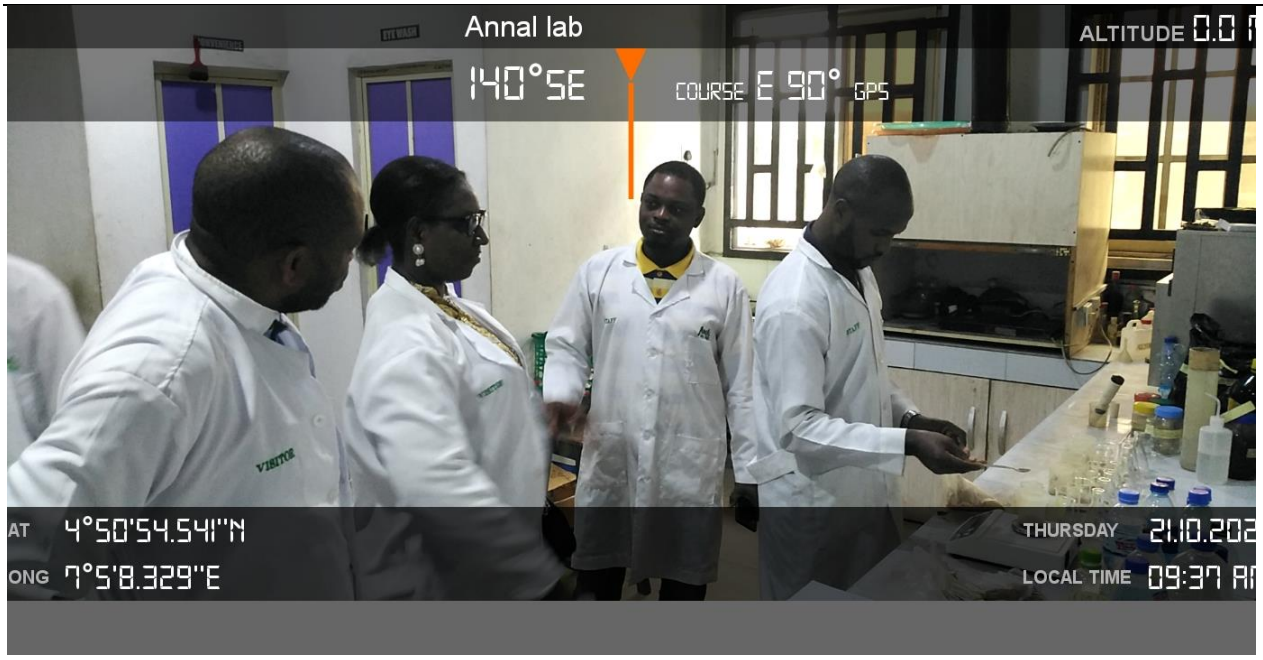

Plate 6: Participation in Laboratory Analysis / walk through

Table 3: Analytical Methods and Detection limits for Various Parameters

Parameter	Analytical Method	Detection limit	
		Soil/Sediment (g/kg)	Water (mg/l)
Cadmium	ASTM D3557	0.001	0.001
Chromium	WI 36 ASTM D1687	0.001	0.001
Total Copper	WI 36-APHA 311B	0.001	0.001
Lead	WI 36-D2559 ASTMD, API-RP 45	0.001	0.001
Mercury	APHA 3112B	0.001	0.001
Zinc	WI 36-1687 ASTM	0.001	0.001
Potassium	WI 34 APHA 311D/ASTM D3561	0.001	0.001
Vanadium	WI 36- APHA 303C	0.001	0.001
Sodium	WI 34- APHA 311B/ASTM D3561	0.001	0.001
Fe3+	WI 36-D1068 ASTMD 106C	0.001	0.001
pH	ASTM D1293 WI - 07	-	-
Conductivity	Electrde WI-07	-	-
Turbidity	Turbidimetric	-	-
Nitrate	WI 128- APHA/ASTM	0.01	0.01
Sulphate	HACH DR 2000 Environmental Spectrophotometer	-	-
Phosphate	APHA 4500P-WI24 UV/V4	0.001	0.001
TDS	Electrometric WI 06	-	-
Dissolved oxygen	Electrometric WI06	-	-
TSS	W 105-APHA-Filtering then weighting	-	-
Petroleum Hydrocarbon	IR WI 32 ASTM D3921 FT-IR Spectrophotmeter	0.001	0.001

Microbes	ASTM D5465 – 93	-	-
Cl^-	ASTM 512A	0. 01	0. 01
Aluminum	APHA 3111D	0.001	0.001
Calcium	APHA 3111B	0.001	0.001
Manganese	APHA3111B	0.001	0.001
PSD	BS 1377/ASTM D422	-	-

7.0 CONCLUSION

The data gathering for the ESIA of the proposed road project was successfully completed.