ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

FINAL REPORT

OF

AGRO PROCESSING PRODUCTIVITY ENHANCEMENT AND LIVELIHOOD IMPROVEMENT SUPPORT (APPEALS) PROJECT, ENUGU

BY

AGRO PROCESSING PRODUCTIVITY ENHANCEMENT AND LIVELIHOOD IMPROVEMENT SUPPORT (APPEALS) PROJECT
ENUGU STATE COORDINATION OFFICE
11/13 UBOSI STREET
NEW HAVEN, ENUGU
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LIST OF ABBREVIATION AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
APPEALS	Agro-Processing, Productivity Enhancement and Livelihood Improvement Support
CIGs	Community Interest Groups
DPC	Damp Proof Course
EC	Environmental Committee
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMS	Environmental Management Systems
ENWARD	Enugu State Ministry of Agriculture and Rural Development
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESO	Environmental Safety Officer
FBO	Faith Based Organizations
FEPA	Federal Environmental Protection Agency
FGDs	Focal Group Discussion
FMARD	Federal Ministry of Agriculture & Rural Development
FMENV	Federal Ministry of Environment
GBV	Gender Based Violence
GIS	Geographic Information System
HIV	Human Immunodeficiency Virus
HSE	Health Safety and Environment
IDA	International Development Association
ISDS	Integrated Safeguards Data Sheet
M&E	Monitoring and Evaluation
MDAs	Ministry Department and Agencies
Mg/L	Milligram per Litre
NESREA	National Environmental Standards and Regulations Enforcement Agency
NGOs	Non-Governmental Organizations
NIWRMC	National Integrated Water Resources Management Commission
NPC	National Population Commission
NWRI	National Water Resources Institute
PAD	Project Appraisal Document
PAPs	Project Affected Persons
PDO	Project Development Objective
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PPE	Personal Protection Equipment
PRODA	Project Development Institute
RBDAs	River Basin Development Authorities
SEA	Sexual Exploitation and Abuse
SEPA	State Environmental Protection Unit
SMH	State Ministry of Health
SPM	Suspended Particulate Matter
SPMU	State Project Management Unit
STD	Sexual Transmitted Disease
WMP	Waste Management Plan

EXECUTIVE SUMMARY

ES.01 Background

The Federal Government of Nigeria through the Federal Ministry of Agriculture and Rural Development (FMARD) secured a Credit for US$200 million equivalent from the International Development Association (IDA) of the International Bank for Reconstruction and Development (the World Bank) to implement the Agro-Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) project.

The project is effective and is at an early stage of implementation both at national and states levels. The Federal Ministry of Agriculture and Rural Development will implement the project through partnership with participating states of Lagos, Enugu, Kano, Cross River, Kaduna and Kogi. The project is expected to benefit additional states conditional on overall project performance and funding availability.

The priority value chains for Enugu State are cashew, rice and poultry. Furthermore, the women and youth empowerment sub-component of the project is focusing on other agribusinesses that will enhance job creation, overall increase in income and livelihood of the beneficiaries. The Project Development Objective (PDO) is to enhance agricultural productivity of small and medium scale farmers and improve value addition along priority value chains in participating states.

The Environmental and Social Safeguards Policies triggered by the proposed project are Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Pest Management (OP/BP 4.09) and Forest (OP/BP 4.36). The preparation of the ESIA was specifically guided by the Environmental and Social Management Framework (ESMF) for the APPEALS project as well as the Nigerian Environmental Assessment guidelines and procedure (APPEALS ESMF,2017).

ES.02 Rationale for ESMP

The rationale for the preparation of the ESIA is to develop a site specific management plan that will ensure that the likely environmental and social concerns that will arise from the proposed APPEALS Project are addressed in environmentally sound and socially sustainable manner.

ES.03 Objective of this ESIA

The main objective of the study is to assess the potential environmental and social impacts of the proposed works as described in the scope of work and prepare an Environmental and Social Impact Assessment (ESIA) that will include detailed Environmental and Social Management Plans (ESMP) along all value chains especially the segments of cashew, rice and poultry.

ES.04 Project Components

The project has five components presented as follows:

Component 1: **Production and Productivity Enhancement:**

The aim of this component is to increase total supply of the targeted priority value chains with a purpose to ensure consistent, reliable and timely stream of produce to the markets. Improving farmers' productivity and quality of their produce will create the basis for improving farmers' participation in agri-business supply chains and responding to the market requirements. The activities to be financed are clustered around the following three subcomponents:

- ✓ Subcomponent 3.1.1: Business alliances and out-grower scheme
- ✓ Subcomponent 3.1 2: Technology demonstration:
- ✓ Subcomponent 3.1.3: Support to technology adoption

Component 2: Primary Processing, Value Addition, Post-Harvest Management and Women and Youth Empowerment

Component seeks to support the reduction of post- harvest losses, facilitate the consolidation of produce and primary processing by farmers' cooperative societies, and small and medium-scale enterprises in project intervention areas, focusing on gender-sensitive activities along the core segments of the value chains (production, processing, marketing) and ancillary businesses (agro-dealership, haulage, packaging, business management, etc.). Activities to be financed under this component are organized around the following three subcomponents:

- ✓ Subcomponent 3.2.1: Women and Youth Empowerment
- ✓ Subcomponent 3.2.2: Commodity aggregation and cottage processing
- ✓ Subcomponent 3.2.3: Market development and linkage to business services.

Component 3: **Infrastructure Support to Agri-business Clusters:**

This component aims at improving physical environment (last mile connection to roads and utilities) for agro-industrial and cottage processing units, located in agri-business clusters with significant potential for agro-processing and greater inclusion of small to medium size farmers into the agri-business supply chains through the business alliances. It tackles the major constraints to efficient supply of raw materials and competitive agro-processing. Activities to be financed under this component are clustered around the following subcomponents:

- ✓ Subcomponent 3.3.1: Infrastructure support to production
- ✓ Subcomponent 3.3.2: Infrastructure support to processing and value addition.

Component 4: Technical Assistance, Knowledge Management and Communication:

The aim of this component is to build capacity of the project staff and partners in the relevant areas of value chains development, harness the knowledge acquired and generated under the project, facilitate exchanges of experience and build capacity of stakeholders participating in the implementation of the project, and support the FMARD in conducting strategic and technical studies for scaling up agricultural productivity and processing programs. Activities to be financed under this component are:

- ✓ Subcomponent 3.4.1: Capacity Building and support to collaborating institutions
- ✓ Subcomponent 3.4.2: Technical assistance and knowledge management
- ✓ Subcomponent 3.4.3: Communication and outreach

Component 5: Project Management and Coordination:

The essence of component 5 is to ensure effective management and coordination of the project for proper accomplishment of project related goals and achievement of the PDO. This component will support the work of technical, financial, administrative and M&E activities during the entire project period. Activities to be financed under this component are organized around the following subcomponents

- ✓ Subcomponent 3.5.1: Project management and coordination
- ✓ Subcomponent 3.5.2: Monitoring and Evaluation (M&E)

Subcomponent 3.5.3: Environmental and Social Safeguards and Grievance Redress Mechanism.

ES.05 Scope of the ESIA

The core tasks for the consultancy assignment shall include but not limited to the following:

1. Review existing ESMF prepared for APPEALS and incorporate GBV requirements into the operationalization of the ESIA final report and ESMP developed;
2. Review Environmental Safeguards instruments of the World Bank Safeguards policies triggered by the project;
3. Describe the proposed project by providing a synthetic description of the project relevant components and presenting plans, maps, figures and tables;
4. Identify the policy, legal and administrative framework relevant to the project;
5. Develop a baseline environmental (bio-physical and social) description of the project setting including both the direct and indirect areas of influence. This should include aspects such as geology, soil, water quality (both surface and underground), wetlands in the vicinity of the project areas, terrestrial and aquatic flora and fauna groups/ population (including identification of vulnerable groups), air quality, climatic conditions, economic activities, amongst others;
6. Describe and evaluate the social-economic background of the project area. In this respect, the following socio-economic issues are addressed in the ESIA:
    I. The social baseline information before project intervention;
    II. The project's impacts on health and social well-being; quality of the living environment; economic well-being; family and community; and gender relations;
    III. The impacted communities for the project: location, access, population (number, demographic and social characteristics); economy (employment rate, income distribution); services (types, capacity, and adequacy) and housing. Concern is the ability to provide work force, service new development and absorb and adjust to growth (worker/family);
    IV. The report should identify and assess social impact identified during the public consultation process and those that, based on consultant's experience, are also likely to occur. In some instances, the affected communities may not be aware of or be in a position to identify all the social impact that may occur. However, this does not mean that they will not occur. In such cases the consultant should use his/her experience to identify additional social impacts that have not been raised by the public. A summary of the views of the population including vulnerable groups, determined through thoroughly documented discussions with local communities. The meetings and discussions must be documented and should show how issues and problems raised are or will be resolved
    V. Particular attention to the impacts of the project on vulnerable and marginalized individuals and groups (including but not limited to mobility impaired individuals and groups, and People Living with Disabilities)
    VI. Detail measures that will need to be taken to mitigate the negative social impact identified and the procedures for their implementation;
    VII. Key uncertainties and risks: Identify and communicate any key uncertainties and risks associated with the accuracy of the findings of the social assessment, as well as of the proposed project. Some sources of uncertainty and risk commonly associated with projects are linked to: (a) Lack of adequate information at the community level; (b) Creation of employment and business opportunities for members from the local, historically disadvantaged communities; (c) The influx of job seekers and construction workers to the area and the impact on services etc.;

VIII. Methods of data collection: Information will be gathered from field surveys and secondary data sources (interviews, structured questionnaires, in-depth interviews and focus group discussions);

7. Describe and analyse the physical, biological and human environmental conditions in the study area before project implementation. This analysis shall include the interrelations between environmental and social components and the importance that the society and local populations attach to these components, in order to identify the environmental and social components of high value or presenting a particular interest.
8. Present and analyse alternatives to the proposed project, including the "without project" option, by identifying and comparing the alternatives on the basis of technical, economic, environmental and social criteria;
9. For the selected alternative, identifying and assessing potential importance of beneficial and adverse environmental and social, direct and indirect, short and long-term, temporary and permanent impacts, on the basis of a rigorous method;
10. Present the potential environmental and social risks and impacts of the proposed project;
11. Define appropriate mitigation/enhancement measures to prevent, minimise, mitigate, or compensate for adverse impacts or to enhance the project environmental and social benefits, including responsibilities and associated costs;
12. Address potential cumulative effects taking into account other initiatives planned in the study area;
13. Develop an environmental and social monitoring program, including indicators, institutional responsibilities and associated costs;
14. As appropriate, prepare an environmental hazard plan including an analysis of the risk of accident, the identification of appropriate security measures and the development of a preliminary contingency plan;`
15. Assess the capacity available to implement the proposed mitigation measures and identify institutional responsibilities and needs for capacity building if necessary to implement the recommendations of the environmental and social assessment and associated costs;
16. Undertake Risk Assessment and propose a Disaster Management Plan including emergency evacuation during natural and man-made disaster;
17. Carry out consultations with primary and secondary stakeholders in order to obtain their views on and preoccupations about the project. These consultations shall occur during the preparation of the ESIA Report to identify key environmental and social issues and impacts, and after completion of the draft ESIA Report to obtain comments from stakeholders on the proposed mitigation/enhancement measures;
18. Develop a Labour Influx, Sexual Exploitation and Abuse, and Occupational Health and Safety Response Plan;
19. Identify under infrastructure and provide a description and an evaluation of possible project alternatives in terms of the technology, design and lay outs, levels of works and location consideration of the project sites. The assessment of alternatives should cover assessment of the sites, routes and alignments for the project infrastructures. An analysis for each alternative in terms of cost and technical feasibility should be given and the best option justified. The analysis should include parameters considered along with weight age criteria for short-listing selected site;
20. Conduct ecological evaluation of the available project alternatives to compare their viability taking into account a number of considerations such as environmental costs, ecological values and uses and inherent opportunity costs against each of the alternatives including the presentation of the preferred project design option, based on the technical and ecological alternatives evaluation;

21. Describe development activities to be undertaken in the project and map out key environmental and social impacts of the project in terms of their extent, duration and reversibility. The ESIA should provide matching feasible mitigation measures for such impacts;
22. Assess HIV/AIDS potential impacts of the project and propose measures to address such concerns during project implementation;
23. Assess noise and vibration effects associated with the construction and operation during infrastructure development. It is expected that; noise sources could come from vehicular traffic. Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Assessment should be based on equivalent ambient noise levels that should not be exceeded and general recommendations for prevention and control of noise stated;
24. Identify wastes from the implementation and operations of the project. These should include details of the processes for each activity, generation of wastes, types, quantity and methodology for collection, storage, treatment and disposal of wastes. Therefore, measures for effective management of such effluent waste should be outlined in the ESIA study;
25. Occupational health and safety issues during the construction operations are to be outlined in the ESIA in line with internationally acceptable practices and standards such as general recommendations for managing physical hazards as addressed in the General EHS Guidelines. This should comprehensively cover among others protections against exposure to dust and hazardous materials that may be present in infrastructure materials and other forms of waste and a host physical hazards associated with the use equipment in line with this nature of project;
26. Prepare an Environmental and Social Management Plan (ESMP). The ESMP should capture:
    - The potential environmental and social impacts resulting from project activities;
    - The proposed mitigation measures;
    - The institutional responsibilities for implementation;
    - The monitoring indicators;
    - The institutional responsibilities for monitoring and implementation of mitigation measures;
    - The costs of activities; and

    (Vii) A calendar for implementation;

ES.06 Geographical Location and Description of Enugu State

Enugu State is one of the states in the eastern part of Nigeria located at the foot of the Udi Plateau. It is located in the geographical position of $6^0$30'N $7^0$30'E.The state shares borders with Abia State and Imo State to the south, Ebonyi State to the east, Benue State to the northeast, Kogi State to the northwest and Anambra State to the west.

Enugu has good soil-land and climatic conditions all year round, sitting at about 223 metres (732 ft) above sea level, and the soil is well drained during its rainy seasons. The mean temperature in Enugu State in the hottest month of February is about 87.16 °F (30.64 °C), while the lowest temperatures occur in the month of November, reaching 60.54 °F (15.86 °C).

ES.07 Approaches and Methodology

A multidisciplinary approach was employed in order to holistically address all pertinent aspects of the proposed project on the bio-physical and socio-economic environment. Accordingly, the bio-physical and socio-economic environment of the

proposed project was characterized and assessed using a number of survey instruments, field studies including broad-based community consultations to determine the likely environmental and social impacts of the proposed project and thereafter formulated specific, measurable, achievable, relevant and time-based mitigation measures (SMART).

ES.08 Project Description

The proposed APPEALS project is centered on three priority value chains namely Rice, Cashew and Poultry while the segments are production, processing and marketing. Rice Production involves land development- site clearing, cultivation and rice harvesting. Rice Processing involves procurement and installation of machines, sieving and bagging of rice ready for marketing. Poultry production, processing and marketing involves construction of pens, rearing of chicks and harnessing chicken meats while cashew involves grafting, construction of processing plant and roasting or steam of cashew seeds.

ES.09 Institutional and Legal Framework for Environmental Management

The ESIA was prepared in compliance with the regulations, guidelines and standards of the Federal Ministry of Environment (FMEnv.), Enugu State legislations on environment including all other applicable national legislations involving the World Bank environmental and social safeguards policies as well as other Multilateral Environmental Agreements to which Nigeria is a party. The relevant policies, legal and administrative framework existing at the State, National and International levels are also reviewed;

ES.10 Biophysical Environment

Geologically, Enugu State is underlain by seven major geologic formations which from the oldest to the youngest include: Eze-Aku Formation; Awgu Formation (Agbani Sandstone); Nkporo Enugu Shale; Mamu Formation; Ajali Sandstone; Nsukka Formation and Imo Shale. The climate in the project area is generally congenial with mean daily temperature of 26.7 °C (80.1 °F). The average annual rainfall is around 2000 millimetres (79 in) which arrives intermittently and becomes very heavy during the rainy season.

The ambient air quality parameters considered during the study include Nitrogen (IV) oxide ($N0_2$), Sulphur (IV) oxide ($S0_2$), Carbon monoxide (CO), Carbon (IV) Oxide, Volatile Organic Carbon (VOC), Methane CH_4), Hydrogen Sulphide (H_2S), and Ammonia (NH_4). The results of air quality analysis revealed that the parameters were within FMEnv permissible limits.

The result of water samples collected and analysed shows that the tested parameters were all within FMEnv acceptable limits except BOD which recorded 10.4, 7.04 and 8.84 at Eha-Amufu, Iwollo and Eha-Alumona respectively as against FMEnv limit of 5.0; Iron which recorded 0.25, 0.35, 0.36 and 0.05 at Eha-Amufu, Eha-Alumona, Obollor Afor and Iwollo respectively as against 0.03; Chlorine which recorded 303.01 at Eha-Amufu as against 250 and Potassium which recorded 76.48, 50.08 and 74.8 at Eha-Amufu, Eha Alumona and Iwollo respectively as against <20.

The flora pattern in the project area is closely related to the soil structure. However, this has been largely influenced over time by geological formation/changes, erosion processes and prevailing climatic conditions. Flora within the study area are luxuriant and consist of shrubs, grasses and tree plants components while the faunal composition in the project area include reptiles, insects, birds and mammals.

ES.11 Existing Socio-economic Conditions

The results obtained from the analysis of field reconnaissance surveys and administration of pre-tested questionnaires indicate more males (63.3%) than females (36.7%); 48.5% of the respondents are married, 3.6% (widow), 47.6% (single) and an insignificant 0.3% comprise widows/widowers. Majority of the people are into crop farming (57%) and animal farming (54.7%) as their main sources of livelihood respectively. The family sizes prevalent in the study area are large and is consistent with family sizes usually encountered in farming communities in Nigeria. The income of the respondents as indicated from the survey data shows that 23.9% earn between N6,000-₦10,000 monthly, 22.4% earn above ₦25,000 monthly, 20.4% between ₦16,000- ₦20,000 monthly, 12.4% earn between ₦21,000-₦25,000 monthly, 6.5% earn between ₦11,000-₦15,000 monthly while only 6.8% of the respondents earn ₦5,000 and below monthly. About 7.5% of them earn no monthly income at all (jobless). The conditions of roads, domestic water supply, energy supply and other social infrastructure are generally poor and require improvement.

ES.12 Grievance Redress Mechanism/Gender Based Violence (GBV)

During the FGDs, the elders explained that conflicts in the community were resolved through dialogue but exceptional cases were reported to the police. They further explained that all conflicts in the community were brought to the Igwe's palace for resolution while land dispute were assigned to the elders. On Gender Based Violence GBV, they said that it rarely occurred, however whenever it occurred it was also resolved by the Igwe's cabinet. But when the parties are not satisfied, it will be directed to the government agency charged with such responsibility.

The survey on gender based violence revealed that 18.5% and 2.8% of those who have experienced some form of gender based violence were girls and women respectively. The results show that across the communities in the project area, girls are the most vulnerable gender group suffering from gender based violence.

ES.13 Summary of Significant Positive and Negative Impacts

The potential impacts, both positive and negative, associated with the proposed APPEALS project are soil contamination from chemical accumulation from fertilizers, herbicides and pesticides, fire outbreak from rice husk and cashew roasting, air pollution and associated ailment from inhalation of rice husk, odour from chicken droppings and processing meat station. Some positive impacts include increased output in rice, cashew and chicken/meat/eggs, and employment generation. The negative environmental and social impacts are temporary in nature subsisting during pre and construction phases but will eventually disappear after the completion of rehabilitation works. These impacts have appropriate mitigation measures drawn up to ameliorate and or compensate for such conditions.

In view of the aforementioned, the people unanimously agreed to support the proposed APPEALS project due to the benefits associated with it which include: temporary employment, restoration of farmlands and livelihoods, improvement of land values and enhanced development activities that will result from the successful completion of the proposed intervention activities. This report has proposed the best project implementation options and technological alternatives.

ES.14 Public Consultations Program

Community consultations were held from 3rd to 16th November 2020 in Nine Local Government Areas within the three Senatorial zones of Enugu State. Consultations were held with community leaders comprising men, women, youths including

project affected persons, CBOs, FBOs, CIGs, etc at Adani, EhaAlumona, EhaAmufu, Nenwe, Obinagu Udi, Nsukka, Iwollo, Obollo Afor, Ugwuomu Nike and Ako Nike where production segments of the 3 value chains are predominant. Focal group discussions (FGDs) were held for marketing and processing segments at Emene, Udume, 9th mile, Ngwo, Idodo, Nenwe and Enugu. Others are Eha Amufu and Eha Alumona.

ES.15 Occupational, Health and Safety Issues/ Plan

Ensure that all workers undergo proper HSE orientation and induction before engaging in site activity.

- HSE officer shall enforce daily tool box meeting before anyone embark on site activity
- HSE shall enforce complete and suitable PPEs for workers.
- Ensure that any accident in the site is recorded.
- Ensure that adequate contingency and emergency plans are put in place in case of accidents, injuries and fire outbreaks.
- Ensure that warning signs are strategically pasted to the knowledge of both staff and visitors.
- Ensure that precaution signs are provided and placed at strategic locations along the project route
- Ensure participatory re-orientation meetings are in place to revisit rules and discuss experiences.
- Ensure that the contractor has adequate security personnel to man the site. They can liaise with the local security outfits.
- The security personnel shall be from a registered security outfit.
- Regularly assessing the improvement and required changes in the HSE rules and regulation

ES.16 Environmental and Social Mitigation Measures

Mitigation measures were formulated for reducing, ameliorating, avoiding or compensating for the identified environmental and social impacts and where possible, enhancing environmental quality through the adoption of designed project alternatives and operational procedures. Table 8.3 outlines a summary of the potential and associated impacts of the project, the corresponding mitigation measures, the responsibilities for implementation and monitoring as well as the cost of execution. The mitigation measures formulated for the ESIA are specific, measurable, achievable, relevant and time-based (SMART). To this extent estimated cost of mitigation measures is indicated in order to guide the preparation of the project implementation manual.

ES.17 EHS Plan Covering Workers, Labor, Contractor, Staff and Nearby Communities Including Specific Measures to Deal with the COVID-19 Pandemic

EHS plan covering both workers/labor/contractor staff in the site and nearby communities including specific measures to deal with the COVID 19 Pandemic is addressed.

ES.18 Training Programmes

To enhance the respective roles and collaboration of the relevant stakeholders like the (SPMU), site manager, women and youths, HSE officers, community association, and

cooperative association would require training in the areas of general sensitization on general environmental issues; environmental considerations in construction projects; Integration of ESMP components in project activities as well as the use of vegetation. An estimated cost of one Million Four Hundred and Seventy-Five Thousand Naira (₦1,475,000.00) only is proposed for the training programmes.

ES.19 Labour Influx and Child Abuse

The issues of influx of labourers to the project area during the implementation of the proposed civil works as well as measures to prevent child and gender abuse were addressed in both the labour and gender based violence management plans in Chapter seven

ES.20 Budget

The estimated cost of implementing the ESMP is estimated at Sixteen Million Three Hundred and Thirty Nine Thousand One Hundred and Sixty Two Naira (₦16, 339,162.00) only.

ES.21 ESMP Disclosures

After review and clearance by the World Bank, the ESIA shall be disclosed at the FMEnv, SME and the host LGA offices as well as the World Bank Info Shop. The purpose is to inform stakeholders about the project activities, potential and associated impacts and anticipated and proposed environmental and social management actions/activities.

CHAPTER ONE

1.0 INTRODUCTION

This document is the Draft Report of Environmental and Social Impact Assessment (ESIA) for Agro-Processing Productivity Enhancement and Livelihood Improvement Support (APPEALS) project under the Enugu State World Bank Assisted Programme.

1.1 Background

The Federal Government of Nigeria through the Federal Ministry of Agriculture and Rural Development (FMARD) secured a Credit for US$200 million equivalent from the International Development Association (IDA) of the International Bank for Reconstruction and Development (the World Bank) to implement the Agro-Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) project.

The project is effective and is at an early stage of implementation both at national and states levels. The Federal Ministry of Agriculture and Rural Development will implement the project through partnership with participating states of Lagos, Enugu, Kano, Cross River, Kaduna and Kogi. The project also is expected to benefit additional states, conditional on overall project performance and funding availability.

The project support focuses on priority value chains as identified in Agricultural Promotion Policy-the Green Alternative (APP-2016-2020). While many, if not all of these value chains, may have dual or triple purposes, each participating state will focus on three promising value chains. This will allow for greater impact and a focused approach, with priority given to structuring value chains with potential for geographic and vertical integration across the States (for example, maize can be integrated into the animal feed industry to support the development of poultry and aquaculture value chain and geographically along the North West-South West corridor).

The Priority value chains for Enugu State are Cashew, Rice and Poultry. Furthermore, the women and youth empowerment sub-component of the project is focusing on other agribusinesses that will enhance job creation, overall increase in income and livelihood of the beneficiaries. The Project Development Objective (PDO) is to enhance agricultural productivity of small and medium scale farmers and improve value addition along priority value chains in participating states.

1.2 Rationale for ESMP

The rationale for the preparation of the ESIA is to develop a site specific management plan that will ensure that the likely environmental and social concerns that will arise from the proposed APPEALS Project are addressed in environmentally sound and socially sustainable manner.

1.3 Objective of this ESIA

The main objective of the study is to assess the potential environmental and social impacts of the proposed works as described in the scope of work and prepare an Environmental and Social Impact Assessment (ESIA) that will include detailed Environmental and Social Management Plans (ESMP) along all value chains and segments of cashew, rice and poultry.

1.3.1 Specific Objectives:

The specific objectives of the study include:

- To provide up-to-date and detailed baseline conditions: environmental and social information in the project areas and their surrounding areas,taking into account the

evolution of the project and the evolution of environmental, socio-economic and institutional background;

- To conduct an Environmental and Social Assessment of the planned developments in order to identify and assess their potential environmental and social impact in relation to the civil works involving infrastructure;
- To provide good understanding of the communities likely to be affected by the project by preparing a Community Profile through profiling;
- To inform community members about: (a) the project; (b) similar projects elsewhere to give them a sense of how they are likely to be affected; (c) how they can be involved in the ESIA; (d) their procedural rights in the regulatory and social performance framework for the project; and (e) their access to grievance and feedback mechanisms;
- To formulate inclusive participatory processes and deliberative spaces to help community members;
- To conduct a Health Impact Assessment to facilitate the reduction or avoidance of negative impacts of the project on human health and enhance positive impacts;
- To carry out consultations with relevant stakeholders, including potential project-affected persons, to obtain their views and suggestions regarding the environmental and social impacts of the proposed sub project;
- To prepare an estimated cost of the Environmental and Social Management Plan (ESMP), with GBV issues fully addressed and incorporated there-in, and detailing mitigation measures as well as institutional roles and responsibilities necessary for the successful implementation of the ESMP;
- To establish the baseline conditions of the existing environmental setting and identify sensitive components of the existing environment within the project area and areas of influence;
- To assist project design and planning activities by identifying relevant aspects of location, construction and operations activities which may cause adverse environmental, social, health and economic effects;
- To recommend measures during construction, commissioning and operational activities to avoid and mitigate adverse effects and or to enhance beneficial impacts of the proposed project that need to be incorporated as part of the ESMP;
- To identify existing and expected environmental regulations that are affected by the development activities as well as outline standards and targets to be met by the proposed civil works;
- To identify any future environmental issues and concerns which may affect the development of the project, including cumulative and induced impacts;
- To recommend an environmental and social management program for the construction and/or rehabilitation of anticipated rural infrastructure to support agribusiness clusters (e,g roads, jetties, solar mini grid, boreholes) including compliance, monitoring, auditing and contingency planning;
- To provide the basis for co-operation and consultation with regulatory and non-regulatory authorities and the public;
- To cross-reference facts and information in the existing APPEALS Environmental and Social Management Framework;
- To develop a Labour Influx, Sexual Exploitation and Abuse (SEA), and Occupational Health and Safety Response Plan; and,
- To consult with identified project affected persons (PAPs) to complete a baseline socio-economic survey of the PAPs and host communities.

1.4 Project Components

The project has five components presented as follows:

1.4.1 Component 1: Production and Productivity Enhancement:

The aim of this component is to increase total supply of the targeted priority value chains with a purpose to ensure consistent, reliable and timely stream of produce to the markets. Improving farmers' productivity and quality of their produce will create the basis for improving farmers' participation in agri-business supply chains and responding to the market requirements. The activities to be financed are clustered around the following three subcomponents:

- ✓ Subcomponent 1.1. Business alliances and out-grower scheme
- ✓ Subcomponent 1 2. Technology demonstration:
- ✓ Subcomponent 1.3. Support to technology adoption

1.4.2 Component 2: Primary Processing, Value Addition, Post-Harvest Management and Women and Youth Empowerment:

The component will support the reduction of post-harvest losses, facilitate the consolidation of produce and primary processing by farmers' cooperative societies and small and medium-scale enterprises in project intervention areas, focusing on gender-sensitive activities along the core segments of the value chains (production, processing, marketing) and ancillary businesses (agro-dealership, haulage, packaging, business management, etc.).Activities to be financed under this component are organized around three subcomponents:

- ✓ Subcomponent 2.1. Women and Youth Empowerment
- ✓ Subcomponent 2.2. Commodity aggregation and cottage processing
- ✓ Subcomponent 2.3. Market development and linkage to business services.

1.4.3 Component 3: Infrastructure Support to Agri-business Clusters:

This component aims at improving physical environment (last mile connection to roads and utilities) for agro-industrial and cottage processing units, located in agri-business clusters with significant potential for agro-processing and greater inclusion of small to medium size farmers into the agri-business supply chains through the business alliances. It will tackle major constraints to efficient supply of raw materials and competitive agro-processing. Activities to be financed under this component are clustered around the following subcomponents:

- ✓ Subcomponent 3.1. Infrastructure support to production
- ✓ Subcomponent 3.2. Infrastructure support to processing and value addition.

1.4.4 Component 4: Technical Assistance, Knowledge Management and Communication:

The aim of this component is to build capacity of the project staff and partners in the relevant areas of value chains development, harness the knowledge acquired and generated under the project, facilitate exchanges of experience and build capacity of stakeholders participating in the implementation of the project, and support the FMARD for conducting strategic and technical studies for scaling up agricultural productivity and processing programs. Activities to be financed under this component are:

- ✓ Subcomponent 4.1. Capacity Building and support to collaborating institutions
- ✓ Subcomponent 4.2. Technical assistance and knowledge management
- ✓ Subcomponent 4.3. Communication and outreach

1.4.5 Component 5: Project Management and Coordination:

The aim of this component is to ensure effective management and coordination of the project for proper accomplishment of project related goals and the achievement of the PDO. This component will support the work of technical, financial, administrative, and M&E activities during the entire project period. Activities to be financed under this component are organized around the following subcomponents:

- ✓ Subcomponent 5.1. Project management and coordination
- ✓ Subcomponent 5.2. Monitoring and Evaluation (M&E)
- ✓ Subcomponent 5.3. Environmental and Social Safeguards and Grievance Redress Mechanism.

1.5 Scope of the ESIA

The core tasks for the consultancy assignment shall include but not limited to the following:

1. Review existing ESMF prepared for APPEALS, and incorporate GBV requirements into the operationalization of the ESIA final report and ESMP developed.
2. Review Environmental Safeguards instrument of the World Bank safeguards policies triggered on the project;
3. Describe the proposed project by providing a synthetic description of the project relevant components and presenting plans, maps, figures and tables.
4. Identify the policy, legal and administrative framework relevant to the project.
5. Establishment of baseline environmental (bio-physical and social) description of the project setting including both the direct and indirect areas of influence. This should include the following aspects; geology, soil, water quality (both surface and underground), wetlands in the vicinity of the project areas, terrestrial and aquatic flora and fauna groups, population (including identification of vulnerable groups), air quality conditions, climatic conditions, economic activities, amongst others;
6. Describe and evaluate the social-economic background of the project area; in this respect, the following socio-economic issues shall be addressed in the ESIA:
    I. Establish social baseline information before project intervention
    II. Determine the project's social impacts on health and social well-being; quality of the living environment; economic material well-being; Family and community; and gender relations
    III. A summary of the impacted communities for the project: location, access, population (number, demographic and social characteristics); economy (employment rate, income distribution); services (types, capacity, and adequacy) and housing. Concern is the ability to provide work force, service new development and absorb and adjust to growth (worker/family).
    IV. The report should identify and assess social impact identified during the public consultation process and those that, based on consultant's experience, are also likely to occur. In some instances, the affected communities may not be aware of or be in a position to identify all the social impact that may occur. However, this does not mean that they will not occur. In such cases the consultant should use his/her experience to identify additional social impacts that have not been raised by the public. A summary of the views of the population including vulnerable groups, determined through thoroughly documented discussions with local communities. These meetings and discussions must be documented and should show how issues and problems raised are or will be resolved
    V. Pay particular attention to the impacts of the project on vulnerable and marginalized individuals and groups (including but not limited to mobility impaired individuals and groups, and People Living with Disabilities)

VI. Detail measures that will need to be taken to mitigate the negative social impact identified and the procedures for their implementation;
VII. Identify key uncertainties and risks: Identify and communicate any key uncertainties and risks associated with the accuracy of the findings of the social assessment, as well as of the proposed project. Some sources of uncertainty and risk commonly associated with projects are linked to: (a) Lack of adequate information at the community level; (b) Creation of employment and business opportunities for members from the local, historically disadvantaged communities; (c) The influx of job seekers and construction workers to the area and the impact on services etc.
VIII. Information will be gathered from field surveys and secondary data sources (interviews, structured questionnaires, in-depth interviews and focus group discussions).

7. Describe and analyse the physical, biological and human environment conditions in the study area before project implementation. This analysis shall include the interrelations between environmental and social components and the importance that the society and local populations attach to these components, in order to identify the environmental and social components of high value or presenting a particular interest.
8. Present and analyse alternatives to the proposed project, including the "without project" option, by identifying and comparing the alternatives on the basis of technical, economic, environmental and social criteria.
9. For the selected alternative, identifying and assessing potential importance of beneficial and adverse environmental and social, direct and indirect, short and long-term, temporary and permanent impacts, on the basis of a rigorous method.
10. Present the potential environmental and social risks and impacts of the proposed project
11. Define appropriate mitigation/enhancement measures to prevent, minimise, mitigate, or compensate for adverse impacts or to enhance the project environmental and social benefits, including responsibilities and associated costs.
12. Address potential cumulative effects taking into account other initiatives planned in the study area.
13. Develop an environmental and social monitoring program, including indicators, institutional responsibilities and associated costs.
14. As appropriate, prepare an environmental hazard plan including an analysis of the risk of accident, the identification of appropriate security measures and the development of a preliminary contingency plan.
15. Assess the capacity available to implement the proposed mitigation measures and identify institutional responsibilities and needs for capacity building if necessary to implement the recommendations of the environmental and social assessment and associated costs
16. Undertake Risk Assessment and propose a Disaster Management Plan including emergency evacuation during natural and man-made disaster.
17. Carry out consultations with primary and secondary stakeholders in order to obtain their views on and preoccupations about the project. These consultations shall occur during the preparation of the ESIA Report to identify key environmental and social issues and impacts, and after completion of the draft ESIA Report to obtain comments from stakeholders on the proposed mitigation/enhancement measures.
18. Develop a Labour Influx, Sexual Exploitation and Abuse, and Occupational Health and Safety Response Plan
19. Identify under infrastructure and provide a description and an evaluation of possible project alternatives in terms of the technology, design and lay outs, levels of works in

the works and location consideration of the project sites. The assessment of alternatives should cover assessment of the sites, routes and alignments for the project infrastructures. An analysis for each alternative in terms of cost and technical feasibility should be given and the best option justified. The analysis should include parameters considered along with weight age criteria for short-listing selected site;

20. Conduct ecological evaluation of the available project alternatives to compare their viability taking into account a number of considerations such as environmental costs, ecological values and uses and inherent opportunity costs against each of the alternatives; Present the preferred project design option, based on the technical and ecological alternatives evaluation.
21. Describe development activities to be undertaken in the project and map out key environmental and social impacts of the project in terms of their extent, duration and reversibility. The ESIA should provide matching feasible mitigation measures for such impacts;
22. Assess HIV/AIDS potential impacts of the project and propose measures to address such concerns during project implementation;
23. Assess noise and vibration effects associated with the construction and operation during infrastructure development. It is expected that; noise sources could come from vehicular traffic. Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Assessment should be based on equivalent ambient noise levels that should not be exceeded and general recommendations for prevention and control of noise stated.
24. Identify wastes from the implementation and operations of the project. These should include details of the processes for each activity, generation of wastes, types, quantity and methodology for collection, storage, treatment and disposal of wastes. Therefore, measures for effective management of such effluent waste should be outlined in the ESIA study;
25. Occupational health and safety issues during the construction operations are to be outlined in the ESIA in line with internationally acceptable practices and standards such as general recommendations for managing physical hazards as addressed in the General EHS Guidelines. This should comprehensively cover among others protections against, exposure to dust and hazardous materials that may be present in infrastructure materials and other forms of waste and a host physical hazards associated with the use equipment in line with this nature of project;
26. Prepare an Environmental and Social Management Plan (ESMP).The ESMP should capture:
    - The potential environmental and social impacts resulting from project activities
    - The proposed mitigation measures;
    - The institutional responsibilities for implementation;
    - The monitoring indicators;
    - The institutional responsibilities for monitoring and implementation of mitigation measures;
    - The costs of activities; and
    - A calendar for implementation

1.6 Geographical Location and Description of Enugu State

Enugu State is one of the states in the eastern part of Nigeria located at the foot of the Udi Plateau. It is located in the geographical position of $6^0$30'N $7^0$30'E.The state shares borders with Abia State and Imo State to the south, Ebonyi State to the east, Benue State to the northeast, Kogi State to the northwest and Anambra State to the west (Figure 1.1).

Enugu has good soil-land and climatic conditions all year round, sitting at about 223 metres (732 ft) above sea level, and the soil is well drained during its rainy seasons. The mean temperature in Enugu State in the hottest month of February is about 87.16 °F (30.64 °C), while the lowest temperatures occur in the month of November, reaching 60.54 °F (15.86 °C). The lowest rainfall of about 0.16 cubic centimetres (0.0098 cu in) is normal in February, while the highest is about 35.7 cubic centimetres (2.18 cu in) in July.

Enugu State had a population of 3,267,837 people at the census held in 2006 (estimated at over 3.8 million in 2012). It is made up of 17 Local Government Area (Figure 1.2). It is home of the Igbo of southeastern and few Idoma/Igala people in Ette (Igbo-Eze North) of Enugu State, Nigeria.

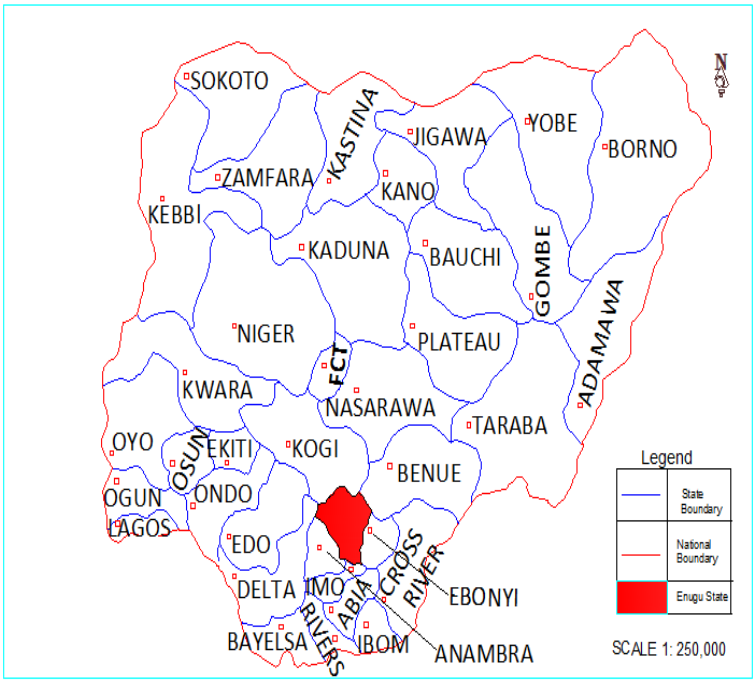

Fig1.1: Map of Nigeria Showing Enugu State

Fig1.2: Map of Enugu State Showing 17 LGAs

1.7 Approaches and Methodology

The methodology for preparation of the ESIA was in line with the World Bank Safeguard Policies - Operational Policy on Environmental Assessment (OP/BP 4.01) as well as the Nigerian Environmental Assessment guidelines and procedures. The preparation of the ESIA was specifically guided by the Environmental and Social Management Framework (ESMF) prepared for the APPEALS project. A multidisciplinary approach was employed in order to holistically address all pertinent aspects of the proposed project on the bio-physical and socio-economic environment of the project area.

A summary of blend investigative method used to acquire the socio economic data is as follows:

- Review of Existing data;

- Reconnaissance survey to identify project affected communities and to alert community's leaders on the activities of the proposed projects;
- In-depth interviews with leaders of communities as well as key investors in the value chains. segments project areas;
- Focus Group Discussion (FGDs) with men, women, youths and project affected persons in the focal communities;
- Field observations using strategic instruments and devices to record and note Observations and detections by the consultants and interviewers;
- Structured questionnaire to acquire needed baseline information and perceptions of people using simple random sampling techniques;
- Population assessment using combined field survey and 2006 census figures by the National Population Commission (NPC).

Well designed and sectionalized questionnaires were administered to households within the project communities and from it the socio-economic status of the people were deduced after analysis. A typical questionnaire has plain questions, which comprises issues of existing livelihood opportunities, income, gender characteristics and other demographic, physical and social infrastructure. Series of consultations were also held with stakeholders on issues of traditional administrative system, existing formal and informal redress mechanisms; concerns of the project affected persons using Focused Group Discussion (FGD). The minutes of the consultations were written and presented in the Annexure. All the communities and villages affected by the projects were considered in the socio-economic studies.

Specifically, the methodology for carrying out the study involved the following steps:

- Initial meeting with Enugu APPEAL PIU
- Desktop Studies/Literature Review;
- Field Work;
- Community Consultation
- Data & Laboratory Analysis;
- Public Consultations;
- Covid Protocol**;** and
- Preparation of ESMP Report.

1.7.1 Initial meeting with Enugu APPEALS PIU

The meeting with APPEALS PIU was to discuss the modality for the assignment as well as request for some relevant documents.

1.7.2 Literature Review/Desktop Studies

Literature review and desktop studies was carried out to obtain documented information on the proposed project and its potential impact on the environment. The documents reviewed include: ESMF, Project Implementation Manual (PIM), Project Appraisal Document (PAD), Integrated Safeguards Data Sheet (ISDS), World Bank's safeguard policies, relevant federal/state laws, regulations, policies and guidelines, reports on the proposed value chains and segments and other relevant literature.

1.7.3 Community Consultation

Consultations were held in nine Local Government Areas within the three senatorial zones in Enugu State. Communities were selected through random sampling technique where the various value chains and segments to be implemented by the APPEALS project are already operational. The criteria for selection of communities

were based on the concentration of the value chains and segments in the area. A well structured questionnaire was administered to the people by 15 enumerators during community consultation after the impact of the project and its mitigations were made known by the Lead Consultant. A total of 1,200 questionnaires were administered during consultation out of which 920 were returned and 280 were wrongly filled and therefore discarded. The questionnaires were administered based on the number of community members that participated during the consultations.

1.7.4 In-Depth Interview

In depth interview was held with community elders and farmers that have deep knowledge of the socio-cultural behaviours of the community, history of ecological issues in the communities as well as vast knowledge in their value chains and segments.

1.7.5 Focus Group Discussions FGDs

FGDs were held with the men, women and youths in the community. At this stage, the consultant team engaged them on the social, cultural and economic life of their people as well as the possible impact of the value chains and segments on them. Information on mitigation measures adapted by them was also elicited.

1.7.6 Field Studies

Field studies were carried out to ascertain site specific environmental baseline data on the environment. This includes visual observations, on-site measurements and collection of environmental samples for laboratory analysis/testing. Collected samples were analyzed in a Laboratory approved by the Federal Ministry of Environment. The baseline data provide information on the existing environmental conditions against which subsequent changes can be measured. The baseline data collected includes study of all relevant physical, biological, socio economic and cultural factors.

1.8 Project Description

The proposed APPEALS project is centered on three priority value chains namely Rice, Cashew and Poultry while the segments are production, processing and marketing.

1.8.1 Rice Production:

1.8.2 Land Development

Land development for the purpose of rice cultivation is the most important preliminary preparation in the rice production enhancement. The project is estimated to develop hectares of land for rice production across the three senatorial zones of the State. The project entails mechanized preparation of the land for rice cultivation. This involves the following steps;

1.8.2.1 Site Clearance and Earthworks

The site will be cleared of trees and grasses with bulldozer, while pay-loader and trucks shall be used to cart them away tree trucks. The bulldozer piles this debris in form of heaps while the pay-loader loads them into the trucks to be carted away and dumped at an approved site. Meanwhile, existing ground levels were taken before and after clearing.

1.8.2.2 Cultivation

This involves tilling/ cultivation.

Primary Cultivation

This entails to plough the land using a tractor or rotary tiller leaving a loose soil and rough surface.

Secondary Cultivation

This includes preparation of ridges and furrows for crops. Crops like grains require a fine tilt. Ridging is done in such a way that will not make seed planting difficult.

Rice Grow

This includes planting of rice on the prepared field, supply of water (irrigation) to the field, weeding and harvesting of matured rice seeds.

1.8.3 Rice Processing

One of the segments of this project is agro processing and packaging which is meant to reduce farmers' loss on damage crop after post harvesting stages. Rice processing involves removing the outer covering of the rice seed called husk in order to have the edible rice kernel. It also involves sieving and bagging of rice kernel ready for marketing. The project will upgrade available rice processing plants.

This will include;

- Processing unit
- Store
- Boiling unit
- Drying unit
- Bagging Outlets

Machines Installation

This involves the assembling of different components of machines in the milling station.

1.8.4 Poultry Production

1.8.4.1 Poultry rearing

This involves feeding the chicks, sanitation and waste management for proper growth of the chicks.

1.8.5 Poultry (Meat) Processing

This involves harnessing chicken meats to make it available and meet market demand. These involves

- Processing and bagging
- Freezing and storage
- Waste management
- Value addition

1.8.6 Cashew

1.8.6.1 Cashew production

Cashew production proposed in this project is by adding selected cashew species to the old adaptive cashew trees in the communities through the grafting technology.

1.8.7 Cashew processing

This process involves

- Building of cashew processing plant to communities to enhance quality and quantity production
- Roasting or steaming of cashew seed to remove the unwanted shell
- Packaging of cashew nuts readying for marketing.

1.9 Structure of the Report

The structure of the ESIA report is presented in seven chapters:

Chapter One	Introduction
Chapter Two	Institutional and Legal Framework for Environmental Management
Chapter Three	Biophysical Environment
Chapter Four	Socio-economic Characteristics and Consultation with Stakeholders
Chapter Five	Gender Based Violence and Grievance Redress Mechanism
Chapter Six	Assessment of Potential Adverse Impacts & Analysis of Alternatives
Chapter Seven	Stakeholders Consultation and Engagements
Chapter Eight	Environmental & Social Management Plan (ESMP)
Chapter Nine	Summary, Recommendations and Conclusion

CHAPTER TWO

2.0 INSTITUTIONAL AND LEGAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

2.1 Introduction

The policy, legal and administrative framework at both national and international levels is adequately described in the publicly disclosed ESMF for APPEALS. This chapter presents the various policy and legislative instruments including policies, regulations, protocols and treaties relevant to the project for environmental protection.

2.2 Administrative Framework

In Nigeria, the Federal Ministry of Environment (FMENV) is vested with the power to regulate policies on all environmental matters since 1999. While the National Environmental Standards and Regulations Enforcement Agency (NESREA) has the mandate to enforce the implementation of all national environmental guidelines, policies, regulations as well as protocols and treaties. However in the Part III of the Act, State Governments are encouraged to set up "their own Environmental Protection Agencies and Ministries for the purpose of maintaining good environmental quality".

2.3 Relevant National and State Policies

In Nigeria, the National Policy on Environment is known to be the most relevant policy established on managing the environment. There are also other environmental legislations, regulations and guidelines operational at both national and state levels of government. Table 2.1 shows international treaties and conventions on environment to which Nigeria is a party. A comparison of the various documents was made with a view to identifying ameliorable gaps. Measures for the amelioration are also given in Table 2.3.

i. Federal Ministries, Departments and Agencies (MDAs):

The Federal Ministry of Environment (FMEnv) and National Environmental Standards and Regulations Enforcement Agency (NESREA) are responsible for regulating, monitoring and enforcing environmental concerns at the federal level. The Federal Ministries of Agriculture and Natural Resources (FMANR) and Water Resources and their agencies, such as River Basin Development Authorities (RBDAs), as well as National Water Resources Institute (NWRI), Nigeria Integrated Water Resources Management Commission (NIWRMC) are other Federal MDAs considered relevant to the proposed project.

ii. State MDAs:

In Enugu state, the Ministry of Environment and Mineral Resources has the responsibility for the general protection and development of the environment, conservation of biodiversity, natural resources and sustainable development. Other State MDAs relevant to the project include Enugu State Ministry of Agriculture and Rural Development (ENMARD), Ministry of Lands and Urban Development and Enugu State Waste Management Authority (ESWAMA).

The Enugu State Ministry of Environment and Mineral Resources established by an Act of Parliament in 2004 have the following functions:

i. Liaising with the Federal Ministry of Environment, FMEnv to achieve a healthy and better management of the environment via development of National Policies on Environment;

ii. Liaising with FMEnv and other National Directorates/Agencies in the performance of environmental functions including environmental education/awareness to the citizenry;
iii. Responsibility for monitoring waste management standards;
iv. Responsibility for general environmental matters in the State, and;
v. Monitoring the implementation of EIA studies and other environmental studies for all development projects in the State;
vi. Management of open space;
vii. Setting standards for mitigation of climate change;
viii. Setting standards and guidelines for fumigation of premises;
ix. Urban sanitation and beautification;
x. Urban sewage management and control;
xi. Regulation of outdoor advertising in the state;
xii. Oversee activities of forestry commission;
xiii. Conservation of solid minerals and water resources; and
xiv. Soil erosion and pollution control.

2.4 International Treaties and Conventions on Environment to Which Nigeria Is a Party

International treaties and conventions on environment to which Nigeria is a party relevant to this ESIA study are summarized in Table 2.1 below.

Table 2.1: International Treaties and Conventions on Environment to which Nigeria is a party

S/N	Treaties and Conventions	Year	Agreement
1.	The United Nations Environmental Guidance Principles	1972	Provide guidelines for protecting the integrity of the global environment and the development system
2.	Montreal Protocol on Substances that deplete the Ozone Layer	1987	An international treaty to eliminate Ozone depleting chemical production and consumption.
3.	United Nations Convention on Biological Diversity	1992	Places general obligations on countries to observe sustainable use and equitably share the plants and animals of the earth
4.	United Nations Framework Convention on Climate Change	1994	It calls on developed countries and economies to limit her emissions of the greenhouse gases which cause global warming
5.	Convention on International Trade in Endangered Species of Wild Fauna and Flora	1973	Restricts the trade of fauna and flora species termed as endangered species
6.	Convention on Conservation of Migratory Species of Wild Animals (Bonn Convention)	1979	Stipulates actions for the conservation and management of migratory species including habitat conservation
7.	Vienna Convention for the Protection of the Ozone Layer	1985	Places general obligation on countries to make appropriate

			measures to protect human health and the environment against adverse effects resulting from human activities which tend to modify the ozone layer

Source: Field Survey Nov. 2020

2.5 World Bank Safeguards Policies Triggered by APPEALS and the Proposed Activity

The World Bank has 10 Environmental and Social Safeguards Policies to reduce or eliminate the adverse effects of development projects and improve decision making (these are summarized in the Annex 4). The Environmental and Social Safeguards Policies triggered by the proposed project are Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Pest Management (OP/BP 4.09) and Forest (OP/BP 4.36) as indicated in Table 2.2.

Table 2.2: Triggered World Bank Safeguard Policies

Safeguard Policies	Triggered by APPEALS?		Triggered by Site-specific Project?		Applicability to Project due to	How Project Address Policy Requirements
	Yes	No	Yes	No		
Environmental Assessment (OP/BP 4.01)	[x]	[ ]	[x]	[ ]	Civil works/ bush clearing with site-specific impacts	ESMF prepared for APPEALS & site specific mitigation measures developed in this ESIA
Natural Habitats (OP/BP 4.04)	[x]	[ ]	[x]	[ ]	Civil works/ bush clearing with site-specific impacts	ESMF prepared for APPEALS & site specific mitigation measures developed in this ESIA
Pest Management (OP 4.09)	[x]	[ ]	[x]	[]	Cultivation and storage	ESMF prepared for APPEALS & site specific mitigation measures developed in this ESIA
Physical Cultural Resources (OP/BP 4.11)	[]	[x]	[ ]	[x]	NA	NA
Involuntary Resettlement (OP/BP 4.12)	[]	[x]	[]	[x]	NA	NA
Indigenous Peoples (OP/BP 4.10)	[]	[x]	[]	[x]	NA	NA

Forests (OP/BP 4.36)	[x]	[ ]	[x]	[]	Cultivation	ESMF prepared for APPEALS & site specific mitigation measures developed in this ESIA
Safety of Dams (OP/BP 4.37)	[]	[x]	[ ]	[x]	NA	NA
Projects in Disputed Areas (OP/BP 7.60)	[ ]	[x]	[ ]	[x]	NA	NA
Projects on International Waterways (OP/BP 7.50)	[]	[x]	[ ]	[x]	NA	NA

Source: World Bank (2001, updated 2007): Involuntary Resettlement. Operational Policy 4.12. Washington DC: World Bank.

Table 2.3: Comparison of National and State Environmental Legislations, Regulations and Guidelines with Aspects of World Bank Safeguards Policies

S/N	Legal Framework	Year	Description	Aspect of World Bank Policies	Whether Applicable		Where Deficient	Remarks
					YES	**NO**		
1	National Policy on the Environment	1989 revised 1991	Describes the conceptual framework and strategies for achieving the overall goal of sustainable development in Nigeria	Environmental Assessment	Yes	-	-	-
2	Environmental Impact Assessment (EIA) Act No. 86	1992	Provide guidelines for activities of developmental projects for which EIA is mandatory in Nigeria. The Act also stipulates the minimum content of an EIA as well as a schedule of projects, which require mandatory EIAs	Environmental Assessment	Yes	-	No specific guideline is in place for biodiversity conservation and sustainable management of living natural resources	Specific guideline required for biodiversity conservation
3	National Erosion and Flood Control Policy	2005	Addresses the need to combat erosion and flooding in the country utilizing the procedures outlined in the National Action Plan for Flood and Erosion Control and Technical guidelines, developed by the WC	Safety of Dams	Yes	-	Implementation of policy is very poor	Implementation of policy will ensure safety of hydraulic structures and check dams related issues

			Environmental Committee which was set up to plan an operational platform for these issues					
4	Land Use Act	1978 modified 1990	The Act vests all land comprised in the territory of each state in the Federation on the Governor of the state and requires that such land shall be held in trust and administered for the use and common benefit of all Nigerians in accordance with the provisions of the Act.	Involuntary Resettlement	Yes	-	Only people with legal title of Land are duly compensated	People affected by land acquisition should be properly informed and compensated
5	Forestry Act	1994	Provides for the preservation of forests and the setting up of forests reserves	Forests	Yes	-	-	-
6	Endangered Species Act	1985	Provides for the conservation and management of Nigeria's wildlife and the protection of some of her endangered species in danger of extinction as a result of over-exploration	Natural Habitats	Yes	-	No adequate measure provided to avoid endangering wildlife, coastal organisms and forest in their natural habitats by projects.	Project area should be restored as much as possible to the Natural state or condition prior to project commencement
7	FEPA/FMEnv	1995	The Procedural	Environmental	Yes	-	-	-

	EIA Procedural Guidelines		Guidelines indicates the steps to be followed in the EIA process from project conception to commissioning in order to ensure that the project is implemented with maximum consideration for the environment	Assessment				
8	National Guideline and Standard for Environmental Pollution Control	1991	Provide guidelines for management of pollution control measures	Environmental Assessment	Yes	-	The guidelines are weak and do not abate pollution in project areas. E.g. greenhouse emissions	Guideline should be reviewed and operational mechanisms devised for enforcement by regulatory authorities
9	S.I.15 National Environmental Protection (Management of Solid and Hazardous Waste)	1991	Regulates the framework for the effective control of the disposal of toxic and hazardous waste into any environment within the confines of Nigeria	Environmental Assessment	Yes	-	-	-
10	Workmen Compensation Act	1987 review 2010	Occupational Health and Safety	Indigenous Peoples	Yes	-	Implementation failures do arise	To ensure that workers in the projects areas are treated fairly and provided with safe and healthy working conditions

11	Public Health Laws	-	Covering Public Health matters	Indigenous Peoples	Yes	-	No well-defined law on public health issues	Defined law that protect vulnerable workers such as women, person with disabilities and project affected persons (PAPs)
12	Enugu State Ministry of Environmental and Mineral Resources	2004	Focuses on the protection of the rural and urban environment	Physical Cultural Resources	Yes	-	Rural environment usually neglected	Projection of rural environment should be included in the state environmental protection regulations
13	Environmental Sanitation Edicts, laws and Enforcement Agencies	-	General Environmental health and sanitation enforcing necessary laws	Projects on International Waterways	Yes	-	Enforcement of the Act for International waterways is poor	More is expected in the enforcement of Laws
14	Enugu State Waste Management Authority	2004	Ensures proper disposal and clearing of waste	Indigenous Peoples	Yes	-	Stakeholder involvement is usually low in developmental Projects	Stakeholders should be totally carried along in the Project that affects them

Source: ESMP Study of Umuavulu Abor Gully Erosion site, NEWMAP

CHAPTER THREE

3.0 BIOPHYSICAL ENVIRONMENT

3.1 Introduction

This chapter describes the existing baseline (biophysical) environmental conditions of the APPEALS projects in Enugu State. The baseline data is an initial collection of data which serves as a basis for future assessment of temporal and spatial changes of the environment due to the proposed project.

3.2 Study Approach Used in the collection of Primary Data

Considering the multi-variant nature of baseline studies, a wide range of approaches was adopted in the baseline data acquisition. This involved field reconnaissance surveys, collection of primary data through questionnaires, direct interviews, measurements, discussions, photographs, Geographical Information System (GIS) and literature review.

3.2.1 Field Work

The field works were carried out by the team of consultants as well as enumerators from 3rd-16th Nov. 2020. Soil and water samples were collected and in-situ noise, wind speed and air quality parameters and assessments were measured.

3.2.2 Quality Assurance

The quality control /assurance measures were employed during the field study. All environmental samples were collected, handled and analyzed in accordance with FMEnv guidelines and international protocols and best practices. The Project Development Institute (PRODA) Enugu, a foremost National Research Institute in Nigeria was used to carried out the laboratory analyses of the collected environmental samples

3.2.2.1 Soil Sample Study

Soil samples were collected within the selected communities as well as production sites of existing value chains. Soil sample was collected using a hand metal Auger. Sub soil were collected within the range of 15-30cm. Soil samples collected were deposited in black labeled polythene bags in compliance with Environmental Guidelines and Standards. Soil samples were sent to PRODA for laboratory analysis and results were analyzed by comparing it with Federal Ministry of Environment FMENV and National Environmental Standards and Regulations Enforcement Agency NESREA acceptable limits

Method of Soil Analysis

I. pH:

The soil pH will be determined using Glass Electrode pH meter. Ten gram (10g) of soil is taken into a beaker and 25ml of distilled water added and stirred for 5 minutes. The mixture is allowed to equilibrate for 30 minutes after which the pH is measured. The pH meter had been previously standardized at pH4, pH7, and pH10.

II. ELECTRICAL CONDUCTIVITY:

The electrical conductivity (EC) of 1:2:5 soil: water extract will be measured using a digital conductivity meter**.**

III. ORGANIC MATTER:

Soil Organic matter will be determined as described by Broadbent (1956) wet oxidation method. 0.5 of soil sample that has passed through 60mm screen will treated with 10ml of IN $K_2Cr_2O_7$ and 20ml of concentrated H_2SO_4. This is gently

swirled until reagents is thoroughly mixed, then more vigorously for one minutes. It will be allowed to cool for about 30 minutes before the addition of 20ml of distilled water and three drops of ortho-phenanthroline indicator. The content of the flask will be titrated to the end-point with 0.5N $FeSO_4$. As the end-point approaches, the solution will take a greenish cast and then change to dark green colouration. At this point, the 0.5N $FeSO_4$ is added drop wise until the colour change sharply from blue to red (maroon colour in reflected light against a white background). A blank titration is made in the same manner to standardize the dichromate. The results is calculated as follows:

$$\% \text{ Organic carbon} = \frac{(\text{Meq } FeSO_4 \text{ for blank} - \text{Meq } FeSO_4 \text{ for sample}) \times 0.003 \text{ F} \times 100}{\text{Weight of air-dried soil}}$$

Where F = correction, = 1.33
Meq = Normality of solution x ml of solution used
% Organic matter in soil = % organic matter x 1.729

IV. AVAILABLE PHOSPHOROUS;

The method of Jackson (1970) will be employed. 2.5g of soil sample will be treated with 25ml of Bray P-1 extracting solution and stirred for 5 minutes and then filtered. 4ml of ascorbic acid solution and 16ml of distilled water will be added to 5ml of the filtrate to make up to 25ml. Same treatment is carried out (without soil) for standard P stock solution containing 0, 0.2, 0.4, 0.6, 0.8, and 1.0ugP/ml for standard curve preparation. Colour development is allowed for 10 minutes, absorbance is then measured at 882nm on spectrophotometer. Available P will be calculated as follows:

$$\text{Available P} = \frac{\text{V} \times \text{G.F} \times \text{D.F} \times \text{Absorbance}}{\text{Wt}}$$

Where V = Volume of extracting solution
Wt = Weight of sample taken
G.F = Graph factor
D.f = Dilution factor
V = Extraction factor
Wt.

V. PARTICLE SIZE (MECHANICAL) ANALYSIS:

The method of Day (1905) will be used. 50g of fine textured soil will be weighed and placed in the baffled cup filled to half full with distilled water and 10ml of calgon (Sodium Hexametaphosphate) will be added. The cup will be placed on a stirrer and stirred until soil aggregated will broke down (about 15 minutes). The suspension is then transferred to a bouyoucos cylinder and is filled to a lower mark with distilled water while the hydrometer is in suspension.

Percent sand in the sample will be determined as follows: The hydrometer is removed and the suspension is shaken vigorously, the cylinder is then placed on the table and the time recorded. At the end of 20 seconds, the hydrometer is carefully and its reading will be recorded at the end of 14 seconds. Hydrometer will be removed from suspension and the temperature will also be taken. To get the correct hydrometer reading, 0.3 units will be added for every degree above 20^0Cand 0.3 unit will be subtracted for every degree below 20^0C. The hydrometer is then calibrated so that the correct reading gives the grams of the soil materials in suspension. The sand will settle to the bottom of the cylinder within 40 seconds. Therefore, the 40 seconds hydrometer reading will give the amount of silt and clay in suspension. The weight of

sand in the sample will be obtained by subtracting the corrected hydrometer reading for the total weight of the sample.

$$\% \text{ Sand} = \frac{\text{Wt of sand}}{\text{Wt of sample}} \times 100$$

Percent clay in the sample is then determined as follows: The suspension is re-shaken and the hydrometer reading is taken at the end of 2 hours. The hydrometer is inserted just before the reading is taken. Temperature of the suspension is then taken and the reading will be corrected as above. At the end of the 2 hours, the silt in addition to the sand settles out of the suspension. The corrected hydrometer reading will therefore represent the gram of clay in the sample.

$$\% \text{ clay} = \frac{\text{Wt of clay in the sample}}{\text{Wt of sample}} \times 100$$

The percent silt in the sample is obtained by difference i.e

$$\% \text{ silt} = 100\% - (\% \text{ sand} + \% \text{ clay})$$

VI. HYDROCARBON CONTENT (THC):

The hydrocarbon content of the soil samples will be determined by shaking 5g of the air-dried soil with 10ml carbon tetrachloride and the concentration in mg/l of oil in the extract was determined by means of a spectrophotometer at 420nm. A calibration curve was prepared from the readings obtained from known concentrations of oil standards in exact.

VII. NITRATE AND NITRITE (NO_3, NO_2):

The nitrate and nitrite in the soil samples will be extracted from fresh samples with 1m sodium acetate solution. Nitrate nitrogen in the extract will be determined by the brucine method of Greweling and Peach method (1964), while nitride-nitrogen will be determined by the alpha-naphthol method.

VIII. SULPHATE (SO_4);

The sulphate sulphur in the soil will be extracted twice with a solution of potassium orthophosphate and the sulphate determined by turbidimetric method as follows: 50ml of the extract is measured into a conical flask and then made up to 100ml mark using distilled water. 5.0ml of the conditioning reagent is added and stirred at the constant speed using a magnetic stirrer. 0.5g of barium chloride crystals will be added into the conical flask and stirring continued for exactly one minute. Immediately after one minute, the absorbance is measured at 420nm using a spectrometer. Blank will run through the whole process and the absorbance of blank will be deducted from that of the sample. A calibration graph is then used to determine the concentration of sulphate in mg/l.

IX. HEAVY METALS:

The heavy metals in soils are analyzed using American and Chan (1975) method. 0.1g of soil that had been air dried and sieved with 2mm mesh sieve is measured into a Teflon cup. 4ml of concentrated nitric acid, 1ml of perchloric acid (60%) and 6ml of hydrofluoric acid (49%) is added. The Teflon cup with its content is heated on a hot plate in fume cupboard oat 40^0 C for 3.5 hours. After this, the contents of the cup will

be quantitatively transferred to a 125ml polyprophyene bottle containing a solution of 0.35g Boric acid in about 30ml deionized water to dissolve the precipitated metal flourides. Standard solutions in metals will be aspirated into air-acetylene flame of Buck scientific absorption spectrophotometer.

X. TOTAL NITROGEN

About 5-10g of the soil/sediment sample containing about 10mg of Nitrogen (air-dried, grind to pass 0.5mm sieve) in a dried is weighed into a 500mL Macro-kjeldahl flask. 20mL of distilled water is added and the flask swirled for a few minutes before it was allowed to stand for about 30 minutes. One tablet of mercury catalyst and 10g of potassium sulphate is then added. Then 30mL of concentrated sulphuric acid will be added and the flask will be heated continuously at low temperature on the digestion stand. The flask is then allowed to cool and then about 100mL of water is slowly added to the flask.

The digest is again transferred into another clean Macro-Kjeldahl flask. 50mL of Boric acid indicator is added into a 500mL Erlenmeyer flask, which is then placed under the condenser of the distillation apparatus. The end of the condenser is about 4cm above the surface of the Boric acid solution. 750mL of Kjeldahl flask is attached to the distillation apparatus and about 150mL of 10N NaOH is poured through a distillation flask. The condenser is kept cool (below 30^0C), and 150mL of the distillate was collected. The NH4-N is then determined in the soil distillate using 0.01N Standard Sulphuric acid. The colour will change from green to pink. The percentage Nitrogen is then calculated using the formula below.

$$\%N = \frac{(T-B) \times N \times 1400}{S}$$

Where T = Sample titration in mL
B = Blank titration in mL
N = Normality of sulphuric acid
S = Sample in mg.

XI. SOIL TEXTURE;

51g of air-dried soil/sediment, which has passed through a 2mm sieve will be transferred to a “Milkshake” mix cup. 50cc of 5% sodium hexametaphosphate along with 10cc of distilled water, mix with a stirring rod allowed to set for about 30 minutes. The suspension is transferred to a glass cylinder and distilled water added to 1130cc mark. The cylinder top is covered and will be inverted several times and placed on a flat surface. The soil hydrometer is then inserted into the suspension. The first reading of the hydrometer is taken after 40 seconds. Temperature will also be taken. The suspension is left for three hours after which the hydrometer and temperature reading is recorded.

CALCULATION

$SAND = 100.0 – (H1 + 0.2(T1 – 68) – 2.0)2$

$CLAY = (H2 + 0.2(T2 – 68) – 2.0)2$

$SILT = 100 – (\%SAND + \%CLAY)$

Where T1 = Temperature reading at 40 seconds
H1= Hydrometer reading at 40 seconds
T2 = Temperature reading at 3 hours
H2 = Hydrometer reading at 3 hours

Salt correction factor to be added to hydrometer reading = -2.0

3.2.2.2 Water Quality Studies

Similarly, water samples were also collected from water borehole, rivers, streams and well within the communities. Water samples were collected in containers, properly labeled and stored in a cooler as applicable to quality assurance criteria and international practices of laboratory protocols, Water samples were sent for laboratory analysis and results were compared with WHO and FMEnv acceptable limits.

Method of Water Analysis

1. **PH**
   Measurements will be carried out by means of a Barnant pH meter which has been previously calibrated in the laboratory. Calibration is checked on the field by measuring standard buffer. Calibration will be repeated if reading is more than +/- 5% of expected riding.

2. **TEMPERATURE**
   This is determined by means of a mercury thermometer calibrated in 0.2^0C units from 0^0C to 100^0C. The thermometer will be dipped into the sample and left for about 5 minutes before the reading will be recorded.

3. **CONDUCTIVITY & TDS:**
   These will be determined according to APHA-145 and APHA-209C i.e. instrumental method using the HACH Conductivity/TDS meter. Electrical conductivity will be reported in μS/cm while TDS will be recorded in mg/l.

4. **DISSOLVED OXYGEN;**
   Dissolved oxygen is determined using the membrane electrode method. The HACH dissolved oxygen meter is first zeroed using saturated sodium sulphite solution and slope calibrated against air. The electrode is then dipped in sample and the dissolved oxygen concentration in mg/l is recorded.

5. **TURBIDITY;**
   Turbidity of collected samples will be analysed using HACH Turbidimeter as described in APHA 214A

6. **TOTAL HYDROCARBON;**
   TPH is determined according to DPR recommended method API-RP45 section 3.17 (photometric) using a spectrophotometer. The sample is extracted twice with 50-ml portions of Xylene and the combined extract after centrifuging is read in the spectrometer using Xylene as the reference material. Silica gel will be used to remove non-pathogenic hydrocarbons. The spectrometer will be calibrated with crude oil. Readings obtained from the spectrometer will trace out on the calibration graph and will be used to calculate the concentration of TPH in mg/l taking into account the total volume of the sample.

7. **SALINITY;**
   Salinity as chloride will be determined using the Mohr's method as described in APL-RP45. The titration method is based on the reaction of silver with chloride ions using potassium chromate as indicator. Silver chloride is precipitated quantitatively before

red silver chromate is formed. Salinity as chlorides is reported in mg/l after calculation.

8. TOTAL SUSPENDED SOLID (TDS);

This is determined by filtering a well-mixed aliquot (100-ml) of the sample through a dried and pre-weighed Millipore filter paper using vacuum filtration apparatus. The filter paper is then dried at 105%^{0}C to constant weight. The difference in weight of the filter paper represents the total suspended solids. This will be reported by mg/l after calculation.

9. BIOLOGICAL OXYGEN DEMAND

BOD which depends on oxygen uptake by bacteria will be determined using the dilution method according to APHA-507. The amount of oxygen consumed during a fixed period (Usually 5 days) is related to the amount of organic matter present in the original sample. Dissolved oxygen of the samples is first determined using the Schott Gerate Oxygen meter and then incubated for five (5) days at 20^{0}C. DO is again measured after a period of five days and BOD in mg/l was determined from the following calculation and reported accordingly.

BOD (mg/l) = $[DO_B - DO_A] - [DO_{SB} - DO_{SA}]$

Where D = Dilution factor usually 05 or $\frac{1}{2}$
DO_B = DO of sample before incubation
DO_A = DO of sample after incubation
DO_{SB} = DO of sample blank before incubation
DO_{SA} = DO of sample blank after incubation

10. CHEMICAL OXYGEN DEMAND;

Chemical oxygen Demand is used as a measure of the oxygen equivalent of the organic matter content of the sample which is susceptible to oxidation by a strong chemical oxidant. COD will be determined using the open reflux method where a sample is refluxed and digested in a strongly acidic solution with a known excess of potassium dichromate ($K_2Cr_2O_7$). After digestion, the excess un-reacted potassium dichromate is read into a spectrometer at 600-nm and results reported in mg/l (APHA 508). Results will also be verified by titrated a standard solution of ferrous ammonium sulphate.

11. NITRATE;

Nitrate is determined with the HACH Spectrophotometer using the cadmium reduction method. 25-ml of the sample was put in the sample cell and the contents of one HACH Nitra Ver 5 Nitrate reagent power pillow that is gentistic acid was added. A five-minute reaction time was allowed after which the concentration of Nitrogen-Nitrate was read with the Spectrophotometer at a wavelength of 400nm using deionized water as reagent blank. Results were reported as mg/l Nitrate-Nitrogen.

12. AMMONIA;

This is also determined with the HACH Spectrophotometer using the Nessler method. Essentially, the Nessler reagent (K_2Hgl_4) reacts under strong alkaline conditions with the ammonia present in the sample to produce a yellow coloured solution in direct proportion to the ammonia concentration. Measurements will be made at a wavelength of 425nm and results recorded in mg/l.

13. SULPHATE;

The sulphate content of all the samples will be determined by the turbidimetric method APHA-427C. The sulphate ion is precipitated in an acetic acid medium with barium chloride ($BaCl_2$) to form barium sulphate crystals of uniform size. Light absorbance of the barium sulphate suspension is measured by a spectrophotometer at 450nm and the $SO4^{2-}$ concentration in mg/l is determined by comparing the observed reading with the previously prepared calibration graph.

14. BICARBONATE;

Bicarbonate is determined by the titrimetric method API-RP45. Known volume of the sample is taken in a conical flask and 3 drops of bromocresol green indicator is added. This is titrated with 0.01N solution of sulphuric acid. The titre value of the titration is used to calculate the bicarbonate concentration in mg/l using the relationships:

$$HCO3 = \frac{V \times E \times N \times 100}{\text{Vol. Of Sample}}$$

Where V = titre volume
E = Eqivalent weight of bicarbonate = 61
N = Normality of surphuric acid
= Constant

15. TOTAL PHOSPHOROUS;

Total phosphorous is determined by the ascorbic acid method, which is a reaction between ammonium molybdate and potassium animonyl tatrate with orthophosphate in an acid medium to form heteropoly acid – phosphomolybdic acid. This is then reduced to intensely colored molybdenum blue by ascorbic acid.

The intensity of the colour, which is proportional to the phosphate concentration present as phosphorous, will be measured with a spectrophotometer at wavelength of 690nm. The actual concentration as determined from the calibration curve is recorded in mg/l.

16. METALS DETERMINATION;

The metal content of the water samples will be determined using APHA 301 Atomic Absorption spectrophotometer (AAS) method. The water samples will be digested by using HNO_3. The digested will be quantitatively transferred into 100ml volumetric flask. Known standard solutions will be taken through the same process to determine the recovery factor, which is usually higher than 98%. The metal concentrations will be determined by aspiration using the AAS model BUCK SCIENTIFIC 210 VGP. Standard samples will be used to calibrate the AAS and the concentrations of metals in the sample will be read of the calibration curve.

17. TOTAL HARDNESS;

25ml of the sample is transferred into a 250mL Erlenmeyer flask. Distilled water is added to the 50mL mark. 1mL of 8N KOH and calver2 calcium indicator powder pillow. A 25mL burret is then filled to the zero mark with titriver hardness titrant. The sample is then titrated until the colour changes from red to purple blue.

CALCULATION

Calculation of mg/l Calcium as CaCO3 = mL titrant x 40

1mL of hardness, 1 buffer solution is then titrated with the titrant until the colour changes again from red to blue.

CALCULATION
Mg/l total hardness as CaCO3 = mL of total titrant used x 40

18. ALKALINITY;

25mL of the sample is transferred into a 250mL erlnmeyer flask. The content of one phenolphthaline indicator powder pillow is added and will be titrated with 0.16N N2SO4 to a colourless end point.

CALCULATION
Mg/l as CaCO3 P alkalinity = mL of titrant x 0.4
Then the content of one Bromocresol Green Methyl Red indicator powder pillow will be added to the flask and swirled. The titration will be continued to a light blue grey end point.
CALCULATION
Mg/l as CaCO3 total alkalinity = Total mL of titrant x 0.4

19. COLOUR;

25mL of membrane-filtered sample is transferred into a 25mL cell of DR4000 spectrophotometer. The colour is measured at a wavelength of 455nm after zeroing with distilled water as blank. The result is recorded as PtCo.

20. SILICA (HETEROPOLY METHOD);

Silica is determined by the heteropoly blue method. Silica and phosphate in the sample react with molybdate ion under acidic conditions to for silicomolybdic acid and phosphomolybdic acid complexes. Addition of citric acid preferentially destroys the phosphate complex. An amino acid is then added to reduce the yellow silicomolybdate to an intense blue colour, which is proportional to the silica concentration. The concentration of silica present is measured with a spectrophotometer at a wavelength of 815nm. The actual concentration as determined from the calibration curve is recorded in mg/l.

MICROBIOLOGICAL ANALYSIS

The techniques employed in the microbial analysis of the soil, sediment and water samples were adapted from APHA (1985) and EPA (1978) and are as follows.

A. Estimation of Total Heterotrphic Bacteria (THB) by Plate Count Technique
One gram of the soil/sediment samples will be rehydrated with 9ml sterile distilled water in a MacCartney bottle containing some glass Chips (i.e. 10^{-1} w/v in the first instance). Hundred folds serial dilution of the suspension is carried out five times in a set of MacCartney bottles each containing 9.9ml sterile distilled water. Same dilution will be carried out on each of the water samples. One milliliter of each diluent is plated out respectively in duplicates employing the use of nutrient agar medium (sterile) kept in molten form. Pour plate method will be adopted.

The culture plates, having allowed the agar medium to set, will be incubated aerobically at 28^0C for 36-48 hours. Thus enumerating for only aerobes and facultative heterotrophic bacteria. The culture plates will be observed for growth and selected for count after the expiration of the incubational period. The culture plate on

which the number of colonies is less than 300, starting from the least to the most diluted and its duplicated for each sample will be selected. The average count is multiplied by the dilution factor of that dilution and expressed as cell forming unit (cfu) per gram or milliliter of the original sample. This is a viable count.

B. Estimation of Total Heterotrophic Fungi (THF) by Plate Count Method

The same procedure used for estimation of the THB will be used also for the estimation of THF. The differences are, however, as follows

1. Sabourand Dextrose agar (SDA) is employed as the culture medium.
2. The culture plates will be incubated aerobically at 28^{o}C for 5-7 days (until the plates showed no further increase in the number of fungal colonies).

C. Estimation of Total Hydrocarbon Degrading Bacteria (THDB) by Plate Count Method

CULTURE MEDIUM: Bushnell-Haas broth in which 15g/l agar, 30mg/l fungusol miconazale Nitrate B.P 2%) and varying concentrations of NaCl for fresh and salt-water environment will be incorporated. 15ml/l sterile crude oil will also be added as carbon source.

CULTURING: Same as THB.
INCUBATION: Culture plates will be incubated at 30^{o}C for 7-14 days
COUNT: Viable counts.

D. Estimation of Total Hydrocarbon Degrading Fungi (THDF) by Plate Count Method

CULTURE MEDIUM: Bushnell-Haas broth in which 15g/l agar, 50mg/l streptomycin and varying concentrations of NaCl for fresh and salt-water environment will be incorporated. 15ml/l sterile crude oil will also be added as carbon source.

CULTURING: Same as for THB.
INCUBATION: Culture plates will be incubated at 30^{o}C for 7-14 days
COUNT: Viable counts.

E. Estimation of Coliform Bacilli by MPN Presumptive Test Method

The most probable number (MPN) of coliform presumptive test is carried out on each of the water samples by planting three portions in each of three dilutions in geometric series, employing the use single and double strength MacConkey broth. For planting three portions in each of three dilutions in geometric series, a set of three test tubes, each containing 10ml double strength sterile broth, two sets of three test tubes, each containing 5ml sterile single strength broth will be required. A Durham tube is inserted into each for gas collection.

Ten milliliters of a sample is inoculated into each tube of double; 1ml of same sample is inoculated into each of the first set of three test tube of single strengths and 0.1ml of the sample inoculated into each of the other set of three tubes of the single strength. The culture tubes will be carefully agitated to mix the inoculum with the broth medium. They will be incubated at 35^{o}C for 36-48 hrs and each tube observed for acid cum gas production to obtain positive tubes(s).

The combined numbers of positive tubes in each set, arranged in order of least diluted to the most diluted; will be read out from the appropriate standard MPN to obtain the estimated number of coliform cells present in100ml of the original water sample.

F. Isolation and Identification of Bacteria and Fungi Present in the Samples

Bacteria and fungi isolated from each of the samples is gotten from the previous *Culture plates and tubes*. Parameters to be used in differentiating each isolate include colonial characteristics (i.e. elevation, edges, texture, pigmentation, etc); cell morophology (i.e. shape, arrangement and Gram reaction); and spore formation. The bacteria isolates is sub-cultured in nutrient agar slants while the fungi is done on Sabourand Dextrose agar slants for subsequent use.

Primary identification of each bacteria isolate is carried out by sub culturing unto Eosin methylene blue (EMB) agar, MacConkey agar, Triple sugars iron (TSI) agar for differentiating enteric bacilli. Further and confirmatory biochemical reactions in the identification processes will be carried out employing various tests such as gelatin liquefaction, nitrate reduction, sugars fermentation, indole production, H_2S production, motility, citrate utilization, MRVP and oxidase. The data collected for the various isolates will be collected and compared with standards available in various manuals and textbooks with a view to identifying to generic and/or species levels.

Molds and yeast isolates will be identified by their growth characteristics (i.e. texture, pigmentation, form, spore formation, etc) and morphology through staining technique using Lactophenol in cotton blue (for molds) and Gram staining (for yeast). The prepared slides will be examined under the microscope. Drawings of the various structure (i.e. sporangium, sporangiophore, columellae, mycelium, spores, ascospores etc) of each isolate made and compared with the drawings of described commonly encountered molds and yeast.

3.2.2.3 Air Quality

Air quality studies were measured at every location where soil sample was collected to obtain the corresponding values using the Aeroqual digital gas monitor (Model 500) to determine the ambient air quality. Dust particulates were also measured in the locations using Met One 321 particle monitor. Noise levels were measured in-situ at different locations using Extech 407732. Ambient air, dust particulate and noise levels were taken in the farms of the selected communities and results compared with FMEnv permissible limits.

3.2.2.4 Plant and Animals

Flora and Fauna data were captured in the selected communities using different approaches such as quadrants, foot print, observations and oral interviews. Plant species were enumerated and characterized into genera, species, family and common names while animals were categorized into Arthropods, Gastropods, Snakes, Fishes and Birds. Local animals that still exist or became extinct were also indicated.

3.3 Geographical Characteristics and Climatic Conditions

The existing geographical characteristics of the proposed project environment such as the topography, geology, hydrology and climatic conditions were sourced from secondary sources as indicated below.

3.3.1 Topography

Enugu lies at the foot of an escarpment and not a hill. The topography of Enugu includes major features such as the plateaus, rolling plains and the cuesta. The cuesta is a 500km long belt which runs from Leru northwards to Idah in kogi State. The Enugu escarpment runs west wards and stands as a divide between the Anambra River Basin to the West and the Cross-River Basin to the east. The expanse of the cuesta narrows down as one runs from northern Enugu to southern Enugu with valleys as wide as 40km at Nsukka, 20km at Udi and 12km at Leru. The scarp reduces almost to zero at Isuochi junction and rises again after the junction with unbroken stretches between Awgu and Lokpanta, Awgu and Ozalla onward to Enugu town. Enugu town lies on top of the Udi escarpment and the surrounding valleys and from this the name Enu-ugwu was derived. The region is overlaid with sediments bearing coal from the Cretaceous and Tertiary age. Coal seams in the Enugu coal district measure between 1 and 2 metres (3.3 and 6.6 ft) in thickness and the reserves have been estimated to be more than 300 million tonnes. Highlands surrounding Enugu for the most part are underlain by sandstone, while lowlands are underlain by shale. Much of the escarpment stretching from Enugu to Orlu has been ravaged by soil and gully erosion.

3.3.2 Drainage

Predominantly, Enugu State like the rest of South East states of Nigeria has well drained watershed pattern with pockets of poorly drained soil and a small portion of imperfectly drained pattern towards the northeast of the State. The watershed of Enugu Urban is the Nyaba River basin. It is a mountainous region with steep slopes and an upland ecosystem. The watershed drains into Nyaba River which flow eastwards into the cross river basin. Nyaba flows through the southern part of Enugu passing through various land covers and land uses from its source down to its confluence with Abonyi River in Ebonyi State. Its tributaries are Idaw, Ekulu, Asata, Aria and Ogbete rivers. Erosion is noted as one of the major causes of soil depletion in eastern Nigeria; thus, adequate soil management, frequent irrigation and fertilization may be required for utmost crops yield in the area.

3.3.3 Geology and Hydrogeology

Geologically, Enugu State is underlain by seven major geologic formations which from the oldest to the youngest include: Eze-Aku Formation; Awgu Formation (Agbani Sandstone); Nkporo Enugu Shale; Mamu Formation; Ajali Sandstone; Nsukka Formation and Imo Shale as shown in figure 3.1. Eze-Aku Formation is located around Aninri and Nkanu East local government areas in the state. It was deposited during Turonian times. It is overlain by Awgu Formation (Santonian). The lithology of Awgu Shale includes bluish grey shales with few sandstone intercalations. There exist small tongues of shale-like limestone at Awgu town. The Agbani Sandstone is a medium to coarse grained consolidated sandstone which is a member of Awgu Formation.

Anambra basin is situated in the south western extremity of the Benue trough of Nigeria. It is roughly triangular in shape and covers an area of about 40000sqkm. It is characterized by three distinct formations such as Enugu shale, Ajali and Mamu formations. The Enugu Shale is carbonaceous, fissile, grey and jointed with beds of siltstone and clay. The Ajali formation whose age is upper Maastrichtian is false bedded and highly friable sandstone while the Mamu formation (lower Maastrichtian) which is also known as the Lower Coal Measure is mainly made up of shale with intercalations of sand and siltstone. Mamu formation is moderately well sorted to moderately sorted, coarse skewed to strongly fine skewed and very leptokurtic to

extremely leptokurtics. It is worthy to note that the Mamu formation is the main coal bearing unit of the area. Ekulu River is seen at main points around Enugu, which rises from the Nsukka Udi Escarpment and flows eastwards joining Nyaba before flowing to Ebonyi River. These rivers have courses and are not completely unnavigable. The rivers, seasonal streams, lakes and the underground water constitute the sources of water supply in Enugu. It must be noted that most of the rivers especially Ekulu, Idodo, Nyaba and Ajalli carry a lot of sediments, solid wastes and industrial effluents.

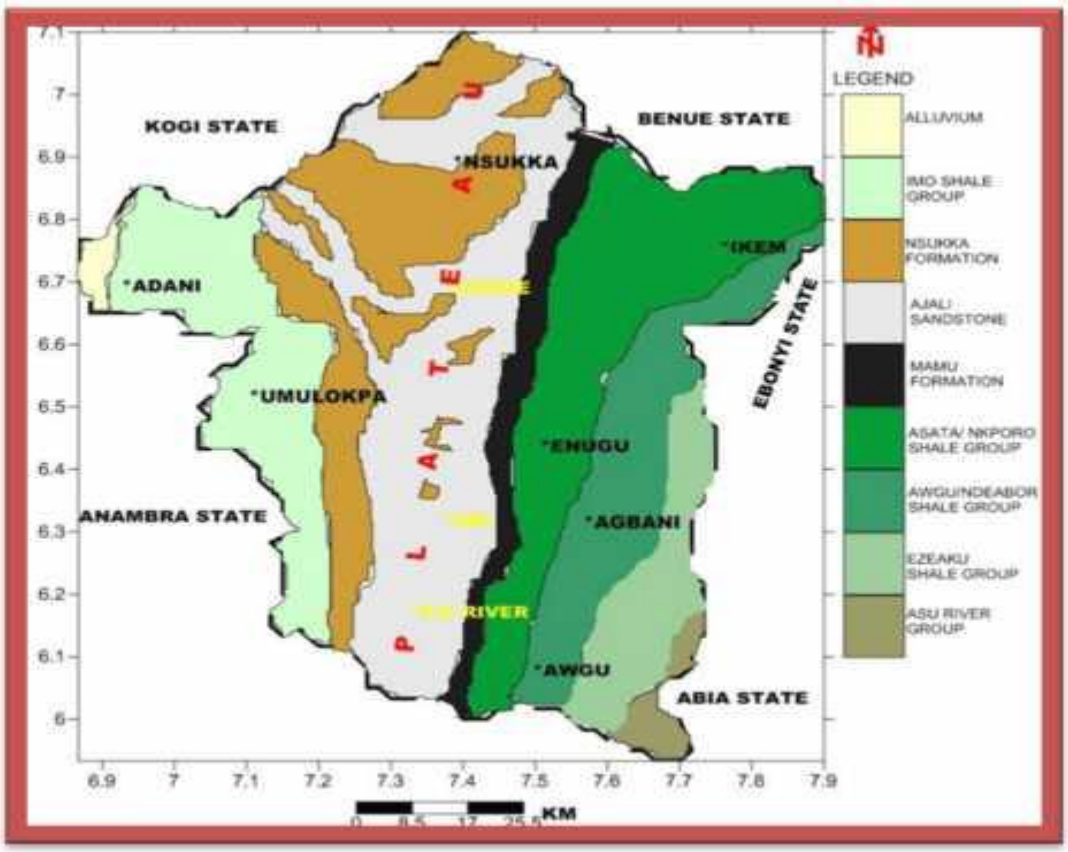

Figure 3.1 Geologic Map of Enugu State
Source: researchgate.net

3.3.4 Climate

Enugu State is located in a tropical rain forest zone with a derived savannah climate made up of dry and raining seasons. The dry season lasts from November to March while the wet season starts from April and ends in October. The mean monthly rainfall varies from an average of 25.8mm to 508.3mm while the mean annual rainfall varies from 1497mm to 2262.4mm. Average daily temperature varies between 24 and 29 degrees centigrade throughout the year with the mean daily temperature of 26.7 °C (80.1 °F) (Table 3.1). Other weather conditions affecting the proposed project area include harmattan (a dusty trade wind lasting a few weeks of December and January).

Table 3.1: Climate Data for Enugu

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	36.9 (98.4)	37.6 (99.7)	38.5 (101.3)	36.4 (97.5)	34.2 (93.6)	33.2 (91.8)	32.9 (91.2)	32.3 (90.1)	32.5 (90.5)	34.1 (93.4)	34.8 (94.6)	36.5 (97.7)	38.5 (101.3)
Average high °C (°F)	34 (93)	35 (95)	35 (95)	34 (93)	32 (90)	31 (88)	30 (86)	30 (86)	30 (86)	31 (88)	33 (91)	33 (91)	32 (90)
Daily mean °C (°F)	27 (81)	29 (84)	29.5 (85.1)	29 (84)	27.5 (81.5)	27 (81)	26 (79)	26 (79)	26 (79)	26.5 (79.7)	27.5 (81.5)	26.5 (79.7)	27 (81)
Average low °C (°F)	20 (68)	23 (73)	24 (75)	24 (75)	23 (73)	23 (73)	22 (72)	22 (72)	22 (72)	22 (72)	22 (72)	20 (68)	22 (72)
Record low °C (°F)	10.3 (50.5)	15.9 (60.6)	19.8 (67.6)	20.9 (69.6)	20.6 (69.1)	20.1 (68.2)	20.2 (68.4)	20.5 (68.9)	20.0 (68)	17.4 (63.3)	13.5 (56.3)	9.8 (49.6)	9.8 (49.6)
Average precipitation mm (inches)	19 (0.75)	15 (0.59)	70 (2.76)	130 (5.12)	217 (8.54)	252 (9.92)	242 (9.53)	237 (9.33)	292 (11.5)	201 (7.91)	12 (0.47)	8 (0.31)	1,695 (66.73)
Average precipitation days	1	1	4	7	12	14	16	15	18	12	1	1	102
Mean monthly sunshine hours	186	174	183	183	186	153	118	118	123	174	219	217	2,034
Source: The Weather Network													

3.4 Results of Biophysical Assessment

3.4.1 Relative Humidity

Relative humidity measures the ratio of the air actually present and the amount that can saturate the air and this value is expressed in percentage. Relative humidity of 100 percent means that the air is fully saturated and it can give rise to rain. The relative humidity of the locations recorded a lowest value of 63.7% and highest value of 68.6% as shown in table 3.2.

Table 3.2: Relative Humidity, Wind Speed, Light and Air Temperature at Selected locations (Equipment Used: Extech 4-In-1 Environmental Meter; Model 45170)

S/N	Station	Relative Humidity (%)	Wind Speed (M/S)	Light (Lux)	Temp. (Oc)
1.	ADANI (ATAPS) (Rice) Community Consultation	64.8	1.4	427 x 10	36.0
2.	ADANI (ATAPS) (Rice) Rice Processing	67.4	2.1	424 x 10	36.5
3.	ADANI (ATAPS) (Rice) Farm site	63.7	0.0	414 x 10	40.5
4.	NENWE(Rice) Community Consultation	65.3	2.4	423 x 10	33.4
5.	NENWE(Rice)	66.9	0.0	433 x 10	33.9

	Rice Processing				
6.	NENWE(Rice) Rice farm	68.6	0.5	430 x 10	33.2
7.	EHA-AMUFU (Rice) Community Consultation	64.8	1.5	415x10	41.5
8.	EHA-AMUFU (Rice) Rice Processing	67.4	1.3	423x10	40.5
9.	EHA-AMUFU (Rice) Rice farm	63.7	0.0	427x10	40.1
10.	IWOLLO (Cashew) Community Consultation	65.3	0.8	411x10	31.7
11.	IWOLLO (Cashew) Cashew farm	66.9	0.0	417x10	31.7
12.	ACHI Oji River (Cashew) Community Consultation	68.6	0.6	410x10	33.2
13.	EHA-ALUMONA Cashew Processing	65.3	1.8	429x10	33.8
14.	OBINAGU Community Consultation	66.9	0.7	431x10	35.1
15	OBINAGU Farm site	68.6	0.4	421x10	37.7
16.	NSUKKA Community Consultation	64.8	0.2	417x10	33.2
17.	NSUKKA-CHIMHAZIE Co-operative Farm	67.4	0.5	420x10	33.3

Source: Field Survey, Nov. 2020

3.4.2 Wind Speed

The raining season (April to October) typified by the southwest trade winds and the dry season (November to March) is characterized by the northeast trade winds which bring harmattan. Wind speed measurement in the project areas recorded a lowest value of 0.0m/s and highest value of 2.4m/s (Table 3.2).

3.4.3 Air Quality Assessment

Ambient Air Quality

The ambient air quality parameters considered during the study include Nitrogen (IV) oxide ($N0_2$), Sulphur (IV) oxide ($S0_2$), Carbon monoxide (CO), carbon dioxide (CO_2), Volatile Organic Carbon (VOC), Methane CH_4), Hydrogen Sulphide (H_2S), and Ammonia (NH_4). The results of air quality analysis revealed that the parameters were within FMENv permissible limit.

Table 3.3: Nigerian Ambient Air Quality Standards

Pollutants	**Average Time**	**Limit**
Particulates	Daily Average Value/hour	250µg/m3-600µg/m3
Sulphur oxide (Sulphur e)	Daily average of hourly value/hour	0.01ppm (26µg/m3)-0.1ppm (26gµ/m3)
Non-methane	Daily average of 3 hourly values	160gµ/m3
Carbon monoxide	Daily average of hourly values (8 hourly)	10ppm (11.4µg/m3)-20pmm (22.8µg/m3)

Nitrogen oxides (Nitrogen dioxide)	Daily average of hourly values (8 hourly)	0.04ppm – 0.06ppm-75.0µg/m3-g/m3
Photochemical oxidants	Hourly values	0.06ppm

Source: FMENV.

Table 3.4: Ambient Level of Gaseous Compounds in the Locations

S/N	STATION	GASES (mg/m3)							
		VOC	**CO**	**NH_3**	**NO_2**	**CH_4**	**SO_2**	**H_2S**	**CO_2**
1.	ADANI (ATAPS) (Rice) Community Consultation	0.00	**0.0**	0.18	0.000	0.00	0.00	0.00	0.00
2.	ADANI (ATAPS) (Rice) Processing	0.00	**0.0**	0.06	0.000	2.0	0.00	0.00	0.00
3.	ADANI (ATAPS) (Rice) Farm site	0.00	**0.0**	0.12	0.000	0.00	0.00	0.44	0.00
4.	NENWE (Rice) Community Consultation	0.00	**0.0**	0.14	0.000	1.00	0.00	0.08	0.00
5.	NENWE (Rice) Rice Processing	0.00	**0.0**	0.08	0.000	2.5	0.00	1.2	0.00
6.	NENWE (Rice) Farm	0.00	**0.0**	0.11	0.000	1.00	0.00	0.09	0.00
7.	EHA-AMUFU (Rice) Community Consultation	0.00	**0.0**	0.12	0.000	0.01	0.00	0.21	0.00
8.	EHA-AMUFU (Rice) Processing	0.00	**0.0**	0.16	0.000	2.2	0.00	0.00	0.00
9.	EHA-AMUFU (Rice) Rice farm	0.00	**0.0**	0.07	0.000	0.10	0.00	0.14	0.00
10.	IWOLLO (Cashew) Community Consultation	0.00	**0.0**	0.13	0.000	1.00	0.00	0.08	0.00
11.	IWOLLO (Cashew) Farm	0.00	**0.0**	0.11	0.000	1.5	0.00	1.5	0.00
12.	ACHI Oji River (Cashew) Community Consultation	0.00	**0.0**	0.13	0.000	1.00	0.00	0.11	0.00
13.	EHA-ALUMONA Cashew Processing	0.00	**0.0**	0.08	0.000	0.00	0.00	0.03	0.00
14.	OBINAGU Community Consultation	0.00	**0.0**	0.15	0.000	1.7	0.00	0.20	0.00
15.	OBINAGU Farm site	0.00	**0.0**	0.12	0.000	0.02	0.00	0.49	0.00
16.	NSUKKA Community Consultation	0.00	**0.0**	0.14	0.000	1.30	0.00	0.18	0.00
17.	NSUKKA-CHIMHAZIE CO-OPERATIVE FARM	0.00	**0.0**	0.12	0.000	2.3	0.00	1.1	0.00
	FMENV LIMIT	-	**10.00**	**0.6**	**0.04 – 0.06**	-	**0.26**	**8.00**	-

Source: **Field Survey, Nov. 2020**

Table 3.4 shows The ambient air quality parameters considered during the study and they include Nitrogen (IV) oxide ($N0_2$), Sulphur (IV) oxide ($S0_2$), Carbon monoxide

(CO), carbon dioxide (CO_2), Volatile Organic Carbon (VOC), Methane CH_4), Hydrogen Sulphide (H_2S), and Ammonia (NH_4). Ambient air were below FMEnv permissible limits.

Table 3.5: Ambient Levels of Suspended Particulate Matter (SPM) in the Locations

S/N	STATION	Suspended Particulate Matter (SPM					
		PM0.3	PM0.5	PM1.0	PM2.0	PM5.0	SPM
1.	ADANI (ATAPS) (Rice) Community Consultation	1.083	0.912	0.405	0.072	0.006	2.478
2.	ADANI (ATAPS) (Rice) Rice Processing	0.657	0.718	0.273	0.015	0.001	1.664
3.	ADANI (ATAPS) (Rice) Farm site	1.307	0.482	0.192	0.081	0.003	2.065
4.	NENWE (Rice) Community Consultation	0.738	0.261	0.238	0.026	0.002	1.265
5.	NENWE (Rice) Processing	2.346	0.781	0.217	0.023	0.004	3.371
6.	NENWE (Rice) Farm	0.183	0.153	0.288	0.038	0.002	0.664
7.	EHA-AMUFU (Rice) Community Consultation	1.071	0.152	0.495	0.018	0.001	1.737
8.	EHA-AMUFU (Rice) Rice Processing	0.687	0.628	0.743	0.077	0.003	2.138
9.	EHA-AMUFU (Rice) farm	1.902	0.402	0.192	0.052	0.005	2.553
10.	IWOLLO (Cashew) Community Consultation	0.738	0.721	0.148	0.020	0.004	1.631
11.	IWOLLO (Cashew) farm	2.346	0.457	0.292	0.079	0.003	3.175
12.	ACHI Oji River (Cashew) Community Consultation	0.258	0.853	0.275	0.091	0.005	1.482
13.	EHA-ALUMONA Cashew Processing	1.075	0.281	0.411	0.042	0.001	1.810
14.	OBINAGU Community Consultation	0.537	0.623	0.253	0.033	0.003	1.449
15.	NSUKKA Community Consultation	1.201	0.291	0.162	0.021	0.007	1.682
16.	NSUKKA-CHIMHAZIE Co-operative Farm	0.618	0.384	0.276	0.016	0.001	1.295

Source: Field Survey, Nov. 2020

The levels of suspended particulate matters range from 0.664 to 3.371mg/m3, and the values were below the threshold limits of 25mg/m3 set by the Federal ministry of Environment (FMEnv).

Noise Level

Noise level within and around the selected sites was assessed using Digital Extech 407732 sound meter calibrated in decibel dBA. The results revealed that noise level varies between 42.1 to 78.3 dBA with a mean value of 60.2dBA. Noise levels as revealed were below the permissible limits of 90dBA set by the Federal Ministry of Environment (Table 3.6).

Table 3.6: Noise Level Assessment in the Project Area

S/N	STATIONS	Noise	FMEnv Limit (dBA)
1	ADANI (ATAPS) (Rice) Community Consultation	46.4	90
2	ADANI (ATAPS) (Rice) Processing	78.3	90
3	ADANI (ATAPS) (Rice) Farm	66.3	90
4	NENWE (Rice) Community Consultation	62.7	90
5	NENWE (Rice) Processing	68.5	90
6	NENWE (Rice) Farm	58.3	90
7	EHA-AMUFU (Rice) Community Consultation	46.5	90
8	EHA-AMUFU (Rice) Processing	72.7	90
9	EHA-AMUFU (Rice) Farm	46.4	90
10	IWOLLO (Cashew) Community Consultation	50.3	90
11	IWOLLO (Cashew) Farm	56.3	90
12	ACHI Oji River (Cashew) Community Consultation	42.1	90
13	EHA-ALUMONA Cashew Processing	46.7	90
14	OBINAGU Community Consultation	48.3	90
15	OBINAGU Farm site	61.9	90
16	NSUKKA Community Consultation	65.7	90
17	NSUKKA-CHIMHAZIE CO-OPERATIVE FARM	48.1	90

Source: Field Survey, Nov. 2020

3.4.4 Biodiversity

Flora

The flora pattern in the locations is closely related to the soil structure, which has been largely influenced over time by geological formation/changes erosion and prevailing climatic conditions. Floras within the study area are luxuriant and consist of shrubs, grass and tree components.The woody species include: Danielliaoliveri, Vitexdoniana, Nuclealatifolia, Annonasenegalensis, Uvariachamae, Alstoniaboonei, Cussoniabarteri, Ceibapentandra, Canariumschweinfurthii, Berliniagrandiflora, Cassia spp, Dialiumguineense, Alchorneacordifolia, Hymenocardiaacida, Napoleanaimperialis, Anthocleistavogelli, Parkiaclappertoniana, Pentaclethramacrophylla, Baphianitida, Newbouldialaevis, Rauwolfiavomitoria,Terminaliaivorensis,Acioabarteri, Erythrophylumspp, Pterocarpusstantalinoide and, Lonchocarpuscyanescens.

Herbaceous or semi-woody species include: Aspiliaspp, Panicum maximum, Andropogonspp, Anthephoraspp, Commelinaspp, Axonopuscompressus, Aframomumlatifolium, Mimosa spp, Chromolenaodorata, Ipomea involucrate, Centrosomaspp, Calopogoniummucunoides, Sidaacuta, Bambusa vulgaris.Pteridophytes include: Gleichenialinearis, Lycopodiumcernum, Selaginellamyosurus.

Economic trees include: Elaeisguineensis (Palm), Mangiferaindica(Mango), Dacroyoidesedulis(Pear), Carica papaya (paw paw),Anacardiumoccidentale (Cashew), Gmelinaaborea (Gmelina).Arable crops include: Manihotesculenta (Cassava), Amaranthusspinosa (Green vegetable), Telfairaoccidentalis (Fluted pumpkin), Citruluslanatus (Melon), Solanummicrocarpum (Eggplant), Pepper nigrum (Pepper), Zea mays (Maize), Reccinuscommunis (Castor oil), Colocassiaspp (Cocoa yam), Vernoniaarmendalina (Bitter leaf), Musaspp (Plantain & Banana), Lycopersiconesculentum (Tomatoes).

Fauna

Fauna composition found in the locations include: Hyperiodrilus (Earth worm), Pachybolus (Millipede), Acraeasp (Butterflies), Precissp (Moths), Papiliosp (Caterpillars), Zonocerussp (Grasshopper), Apis (Bee), Oecophylla (Ants), Bradinopyga (Dragon flies), Sphedromantis (Praying mantis), Vespa (Wasp), Numida (Guinea fowl), Francolinuslanthami (Bush fowl), Streptopeliasp (Dove), Cricetomysgambianus (Giant rat), Heliosciurussp (Tree squirrel), Xeruserythropus(Ground squirrel), Thryonomysswinderianus (Grass cutter), Najamelanoleuca (Black cobra), Polyboroidesradiatus (Harrier hawk), Lophocerossp (Hornbill), Neophronmonachus (Hooded vulture), Pycononotusbarbatus (Bulbul), Lepuscapensiszechi (Hare), Hypsignathussp (Fruit bat), Bufo sp. (Toad), Notonecta sp. (Water boatman), Gerrislacustris (Pond-skater).

3.4.5 Soil

Soil in the locations are majorly made up of loosely clay silty fine sand, ferrallitic (also called Red Earth or Acidic) sands and hydromosrphic soils. The Soils are typically acidic and ranges from 3.5 to 5.5 with mean value of 4.5 against NESREA limit of 6-9 (Table 3.7).

Table 3.7a: Laboratory Results of Soil Samples

S/N	Parameters	Units	Ezeagu Cashew Farm	Emene	Eha - Alumona	Nenwe	Nenweu duma	FMEnv /NESREAS tandards
1	Temperature	^{0}C	29.7	29.7	29.9	29.6	29.6	<3
2	PH		3.6	3.9	4.1	3.7	4.3	6 – 9
3	Loss of Ignition	%	11.84	9.83	14.65	12.29	12.83	
4	Calcium	Mg/kg	59.07	66.51	68.03	63.85	58.72	
5	Magnesium	Mg/kg	41.11	50.33	49.98	49.09	41.39	
6	Lead (Pb)	Mg/kg	0.02	0.02	0.03	0.04	0.04	164
7	Iron	Mg/kg	0.71	0.9	0.89	0.79	0.83	2.0
8	Chloride	Mg/kg	65.91	89.01	78.64	62.99	78.31	100
9	Sulphate	Mg/kg	98.32	134.18	116.35	102.03	120.08	
10	Nitrate	Mg/kg	0.9	0.77	0.83	0.86	0.94	
11	Copper	Mg/kg	0.03	0.04	0.02	0.03	0.03	
12	Moisture	%	9.4	2.38	18.06	20.04	9.88	
13	Sodium	Mg/kg	56.04	64.29	70.17	50.91	55.46	
14	Potassium	Mg/kg	72.62	83.31	95.22	63.38	71.04	
15	Oil and Grease	Mg/kg	NIL	NIL	NIL	NIL	NIL	

Table 3.7b: Laboratory Results of Soil Samples

S/N	Parameters	Units	Iwollo Oghe Cashew Productio n Site	Eha-Amufu Farm Site	Adani Rice Farm	Adani Rice Producti on Site	Ako Nike Cashew Producti on Site	FMEnv/ NESREA Standards
1	Temperature	^{0}C	29.4	29.4	29.6	29.1	29.3	<3
2	PH		4.3	3.8	4.7	4.3	3.7	6 – 9
3	Loss of Ignition	%	12.45	11.5	12.23	12.77	11.27	

4	Calcium	Mg/kg	66.03	66.83	59.74	64.91	62.85	
5	Magnesium	Mg/kg	51.02	57.19	40.88	50.02	47.11	
6	Lead (Pb)	Mg/kg	0.04	0.03	0.04	0.01	0.04	164
7	Iron	Mg/kg	0.89	0.86	0.69	0.79	0.69	2.0
8	Chloride	Mg/kg	64.36	86.21	72.59	84.5	63.89	100
9	Sulphate	Mg/kg	102.99	138.07	115.03	131.04	105.01	
10	Nitrate	Mg/kg	0.68	0.98	0.82	0.9	0.90	
11	Copper	Mg/kg	0.03	0.04	0.02	0.03	0.03	
12	Moisture	%	20.07	49.64	19.27	20.19	21.02	
13	Sodium	Mg/kg	65.55	73.17	66.28	78.05	65.81	
14	Potassium	Mg/kg	62.98	81.33	73.81	83.67	73.19	
15	Oil and Grease	Mg/kg	NIL	NIL	NIL	NIL	NIL	

Source: Field Survey, Nov. 2020

Table 3.7c: Laboratory Results of Soil Samples

S/N	Parameters	Units	Nsukka Poultry Production Site	Udi Agu Odoo Poultry Production Site	Iwollo Oghe Cashew Production Site	Ugwuomu Poultry Cluster	FMEnv /NESREAS tandards
1	Temperature	^{0}C	29.8	29.6	29.4	29.5	<3
2	PH		4.5	4.0	4.3	4.6	6 – 9
3	Loss of Ignition	%	13.02	13.31	12.45	11.45	
4	Calcium	Mg/kg	63.11	62.47	66.03	63.01	
5	Magnesium	Mg/kg	49.16	50.17	51.02	50.11	
6	Lead (Pb)	Mg/kg	0.04	0.04	0.04	0.03	164
7	Iron	Mg/kg	0.59	0.67	0.89	0.79	2.0
8	Chloride	Mg/kg	63.59	63.77	64.36	61.99	100
9	Sulphate	Mg/kg	107.20	112.1	102.99	113.07	
10	Nitrate	Mg/kg	0.87	0.86	0.68	0.92	
11	Copper	Mg/kg	0.03	0.03	0.03	0.03	
12	Moisture	Mg/kg	21.15	21.02	20.07	22.14	
13	Sodium	Mg/kg	64.93	63.53	65.55	57.31	
14	Potassium	Mg/kg	70.19	70.44	62.98	65.30	
15	Oil and Grease	Mg/kg	NIL	NIL	NIL	NIL	

Source: Field Survey, Nov. 2020

3.4.6 Water Quality

The result of Laboratory analysis of water samples collected is shown in table 3.8.

Table 3.8a: Summary Results of Water Analysis in the Communities

S/N	Parameters	Units	Eha-Amufu	Eha Alumona	Nsukka	Obollo Afor	WHO/ FMEnv Limit
1	pH		7.2	7.21	7.12	7.15	6.5-8.5
2	Temperature	^{0}C	30.4	30.7	30.5	30.7	23-33
3	Taste	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
4	Odour	Unobjectio	Unobjectio	Unobjectio	Unobjectio	Unobjectio	Unobjectio

		nable	nable	nable	nable	nable	nable
5	Colour	Mg/L	15	8.3	11.5	9.3	5-50
6	Electrical conductivity	Mg/L	10^3x0.8	10^3x2.7	10^3x0.7	10^3x2.7	1000uScm
7	Total solids	Mg/L	62.54	52.39	62.54	52.39	500
8	Total dissolve solids	Mg/L	52.05	50.57	52.05	50.57	1000
9	Total suspended solids	Mg/L	10.89	1.82	10.90	1.82	30
10	Chromium	Mg/L	ND	ND	ND	ND	0.10
11	Dissolved oxygen	Mg/L	0.52	0.39	0.52	0.39	5.0
12	Lead	Mg/L	0.002	NIL	0.002	NIL	1.7
13	Copper	Mg/L	0.02	NIL	0.01	NIL	0.5
14	COD	Mg/L	8.16	7.19	8.56	7.19	10
15	BOD	Mg/L	10.04	8.84	3.5	3.2	5
16	Sulphate	Mg/L	136.12	98.63	136.12	98.63	250
17	Nitrates	Mg/L	0.45	0.11	0.45	0.11	10
18	Iron	Mg/L	0.25	0.35	0.00	0.36	0.03
19	E-Coli	MPN/100ml	NIL	NIL	NIL	NIL	0
20	Coliform	MPN/100ml	NIL	NIL	NIL	NIL	10
21	Chloride	Mg/L	303.01	61.52	110.02	61.52	250
22	Sodium	Mg/L	38.11	38.92	38.11	38.92	200
23	Potassium	Mg/L	76.48	50.08	13.41	13.77	<20
24	Calcium	Mg/L	12.0	8.34	15.0	8.34	200
25	Magnesium	Mg/L	5.86	3.04	5.86	3.11	150
26	Phenol	Mg/L	ND	ND	ND	ND	Nil
27	Arsenic	Mg/L	ND	ND	ND	ND	0.015
28	Total Hardness	Mg/l CaCO3	43.42	27.08	43.42	30.08	100
29	Acidity	Mg/l CaCO3	100	140	100	121	200
30	Alkanality	Mg/l CaCO3	70	60	15	61	100
31	Manganese	Mg/L	NIL	NIL	NIL	NIL	0.5
32	Zinc	Mg/L	NIL	NIL	NIL	NIL	1.5
33	Cadmium	Mg/L	ND	ND	ND	ND	0.002
34	Oil & Grease	Mg/L	NIL	NIL	NIL	NIL	10

Source: Field Survey, Nov. 2020

Table 3.8b: Summary Results of Water Analysis in the Communities

S/N	Parameters	Units	Iwollo	Obinagu	Nenwe	Ugwuomu	WHO/ FMEnv
1	PH		7.2	7.3	7.2	7.1	6.5-8.5
2	Temperature	^{0}C	30.2	30.2	27.8	30.6	23-33
3	Taste	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
4	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable

5	Colour	Mg/L	15	1.5	5.2	23	5-50
6	Electrical conductivity	Mg/L	10^3x0.8	10^3x0.5	10^3x1.9	10^3x2.7	1000uScm
7	Total solids	Mg/L	62.54	52.54	55.16	62.39	500
8	Total dissolve solids	Mg/L	52.05	59.05	56.12	56.57	1000
9	Total suspended solids	Mg/L	10.89	13.8	4.04	1.35	30
10	Chromium	Mg/L	ND	ND	ND	ND	0.10
11	Dissolved oxygen	Mg/L	0.52	0.72	0.13	0.49	5.0
12	Lead	Mg/L	0.002	0.002	NIL	NIL	1.7
13	Copper	Mg/L	0.02	0.02	NIL	NIL	0.5
14	COD	Mg/L	8.16	8.15	8.88	8.19	10
15	BOD	Mg/L	7.04	1.04	3.19	4.24	5
16	Sulphate	Mg/L	136.12	138.12	147.0	77.63	250
17	Nitrates	Mg/L	0.45	0.45	0.07	0.24	10
18	Iron	Mg/L	0.05	0.00	0.00	0.02	0.03
19	E-Coli	MPN/100ml	NIL	NIL	NIL	NIL	0
20	Coliform	MPN/100ml	NIL	NIL	NIL	NIL	10
21	Chloride	Mg/L	95.01	34.01	91.18	68.51	250
22	Sodium	Mg/L	38.11	36.14	46.42	38.43	200
23	Potassium	Mg/L	74.8	14.43	18.84	17.01	<20
24	Calcium	Mg/L	12.0	12.0	8.36	11.34	200
25	Magnesium	Mg/L	5.86	5.30	3.8	3.46	150
26	Phenol	Mg/L	ND	ND	ND	ND	Nil
27	Arsenic	Mg/L	ND	ND	ND	ND	0.015
28	Total Hardness	Mg/l CaCO3	43.42	35.42	38.92	20.08	100
29	Acidity	Mg/l CaCO3	100	100	150	130	200
30	Alkanality	Mg/l CaCO3	70	70	76	60	100
31	Manganese	Mg/L	NIL	NIL	NIL	NIL	0.5
32	Zinc	Mg/L	NIL	NIL	NIL	NIL	1.5
33	Cadmium	Mg/L	ND	ND	ND	ND	0.002
34	Oil & Grease	Mg/L	NIL	NIL	NIL	NIL	10

Source: Field Survey, Nov. 2020

Table 3.8c: Summary Results of Water Analysis in the Communities

S/N	Parameters	Units	Adani	Ako Nike	WHO/ FMENv LIMIT
1	pH		7.2	7.23	6.5-8.5
2	Temperature	^{0}C	30.6	29.3	23-33
3	Taste	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
4	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
5	Colour	Mg/L	1.8	1.5	5-50
6	Electrical conductivity	Mg/L	10^3x0.8	10^3x0.8	1000uScm
7	Total solids	Mg/L	65.54	68.34	500
8	Total dissolve	Mg/L	52.05	54.01	1000

	solids				
9	Total suspended solids	Mg/L	10.89	14.20	30
10	Chromium	Mg/L	ND	ND	0.10
11	Dissolved oxygen	Mg/L	0.58	0.62	5.0
12	Lead	Mg/L	0.002	0.002	1.7
13	Copper	Mg/L	0.02	0.02	0.5
14	COD	Mg/L	8.16	7.16	10
15	BOD	Mg/L	1.04	2.04	5
16	Sulphate	Mg/L	116.12	106.12	250
17	Nitrates	Mg/L	0.60	0.45	10
18	Iron	Mg/L	0.00	0.002	0.03
19	E-Coli	MPN/100ml	NIL	NIL	0
20	Coliform	MPN/100ml	NIL	NIL	10
21	Chloride	Mg/L	38.01	245.01	250
22	Sodium	Mg/L	38.11	45.11	200
23	Potassium	Mg/L	6.48	12.48	<20
24	Calcium	Mg/L	12.0	12.0	200
25	Magnesium	Mg/L	5.86	5.86	150
26	Phenol	Mg/L	ND	ND	Nil
27	Arsenic	Mg/L	ND	ND	0.015
28	Total Hardness	Mg/l CaCO3	43.42	39.42	100
29	Acidity	Mg/l CaCO3	100	125	200
30	Alkanality	Mg/l CaCO3	69	40	100
31	Manganese	Mg/L	NIL	NIL	0.5
32	Zinc	Mg/L	NIL	NIL	1.5
33	Cadmium	Mg/L	ND	ND	0.002
34	Oil & Grease	Mg/L	NIL	NIL	10

Source: Field Survey, Nov. 2020

The result of water samples collected shows that the tested parameters were all within FMEnv acceptable limits except BOD which recorded 10.4, 7.04 and 8.84 at Eha-Amufu, Iwollo and Eha-Alumona respectively as against FMEnv limit of 5; Iron which recorded 0.25,0.35,0.36 and 0.05 at Eha-Amufu, Eha-Alumona, ObollorAfor and Iwollo respectively as against 0.03; Chlorine which recorded 303.01 at Eha-Amufu as against 250 and Potassium which recorded 76.48, 50.08, 74.8 at Eha-Amufu, Eha-Alumona and Iwollo respectively as against <20.

CHAPTER FOUR

4.0 SOCIO-ECONOMIC CHARACTERISTICS AND CONSULTATIONS WITH STAKEHOLDERS

4.1 Socio-Economic Profile of the Population

Consultations were held in communities where the various value chains and segments to be implemented by the APPEALS project are already operational. The criteria for selection of communities were based on the concentration of the value chains and segments in the area. Consultations were held in nine Local Government Areas within the three senatorial zones.

4.1.1 Gender Distribution

The summary of result obtained from the analysis of administered questionnaire revealed that there are more males (63.3%) than females (36.7%) (Figure 4.1).This indicates that men in the area men tend to respond to invitations on agricultural programs by government

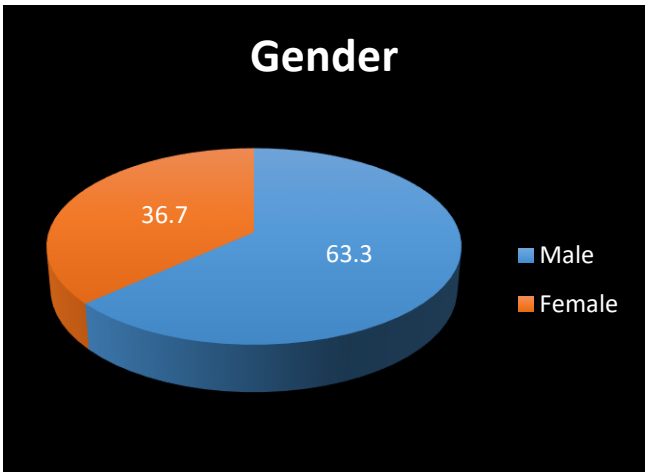

Figure 4.1: Gender Distribution of Respondents
Source: Field Survey, Nov. 2020

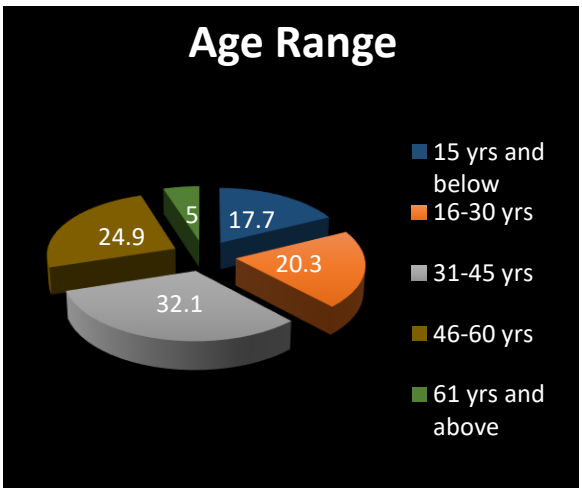

Figure 4.2: Age Distribution
Source: Field Survey, Nov. 2020

4.2.2 Age Range of Respondents

Information obtained from the analysis of results revealed that the age ranges of respondents are 18and below (17.7%), 16-30(20.3%), 31-45 (32.1%), 46-60 (24.9%) and 61 and above (5%) (See Figure 4.2 below).

4.2.3 Marital Status of Respondents

As shown in figure 4.3, the survey data revealed that 48.5% of the respondents were married, 3.6% widows, 47.6% single and 0.3% were widowers.

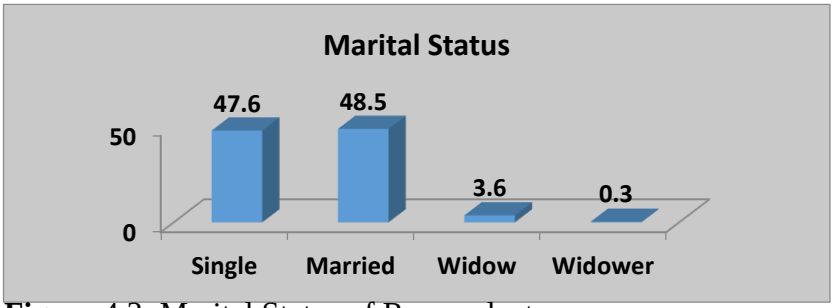

Figure 4.3: Marital Status of Respondents
Source: Field Survey, Nov. 2020

4.2.4 Family Size of the Respondents

The data on the family size of respondents shows that 51.6% of respondents had 6-10persons in their families; 31.5% had1-5 persons, 2.9%had11-15persons while 14% had family size of 16-20 persons (Figure 4.4). The large family sizes prevalent in the study area are consistent with family sizes usually encountered in farming communities in Nigeria.

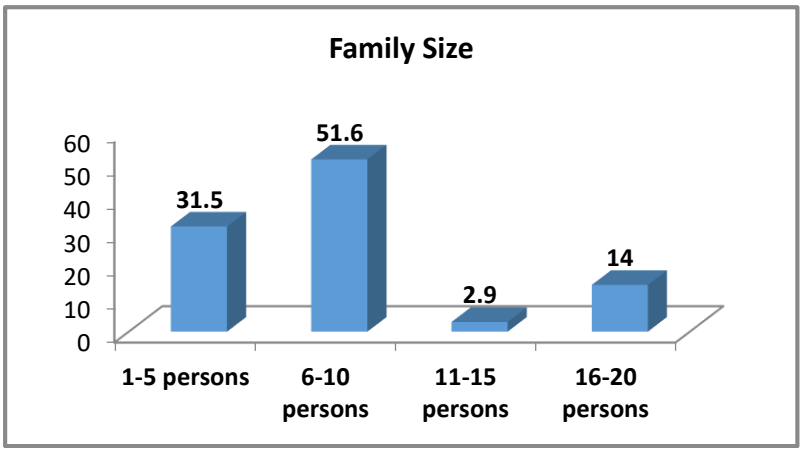

Figure 4.4: Family Size of the Respondents
Source: Field Survey, Nov. 2020

4.2.5 Religion of Respondents

The data revealed that the people were predominantly Christian (99.7%) and a few were involved in traditional practice (0.3%).

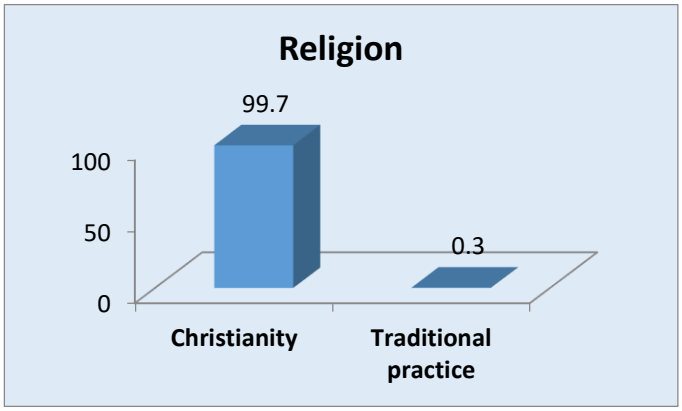

Figure 4.5: Religion of Respondents
Source: Field Survey, Nov. 2020

4.2.6 Educational Qualification

Educational status of respondents shows that primary school certificate holders made up 6.4% of the respondents, while those with secondary school certificate were 60.7%, vocational/technical certificate holders 1.6%, tertiary certificate holders 25.5% and those without any form of education constitute 5.8% (figure 4.6). These results show that majority of the respondents are literate and as such can read and write.

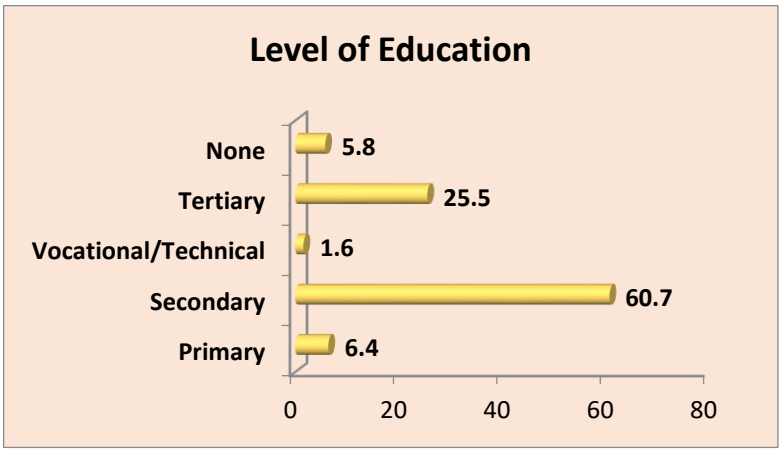

Figure 4.6: Educational qualification of Respondents
Source: Field Survey, Nov. 2020

4.2.7 Occupation and Sources of Livelihood

Figure 4.7 shows the primary occupation of respondents. It revealed that majority 57% and 54.7% of the respondents were crop farmers and animal farmers respectively. Other occupation/ livelihoods were trading (22.4%), Agro processing (22.3%), Students (16.1%) and artisan (11.7%), while 4.9% of the respondents were civil servants, private sectors and other sources of livelihood respectively.

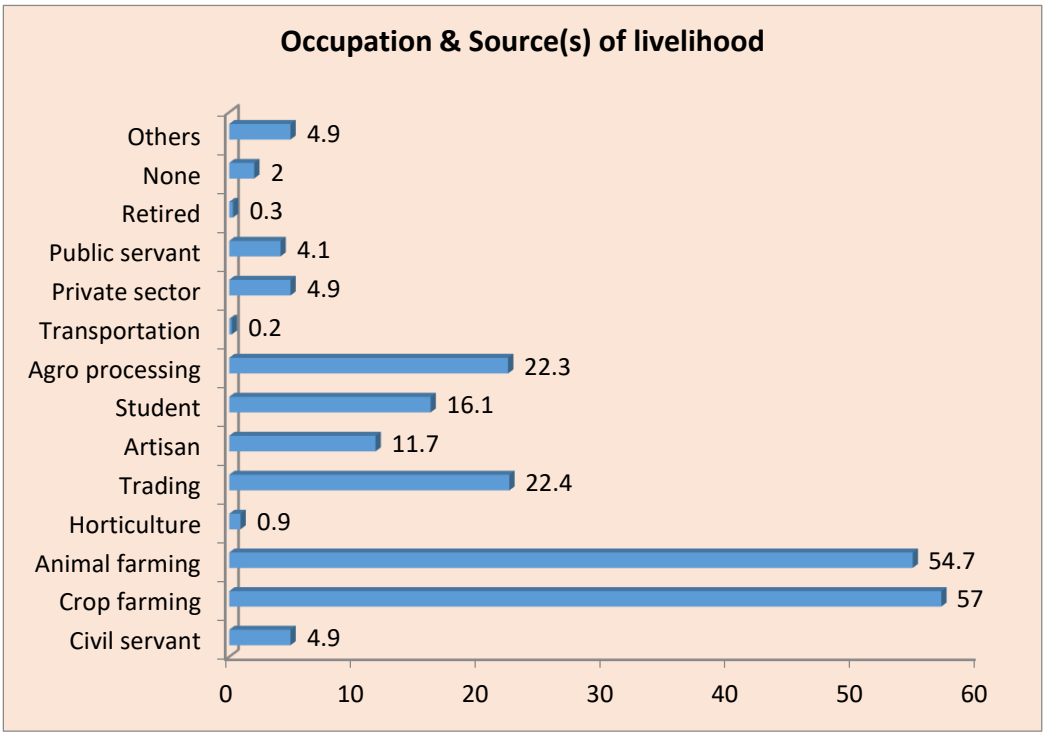

Figure 4.7: Occupation and Sources of Livelihood
Source: Field Survey, Nov. 2020

4.2.8 Monthly Income Status

The income of the respondents as indicated from the survey data shows that 6.8% of the respondents earn below ₦6,000 monthly, 23.9% earn between ₦6,000 and ₦10,000 monthly, 6.5% earn between ₦10,001 and ₦15,000 monthly, 20.4% between ₦15,001 and ₦20,000 monthly, 12.4% earn between ₦20,001 and ₦25,000 monthly, while

22.4% earn above ₦25,000 monthly. About 7.5% of respondents earn no monthly income at all (jobless). These results show that majority of respondents in the communities are gainfully employed (Table 4.8)

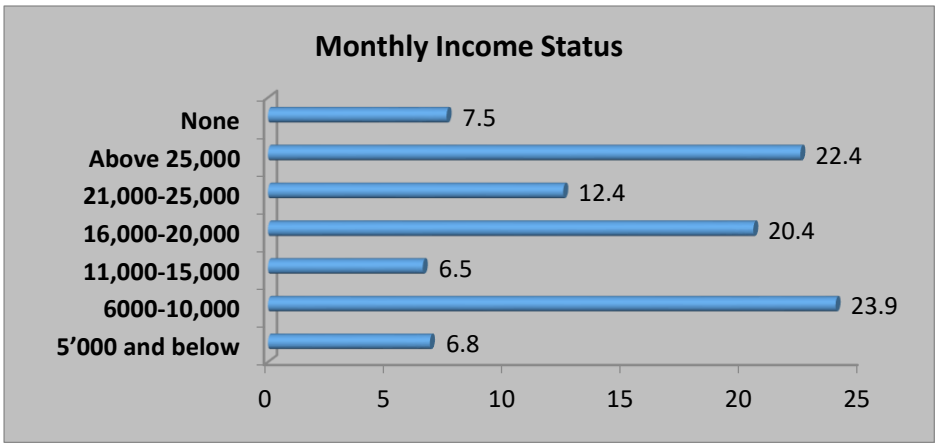

Figure 4.8: Monthly Income Status of Respondents
Source: Field Survey, Nov. 2020

4.2.9 Cultural/Historical Heritage

The study identified the existing cultural and historical heritage in the area. Figure 4.9 shows that stream recorded (45%), shrine (42.8%), forest reserves (16.5%), sacred droves (6.6%) and other community valued landscapes (10%). In addition to their other social functions in the communities, these heritages serve as attractions for recreation and tourism. Stream for instance is source of water for domestic uses but some of them are abode for traditional deities.

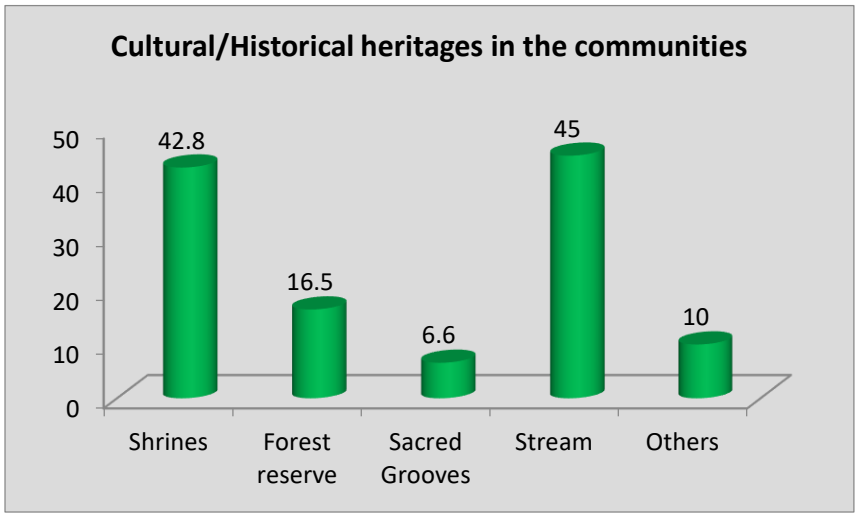

Figure 4.9: Cultural/ Historical Heritage
Source: Field Survey, Nov. 2020

4.3 Public Infrastructure and Social Facilities

4.3.1 Water

Sources of water as revealed by the respondents were rain water 44.9%, stream 51.3%, borehole 34.5%, well 31.7%, water vendor 16.8%, pipe borne 26.1% and spring water 12% (Figure 4.10). The analysis of result shows that the respondents depend on multiple

sources of water supply for their domestic and agricultural purposes. See the list of Public Infrastructures and Social facilities in annexure 3:

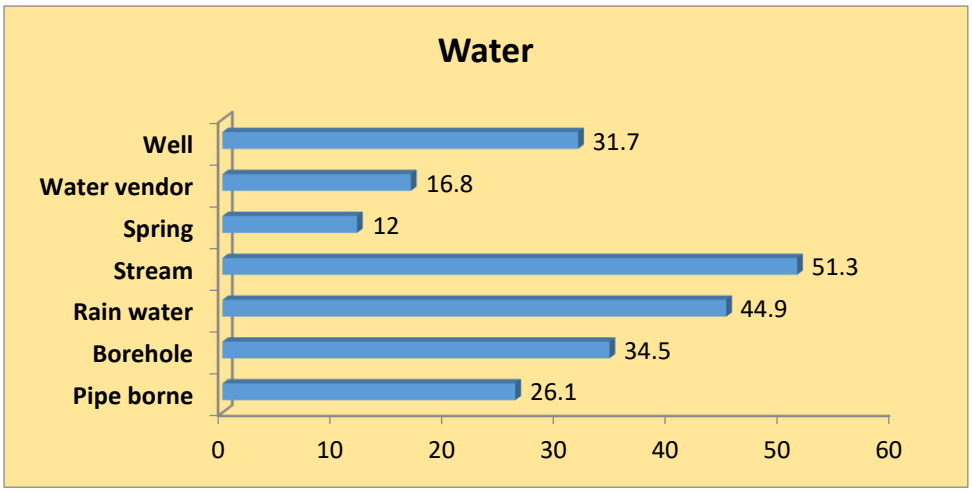

Figure 4.10: Source of Water
Source: Field Survey, Nov. 2020

4.3.2 Energy

The available sources of energy for lighting as revealed by the respondents were generator 62.2%, kerosene lamps 44.1%, public electricity (36.1%), solar energy (9.1%), wick lamp (20.9%) and gas lamp (10.4%) (Figure 4.11). The generator serves as their main source of energy due to irregular power outage in the area.

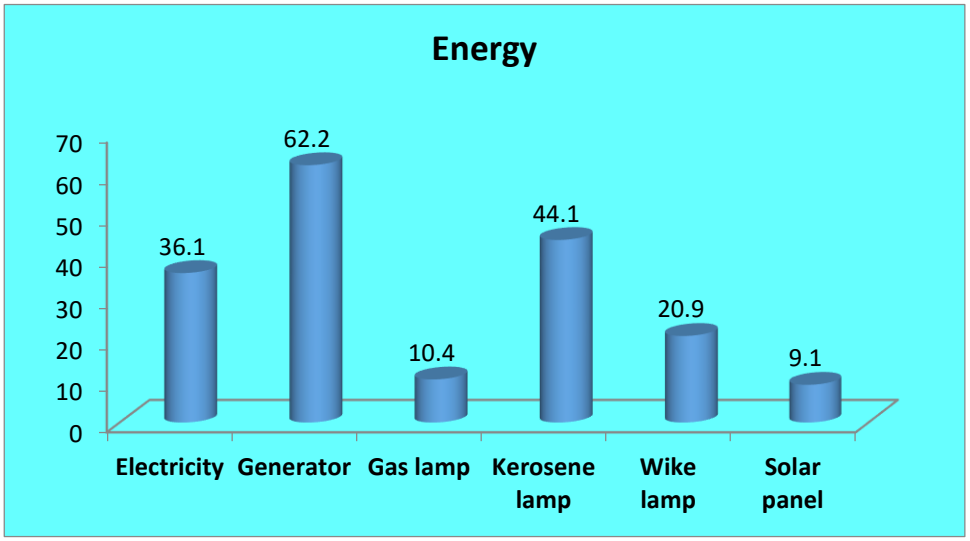

Figure 4.11: Source of Energy
Source: Field Survey, Nov. 2020

4.3.3 Roads

Roads are one of the main infrastructure in modern environment and an indispensable component in the development of countries. The availability of good motorable roads in any community makes movement of farm produce to the market easy. Figure 4.12 shows the available roads in the communities as revealed by the respondents. The survey shows that foot path recorded (43.4%), ungraded earth road (28.6%), tarred/ asphalt (16.5%), earth graded roads (31.5%) and concrete paved roads (5.9%).

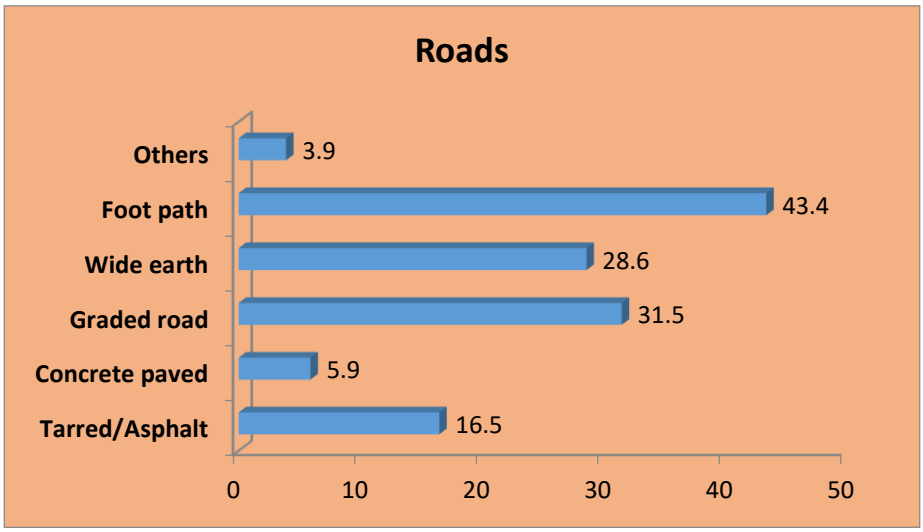

Figure 4.12: Assessment of Rural Road Infrastructure
Source: Field Survey, Nov. 2020

4.3.4 Health Care Facilities

The results of the survey of health facilities show that greater numbers of the respondents have access to the services of public hospital/health centre (57.3%) and maternity (47.7%) in the community to deal with their health issues. While majority of the respondents depend on public health centres in the area a significant proportion of them also use private clinics (51.7%), traditional healing home (28.2%) and patent medicine store (37.1%) to attend to their health challenges.

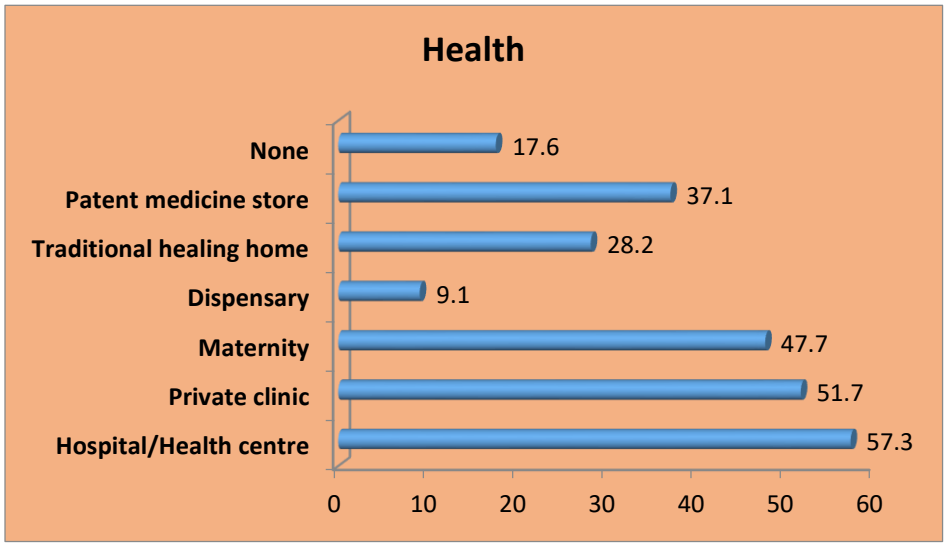

Figure 4.13: Health Facilities
Source: Field Survey, Nov. 2020

4.3.5 Market

The survey revealed that most communities do not have organized market structure where they sell their goods and other farm produce. The respondents averred that

markets in their locality were lock up stalls 29.5%, open market stalls 27.1%, open field village market 17.5% and 1.8% for any other market in the area.

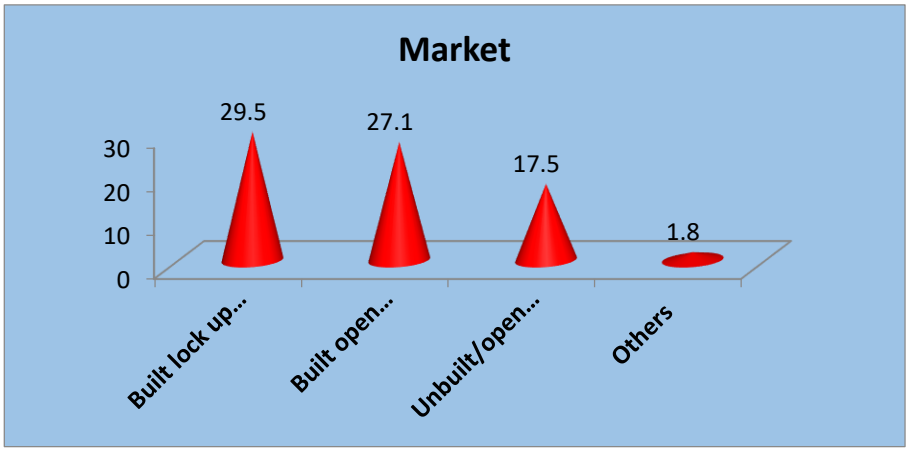

Figure 4.14: Market Facilities
Source: Field Survey, Nov. 2020

4.3.6 Waste Management

The survey results show that 41.6% of the respondents dispose their waste in open dumpsites, 33.6% burn or bury their domestic waste, 26.4% use temporal public dumpsites, 15.2% dump their waste into drainage channels and stream while an insignificant 1.6% recycle their waste. The results show the need to prohibit open dumping of waste in the area in order to reduce environmental nuisance and poor sanitation.

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CHAPTER FIVE

5.0 GENDER BASED VIOLENCE AND GRIEVANCE REDRESS MECHANISM

5.1. Preamble

This chapter presents the forms of Gender based Violence in the project area and the groups of persons affected by GBV as well as possible ways to address gender based violence and the local authorities charged with handling GBV in communities. Grievance handling mechanisms were also addressed.

5.2 Groups Vulnerable to Gender Based Violence

The survey on gender based violence revealed that 18.5% and 2.8% of those who have experienced some form of gender based violence were girls and women respectively (figure 5.1), while 43.7% of the respondents have not suffered from gender violence. The results show that across the communities in the project area, girls are the most vulnerable gender group suffering from gender based violence viz-a-viz sexual abuse, physical abuse, economic deprivation and threats.

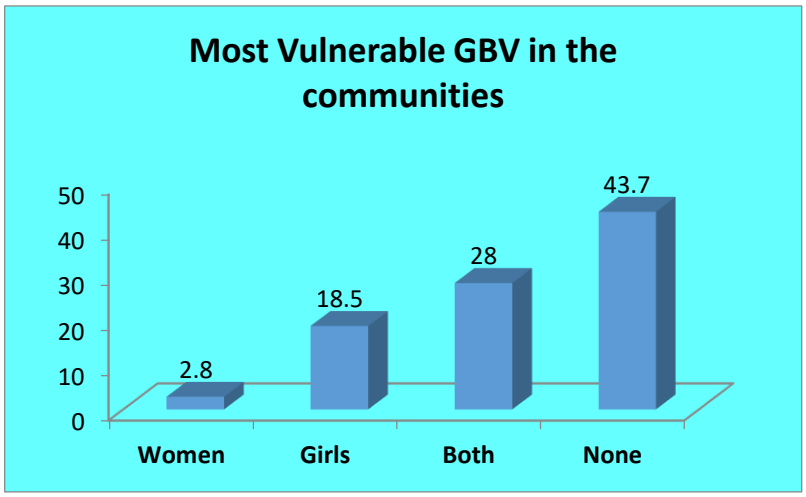

Figure 5.1: Gender Based Violence
Source: Field Survey, Nov. 2020

5.3 Type of Gender Based Violence in the Community

The study revealed respondents opinion on type of GBV in the community. The analysis of result shows that issues related to physical abuse were 17.7%, sexual 20%, economic deprivation 59.2% and threat 22% (figure 5.2). These results clearly underscore the need for massive sensitization of the people in the communities prior the implementation of the APPEALS project.

5.4. Handling Gender Based Violence in the Community

On how the issue of gender based violence could be effectively handled in the community, majority of the respondents believe the Igwe-In-Council and law enforcement agency can adequately handle it. Figure 5.3 shows the frequency distribution of respondents on the means for resolving gender based violence in the area: Igwe in Council 58.8%, village head 47.6%, kindred 29.6% and law enforcement agent 57.8%.

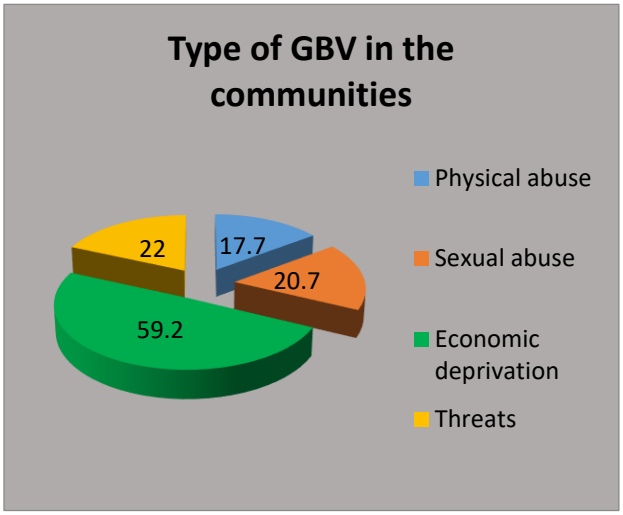

Figure 5.2: Type of GBV in the Communities
Source: Field Survey, Nov. 2020

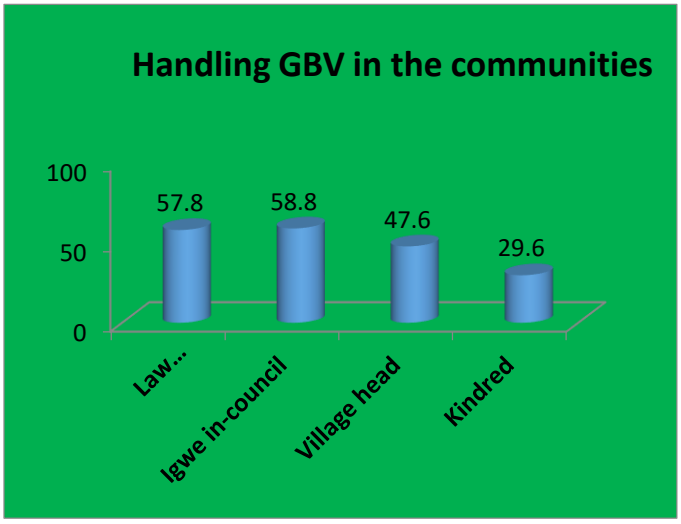

Figure 5.3: Handling GBV in Communities
Source: Field Survey, Nov. 2020

5.5 Project Affected Persons (PAPs)

One key concern of the ESIA is the issue of vulnerability of the project affected persons and how it could be addressed sustainably. The survey results show the elderly/aged are most affected people with 36.8%. Other persons affected were widow/widower (24%), physically challenged (24%), orphans (12.2%), people living with HIV/AIDS 8% and internally displaced persons (3%).

5.6 Hierarchy of Traditional Authorities and Conflict Resolution Mechanism

The hierarchy of authority in the various communities was ascertained during the FGDs with the men and elderly. Consultation with the project affected persons (PAPs) was also held and the key concerns of the PAPs are:

- The odour and nuisance from poultry farms;
- Air pollution from rice processing and its associated impact

5.7 Grievance Redress Mechanism

During the FGDs, the elders explained that conflicts in the community are resolved through dialogue but exceptional cases are reported to the police. They further explained that all conflicts in the community are brought to the Igwe's palace for resolution while land dispute are assigned to the elders. On Gender Based Violence GBV, they opined that it rarely occurs and whenever it occurs it is resolved by the Igwe's cabinet. But when the parties are not satisfied, it will be directed to the government agency charged with such responsibility.

CHAPTER SIX

6.0 ASSESSMENT OF POTENTIAL ADVERSE IMPACTS & ANALYSIS OF ALTERNATIVES

6.1 Preamble

This chapter describes the potential environmental and social impacts that are envisaged due to the interaction between the project components and the environmental components. The method employed for impact identification and evaluation as well as alternative options are presented in this chapter.

6.2 Impact Assessment Methodology

A wide range of methods was used for assessing the potential impacts of the proposed projects activities on the project community and environment. They include reconnaissance survey, field measurements (acquisition of spatial data, In-situ soil/water and air analysis), laboratory tests, public consultation and professional judgment.

The potential impacts are presented in a matrix using a combination of Checklists and Leopold matrix methods identifying **Likelihood of occurrence** and **Severity** of impacts. The classifications of Likelihood of occurrence and Severity of impacts are presented in tables 6.1 and 6.2 respectively. In the table, potential impacts are further classified into **Environmental** or **Social** aspects; **Adverse** and **beneficial**.

Table 6.1: Classification of Likelihood of Occurrence

Likelihood	**Attributes**
Certainly	Impact that will definitely occur
Possible	Impact has chances of occurrence
Unlikely	Impact will hardly occur

Table 6.2: Classification of Severity of Impact

Severity	**Attributes**
Negligible	Impact is insignificant to environmental and social-economy
Significant	Impact is significant to either environmental, social-economy or both
Critical	Impact is in high order

Table 6.3: Impact Ranking Table

Likelihood / **Severity**	Negligence	Significant	Critical
Certainly			
Possible			
Unlikely			

	Impact is certain but negligence
	Impact is possible but negligence
	Impact is unlikely and negligence
	Impact is unlikely and significant
	Impact is possible and significant

	Impact is certain and significant
	Impact is unlikely but critical
	Impact is possible and critical
	Impact is certain and critical

Table 6.4: Envisaged impacts of proposed activities

Envisaged Activities	Potential Impact/Concerns
Agricultural activities (Crop production) that involves development and operation of agricultural fields (Rice)	**A. Environmental**
	Biodiversity • Interference on biodiversity conservation (changes in flora and fauna) • Cultivation of single crop may alter natural vegetation; • Poaching of wildlife
	Water Resources • Alterations of local natural water cycles/ hydrology • Water quality and flow – contamination of water source by fertilizer, herbicides and insecticides • Siltation of water from accumulated soil particles in water
	Soil • Soil pollution due to wastes, fertilizer, herbicides and insecticides • Crop cultivation, continuous growth deplete soil fertility and grown on slope provides little protection from the direct impact of rainfall • Changes in soil nutrient cycles (fertility and carbon storage capacity) • Soil structure and surface layer disruption due to agronomic practices
	Air quality • Degradation due to vehicular movement, mobilization of equipment • Deterioration from burning of biomass of cleared forest and addition of carbon into atmosphere
	Pesticides and Chemical Use • Lethal and sub-lethal impacts on human and other non-target organisms; • 'Pesticide treadmill'- higher doses of pesticides required to control pest populations that develop resistance and elimination of pest predators. • Washed out of soils, and pollute rivers and groundwater • Intake of toxic chemicals by plants, animals and humans • Improper use, contamination by high exposure due to no or poor precautionary measures leading to health impacts
	Waste Management • Agricultural waste, improper disposal of fertiliser and

Envisaged Activities	Potential Impact/Concerns
	chemical containers
	• **SOCIAL**
	Land take • Land acquisition through increase in cultivated land.
	<u>Displacement Maintaining Livelihoods</u> • Increasing demand for lands for farming/ settlements by fringe communities because productive lands not enough or available; • Loss of employment at the end of farming season.
	<u>Cultural Heritage</u> • Clearing of cultural resources • Interference with local cultural identity and heritage
	<u>Social Tension, & conflict</u> • Restriction and outright loss of grazing ground • Social exclusion of women or the vulnerable persons
	<u>Traffic and Transportation</u> • Increase in traffic on the roads • Accident to people and animals
	<u>Public and Occupational health and safety</u> • Inhalation of chemicals and injury due to lack of awareness creation programs on health and safety including chemical handling. • Possible injure or death of workers from farm operations • Influx of people resulting in spread of communicable diseases such as HIV/AIDS and STDs, Pathogenic disease and disease outbreak and Water-Borne and water related Diseases • Psychosocial disorder
Agricultural Activities Animal production (Poultry)	**<u>Biodiversity</u>** • vegetative loss during construction of Pens • loss of habitat and migration of animals • Poaching of wildlife
	<u>Water Resources</u> • Water quality and flow – waste water and drugs will contaminate water source
	<u>Soils</u> • Soils – pollution/contamination due to wastes • Changes in soil nutrient cycles (fertility and carbon storage capacity) • Exposure of soil to erosion
	<u>Air quality</u> • Foul odor arising from droppings
	<u>Noise</u> • Increase in noise level

Envisaged Activities	Potential Impact/Concerns
	Waste • Excessive Animal droppings • Droppings creating environmental nuisance
	Socio economic • Source of livelihood • Availability of poultry meat and eggs
Processing	**Processing** • Pollution of Water • Pollution of environment due to processing with high concentration of organic matter, cyanide and processing chemicals • Solid wastes generation from feathers and intestine • Foul odor from waste • Visual impacts due to unsightly stagnant ponds and ditches • Dust emissions from milling/machine operations • Accident due to improper handling of machine.
	• Noise will disturb residents rest/sleep
Processing (Cashew)	• Fire outbreak and occupational accidents • Possibility of causing respiratory ailment on workers

Source: Field Survey, Nov. 2020

Table 6.5: Potential Impact of Rice Segments

Project Activity	Potential Impact	Impact Classification				Impact Ranking
		Environmental	Social	Adverse	Beneficial	
Rice Production						
Land Take	Acquiring land for rice production may trigger Involuntary resettlement.		×	×		
	They will be loss of access to asset/farmlands		×	×		
Field development	Tractors may scrap organic top soil during clearing	×		×		
	There will be destruction of economic trees and important herbs within the field.	×	×	×		
	Reshaping of the field topography may alter drainage patterns leading to waterlogged or poor water retention in the field	×		×		
	Removal of tree roots will create dishes of loose soils, and may result to erosion.	X		×		
	Field ploughing will lead to excessive release of dust to the air.	X		X		
	There will be loss of habitats to animal species	X		X		
	Loss or disturbance of habitats will lead t migration of animal species.	X		X		
	Deforestation in the rice field will contribute to global warming	X		X		

	Oil and grease drops from the farm machinery will contaminate the soil and water bodies within the community.	×		×		
	Risk of wild animal attack and snake bite		x	X		
	Off cuts of roots and shoots in the field will lead accidents and injuries to field workers.		×	×		
	There shall be poaching of animal and eventual extinctions of some species.	×		×		
	Loosen sediments will be carried by runoff and deposit to rivers and streams which shall lead to river siltation	×		×		
	Lack of adequate PPEs will lead to minor injuries and accidents.		x	X		
	Increases rice output		x		x	
	Generate Employment for locals		×		×	
	Enhanced production of quality rice in Enugu State		×		×	
Planting, growth and harvesting	Applying artificial fertilizer may alter the soil nutrient in the long run.	X		X		
	Use of Herbicides, insecticides will pollute water and air environment	X		X		
	Use of Herbicides, insecticides is injuries to health. Frequent inhaling may cause cancer and failure of bronchitis.		x	X		
	High water retention on the rice field will lead to soil water saturation, swampy environment and may trigger flooding	X		X		
	Flooding in the rice field will produce greenhouse gas nitrous oxide.	X		X		
	Constant water on rice will turn it to swamp and unfit for growing some crops in future	X		X		
	Breaking down of rice waste plants by microbes after harvesting the seed releases large volume of green house gas-Methane	X		X		
	Heaps of waste stems and shafts after harvest will house rodents and snakes	X		X		
	Burning of the waste stems and shafts after harvest will release gaseous emission that deteriorates the atmosphere.	X		X		
	Lack of adequate PPEs will lead to minor injuries and accidents.		x	x		
	Increases rice output		x		x	
	Generate Employment for locals		x		x	
	Enhanced production of quality rice in Enugu State		x		x	
Rice Processing						
Construction and expansion of processing Plants	Land take for sitting processing plants may need to Involuntary resettlement		×	×		
	Loss of access on assets and farmland		×	×		
	There will be loss of economic and un-harvested crops on the land used for sitting processing plants		x	×		
	Deterioration of air quality from release of cement	×		×		

	dusts and toxic fumes during construction of concrete structures					
	Noise and vibration from the use of machineries and motorized equipment will constitute nuisance to the neighbourhood		×	×		
	Soil contamination and loss of soil quality from cement waste water resulting from leakages and/improper handling	×		×		
	Waste generation from cement and concrete works such as cement bags and metal scraps etc.	×		×		
	Contamination of surface and underground water from cement waste water and spillages of oil and other petroleum products through leakages and/improper handling.	×		×		
	Risk of HIV/AIDS and other STDs arising from the interactions amongst the foreign workforce and the host community.		×	×		
	Risk of respiratory and eye related problems from exposures to chemical hazards such as cement dusts and toxic fumes emanating from cement and concrete works		×	×		
	Risk of skin related health problems from physical contacts to cement and concrete		×	×		
	Lack of adequate PPEs will lead to minor injuries and accidents.		x	X		
	Increases rice output		x		x	
	Generate Employment for locals		x		x	
	Enhanced production of quality rice in Enugu State		x		x	
Operational Stage	Fumes from the processing plant and the power generating set shall pollute the air environment, leading to ozone depletion, acid rain, breathing problems etc.	X		×		
	Inadequate ventilation in the processing chamber will cause difficult breathing and failure of bronchitis.		x	X		
	Waste water for plant cooling system shall contaminate Community streams/Rivers	×		×		
	Operation will generate noise pollution and irritation to the neighbourhood		x	X		
	Waste water will cause offensive odour		×	×		
	There will be large waste of rice Husk and other residues	×		×		
	Burning of waste husk will release gaseous emission that deteriorates the atmosphere.	X		X		
	Dust emanating from debris of husk will lead to breathing problems	X	x	×		
	Accidents, Injuries and Occupational hazards may occur due to failure or malfunction of the machineries.		×	×		
	Lack of adequate PPEs will lead to minor injuries		x	X		

	and accidents.					
	Generate Employment for locals		×		×	
	Enhanced production of quality rice in Enugu State		×		×	
	Rice mill will boast the conversion of rice kernel into food varieties.		×		×	
	Agro-processing yard may serve as a contact point between farmers and buyers reducing hitches of marketing		×		×	
	There will be on job skill acquisition by locals working on the mill		×		×	
	Milling factory may triggers off business boom and development to the locality		×		×	
	Presence of Agro-processing plants may motivate youths to be more dedicated to rice farming		×		×	
	It shall boast income farmers directly and indirectly		×		x	
Rice Marketing						
	Dust remnants from husk will cause cough and difficult breathing	X	x	X		
	Risk of infestation by the pest and insect living in rice grains.		x	X		
	Inhaling of chemical preservatives will cause cancer and organ damage		x	X		
	Contact with chemical preservatives will cause skin inflammation		x	x		
	Generation of waste bags that litters the environment	X		X		
	Increases rice availability to households		x		x	
	Generate Employment and livelihoods		x		x	
	Bridge the gap between producers and consumers.		x		x	

Source: Field Survey, Nov. 2020

Table 6.6: Potential Impacts of Poultry segments

Project Activity	Potential Impact	Impact Classification				Impact Ranking
		Environment	Social	Adverse	Beneficial	
Poultry Production						
Building of pens	Land take for sitting chicken pens may need to Involuntary resettlement		×	×		
	Loss of access on assets and farmland		×	×		
	There will be loss of economic and unharvested crops on the land used for sitting pen		x	×		
Chicken Rearing	Waste water from diet will contaminate water bodies.	X		X		
	Odour from chicken droppings will be nuisance to the neighbourhood	X		X		
	Chicken produce large volume of excretes waste which can attract flies	X		X		
	Discomposing of chicken excrete releases Greenhouse Gases particularly methane.	X		X		

	The use of antibiotics to accelerate weight gain and control infections will contribute to the growing public health problems		x	X		
	Chicken and eggs attract dangerous reptiles like snakes and monitor.		x	X		
	Risk of diseases infection to those tending the birds		x	X		
	Lack of adequate PPEs will lead to infection of birds or humans		x	X		
Poultry (meat) Processing						
Construction of cold room and processing Plants	Land take for sitting processing plants may need to Involuntary resettlement		×	×		
	Loss of access on assets and farmland		×	×		
	There will be loss of economic and unharvested crops on the land used for sitting processing and cold room plants		x	×		
	Deterioration of air quality from release of cement dusts and toxic fumes during construction of concrete structures	×		×		
	Noise and vibration from the use of machineries and motorized equipment		×	×		
	Soil contamination and loss of soil quality from cement waste water resulting from leakages and/improper handling	×		×		
	Waste generation from cement and concrete works such as cement bags and metal scraps etc.	×		×		
	Contamination of surface and underground water from cement waste water and spillages of oil and other petroleum products through leakages and/improper handling.	×		×		
	Employment of local labour for construction activities resulting in improved livelihood and welfare		×		×	
	Risk of HIV/AIDS and other STDs arising from the interactions amongst the foreign workforce and the host community.		×	×		
	Risk of respiratory and eye related problems from exposures to chemical hazards such as cement dusts and toxic fumes emanating from cement and concrete works		×	×		
	Risk of skin related health problems from physical contacts to cement and concrete		×	×		
Meat Processing and packaging	There shall be streams of waste from blood, bones, and feathers	X		X		
	Plastic bag packages will contribute to community wastes	X		X		
	Odour release from meat processing will be nuisance to the neighbourhood	X		X		
	Cold rooms use multiple freezers for meat storage, and the chlorofloro-carbon from refrigerator depletes ozone layer.	X		X		
	Meat processing will attract tsetse flies and rodents		x	X		

	which are disease carriers and will potent nuisance to the neighbourhood.					
	Increases quality meat output		x		x	
	Generate Employment for locals		x		x	
	Ensures availability of meat all time		x		x	

Source: Field Survey, Nov. 2020

Table 6.7: Potential Impacts of Cashew Segments

Project Activity	Potential Impact	Impact Classification				Impact Ranking
		Environ	Social	Adverse	Beneficial	
Cashew Production						
Grafting cultivation	Climbing cashew truck for grafting planting will pose risk of falling from heights.		×	×		
	Cashew fruits will attract bees, wasps that usually sting poison to humans. This may be a threat to social existence of the community. High dose of bee poison can lead to blind, death or damage to organ.		×	×		
	Cashew leaves pile up will house rodents and snakes	x	X	X		
	Application dung manure for nourishing of cashew tree will flies and rodents. Flies and rodents are disease carriers and will pose health risk to the neighbourhood.		X	×		
	Cashew is highly competitive plant, and will phase out any other plants within the surrounding; such plants or crops may be beneficial to the communities.	x	×	×		
	Piling up of cashew leaves will trigger wild fire					
	Source of livelihood and employment to the community		X		x	
	Generate Employment for locals		X		x	
	Enhanced production of quality cashew in Enugu State		X		x	
Cashew fruit and seed handling	The fluid of cashew fruit and seed is highly acidic and can be harmful to the eyes and skin. Most often skin inflammation and burn.		X	X		
	Risk of skin cancer from constant contact with cashew fluid.		X	X		
	The fluid of cashew seed is highly flammable and can cause fire outbreak.	x	X	X		
Cashew Processing						
Roasting	Roasting cashew nut produces irritating smell and will be nuisance to the neighbourhood.		X	X		
	Roasting cashew nut releases large amount of smoke to the air contributing in the ozone layer depletion	x		X		

	Cashew nut shell is a natural fuel and can be used for cooking		X		x	
	Cashew nut shell is highly flammable and pose risk of fire outbreak	×	X	×		
	Large waste water is generated from quenching of roasting plant	×		×		
	Roasting of cashew nuts triggers dangerous explosives which can light up buildings and other assets. Roasting poses high health risk to workers as nuts can shut out from the flame to damage one eye or cause skin burn.	×	X	×		
	The neighbourhood will be covered by sooth from cashew roasting plant	×		×		
	Risk of skin related health problems from physical contacts to cashew fluid		X	X		
	Roasting will generate solid wastes and ashes	×		×		
	Employment and livelihood to the locals		×		×	
	Increases cashew output		X		x	
	Enhanced production of quality cashew in Enugu State		×		x	

Source: Field Survey, Nov. 2020

6.3 Assessment of Implementation Options

This section examines the project implementation alternatives considered at the planning stage of the APPEAL Value chain program. The most viable option was adopted looking into merits and demerits of each of the technologies considered. The proposed programs were analyzed based on the most sustainable implementation option and technology for optimal beneficial impact on man and environment. The result of the analysis is given below.

Table 6.8 Technology and Implementation Options

Intervention Options	Strength	Weakness	Remarks
1. No Intervention: This demands that the Projects remains as status quo. In the other words the proposed projects shall not be executed.	• Avoid social disturbance due to intervention	• Farmers rely on the low scale farming system • Increased difficulty of farmers accessing credits • More farm produce spoils due delay lack adequate processing plants. • All seasons farming not applicable • People withdrawn from	The weaknesses outweighed the strengths, hence this option was rejected

		Agriculture to risk and cost due involved	
2.Postpone Intervention This option suggests carrying out the program on a later date outside this schedule.	• Avoid social disturbance due to intervention.	• Cost of intervention increased after delay • More farm produce spoils due to delay in processing and preserving	This option was rejected also as the weakness far outweighed the strengths
3.Intervene Now. This option entails carrying out the program as scheduled.	• Encourages more people to go into Agriculture • Increase farm output • Temporal employment to local youths and artisans • Enhance promptly processing of farm produce • Increased access to market by farmers	• Increase in traffic and social disturbance	The option was adopted as the benefits outweighed the weaknesses

Source: Field Survey, Nov. 2020

Table 6.9: Summary of Significant Positive and Negative Impact

Project	**Significant Potential Impact**			
	Negative Impacts		**Positive Impacts**	
	Environment	**Social**	**Environment**	**Social**
Land Development	•Destruction of economic trees during field development • There shall be shift in the eco-system that may lead to extinction of some organisms • Tractors may scrap the rich top soil during clearing and shaping		*Improved field drainage system *Reduce field ponding	*Land shall be readily available for farmers to grow seed *Increase in yield *increase in income *Attracts more farmers to join the cooperatives
Rice	•Soil contamination from chemical accumulation from fertilizers,	•Noise and disturbance of neighbourhood		• Employment of local labour • Increased accessibility to

	herbicides and pesticides • Deterioration of micro-climatic condition of the project areas due to mass cutting down of vegetation			farmlands • Enhanced conveying of farm produce to market • Increase in farm output
Agro-processing	• Cashew waste shall cause eye sore and may contaminate communities' stream/rivers • Rice husk and other residues shall give huge environmental wastes • Cashew roasting will cause fire outbreak • Odour from processing meat station will cause nuisance to the neighbourhood.	• Noise and disturbance of neighbourhood		• Employment of local labour during construction and operations stages. • Enhanced quality and quantity of rice and cashew production in Enugu State. • Rice mill shall boast the conversion of rice kernel into varieties of food

Source: Field Survey, Nov. 2020

CHAPTER SEVEN

7.0 STAKEHOLDERS CONSULTATION AND ENGAGEMENTS

7.1 Preamble

The meaning, rationale, general principles and summaries of the minutes of meetings held during stakeholder's consultation and engagements required for identifying, articulating and formulating mitigation measures for potential and residual impacts of the various implementation stages for delivering the proposed APPEALS project are presented in this chapter.

7.2 Consultation and Public Participation

Public or community consultation seeks and facilitates the involvement of those potentially affected by or interested in a decision. It is the process by which the people's input on matters affecting them is sought. It is considered as a best practice measure to promote project sustainability by World Bank and other International Development partners. It was introduced by donor agencies in projects because experiences have shown that top-bottom approach to decision making and program development have failed in areas where they were implemented leading to project abandonment, environmental pollution and conflicts (Plates 7.1 – 7.4).

Plates 7.1 – 7.4: Community Consultation Meeting
Source: Field survey, 2020

Public consultation in project development planning and implementation has been rationalized on the need to;

- Sensitize all the stakeholders and actors in project intervention areas on the mandate of the APPEALS project and the need to involve consultants on project implementation.
- Elicit information and knowledge from men, women, individuals in the community, NGOs, CBOs, FBOs and other stakeholders on the project management strategy towards facilitating project implementation and monitoring;
- Identify areas of conflict, risks and concerns of the people about the proposed project and develop possible strategies to deal with them before actual project implementation begins.

Community consultations were held between 3rd to 16th November in Nine Local Government Areas within the three Senatorial zones of Enugu State. Consultations were held with community leaders, men, women, youths, project affected persons, CBOs, FBOs, CIGs, etc at Adani, Eha-Alumona, Eha-Amufu, Nenwe, ObinaguUdi, Nsukka, Iwollo, Obollo-Afor, Ugwuomu Nike and Ako Nike were production segments of the 3 value chains are predominant. Focal Group Discussions FGDs were held for marketing and processing segments at Emene, Udume, 9thMile, Ngwo, Idodo, Nenwe and Enugu. Others are Eha-Amufu and Eha-Alumona.

7.3 Summary of Outcome of Public Consultations

Consultations were properly documented with issues of concern, opinions and contributions summarized in Tables 7.1 to 7.7

Table 7.1: Minutes of Community Consultation at Adani

S/N	ITEMS	DESCRIPTION
1	Projects	ESIA Community Consultation
2	Venue	ATAPS Adani
3	Date	3rd November, 2020
4	Language of Communication	Igbo and English
5	Introduction	The meeting commenced with opening prayer said by a member of the Community. The meeting was chaired by the APPEALS rice facilitator Mr.Uche Obuna. Mr.Uche sensitized the audience on the objectives of APPEALS projects. He pointed out that APPEALS project is designed to help farmers to be more efficient across all value chains and segments. Afterwards, he introduced the ESIA consultant and team and called on the team leader Mr Chime to address the audience. Mr Chime gave an overview of their assignment and the purpose of the community consultation. Which he explained was to sensitize the people on the proposed project as well as the impact (positive and negative) associated with the project. He further emphasized that the aim of the assignment was to enhance the positive impact and minimize or eliminate the negative impact. He mentioned some of the impacts both

		positive and negative associated with the project. He also informed them that he would like to know the impacts of rice production, processing and marketing on the environment and social life of their community. He urged them to cooperate and participate effectively during group discussions and urged them to fill the questionnaire without bias.
6	Consultant's Questions/Concerns	Are there any environmental or social challenges arising from rice production, processing & marketing?
7	Responses to Questions/Concerns	Hon. Ben Idu said that burning of rice husk pollute the air quality of the environment. He also stated that such method of waste disposal could affect rice farmland and other properties especially during dry season.
8	Community Concerns	Mr Eze Christopher said the Farmers are looking forward for more support from the Government. He said that most times Government resources do not get to the farmers. He pleaded for State Government assistance in the area of marketing Adani rice.
9	Closing Remarks	Closing Prayer was said by Hon. Ben Idu

Table 7.2: Minutes of Community Consultation at Nenwe

S/N	ITEMS	DESCRIPTION
1	Project	ESIA Community Consultation
2	Venue	Nenwe
3	Date	4th November, 2020
4	Language of Communication	Igbo and English
5	Introduction	The Chairperson in charge of Farmers Union of Nenwe, Aninri LGA, Mrs Ejim Lovelyn introduced the APPEALS facilitator Mr Uche Obuna, the Consultant Chief Dennis Nebedum and his team
6	Opening Remarks	Mrs Ejim Lovelyn spoke on the essence of farming on the economy of the state. She further explained the importance of Community Consultation. APPEALS Rice facilitator, Mr Uche said that the main objective of the APPEALS project is to help farmers improve production, processing and marketing of rice. He urged the farmers and the Community to co-operate with the Consultants team. The Consultant took note of the number of youths present in the meeting and admonished that more youths should be involved in agriculture. He said that APPEALS is an extension of CADP project and it has three value chains namely: rice, cashew and poultry; and three segments: Production, Processing and marketing. He gave an overview of their assignment and the purpose of the community consultation. Which he explained was to sensitize the people on the proposed project as well as the impact (positive and negative) associated with the project. He further emphasized that the aim of the assignment was to enhance the positive impact and minimize or eliminate the negative impact. He mentioned some of the impacts both positive and negative associated with the project. He also informed them that he

		would like to know the impacts of rice production, processing and marketing on the environment and social life of their community. He urged them to cooperate and participate effectively during group discussions and urged them to fill the questionnaire without bias.
7	Questions/Concerns	Mrs Nweke Gloria asked if the answers will be provided on the Questionnaires individually or as a group? Mrs Juliana Chukwu asked if there are incentives or any form of help that will be given to the Farmers after the ESIA? Mrs Judith asked if it was possible to increase the rate of rice cultivation from once a year to multiple times a year?
8	Responses to Questions/Concerns	Mr Uche in his response informed them that the Government has made provisions that would help farmers improve their whole farming processes. He told the farmers including traders/marketers of farm produce to get ready to receive the incentives by forming cooperative clusters. He further explained the importance of being part of a cooperative as a farmer. Mrs Ejim Lovelyn stressed on the importance of joining a cooperative. She also reminded the farmers to be mindful of sharing their private account details. The Consultant added that there was provision for focal group discussion and that questionnaires are to be answered individually. In response to Mrs Judith's concern, he blamed Climate change for the decrease in rate of rice production but assured her that the Government would rise to the challenge. He also urged the farmers to key into the Agricultural insurance scheme championed by the Government
9	Closing	After the question and answers segment, the participants were asked to seat accordingly: Men, Women and Youths for the focal group discussions and answering of questionnaires.

Table 7.3: Minutes of Community Consultation at Eha-Amufu

S/N	ITEMS	DECRIPTION
1	Projects	ESIA Community Consultation
2	Venue	Eha-Amufu
3	Date	5th November, 2020
4	Language of Communication	Igbo and English
5	Introduction	The opening prayer was done by Prince Dennis Ogbu. The master of the ceremony (MC) introduced the APPEALS Rice facilitator Mr Uche Obuna, the Chairperson of rice processors Mr Prince Uchechukwu, the rice production cluster cooperative chairperson Mr Ogbu Prince and the chairperson rice marketing cluster Miss Olive Ede Eucharia
6	Opening Remarks	Mr Uche Obuna introduced the Consultants team and its leader Mr Chukwuemeka Chime. Mr Uche sensitized the audience on the meaning of APPEALS and how it intends to improve the marketing, processing and production of rice. He stressed that the Consultants presence was part of APPEALS project and urged the audience to cooperate

		with them. Mr Chime gave an overview of their assignment and the purpose of the community consultation which he explained was to sensitize the people on the proposed project as well as the impact (positive and negative) associated with the project. He further emphasized that the aim of the assignment was to enhance the positive impact and minimize or eliminate the negative impact. He mentioned some of the impacts both positive and negative associated with the project. He also informed them that he would like to know the impacts of rice production, processing and marketing on the environment and social life of their community. He urged them to cooperate and participate effectively during group discussions and urged them to fill the questionnaire without bias.
7	Comments and Concerns	Prince Dennis Ogbu said that the Government should help in providing tractors, fertilizers and different rice varieties to help rice production. Mr Ejike Chibuzor spoke on rice processing and its significance to the society. He requested that the Government should help the processors by providing good access roads and more equipment for rice processing. Miss Olive spoke on the need for storage and loan facilities to help the marketers. She also stressed the need for advertisement, de-stoning and packaging equipment. Mr. Ede Samuel said that the major challenges of the rice marketing in EhaAmufu are bad access roads and proper packaging. Mr James Ohia said that machineries for de-husking, shaft, de-stoning, colour sorting and size sorting are needed. He also added that good rice species and steady power supply are needed to enhance productivity
8	Responses to Comments and Concerns	Mr Uche in response to the Concerns raised, urged them to join and remain in a known cooperative. While stressing the need to be in a cooperative he said that the Government incentive can only be attracted where there is proper organisation. He told the farmers that their concerns are part of the Government and APPEALS programme and that all parties should cooperate to achieve these objectives.

Table 7.4: Minutes of Community Consultation at Ninth Mile

S/N	ITEMS	DESCRIPTION
1	Project	ESIA Community Consultation
2	Venue	Ninth Mile
3	Date	6th November, 2020
4	Language of Communication	Igbo and English
5	Introduction	The APPEALS facilitator Mrs Mercy Ogbodu introduced the consultant's team and their team leader Mr Chime Chukwuemeka.
6	Opening	The Chairperson of the Cashew marketing cluster in his

	Remarks	opening remarks welcomed the Facilitator and the consultant's team and spoke about the economic value of cashew. Mr Chime gave an overview of their assignment and the purpose of the community consultation. Which he explained was to sensitize the people on the proposed project as well as the impact (positive and negative) associated with the project. He further emphasized that the aim of the assignment was to enhance the positive impact and minimize or eliminate the negative impact. He mentioned some of the impacts both positive and negative associated with the project. He also informed them that he would like to know the impacts of cashew production, processing and marketing on the environment and social life of their community. He urged them to cooperate and participate effectively during group discussions and urged them to fill the questionnaire without bias.
7	Comments and Concerns	The marketers asked for access to a larger market and storage facilities such as warehouses which will improve cashew sales in the area. They also complained of multiple taxations by different Government Agencies which affects Cashew Marketing. They also added that with proper management that Cashew marketing could improve the revenue generated in the State.

Table 7.5: Community Consultation at Iwollo Oghe Ezeagu

S/N	ITEMS	DESCRIPTION
1	Project	ESIA Community Consultation
2	Venue	Iwollo Oghe
3	Date	10th November, 2020
4	Language of Communication	Igbo and English
5	Introduction	The APPEALS facilitator, Mrs Ogbodu Mercy introduced the Consultant's team leader Mr Chime Chukwuemeka. Mr Chime gave an overview of their assignment and the purpose of the community consultation. Which he explained was to sensitize the people on the proposed project as well as the impact (positive and negative) associated with the project. He further emphasized that the aim of the assignment was to enhance the positive impact and minimize or eliminate the negative impact. He mentioned some of the impacts both positive and negative associated with the project. He also informed them that he would like to know the impacts of cashew production, processing and marketing on the environment and social life of their community. He urged them to cooperate and participate effectively during group discussions and urged them to fill the questionnaire without bias. He also informed them that he would like to find out challenges, risks and hindrances encountered during Cashew production and how to improve on them.

6	Comments & Concerns	The farmers complained about the lack of support from the Government. They said the Government previously promised them support but they are yet to receive any. They also mentioned that they get little or no gain from cashew because of poor marketing. They said financial assistance is needed to enable them.
7	Responses to Comments & Concerns	The facilitator advised them to be patient. She also told them that the best way to attract the Government was to form Cashew based cooperative and clusters. She explained that forming clusters will even bring them closer to International market.

Table 7.6: Community Consultation at Ugwuomu Nike

S/N	ITEMS	DESCRIPTION
1	Project	ESIA Community Consultation
2	Venue	Ugwuomu Nike
3	Date	9th November,2020
4	Language of Communication	Igbo and English
5	Introduction	The APPEALS facilitator introduced the Consultants team and its team leader Mr Chukwuemeka Chime. Mr Chime gave an overview of their assignment and the purpose of the community consultation. Which he explained was to sensitize the people on the proposed project as well as the impact (positive and negative) associated with the project. He further emphasized that the aim of the assignment was to enhance the positive impact and minimize or eliminate the negative impact. He mentioned some of the impacts both positive and negative associated with the project. He also informed them that he would like to know the impacts of poultry production, processing and marketing on the environment and social life of their community. He urged them to cooperate and participate effectively during group discussions and urged them to fill the questionnaire without bias.

6	Concerns & Comments	The Community stated the following as Impacts of Poultry production on their area: Pollution of surface water. The poultry excreta attract disease vectors such as housefly and mosquitoes. Extortion by groups claiming to be government agencies. The community and farmers suggested the following as mitigation measures for negative impacts: Pipe borne water should be provided Government should provide good healthcare facility and good access roads. Financial assistance to the farmers to improve their facilities. Enlightening the farmers on global best practices in poultry production.
7	Responses to Concern & comment	The APPEALS facilitator assured the farmers and the Community that the Government will take care of their needs. He advised them to register and become members of Agriculture based cooperative clusters.

Table 7.7: Community Consultation at Nsukka

S/N	ITEMS	DESCRIPTION
1	Project	ESIA Community Consultation
2	Venue	Port Harcourt, Ngwuru Nsukka
3	Date	11th November,2020
4	Language of Communication	Igbo and English
5	Introduction	The APPEALS facilitator Dr Ossai explained that the Consultant's team visit was to assess the impacts of Poultry Production on the community. Mr Chime gave an overview of their assignment and the purpose of the community consultation. Which he explained was to sensitize the people on the proposed project as well as the impact (positive and negative) associated with the project. He further emphasized that the aim of the assignment was to enhance the positive impact and minimize or eliminate the negative impact. He mentioned some of the impacts both positive and negative associated with the project. He also informed them that he would like to know the impacts of poultry production, processing and marketing on the environment and social life of their community. He urged them to cooperate and participate effectively during group discussions and urged them to fill the questionnaire without bias.
6	Consultants' Question	What are the Impacts of Poultry productions? What mitigation measures should be taken/How can the Government help to improve the current state of poultry production?
7	Comments &	The Community members stated the following as impacts

	Concerns	of poultry production on them: Most the community members are crop farmers therefore, poultry droppings serve as manure in their farms The odour from the poultry pollutes the air. The poultry farms employ community members. The Community and Farmers suggested the following as mitigation measures: Provision of funds so the Farmers can improve their poultry facilities. Construction of water supply facilities in the Community. Use of improved battery cage for poultry and other mechanized approach Construction of access roads through the Community Availability of feed for poultry production

Source: Field Survey Nov. 2020

CHAPTER EIGHT

8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 Preamble

Though appropriate measures were adopted for the implementation of APPEALS Projects to mitigate issues of excessive disturbance on people and environment and abandoned projects; projects of these kinds often not function optimally due to numbers of factors. To avoid the occurrence of such militating factors, ESMP must work to correct the following:

- Poor sensitization of farmers on APPEALS Projects/programs -Inadequate information on the land to be acquired
- Lack of transparency on selection of beneficiaries: the process of selecting beneficiaries should be transparent enough to avoid loss of confident on the program by farmers.
- Failure in completion of projects - incomplete projects do not offer required end use of projects and objectives.
- Inappropriate siting of farms and processing plants –errors in installation may lead to communal crises or unrest
- Non training/capacity building to processing plant operators -may lead to early damage of processing plants or accidents.
- Non availability of lands and agro-input for willing farmers -the process of allocating land and input should be transparent enough to avoid loss of confident on the program by farmers, and
- Poor supervision of general implementations works on projects.

8.2 Objectives and Components of the ESMP

The Environmental and Social Management Plan (ESMP) is a tool that provides the means for continuous assessment of impacts and management framework for implementation of mitigation, monitoring, inter-agency co-operation and capacity

development activities. In addition to this function, the ESMP ensures compliance with stationary requirements through regular updating and periodic reviews.

In order to deliver best results, the following objectives shall be pursued by the ESMP;

a. To adopt appropriate measures for the implementation of land development for crop production, planting, rearing of animals and agro-processing;
b. To apply proper techniques for implementation of mitigation measures;
c. To promote effective integration of all physical and biological control measures;
d. To promote environmental management awareness among project contractors, consultants and monitoring staff;
e. To mainstream social and livelihood issues into all project implementation activities; and
f. To provide standards for overall planning, operation, monitoring, audit and review activities.

The ESMP objectives are to be achieved through the following components;

- Selection of mitigation measures;
- Institutional arrangement for implementation of the ESMP;
- Implementation of mitigation measures;
- Waste management guidelines and procedures;
- Monitoring program and responsibilities.

8.3 Institutional Arrangements for Implementation of ESMP

Poor management of Agro-Projects in Nigeria is often a result of lack of participation of statutory agencies in the actual implementation of mitigation measures by project contractors. To guarantee effective implementation and monitoring activities, the participating agencies should be few while the responsibilities for the monitoring tasks are clearly specified and assigned.

Four agencies would have responsibilities for the implementation of the ESMP. The APPEALS Enugu State Programme Management Unit (SPMU) shall have overall project co-ordination and supervision. The contractors companies shall have full responsibility for implementation of all development and inputs activities working with site manager(s), agricultural personnel(s), engineer(s) and environmental safeguard officer(s). The site committee comprising members drawn from local traditional council, religious bodies, community stakeholders; NGOs/CBOs and Government interagency committee (made up of members drawn from the Enugu State Ministry of Agriculture, Environment and other MDAs) shall have responsibilities for external monitoring, evaluation and audit of all implementation and maintenance activities as summarized in **Table 8.1** while monitoring roles and institutional responsibilities for implementation of the value chains are given in **Tables 8.2, 8.3** and **8.4**

Table 8.1: Roles and Responsibilities for Implementation of the ESMP

S/N	Category	Role and Responsibilities
1	APPEALS/FPMU/ Enugu SPMU	Implementing authority, has the mandate to: • Co-ordinate all policies, programmes and actions of all projects sites across the state • Ensure the smooth and efficient implementation of the project's various technical and ESMP activities • Compile and prepare periodic environmental reports for submission to FMEnv.

		• Assess implementation activities • Recommend additional measures for strengthening the management framework and implementation performance • Responsible for the final review and clearance of the ESMP;
2	Contractor/Service Providers/SPMU	• Implement all proposed works and installations • Ensure land allocation activities are conducted in accordance with relevant regulations • Minimize environmental degradation due to the project • Provide adequate on-site waste collection bins, ensure proper waste disposal, no litter and not to create environmental nuisance • Comply with the specifications for implementing the proposed projects including HSE issues • Provide inputs into the regular environmental report to be prepared by ESO; • Provide oversight function during construction and de-commissioning to ensure adherence to good practice.
3	Facilitators/ESO	• Comply with the specifications for implementing the proposed projects, including health, safety and Environment (HSE) issues • Promote environmental awareness in project area • Assist and liaise with other stakeholders to ensure proper siting and provision of waste disposal sites and measures. • Ensure community participation by mobilizing, sensitizing community members • Conducting investigators alongside government groups to evolve and devise sustainable environmental strategies and rehabilitation techniques. • Identify issues that could derail the project • Support project impacts and mitigation measures, awareness campaigns
4	Government Interagency Committee/FPMU/ ESO	• Site assessment and monitoring of intervention works • Lead role to ensure adherence to this ESMP and applicable standards regulations environmental and social liability investigations, monitoring and evaluation process and criteria • Assessment and monitoring of the health status of staff and workers on site through periodic checks • Monitor performance of medical Kits/First Aid equipment, other medical facilities • Compliance overseer at State level, on matters of Land Acquisition and compensation and other resettlement issues • Come in as and when relevant areas or resources under their jurisdiction or management are likely to be affected by or implicated projects such as utilities • Monitor compliance of health, safety and Environment (HSE) issues

Source: Field Survey, Nov. 2020

Table 8.2: Mitigation Measures – Rice

PROJECT ACTIVITY	POTENTIAL IMPACT	MITIGATION MEASURES	MONITORING INDICATORS	FREQUENCY	RESPONSIBILITY FOR IMPLEMENTATION /MONITORING.	COST (₦)
Rice Production						
Land Take	Acquiring land for rice production may trigger Involuntary resettlement.	Engage on community consultations Develop compensation plan for lost/displaced assets	No. of grievances received	Monthly	CIGs, co-operatives, SPMU	111,200.00
	Loss of access to asset/farmlands	Engage on community consultations Create alternative route to assets and farm land.	No. of grievances received	Monthly	CIGs, Co- operatives, SPMU	113.000.00
Field development	Tractors may scrap organic top soil during clearing	Field Clearing by farm machineries should be thoroughly monitored to avoid excessive topsoil cut. No burning of vegetation after clearing should be maintained.	Poor yield	Annually	Contractor, SPMU, site committee	150,000.00
	There will be destruction of economic trees and important herbs within the field.	Field Clearing by farm machineries should be thoroughly monitored to avoid excessive topsoil cut. No burning of vegetation after clearing should be maintained.	Presence or extinct of rare or native vegetation	Seasonal	Contractor, SPMU, site committee	121,200.00
	Reshaping of the field	Proper on-site supervision	Presence of	Daily	Contractor, SPMU, site	100,000.00

	topography may alter drainage patterns leading to waterlogged or poor water retention in the field	during work	Waterlogged. Poor/increase in yield.	throughout the period of clearing	committee	
	Removal of tree roots will create dishes of loose soils, and may result to erosion.	Grown trees should not be unnecessarily cut down during site clearance and re-vegetation of some protective and valuable trees/grasses should be encouraged. Examples are trees and grasses that have high resistance to erosion and those that have medicinal and economic values	Presence of sheet erosions	Daily throughout the period of clearing	Contractor, SPMU, site committee	141,000.00
	Field ploughing will lead to excessive release of dust to the air.	Wetting of field during field clearing, and workers provided eye shields and nose masks	Noise level and public complaints about noise dust nuisances.	Daily	Site Committee, Govt Committee/ESO	100,000.00
	There will be loss of habitats to animal species	Conduct awareness on conservation of plant and animal species to farmers/communities	Presence or extinct of rare or native vegetation and wildlife	Monthly	Contractor, SPMU, site committee	117,200.00
	Loss or disturbance of habitats will lead t migration of animal species.	Conduct awareness on conservation of wildlife to farmers/communities	Presence or extinct of rare or native vegetation and wildlife	Monthly	Contractor, SPMU, site committee	121,300.00
	Deforestation in the rice field will contribute to global warming	Re-vegetation of some protective and valuable trees/grasses should be	No. of tress cut down	Quarterly	SPMU Contractor, MoH, MoE	112,180.00

		encouraged.				
	There may be Disturbance of National Parks and protected areas	Protect reserved areas in the community	Community complaint	Quarterly	SPMU Contractor, MoH, MoE	91,000.00
	Oil and grease drops from the farm machinery will contaminate the soil and water bodies within the community.	Carry out periodic pre-mob of machinery	Change in physic-chemical characteristics of water - Temp., pH, Turbidity, Nutrients (sulphate, nitrate, etc.), Heavy metals (Fe, Cu, Pb, etc.)	Daily	Site Committee, Govt Committee/ESO	106,000.00
	Off cuts of roots and shoots in the field will lead to accidents to field workers.	Cord off potential risk areas with caution tape	Numbers of accidents	Weekly	Site Committee, GovtCommittee/ESO	139,680.00
	There shall be poaching of animal and eventual extinctions of some species.	Place visible warning sign that disallowed poaching. Conduct awareness on conservation of wildlife to farmers/communities	Extinction of indigenous wild animals	Monthly	Contractor, SPMU, site committee	100,000.00
	Loosen sediments will be carried by runoff and deposit to rivers and streams which shall lead to river siltation	Carry out earthworks operations such that surfaces have mixed drainage patterns to control run-off and prevent sediment transportation	Poor water quality. change in physical characteristics of water	Weekly	Site Committee, Govt Committee/ESO	100,000.00
	Women, youths, widows work in the fields on unfair contract employments	Improve terms of employment of the vulnerable and other community members to	Poor wages	Monthly	Contractor, SPMU	100,000.00

		include pay off fee and insurance where necessary.				
	Lack of adequate PPEs will lead to minor injuries and accidents.	Provide appropriate PPEs for workers. Inspect that workers are wearing PPEs and correctly. Maintain principle of No PPEs No work.	Cases of accidents and injuries	Weekly	Contractor, SPMU	110,000.0
Planting, growth and harvesting	Applying artificial fertilizer may alter the soil nutrient in the long run.	Maintain use of organic manure	Crop yield	Annually	Contractor, SPMU, site committee	120,000.00
	Use of Herbicides will pollute water and air environment	Increase the use of manual weeding to avoid soil contamination by chemical reactants.	No of workers experiencing irritation of eye and nose	Monthly	Contractor, SPMU, site committee	135,000.00
	Flooding in the rice field will produce greenhouse gas nitrous oxide.	Maintain same level of water in the field. Fluctuations increase the chance of release of greenhouse gas.	Presence of NO	Monthly	Contractor, SPMU	130,000.00
	Constant water on rice will turn it to swamp and unfit for growing some crops in future	Drain water off after harvesting Use organic manure to increase infiltration	Crop yield	Annually	Contractor, SPMU	110,000
	Breaking down of rice vegetation waste by microbes releases large volume of green house gas-Methane	Discourage lumping of vegetation waste into heaps. Spread thoroughly within the field to reduce large point source.	Presence of NH4	Monthly	Contractor, SPMU	150,000.00
	Heaps of rice stems and shafts after harvest will	Spread stems and shafts evenly on the field	Presence of rodents or snakes	Annually	Contractor, SPMU, site committee	125,000.00

	house rodents and snakes	Take rice waste to other crop farms to decompose to organic manure				
	Burning of the waste stems and shafts after harvest will release gaseous emission that deteriorates the atmosphere.	Spread stems and shafts evenly on the field Take rice waste to other crop farms to decompose to organic manure	Cases of burn of rice wastes	Annually	Contractor, SPMU, site committee	150,000.00
	Lack of adequate PPEs will lead to minor injuries and accidents.	Provide appropriate PPEs for workers. Inspect that workers are wearing PPEs and correctly. Maintain principle of No PPEs No work.	Cases of accidents and injuries	Weekly	Contractor, SPMU, site committee	110,000.00
						Sub Total = 2,850,760.00
Rice Processing						
Construction of Plants	Land take for sitting processing plants may need to Involuntary resettlement	Engage on community consultations Develop compensation plan for lost/displaced assets	No. of grievances received	Monthly	Contractor, SPMU	320,000.00
	Loss of access on assets and farmland	Engage on community consultations Create alternative route to assets and farm land.	No. of grievances received	Monthly	Contractor, SPMU	171,000.00
	There will be loss of economic trees and unharvested crops on the land used for sitting processing plants	Compensate loss of farm produce	No. of grievances received	Annually	Contractor, SPMU	125,000.00

	Deterioration of air quality from release of cement dusts and toxic fumes during construction of concrete structures	provided eye shields and nose masks to workers	Rise of respiratory related problems	Daily	Govt Committee/ESO	100,000.00
	Noise and vibration from the use of machineries and motorized equipment	Selection of site farther away from community settlement should be maintained. Provided ear mufflers to workers	Noise level and public complaints about noise dust nuisances.	Daily	Govt Committee/ESO	150,000.00
	Soil contamination and loss of soil quality from cement waste water resulting from leakages and/improper handling	Create bund wall to reduce spills overland	Heavy metals in soil, crop productivity	Weekly	Govt Committee/ESO	546,000.00
	Waste generation from cement and concrete works such as cement bags and metal scraps etc.	Develop procedures for waste disposal and ensure appropriate storage of waste to minimize risk of pollution.	Presence of flies and rodents	Weekly	Govt Committee/ESO	165,000.00
	Contamination of surface and underground water from cement waste water and spillages of oil and other petroleum products through leakages and/improper handling.	Create bund wall to reduce spills overland	Change in physic-chemical characteristics of water - Temp., pH, Turbidity, Nutrients (sulphate, nitrate, etc.), Heavy metals (Fe, Cu, Pb, etc.)	Daily	Govt Committee/ESO	150,000.00
	Risk of HIV/AIDS and	Conduct sensitization on	Common/prevale	Weekly	GovernmentCommittee	120,000.00

	other STDs arising from the interactions amongst the foreign workforce(if any) and the host community.	STD to local farmers and workers	nt diseases in the host communities		/ESO	
	Risk of respiratory and eye related problems from exposures to chemical hazards such as cement dusts and toxic fumes emanating from cement and concrete works	provided eye shields and nose masks to workers	Rise of respiratory and eye related problems	Daily	Govt Committee/ESO	150,000.00
	Risk of skin related health problems from physical contacts to cement and concrete	Provide suitable personal protective equipment to workers in cement section	No. of workers having skin rashes	Daily	Govt Committee/ESO	185,000.00
	Lack of adequate PPEs will lead to minor injuries and accidents.	Provide appropriate PPEs for workers. Inspect that workers are wearing PPEs and correctly. Maintain principle of No PPEs No work.	Cases of accidents and injuries	Weekly	Contractor, SPMU	110,000
Operational Stage	Smoke from the processing plant and the power generating set shall pollute the air environment, leading to ozone depletion, acid rain, breathing problems etc.	Work towards using renewable energy system. Such as in a plant powered by solar or wind energy	Presence of sooths on roofs	Monthly	Contractor, SPMU	165,000.00
	Inadequate ventilation in the processing chamber will cause to difficulty breathing	Install industrial fans within the processing unit. Create enough window	Cases of difficult breathing	Monthly	Contractor, SPMU	127,000.00

	and failure of bronchitis.	openings to circulate air.				
	Waste water for plant cooling system shall contaminate Community streams/Rivers	Liquid waste should be retaining in waste pond, treat biologically before disposing off.	Change in physic-chemical characteristics of water- Temp, pH, Turbidity, Nutrients (sulphate, nitrate, etc.), Heavy metals (Fe, Cu, Pb, etc.)	Weekly	Contractor, SPMU, site committee	136,000.00
	Processing operation will generate noise pollution and irritation to the neighbourhood	Locate processing plants farther away from the communities. Provide ear mufflers to workers and neighbourhood alike.	No of complaints	Monthly	Contractor, SPMU, site committee	140,000.00
	Waste water shall cause offensive odour	Liquid waste should be retaining in waste pond, treat biologically before disposing off.	No. of complaints	Daily	Site Committee, Govt Committee/ESO	120,000.00
	There will be large waste of rice Husk and other residues	Mark out a portion of land to dispose husk. It can be supplied to farm lands for manure	Extent of land area covered	Weekly	Site Committee, Govt Committee/ESO	150,000.00
	There will dust emanating from debris of husk and shall lead to breathing problems	Provide suitable personal protective equipment to workers in milling section	Rise in respiratory related problems	Daily	Site Committee, Govt Committee/ESO	571,000.00
	Accidents, Injuries and Occupational hazards may occur	Place visible warning signs on sharp objects. Conduct regular reorientation on the	Numbers of accidents	Daily	Site Committee, Govt Committee/ESO	200,880.00

		risks of machine use				
Sub Total= 3,901,880.00						
Rice Marketing						
	Dust remnants from husk will cause cough and difficult breathing	Ensure the use of nose mask	Cases of difficulty breathing	Monthly	Contractor, SPMU, site committee	166,000.00
	Risk of infestation by the pest and insect living in rice grains.	Wear protective clothes	Cases of skin infection	Monthly	Contractor, SPMU, site committee	124,000.00
	Inhaling of chemical preservatives will cause cancer and organ damage	Ensure that nose masks are used while in the store house	Cases of difficulty breathing	Monthly	Contractor, SPMU, site committee	135,000.00
	Contact with chemical preservatives will cause skin inflammation	Wear protective clothes and booths	Cases of skin infection	Monthly	Contractor, SPMU, site committee	120,000.00
	Generation of waste bags that litters the environment	Each store must have a waste bin Ensure wastes are bagged before disposal into central waste bin	Presence of rodents	Monthly	Contractor, SPMU, site committee	301,000.00
						Sub-Total =846,000.00

Source: Field Survey, Nov. 2020

Table 8.3: Mitigation Measures– Poultry

PROJECT ACTIVITY	POTENTIAL IMPACT	MITIGATION	MONITORING INDICATORS	FREQUENCY	RESPONSIBILITY FOR IMPLEMENTATION /MONITORING.	COST (₦)
Poultry Production						
Building of Pens	Acquiring land for building of pens may trigger Involuntary resettlement.	Engage on community consultations Develop compensation plan for lost/displaced assets	No. of grievances received	Monthly	Contractor, SPMU, site committee	100,200.00
	There will be loss of access to asset/farmlands	Engage on community consultations Create alternative route to assets and farm land.	No. of grievances received	Monthly	Contractor, SPMU, site committee	158,000
	There will be loss of economic and unharvested crops on the land used for sitting pen	Compensate loss of farm produce	No. of grievances received	Annually	Contractor, SPMU, site committee	150,000.00
Chicken Rearing	Waste water from diet will contaminate water bodies.	Liquid waste should be retaining in waste pond, treat biologically before disposing off.	Change in physic-chemical characteristics of water - Temp., pH, Turbidity, Nutrients (sulphate, nitrate, etc.), Heavy metals	Daily	Site Committee, Govt Committee/ESO	120,800.00

			(Fe, Cu, Pb, etc.)			
	Odour from chicken farm will be nuisance to the neighbourhood	Farmers should use driers to manage odour of animal droppings and adhere to practices recommended for them during trainings and seminars.	No. of complaints	Weekly	Site Committee, Govt Committee/ESO	110,000.00
	Chicken produce large volume of excretes waste	Develop procedures for waste disposal and ensure appropriate storage of waste to minimize risk of pollution. Waste can be supplied to required farmers as soon as they are properly bagged to minimize waste accumulation.	Presence of flies	Weekly	Site Committee, Govt Committee/ESO	141,000.00
	Discomposing of chicken excrete releases green house gas methane.	Use of drier will minimize release gases due to decomposition. Supply waste to required farms and spread evenly to minimize point source of methane.	Presence of NH4	Monthly	SPMU Contractor, MoH, MoE	110,000.00
	Chicken and eggs attract dangerous reptiles like snakes and monitor.	Daily cleaning of Pen and removal of droppings Clear grass within the farm surroundings	No of reptiles found	Annually	Contractor, SPMU, site committee	210,000.00

	Risk of diseases infection to those tending the birds	Provide appropriate PPEs for workers. Inspect that workers are wearing PPEs and correctly.	Cases of diseases and infections	Quarterly	Contractor, SPMU, site committee	110,000.00
	Lack of adequate PPEs will infection of birds or humans	Provide appropriate PPEs for workers. Inspect that workers are wearing PPEs and correctly. Maintain principle of No PPEs No work.	Cases of injuries	Monthly	Contractor, SPMU, site committee	175,000.00
	The use of antibiotics to accelerate weight gain and control infections will contribute to the growing public health problems	Use locally prepared feeds Consult qualified vetinary practitioner for growth and disease control	Numbers of health incidence	Every quarter	SPMU Contractor, MoH, MoE	117,200.00
						Sub-Total = 1,502,200.00
Poultry (Meat) Processing						
Construction of cold room and processing Plants	Land take for sitting processing plants may need to Involuntary resettlement	Engage on community consultations Develop compensation plan for lost/displaced assets	No. of grievances received	Monthly	ite Committee, Govt Committee/ESO	122,180.00
	Loss of access on assets and farmland	Engage on community consultations Create alternative route to assets and farm land.	No. of grievances received	Monthly	ite Committee, Govt Committee/ESO	91,000.00
	There will be loss of economic and unharvested	Compensate loss of farm produce	No. of grievances	Annually	ite Committee, Govt	121,300.00

	crops on the land used for sitting processing and cold room plants		received		Committee/ESO	
	Deterioration of air quality from release of cement dusts and toxic fumes during construction of concrete structures	Use concrete batch mixture system to minimize release of cement particle to the air	Rise in respiratory related problems	Daily	Site Committee, Govt Committee/ESO	139,680.00
	Noise and vibration from the use of machineries and motorized equipment	Locate site farther away from community settlement. Provided ear mufflers to workers	Noise level and public complaints about noise dust nuisances.	Daily	Site Committee, Govt Committee/ESO	100,000.00
	Soil contamination and loss of soil quality from cement waste water resulting from leakages and/improper handling	Build bund around concrete mixer to avoid spread of cement waste water away from source.	Heavy metals in soil, crop productivity	Weekly	Site Committee, Govt Committee/ESO	120,000.00
	Waste generation from cement and concrete works such as cement bags and metal scraps etc.	Develop procedures for waste collection and disposal. Ensure appropriate storage of waste to minimize risk of pollution.	Presence of rodents, and scorpions	Weekly	Site Committee, Govt Committee/ESO	100,000.00
	Contamination of surface and underground water from cement waste water and spillages of oil and other petroleum products through leakages and/improper handling.	Liquid waste should be retaining in waste pond, treat biologically before disposing off.	Change in physic-chemical characteristics of water-Temp., pH, Turbidity,	Weekly	Contractor, SPMU, site committee	150,000.00

			Nutrients (sulphate, nitrate, etc.), Heavy metals (Fe, Cu, Pb, etc.)			
	Risk of HIV/AIDS and other STDs arising from the interactions amongst the foreign workforce and the host community.	Conduct sensitization on STD to local farmers and workers	Common/prevalent diseases in the host communities	Weekly	Site Committee, Govt Committee/ESO	160,000.00
	Risk of respiratory and eye related problems from exposures to chemical hazards such as cement dusts and toxic fumes emanating from cement and concrete works	Provide suitable personal protective equipment to workers in cement section	Rise in respiratory/eye related problems	Daily	Site Committee, Govt Committee/ESO	130,000.00
	Lack of adequate PPEs will lead to minor injuries and accidents.	Provide appropriate PPEs for workers. Inspect that workers are wearing PPEs and correctly. Maintain principle of No PPEs No work.	Cases of injuries	Monthly	Contractor, SPMU, site committee	110,000.00
	Risk of skin related health problems from physical contacts to cement and concrete	Provide suitable personal protective equipment to workers in cement section	Rise in skin related problems	Daily	Site Committee, Govt Committee/ESO	110,000
Meat Processing and	There shall be streams of waste from blood, bones, and feathers	Develop procedures for waste collection and disposal.	Presence of flies, rodents and vultures	Weekly	Site Committee, Govt Committee/ESO	150,000.00

packaging		Sort waste at source for easy management Ensure appropriate storage of waste to minimize risk of pollution.				
	Plastic bag packages will contribute to community wastes and contaminate the soil	Develop procedures for waste collection and disposal.	Poor crop yield	Annual	Contractor, SPMU, site committee	120,000.00
	Odour release from meat processing will be nuisance to the neighbourhood	Locate site farther away from community settlement. Maintain daily sanitation on the premises	No. of complaints	Daily	Site Committee, Govt Committee/ESO	120,000.00
	Cold rooms use multiple freezers for meat storage, and the chlorofluorocarbon from refrigerator depletes ozone layer.	Grow trees and flowers around the premises	Presence of chlorofluorocarbon	Monthly	SPMU Contractor, MoH, MoE	131,000.00
	Meat processing will attract tsetse flies and rodents which are disease carriers and will be nuisance and health risk to the neighbourhood.	Maintain daily sanitation on the premises Avoid meat remnants littering the premises	Presence of flies, rodents. Prevalent illness in the community	Weekly	Site Committee, Govt Committee/ESO	125,000.00
	Waste water from meat processing will contaminate water bodies.	Liquid waste should be retaining in waste pond, treat biologically before disposing off.	Change in physic-chemical characteristics of water -	Weekly	Contractor, SPMU, site committee	100,000.00

			Temp., pH, Turbidity, Nutrients (sulphate, nitrate, etc.), Heavy metals (Fe, Cu, Pb, etc.)			
						Sub-Total= 2,200,160.00

Source: Field Survey, Nov. 2020

Table 8.4: Mitigation Measures– Cashew

PROJECT ACTIVITY	POTENTIAL IMPACT	MITIGATION	MONITORING INDICATORS	FREQUENCY	RESPONSIBILITY FOR IMPLEMENTATION /MONITORING	COST (₦)
Cashew Production						
Grafting cultivation	Climbing cashew truck for grafting planting will pose risk of falling from heights.	Encourage climbing with ladder	No. of accidents	Daily	Site Committee, Govt Committee/ESO	150,000.00
	Cashew fruits will attract bees that normally sting poison to humans. This may be a threat to social existence of the community as high dose of bee poison can lead to death or damage of organ.	Develop regular removal fallen cashew fruits to avoid concentration of bees around the plantation	Rise of illness related to bee sting	Daily	Site Committee, Govt Committee/ESO	546,000.00
	Piling up of cashew leaves will trigger wild fire	Take leaves to farmlands for manure	Cases of wild fires related to	Annually	Site Committee, Govt Committee/ESO	210,000.00

			cashew leaves			
	Application dung manure for nourishing of cashew tree will flies and rodents. Flies and rodents are disease carriers and will pose health risk to the neighbourhood.	Encourage use of dried organic manures	Presence of flies, rodents. Prevalent illness in the community	Weekly	Site Committee, Govt Committee/ESO	165,000.00
	Cashew is highly competitive plant, and will phase any other plants that are beneficial to the community	Re-plant threatened plants to other locations.	Extinction of local crops and trees	Monthly	SPMU Contractor, MoH, MoE	150,000.00
Cashew fruit and seed handling	The fluid of cashew fruit and seed is highly acidic and can be harmful to the eyes and skin.	Educate farmers and the communities on the danger of cashew fluid on certain parts of human body.	No. of accidents	Daily	Site Committee, Govt Committee/ESO	120,000.00
	Risk of skin cancer from constant contact with cashew fluid.	Provide and enforce use of appropriate PPEs	No of skin inflammation	Monthly	Contractor, SPMU, site committee	175,000.00
	The fluid of cashew seed is highly flammable and can cause fire outbreak	Educate farmers and the communities on the flammable nature of cashew nuts	No. of fire outbreak	Daily	Site Committee, Govt Committee/ESO	150,000.00
						Sub-Total = 1,666,000.00
			Cashew Processing			
Roasting	Roasting cashew nut produces irritating smell and will be nuisance to the neighbourhood.	Locate site farther away from community settlement.	No. of complaints	Daily	Site Committee, Govt Committee/ESO	150,000.00
	Roasting cashew nut releases large amount of	Cultivate trees on the site environment	Presence of sooth on the	Monthly	Contractor, SPMU, site committee	571,000.00

	smoke to the air contributing in the ozone layer depletion		roofs			
	Cashew nut shell is highly flammable and poses risk of fire outbreak. It can light up buildings and others other assets without warning	Educate farmers and the communities on the flammable nature of cashew nuts Encourage roasting stations to have fire extinguisher	No. of fire outbreak	Daily	Site Committee, Govt Committee/ESO	5,162.00
	Large waste water is generated from quenching of roasting plant, may pollute the streams if used water is discharge into it.	Create bund wall to avoid spread of waste water to other parts of the site	Change in physico-chemical characteristics of water - Temp., pH, Turbidity, Nutrients (sulphate, nitrate, etc.), Heavy metals (Fe, Cu, Pb, etc.)	Weekly	Contractor, SPMU, site committee	585,000.00
	Roasting of cashew nuts triggers dangerous explosives and poses high health risk to roasting workers as nuts can shut out from the flame to damage one's eye or cause skin burn.	Educate farmers and the communities on the flammable nature of cashew nuts Encourage roasting stations to have fire extinguisher Ensure roasting station has a first aid box	No. of accidents	Daily	Site Committee, Govt Committee/ESO	165,000.00
	The neighbourhood will be covered by sooth from	Encourage use of closed chamber	Presence of sooth on the	Monthly	Contractor, SPMU, site committee	136,000.00

	cashew roasting plant		roofs			
	Risk of skin related health problems from physical contacts to cashew fluid	Educate farmers and the communities on the skin risk associated to cashew fluid contact	Rise in skin related problems	Daily	Site Committee, Govt Committee/ESO	120,000.00
	Roasting will generate solid wastes and ashes	Cultivate trees on the site environment	Extent land area covered	Weekly	SPMU Contractor, MoH, MoE	165,000.00
						Sub-Total= 1,897,162.00

Source: Field Survey, Nov. 2020

8.4 Waste Management Procedures and Responsibilities for the ESMP

Effective management of all categories of waste is critical to the protection of natural resources and achievement of environmental objectives of the ESMP. To this end specific, targeted and streamlined waste management procedures have been outlined for the implementation of the ESMP during the phases of the project. These guidelines will guide the Service Providers, CIGs, Women and Youths to draw up a waste management plan (WMP) for the effective performance of its obligations and responsibilities in waste management (Table 8.5).

Table 8.5: Waste Management Guidelines and Procedures

S/N	Source of Waste Impact	Composition/ Classification	Potential Impact	Disposal Options	Implementation	Monitoring
1.	To include waste associated with: Clearing and ploughing soils	Grasses, tree logs, stone, soil, wood, general waste.	Increased generation of Waste; Generation of dust/noise; Pollution of nearby receptors (e.g. streams); flooding, reduced agricultural productivity and impact on reservoir capacity	Develop procedures and controls to ensure appropriate storage of waste to minimize risk of pollution. Ensure that appropriately licensed transportation contractors and disposal sites are identified and used	Contractor	SPMU
2.	Construction of Agro-processing complex.	Concrete, gravel, soil, stone, inert materials, wood, metals, plastics, insulation, packaging (material bags), general waste. Some are combustible; recyclable.	Generation of stone and waste earth, waste oils, domestic waste. Flooding, reduced agricultural productivity and impact on reservoir capacity.	Develop a waste inventory; that should detail the different waste streams, classification, quantities, storage requirements, potential use, and treatment and disposal arrangements; Excavated material to be used for backfilling/landscaping.	Contractor	SPMU
3.	Farm camp		Domestic waste.	Segregate recyclable materials (glass bottles, paper, plastics, metals etc.) and send to processors; disposal to landfill	CIGs, Cooperatives	SPMU
4.	Generation of hazardous waste -	Hazardous	Groundwater contamination	Establish and implement operational	Contractor	SPMU

	replacing machine oils; performing maintenance tasks on equipment etc			controls for on-site storage of hazardous waste; Ensure containers are labeled so contents can be identified.		
5.	Wastewater Discharges from rice, meat processing and washing down of plant and equipment	Wastewater, sediments.	Ground Water Contamination	Ensure that wastewater from the processing plants is collected and treated/recycled for reuse. Ensure that all water used for washing down plant and equipment is collected in a settling pond prior to discharge.	CIGs/ women and youth	SPMU
6.	Oil, Oily rags and diesel/fuel leaks, used protective clothing (hand gloves, shoes, rainwear, etc)	Oil & grease	Maintenance operations, fuel storage, regular work wear	Where possible, oily rags and protective clothing shall be washed and reused at site or incinerated or disposed at an appropriate landfill facility and or recycled.	Contractor	SPMU
7	Excreta, animal droppings	Hazardous/offensive	Rearing of birds	Chicken farm should be clean every day. Animal dropping disposed in farms	CIGs/ women and youth	
8.	Rice Husky debris	Hazardous	Rice Husky debris from rice milling plants.	Recycled/reused, give away or sold to poultry farmers Unusable materials shall be disposed at an appropriate landfill facility.	CIGs/ women and youth	SPMU

9.	Rice stems and shafts	Hazardous/inflammable	Rice stem and shaft leftover after harvesting	Supply to other crop farm lands for manure	CIGs/ women and youth	SPMU
10	Feather and blood waste	Offensive	Feather and blood waste from poultry processing	Recycled/reused, give away or sold Unusable materials shall be disposed at an appropriate landfill facility.	CIGs/ women and youth	SPMU

Source: Field Survey, Nov. 2020

8.5 Appropriate Reporting and Record Keeping

Appropriate records keeping and reporting procedures for all value chain/segments activities guarantee that environmental incidents, accidents and hazards are appropriately captured and used to evaluate the predictive accuracy of impacts, effectiveness of monitory programs and operational efficiency of the ESMP. Records shall be kept and used to monitor and enforce where necessary all operational activities of the project. Such information shall be stored in electronic form to facilitate safe keeping and prompt retrieval. The following records or registers will be maintained as an integral part of the ESMP:

- A register of environmental complaints defining the nature of complaint, date of complaint, corrective action taken and date it was resolved;
- A register of incidents including the date, nature of the incident and corrective action taken;
- Date when the different types and quantities of waste are removed from the site;
- Records of formal consultation or communication activities; and
- Site inspection checklists

8.6 Environmental Risks and Emergency Response

Potential environmental risks that require emergence response during project implementation include accidents, fire, emergency spills and pollution incidents and unexpected sediment problems. The following emergency procedures are formulated and drawn up to mitigate such risks.

8.6.1 Basic Emergency Requirements

1. Make it Safe, Stop, Contain, Notify!
2. Identify the cause of the emergency or incident and act immediately to prevent it from getting worse.
3. Make sure that appropriate PPE is available to use where necessary.
4. Report any emergency or incident to the APPEALS value chain/segment facilitator and environmental safety officer immediately, detailing the nature, cause and location so that appropriate action can be taken.
5. Contact the Local Authority, SEPA and/or SMoH as relevant to the incident.

A. Accident

1. Administer first aid
2. Report accident to APPEALS value chain/segment facilitator immediately.
3. Call community health and follow the instructions if the accident is minor.
4. Take victim to hospital immediately for major accidents.

B. Fire

DO:

5. Report emergency to APPEALS value chain/segment facilitator immediately.
6. Call fire brigade (the fire may only appear to be out).
7. Inform landowner / occupier and relevant site construction supervisor.

C. Emergency Spills and Pollution Incidents

DO:

1. Make sure you have the appropriate PPE before taking action.
2. Contain a pollution incident immediately using absorbent materials or by digging containment facilities or pits.
3. Report incident to APPEALS value chain/segment facilitator and the environmental safety officer and State Coordinating Unit.

D. Unexpected Sediment Problem

DO**:**

1. Check drainage patterns in the field to ensure it does not encourage mass exodus of soil particles to another location or water body.
2. Check for broken drains which could lead to pollution at any time.
3. Take immediate action if you identify any high sediment which is causing pollution or if unsure if it is significant consult with the site service provider who should determine whether APPEALS State Coordinating Unit needs to be notified.
4. Implement mitigation measures immediately. Control pollution at source wherever possible. Consider whether the site activity should be halted. Consult the environmental officer if in doubt.

E. Oil Spills/Grease Discharges

DO:

1.Stop the action/event which is causing pollution immediately.
2.Take immediate remedial actions – block spill; discharge materials to help soak up the spill and the advice in the oil spill response kit.
3.Inform the site service provider to identify more detailed required actions.
4.Inform APPEALS value chain/segment facilitator and environmental safety officer if the spill has not been contained and dealt with.
5.Monitor effects of spill.
6.Remove spill response materials and dispose-off in accordance with the site waste management plan.
7.Deal with any contaminated soils in accordance with the site waste management plan.
8.Learn from the experience and plan site works to avoid pollution happening again.

8.7 Recurring Environmental and Social Issues:

This section treats pertinent Environmental and Social issues and their management plan. They include public/ stakeholders' consultation, occupational public health safety and security, labour, gender based violence, vehicle and traffic, erosion and sedimentation, water and air quality.

8.7.1 Public / Stakeholders Awareness Consultations Management Plan:

1. Regular public sensitization and meetings during the project implementation to reduce incidences that may arise as a result of ignorance, incomplete knowledge and forgetfulness of the basic rules that guide the sites.
2. Have bi-Monthly Public/Stakeholders consultation and awareness meetings geared towards review, revalidate and documentation of the ESMP.
3. Environmental Committee (EC) shall be formed and chaired by ESO.
4. There must be representatives of the CIGs, farmers and women among the committee.
5. EC shall oversee the coordination of public stakeholder consultations and awareness on Environmental and Social Management issues.
6. EC shall hold meetings twice every month, and more during emergency.
7. The meetings shall read out and review its rules including health and safety rules among others.
8. Flyers that contain basic rules shall be printed and shared to participants if need be.
9. The minutes of meetings and consultations if adopted shall be inculcated in the rules.
10. Each participant shall be able to know his obligation, roles and reasonability as a stakeholder.
11. Indicator is the number of CIGs and community members participating in the public awareness.

8.7.2 Occupational/Public Health, Safety and Security Management Plan

1. Ensure that all the project beneficiaries undergo proper EHS orientation and induction before engaging in site activity.
2. HSE shall enforce complete and suitable PPEs for workers.
3. Ensure that any accident that occurs is recorded.
4. Ensure that adequate contingency and emergency plans are put in place in case of accidents, injuries and fire outbreaks.
5. Ensure that warning signs are strategically pasted to the knowledge of both staff and visitors.
6. Ensure that precaution signs are provided and placed at strategic locations.
7. Ensure participatory re-orientation meetings are in place to revisit rules and discuss experiences.
8. Ensure that adequate security personnel are employed. They can liaise with the local security outfits.
9. Regularly assessing the improvement and required changes in the EHS rules and regulation.

8.7.3 Labour Management Plan

1. Workers admitted as labourers must be of age 18 years and above.
2. Community members who possess the required skills and are ready to work shall be given preferential treatment during recruitment.
3. Payment of wages shall be made as and when due.
4. The Contractor shall be responsible for the safety and Health of its employees at the work place.
5. He shall provide PPE, train and inform all workers of any known hazards on the site.
6. Workers shall not be allowed to form labour unions in the site.
7. Labour Grievance Redress Desk shall be instituted.

8. If a labourer is dismissed, he shall be given reasons for dismissal and the right to lodge complaints to Grievance Redress Desk.
9. No worker shall be stigmatized due to his or her social status in the communities.
10. Physically impaired workers shall be given due considerations.
11. Severance allowance should be paid to casual workers during decommissioning.

8.7.4 Gender Based Violence Management Plan

1. Females with requisite skills should be given equal consideration as men during hiring
2. No male shall solicit for sex or any kind of favor in exchange for work
3. The management shall advocate against Gender Based violence, sexual exploitation and work place sexual harassment among his team, employees or community members.
4. The Contractor shall accord female employees the same treatment as their male counterpart, such as equal payment for equal work.
5. There shall be no form of physical or verbal abuse of women, especially those depicting them as less important.
6. Female counterpart shall be incorporated in decision making body in the site.
7. Women shall be given due recognition and award like male counterpart when they merited it.
8. No woman or man shall be stigmatized due to his or her social status in their communities.
9. Male workers involved in gender violence shall be penalized.

8.7.5 Vehicle and Traffic Management Plan

1. HSE officer shall develop and implement Traffic Management Rules.
2. Traffic rules shall be both in written and pictorial signs
3. Pre-Mob all vehicles before allowing them into the field.
4. Cuddle off areas that big trucks are working with caution tape
5. HSE officer shall report, notify or alert EC on cases of persistence breach of traffic rules with specific instances.
6. Traffic safety shall form the integral part of the HSE officer's weekly report to EC and copy ESO.
7. Maintenance of broken down trucks and equipment are done at specified places to avoid careless lubricant spill and contamination of the environment.
8. Vehicles carrying hazards shall attach sharp colored or reflective ribbon on them.
9. The contractor shall engage the services of traffic controllers to control and direct traffic.
10. HSE officer shall ensure that minimum speed limits are observed by haulage trucks and other motorized plants.
11. Competent staff is given the position of handling trucks and equipment at the farm.
12. Trucks conveying materials like laterites should not be filled completely to avoid falling off.

8.7.6 Air Quality Management Plan

1. EC shall develop specific site air quality improvement strategy
2. HSE officer shall enforce usage of PPEs.
3. Supervisors, Inspectors and the general public visiting the site shall be provided with PPEs

4. Waste disposal by burning shall be prohibited.
5. Burning of bushes around the project area shall be strongly discouraged
6. Spray water before and after ploughing or harrowing.
7. Equipment emitting excess smoke/fumes shall be banned.
8. First aid training for workforce and provision of first aid boxes in the farm and processing site.

8.7.7 Water Quality Management Plan

1. Reduce pollution at source (grease trap and on-site treatment of oil spill).
2. Create temporal diversion channels to ensure runoff discharges at different points within the water body, this will reduce point concentration of sediments.
3. Dumping of wastes into water bodies shall be prohibited.
4. Records of water properties before, during and after the project shall be taken

8.8 Proposed Capacity Training Needs for the ESMP

Institutions and agencies to be involved in the implementation of the ESMP would require capacity building in order to effectively and efficiently discharge their monitoring and management responsibilities. To enhance the respective roles and collaboration of the relevant stakeholders like the APPEALS Safeguards Officers (SPMU), service providers, HSE officers, cooperative members, community stakeholders, broad areas for capacity building have been drawn up for effective implementation of the ESMP (Table8.6). An estimated cost of One Million Four Hundred and Seventy Five Thousand Naira (~~₦~~**1,475,000.00**) is expected to be adequate to discharge these responsibilities effectively.

Table 8.6 Training Modules for Environment and Social Management Issues

PROGRAMME	DESCRIPTION	PARTICIPANTS	FORM OF TRAINING	DURATION/ LOCATION	TRAINING/ CONDUCTING AGENCY	COST (₦)
Sensitization	General Environment Issues-Environment management functions, agencies, regulations and APPEAL/Safeguard Instruments	SPMU Environment/Safeguards Unit, M&E, Procurement officers, Site Committee members, Government Interagency Committee	Workshop	SPMU Conference hall/3hrs	Environment & Social Specialists Consultant engaged in capacity building training	175,000.00
Module I	Environmental considerations in implementation of projects; Environmental components affected by project, environmental management best practices, Stakeholder and Community project Participation e.t.c.	SPMU E&S Safeguards Officers, Site Committee Members	Workshop	SPMU Conference hall/6 hrs	Environment & Social Specialists Consultant/engaged for capacity building training	250,000.00
Module II	Integration of ESMP components into construction activities; techniques for project effect and process monitoring; site selection criteria for identifying waste	SPMU, Contractors, Environment Safeguard Officer(s), HSE Officer(s); Government interagency	Lecture and Field Visit	SPMU Conference hall/6 hrs	Environment & Social Specialists Consultant/engaged for capacity building training	350,000.00

	disposal sites; techniques for remediation/restoration/reclamation of degraded sites	committee members site committee members				
Module III	Field development works on farm and environmental management practices: roles and responsibilities of officials/contractors/consultants towards protection of environment during project operational phase	SPMU & H&S Safeguard Officers; service providers, Government Interagency committee members.	Lecture and Field Visits	SPMU Conference hall/12 hrs	Environment & Social Specialists Consultant engaged for capacity building training	700,000.00
Sub-Total = 1,475,000.00						

8.9 Implementation Schedule

The activities contained in the ESMP have to be integrated into the various phases of the project implementation. The key elements of the implementation schedule are presented in Table 8.7 below:

Table 8.7: Summary of Responsibility for Implementation of the ESMP

Project Cycle	Phase	Activities	Responsibilities
Planning	Scoping	• Clearance and final disclosure of ESMP • Review and approval of Contractors ESMP and construction schedule • Preparation of mitigation and monitoring guidelines and procedures • APPEALS No-objection	Consultant Supervised by SPMU/FPMU APPEALS
Design	Preparation of ESMP and Consultations	• Review of concept design of project	‘’
	Completion and Integration	• Inclusion of ESMP in the • Contract documents • APPEALS No-objection	‘’
Construction of facilities/Field preparations/cultivation and planting/Agro inputs	Implementation and Monitoring	• Monitoring and reporting on Environmental and Social mitigation measures (performance monitoring) • Effects monitoring and reporting of ESMP and livelihood issues • Non-conformance and corrective action/measures	Contractors and Consultant Supervised by SPMU, EHS-MDAs/Community stakeholders
Growing of crops/rearing of animals/agro processing/packaging	Implementation and Monitoring	• Monitoring and reporting on Environmental and Social mitigation measures (performance monitoring) • Effects monitoring and reporting of ESMP and livelihood issues • Non-conformance and corrective action/measures	Contractors and Consultant Supervised by SPMU, EHS-MDAs/Community stakeholders

Operation (Post Implementation)	Operations and Maintenance	• Maintenance • Monitoring and Reporting on Environmental and Social sustainability issues • Post project audit	Contractors : and supervised by SPMU, FPMU, ENS MDAS/Community stakeholders

Source: Field Survey, Nov. 2020

8.10 Cost of Implementation of the ESMP

The effective implementation of the ESMP would require the use of equipment logistics and expert/professional services to achieve objectives of the proposed projects and inculcate practice and overall sound environmental and social sustainability. These would require money to execute. The total estimated cost for implementing the ESMP is estimated to be Sixteen Million, Three Hundred and Thirty Nine, One Hundred and Six Two Naira (N16,339,162.00) only (**Table 8.8**).

Table 8.8: Estimated Budget for the Implementation of ESMP

S/N	Item	Estimated Budget (N)
1	Rice Production	2,850,760.00
2	Rice Processing	3,901,880.00
3	Rice Marketing	846,000.00
4	Poultry Production	1,502,200.00
5	Poultry Processing	2,200,160.00
6	Cashew Production	1,666,000.00
7	Cashew Processing	1,897,162.00
8	Capacity building/trainings	1,475,000.00
Grand Total = 16,339,162.00		

Source: Field Survey, Nov. 2020

CHAPTER NINE

9.0 SUMMARY, RECOMMENDATIONS AND CONCLUSION

9.1 Summary of Findings

The preparation of the Environmental and Social Impact Assessment (ESIA) is driven partly by the need to provide a broad framework to safeguard the successful implementation of the APPEALS project in Enugu State on one hand and fulfill the environmental and social safeguards requirements of the World Bank who is a major financier of the proposed projects.

The Priority value chains for Enugu State are Cashew, Rice and Poultry. Furthermore, the women and youth empowerment sub-component of the project is focusing on other agribusinesses that will enhance job creation, overall increase in income and livelihood of the beneficiaries. The Project Development Objective (PDO) is to enhance agricultural productivity of small and medium scale farmers and improve value addition along priority value chains in participating states.

The Environmental and Social Safeguards Policies triggered by the proposed project are Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Pest Management (OP/BP 4.09) and Forest (OP/BP 4.36). The preparation of the ESIA was specifically guided by the Environmental and Social Management Framework (ESMF) prepared for the APPEALS project as well as the Nigerian Environmental Assessment guidelines and procedures.

A multidisciplinary approach was employed in order to holistically address all pertinent aspects of the proposed project on the bio-physical and socio-economic environment. Accordingly, the bio-physical and socio-economic environment of the proposed project was characterized and assessed using a number of survey instruments, field studies including broad-based community consultations to determine the likely environmental and social impacts of the proposed project and thereafter formulated specific, measurable, achievable, relevant and time-based mitigation measures (SMART). Some of the significant impacts enumerated of the proposed APPEALS project are soil contamination from chemical accumulation from fertilizers, herbicides and pesticides, fire outbreak from rice husk and cashew roasting, air pollution and associated ailment from inhalation of rice husk, and odour from chicken droppings and processing meat station. Some positive impacts include increase in output in rice, cashew and chicken/meat/eggs, employment generation to mention a few.

In this connection, the best project implementation options and technological alternatives have been proposed in this ESIA. Similarly a waste management guideline, environmental risks and emergency procedure and a monitoring program have been drawn up to mitigate the waste impacts, risks and emergencies during implementation activities as well as ensure smooth implementation and check effectiveness of mitigation measures respectively. Also, the management capacity needs of the different categories of stakeholders identified at various community consultations was noted and training programs formulated to enhance the efficient discharge of their monitoring and management Furthermore, to guide the preparation of the project implementation manual during project construction activities the total estimated costs for implementing this ESMP has been drawn up even as the planning schedule for carrying out different operational activities of the project has been prepared

9.2 Recommendations

Finally, a number of recommendations were drawn from the views expressed by stakeholders during the preparation of the ESIA and these include providing appropriate PPEs for workers, ensure that workers are wearing PPEs and correctly, maintaining

principle of No PPEs No work, increasing the use of manual weeding to avoid soil contamination by chemical reactants, spread rice stems and shafts evenly on the field, take rice waste to other crop farms to decompose to organic manure, daily cleaning of Pen and removal of droppings, clear grasses within the farm surroundings, educate farmers and the communities on the flammable nature of some of the value chains.

9.3 Conclusion

In conclusion, it is stressed that the full implementation of the proposed APPEALS project will have significant beneficial impacts on the people of Enugu State. A timely, careful and faithful application of the measures contained in this ESIA will ensure that the proposed project is suitably executed in an environmentally and socially friendly manner.

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21. The Weather Network

ANNEX 1: LIST OF ATTENDEES DURING CONSULTATION MEETINGS

ENUGU STATE APPEALS
ESIA/ESMP COMMUNITY CONSULTATION

VENUE: Iwollo DATE:

S/N	NAME	COMMUNITY	SIGN
1	Ozoagu Rita Josephine	Umuilo Ugwuike	
2	JOHN OBUEKE	Umuozovulu	
3	Agu Nneleg	Ezeakwulo	A.N.
4	Awolika Igbonadi	umuezevulu	
5	Anthonia Amaeku	EZE Onibe	A.N.A
6	Uzoechi Nneka	Umuaja	
7	Niki Ozo	Ugwuike	
8	Ifeoma Chiaha	Ugwuike	
9	Obueke Evelyn	Umuezevulu	
10	mary ngozi	"	
11	Onyishi Malachy	Ugwuike	
12	Ogbo okechukwu	"	
13	Blessing Ogwueze	✓	
14	Ifeoma Ejike	Owe	
15	Anidiobi Sunday	ugwuike Iwollo	
16	Edwin Umeayo	" "	E.U
17	Ojiogu Simeon	Umuezevulu	
18	EDWIN UZOECHI	UGWUIKE	

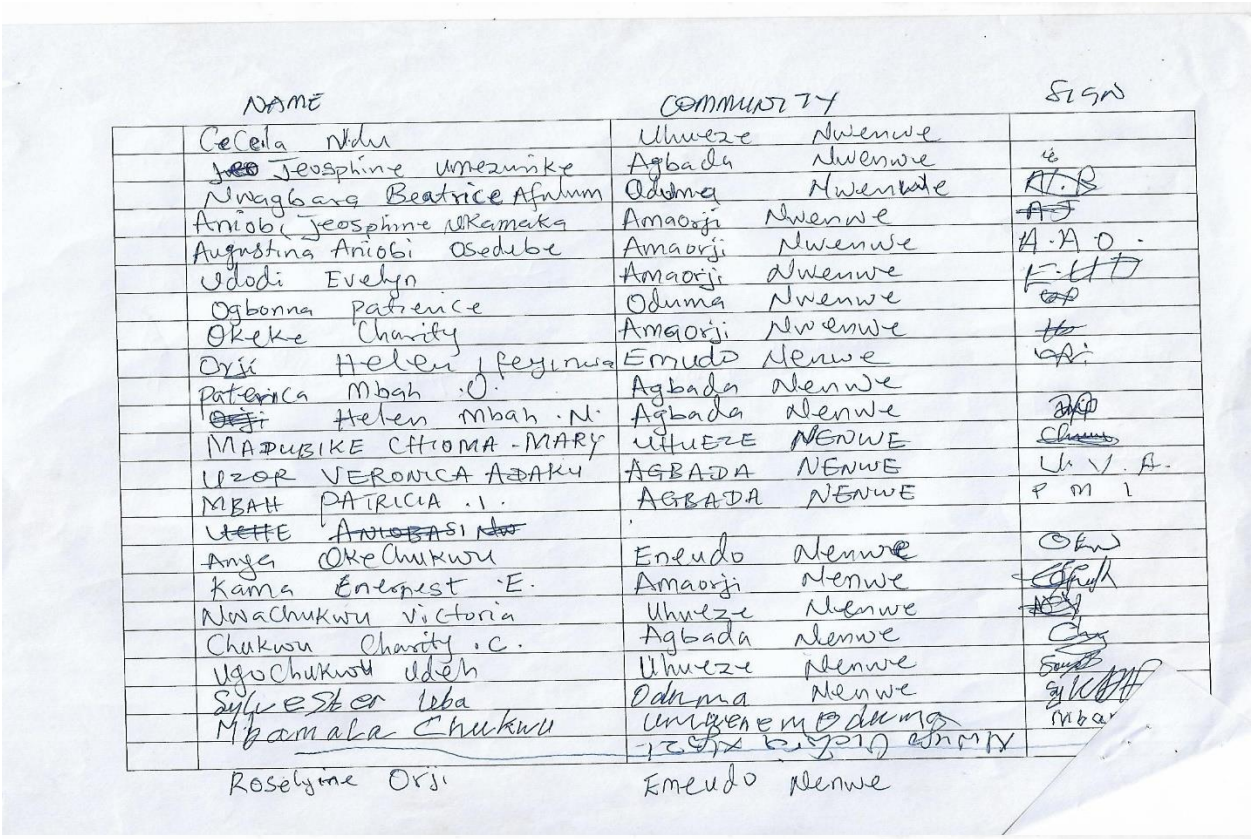
S/N	NAME	COMMUNITY	SIGN
18	GODWIN UDABA	UMUEZEVULU UGWUIKE	
19	OGBOZOR UZOECHI	UMUEZEVULU UGWUIKE	O.U
20	CHIEF CHARLES OBUEKE	UMUEZEVULU UGWUIKE	
21	ELIAS CHIAHA	UGWUIKE	
22	LAWRENCE ANIKPUTA	UGWUIKE	E.C
23	ANIDIOBU ANTHONY	UGWUIKE Umuezevulu	
24	Chief GERALD UWAKNYO	UMUANI UGWUIKE	
25	Ezike Emmanuel	Umuosigo Ugwuike	E.O.E
26	Ozor Obodo Boniface	Umuaja Agbago	B.U.O
27	Ude Jeoffray	Amagu "	

ENUGU APPEALS ESIA/ESMP PROJECT
COMMUNITY CONSULTATION ATTENDANCE SHEET

VENUE: NENWE DATE: 4-12-2020

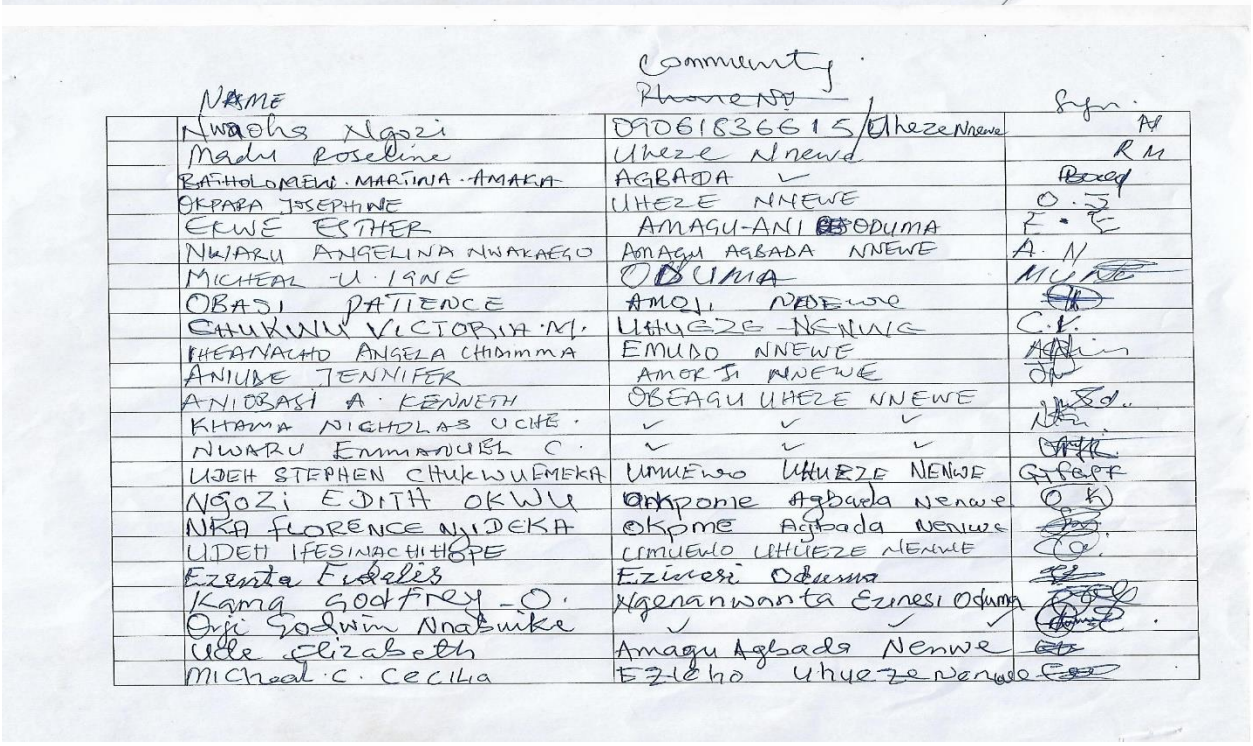
S/N	NAMES	COMMUNITY	SIGN
	JOSEPH UDEH I.	UHUEZE NENWE	
	NWANYA NELSON C.	UHUEZE NENWE	
	Eze Theresa. C	Emuelo Nenwe	
	ONYeoma Victoria	Agbada Nenwe	O V
	Odeola Theresa	Agbada Nenwe	U.T
	Ndeh patrick Adaku	Agbada Nenwe	
	Oleh Theresa	Agbada Nenwe	
	Opa Ekwutose	Agbada Nenwe	
	Nwaobe Scholastica	Agbada Nenwe	
	Aniobi Chinwendu James	Uhueze Nenwe	
	Chukwu Juliana	Uhueze Nenwe	
	Clementina Uwakwe	Uhueze Nenwe	
	Regina Nwaoye	Uhueze Nenwe	R N
	Aniezi Mangrose	Agbada Nenwe	M.K

	NAME	COMMUNITY	SIGN
1	Nwoye Victoria Ngozi	Amafu Oduma	
2.	Mbanta Godwin C.	Uhueze Nenwe	
3.	Chief Simeon Chukwu	Ezinesi Oduma	
4	Chief Ani Michael Okc	Ezinesi Oduma	
5	Ugboy Veronica Okwoji	Nenwe	
6	Nweke Gloria. I.	Uhueze Nenwe	
7	Nwaru Evelyn Ifebuche	Obulonum Amorji Nenwe	
8	Nwamacho Celestine Ejike	Emuelo Nenwe	
9	Nkechinyere Augustina Orji	Nenwe	N.A.O.
10	Nwamya Augustine .I.	Uhueze Nenwe	
11	Rose Mony Nwafor	Uhueze Nenwe	R.N.N.
12	Joseph Okpara	Umuenwo uheze Nenwe	
13	Moureen Mba	Okpome agbada Nenwe	
14	Mbanya Mercy Nenna	Okpome agbada Nenwe	
15	Eleke Patience	Umudigbo Amorji Nenwe	
16	Amaka Patience Judge	Umunagu Amorji Nenwe	
17	Peter Anyiide	Amorji Nenwe	
18	Ojiego Juliette E.	Umuobele Amorji Nenwe	
19	Beatrice Ezeh -N-	Umudigbo Amorji Nenwe	
20	Ugochi Bartholomew chukwu	Amagu Agbada Nenwe	
21	Okorie Kelvin Arinze	Amagu Agbada - Nenwe	
22	Orjeza Kenneth .I.	Umuobele Amorji Nenwe	
	Osundu Brigdet .I.	Agbada Nenwe	B.I.O



	NAME	COMMUNITY	SIGN
	CeCelia Nduu	Uhueze Nwenwe	
	Jeospine Umezuinke	Agbada Nwenwe	
	Nwagbara Beatrice Afulum	Oduma Nwenwe	
	Aniobi Jeospine Nkamaka	Amaoji Nwenwe	
	Augustina Aniobi Osedube	Amaoji Nwenwe	
	Udodi Evelyn	Amaoji Nwenwe	
	Ogbonna Patience	Oduma Nwenwe	
	Okeke Charity	Amaoji Nwenwe	
	Orji Helen Ifeyinwa	Emudo Nenwe	
	Patricia Mbah .O.	Agbada Nenwe	
	Orji Helen Mbah .N.	Agbada Nenwe	
	MADUBIKE CHIOMA-MARY	UHUEZE NENWE	
	UZOR VERONICA ADAKU	AGBADA NENWE	
	MBAH PATRICIA .I.	AGBADA NENWE	
	UCHE ANIOBASI		
	Anya Okechukwu	Eneudo Nenwe	
	Kama Enelpest .E.	Amaoji Nenwe	
	Nwachukwu Victoria	Uhueze Nenwe	
	Chukwu Charity .C.	Agbada Nenwe	
	Ugochukwu Udeh	Uhueze Nenwe	
	Sylvester Uba	Oduma Nenwe	
	Mbamala Chukwu	Umuzeneoduma	

Roselyine Orji Emeudo Nenwe



	NAME	Community Phone No	Sign
	Nwaoha Ngozi	09061836615/Uhueze Nnewe	
	Madu Roseline	Uheze Nnewe	
	BARTHOLOMEW MARTINA AMAKA	AGBADA	
	OKPARA JOSEPHINE	UHEZE NNEWE	
	ERWE ESTHER	AMAGU-ANI ODUMA	
	NWARU ANGELINA NWAKAEGO	AMAGU AGBADA NNEWE	
	MICHEAL U. IGWE	ODUMA	
	OBASI PATIENCE	AMOJI NDEWE	
	CHUKWU VICTORIA M.	UHUEZE-NENWE	
	RHEANYACHO ANGELA CHIDIMMA	EMUDO NNEWE	
	ANIUBE JENNIFER	AMOKI NNEWE	
	ANIOBASI A. KENNETH	OBEAGU UHEZE NNEWE	
	KHAMA NICHOLAS UCHE.	✓ ✓ ✓	
	NWARU EMMANUEL C.	✓ ✓ ✓	
	UDEH STEPHEN CHUKWUEMEKA	UMUENWO UHUEZE NENWE	
	NGOZI EDITH OKWU	Okpome Agbada Nenwe	
	NKA FLORENCE NJIDEKA	Okpme Agbada Nenwe	
	UDEH IFESINACHI HOPE	UMUENWO UHUEZE NENWE	
	Ezenta Fidelis	Ezinesi Oduma	
	Kama Godfrey .O.	Ugenanwanta Ezinesi Oduma	
	Orji Godwin Nnabuike	✓ ✓	
	Ude Elizabeth	Amagu Agbada Nenwe	
	Micheal .C. Cecilia	Ezieho Uhueze Nenwe	

ENUGU APPEALS ESIA/ESMP PROJECT

ATTENDANCE SHEET

VENUE: ETHA-ALUMONA DATE: .....

S/N	NAMES	COMMUNITY	SIGN
1	Asogwa Allogsius	Akwari Eha Etiti	
2	Ezugwu Oseke	〃	
	Onah Basil	Akwari Eha Etiti	
	Ezugwu Hyginus	〃 〃	
	Odo Sunday	〃 〃	
	Agbo Luke	〃 〃	
	Ezugwu Okimma	〃 〃	
	Agbo Sunday	〃 〃	
	Agbo Evaristus	〃 〃	
	Nnadi Godfrey	Akwari Eha-Etiti	
	Kechukwa Asogwa	Akwari Eha Etiti	
	Ona Dorathy	〃 〃	
	Ona Maria	〃 〃	
	Agbo Angelina	〃 〃	
	Nnadi Angelina	〃 〃	
	Ona Cecilia	〃 〃	
	Agbo Obiageli	〃 〃	
	Ona Roseline	〃 〃	
	Ozioko Augustine	〃 〃	

	Ugwuanyi Rita	Akwari Eha-Etiti	
	Nnadi Lilian	〃 〃	
	Nnadi Mosesta	〃 〃	
	Nnadi Ngozika	〃 〃	
	Ezugwu Athanasius	〃 〃	
	Ifun-Ugwu Shedrack	Akwari Eha-Etiti	
	Eze Chinonye Roberta	〃 〃 〃	
	Eze Chinasa	〃 〃 〃	
	Eze Ijeoma	〃 〃 〃	
	Nnadi Nnedinso	Akwari Eha Etiti	
	Agbo Esther	〃 〃	
	Eze Beatrice	〃 〃	
	Ugwuanyi Tonia	Akwari Eha-Etiti	
	Ezugwu Dorathy	Ugwuoru-Eha-Etiti	
	Ata Mary	Ugwuoru-Eha-Etiti	
	Onha Jecita	Akwarani-Eha-Etiti	
	Ugwuanyi Ejioma	Akwari-Eha-Etiti	
	Agbo Francia	Ugwuoru-Eha-Etiti	
	Agbo Caroline	Ugwuoru-Eha-Etiti	
	Agbo Lovecine	Akwari-Eha-Etiti	
	Agbo Clara	Akwari-Eha-Etiti	
	Agbo Juliet	Ugwuoru	
	Ezugwu Ifeoma	Akwari-Eha-Etiti	

	Asogwa Veronica	Akwani Eha-Etiti	VO
	Ugwu Gloria	" "	
	Udoka Agonyi	" "	
	Ozioko Chinenye	" "	
	Ugwuanyi Sabina	" "	"
	Onah Stella	" "	
	Asogwa Christina	" "	
	Nnadi Ugochukwu	Akwani Eha Etiti	
	Onah Felicia	" "	"
	Ezike Juliana	" "	
	Agbo Alice	" "	
	Okwo Roseline	" "	"
	Agbo Charity	" "	
	Agbo Eucharia	" "	
	Agbo Chisom	" "	
	Ezugwu Charity	Akwani Eha-Etiti	
	Chidiebere Ofokansi	" "	"
	Ona Ujunwa	" "	
	Mba Chikamso	" "	CS
	Okwo Mercy	Akwani Etiti	
	Okwo Jesophine	Akwani Eha-Etiti	

ENUGU APPEALS ESIA/ESMP PROJECT
COMMUNITY CONSULTATION ATTENDANCE SHEET

VENUE: ADANI DATE: ....

S/N	NAMES	COMMUNITY	SIGN
1	Udeze Samuel	Uwelu Akpa	
2	Eze Edwin .O.	Akutara village	
3	Ugwu Emmanuel	Akutara Village	
4	Ugwu S.I	Akaitara "	
5	Onuora Micheal	Umueje "	
6	Udeze Cletus	Ojor "	
7	Iduagaba Samuel	Uwemakpa Adani	
8	Jude Obrakor	Adani uwemakpa	
9	Ofodile Lazarus C.	Igga	
10	Ezeh Christopher C.	Adani (Ogurugu Road)	
11	Ezugwu Charles - C.	Adani, Nsukka Road	
12	Okoro Amos .O	Adani Ezioma	Oko
13	Uzo Chukwu Ikedigbo	Adani	
14	Hon Idu Bernard	Adani	

S/N	NAME	COMMUNITY	SIGN
[illegible]	IDU ROMANUS OKEH	ADANI	[signature]
[illegible]	Okoro Emeka	Adani	[signature]
[illegible]	Umunna Mack-ANTHONY CHIKELU	Adani	[signature]
[illegible]	Ugbaji Nkemdilim Lydia	Adani	[signature]
	Nnadozie Emmanuel-O-	Adani	[signature]
[illegible]	Olochie Augustine	Adani	[signature]
[illegible]	Ndidigwe Ezekiel Ekene	Adani	[signature]
[illegible]2	Amuche Sabastin	Adani	U.S.A
[illegible]3	Ejima Paul	Adani	E.P.
[illegible]4	Enemuo Felicia	Adani	[signature]
[illegible]5	Ugbaji Christina	Adani	[signature]
[illegible]6	Okoro Hyacintha Uchenna	Adani	[signature]
27	Okoro Monica	Adani	MS
28	ODO CHRISTIAN	Adani	[signature]
29	Ezugwu Adolphus C.	Adani	[signature]
30	Olaoye Johnson	Adani	[signature]
31	Okoye Samson Chinonso	Adani	[signature]
32	Nnamene Sunday Idu	Adani	[signature]
33	Francise Idu	Adani	[signature]
34	Ugbaji Victoria	Adani	[signature]
35	Achukita Victoria	Adani	[signature]
36	Augustine Ani	Adani	[signature]
37	JOHN EZE A.	Adani	[signature]

S/N	NAME	COMMUNITY	SIGN
37	Ifeanos Theresa	Adani	[signature]
38	Ugbaji Patricia	Adani	[signature]
40	Ilodinime Linnius. O	ADANI	[signature]
41	Orumajum Patricia. U	Adani	[signature]
42	Ugwuoke Isabella	Adani	[signature]
43	Ifekamma patience-O.	Adani	[signature]
44	Egbuniko Njideka	Adani	[signature]
45	Ifeanasi Dominic	Adani	

ENUGU APPEALS ESIA/ESMP PROJECT
COMMUNITY CONSULTATION ATTENDANCE SHEET

VENUE: Achi DATE: ……………………

S/N	NAMES	COMMUNITY	SIGN
	Azuka Ejimofor	Obodongwu	[illegible]
	Obiaguma Evelyn	Adoachi	OB Evelyn
	Josephine Onara	Obodongwu	Ico
	Florence Ejiagbasi	Obodongwu	F C J
	Adline Maduake	Obodongwu	[illegible]
	Evyline Nze	Obodongwu	ENE
	Bibian offorma	Adu	BB
	Josephine Obiaguma	Adu	[illegible]
	Oluedo Agatha	Adu	[illegible]
	Victoria Udesike	Umumba	V.U.U
	Agatha Ibenyenwa	Umumba	Agatha
	Violet Chukwu	Umumba	Violet.
	Onuzulike Oluchi	Obodongwu	[illegible]
	Obiefikponah felicia	Amaofiti Achi	[illegible]

Mr EZE SAMUEL L	AHANI Community ACHI	[illegible]
Mr Ojiekpezie Osita E.	Amankpunato Achi	[illegible]
ORSINGENE BARNABAS	Amanlawo Inyi	[illegible]
Mr. Ezika Thankgod	Isikwe Achi	[illegible]
Mr MAGY MAKWELL	ADU – ACHI	[illegible]
Chief Osita Umeoso	Awlaw	Jumeason
GEOFFREY Onwuchekwu	ADU Achi	[illegible]
ONUZULIKE Echezona	Enugu-agu Achi	[illegible]
Bernard Ezika	Adu - Achi	[illegible]
Emmanuel Nzebunachi	umueleochi	[illegible]
Onyeka Obiagwu	ADU ACHI	[illegible]
Ileka God noarah	umueleochi	[illegible]
Tobias Aduolezuwobi Onyeka	Enuhe Achi	[illegible]
Ugwu charity	Adu Achi	[illegible]
Ngozika chukwuyamgwo	Adu Achi	[illegible]
Chukwu Catherine	Ihe Achi	cc.c
OKoro Ebere	Adu Achi	[illegible]
ESTHER CHUKWUNONYERU	Adu Achi	[illegible]
Helen onur	Adu Achi	[illegible]
Umeano fatricia	Adu Achi	[illegible]
Obiagwuna Romanus	Adu Achi	[illegible]

ENUGU APPEALS ESIA/ESMP PROJECT
COMMUNITY CONSULTATION ATTENDANCE SHEET

VENUE: 9th Mile DATE: ....

S/N	NAMES	COMMUNITY	SIGN
1	Enebechi Chinenye favour	Obioma Udi L.G.A	[signature]
2	Onyia Felicia N.	Amokwe Udi L.G.A	[signature]
3	Chime Victoria .C.	Obioma Udi L.G.A	[signature]
4	Ugwu chekwube	Obioma udi L.G.A	[signature]
5	Obiagbunwe Egille	Obioma Udi L.G.A	[signature]
6	Nnandi Enyidiuru	Obingu Adaba in uzo-uwa L.G.A	[signature]
7	Ifeoma Enyi	Adaba in uzo-uwani L.G.A	[signature]
8	Ezugwu Solomon	9th mile Ngwo	[signature]
9	Owopori Timothy	9th mile ngwo	[signature]
10	Esther Nwakeze	9th mile ngwo	[signature]
11	Agbo Henry	9th mile ngwo	[signature]
12	Onyebuchi Olaum	udi Station	[signature]
13	onyia Chidiebere	ud Station	onyia
14	Nwebo Elizabeth	udi Station	nobe

	Ifeoma onyia	Obi oma	[signature]
	Sabastine Ohaeri	Amozeani	[signature]
	Charles Obodo	9th mile	[signature]
	Benard Onyia	Obi Oma	[signature]
	Okwor John Uchenna	~~Ukeze~~ 9TH MILE	[signature]
	James Nibia	~~Obinagboko Mba~~ 9TH MILE	[signature]
	Jane Igwe	Amokwe	[signature]
	UGWU SUSAN CHINWE	UBOJI	[signature]
	ODO SABINA UKAMAKA	AMAOBE Amalla ORBA	[signature]
	Ugwu Chika Lovett	Amakwe Udi	[signature]
	NGOZI NWEKE	OKWE NGWO	[signature]
	Chibi OSUJI	Kevin OSUJI	[signature]
	Odionye Uche .R.	UDI Station orieagu	[signature]
	Amoke Victoria	61 flyover Nmi udi	[signature]
	Fidelis Udeh	9th mile Ngwo	[signature]
	Ebere Uzdegbu	Obioma	Ebere
	Anthony Ugbo	9th mile	[signature]

ENUGU APPEALS ESIA/ESMP PROJECT
COMMUNITY CONSULTATION ATTENDANCE SHEET

VENUE: Ugwuomu Nike DATE: .....

S/N	NAMES	COMMUNITY	SIGN
1	CHINYERE ANYANWU	Ugwuomu	
2	Christie Okoye	Ugwuomu	
3	Samuel David	Ugwuomu	
4	Nathan David	Ugwuomu	D. N.
5	John Nebo	Nebo Farm Ugwuomu	
6	Linus Obaba	Ugwuomu	
7	Ani Chimezie Patrick	Ugwuomu Nike	
8	Olikeze Agro farms	Ugwuomu	
9	Aneke Kingsley. O	Ugwuomu	
10	Eddy Onyia farm	Ugwuomu	
11	Udeh Onwuteaka Ikechukwu.	Ugwuomu	
12	Nebo Emeka	Ugwuomu	
13	AYAFOR ONYEDIKACHI	NGWO	
14	Ogbodo Innocent	Ngwo	

ENUGU STATE APPEALS
ESIA/ESMP COMMUNITY CONSULTATION

VENUE: Oballo affor DATE: 6/11/2020

S/N	NAME	COMMUNITY	SIGN
1	Enoch Ugwu	Imilike Ani	
2	ALEKE Ikechukwu Valentine	Imilike – Ani	
3	Ugwu Elias Onuora	Imilike-Umo	
	Asogwa Anthony Ifeanyi	Imilike ani	
	EZE CRESCENT .O	UMUAGA EZIMO-AGU	
	Obetta Gabriel	Imilike Ani	G. U.O
	Affoma Jude Chijioke	Imilike Ani	
	Makata Perpetual N.	Imilike Ani	
	Ugwu Veronica Chigozie	Imilik Umo	
	Ugwueke Eric Obioma	Ezimo Agu	
	Ezeleke Alfred	Ezimo umo	
	Ugwu Alphonsus Chinedu	Ezimo – Agu	
	Omeje Ejiofor Valentine	Ezimo – Umo	
	Ugwueke Michael	Ezimo umo	
	Mba Brendan	Ezimo Agu	
	Eze Ikechukwu	Ezimo Agu	
	Nnamuchi Gregory	Ezimo Agu	
	Eze Malachy Ajiekwe	Oballo Afor	

Nwamani Jude Obinna	imilike enu	[signature]
Onah Kenneth .C.	Obollo-Afor	[signature]
Mba prus Chizoba	Ezimo Agu	[signature]
Odo Donkey Emeka	— —	[signature]
Ugwuoke Jude Emeka	—	[signature]
Ogbuisi John	Obollo – Afor	[signature]
Ogbonna Emmanuel Obinna	Obollo – Afor	[signature]
Anthony Ugwuoke	" "	[signature]
Louis Anthony Onyebuchi	Obollo – Afor	[signature]
Odoh Efeofor Romanus	Obollo – Orie	[signature]
Eze Nicholas Ike Chukwu	ORBA	[signature]
Eze Damien	Orba	E.D
Eze Francisca Nkechi	Orba	[signature]
Asogwa Amos Ifeanyi	Orba	[signature]
Ugwu Anthony Chimedu	Orba	[signature]
Eze Christian Chinedu	Obollo- Afor	[signature]
Ezugwu Erasmus Emeka	Orba	[signature]
Eze Jonathan	Ememu-ealee	[signature]
Ifeanyi Ugwuoke	Ezio uno	[signature]
Mba Emmanuel Kelechi	Ezimo Agu	[signature]
Ugwuoke Malachy Chisom	Ezimo Agu	[signature]

Ichie Innocent ? Odo C.	Ezimo – Uno	[signature]
Ucha Chukwu Obella	Obollo – Afor	[signature]
Odo Oluoma	OBollo Afor	O.O.C
Eze Christian	Ezimo Agu	[signature]
Umohulam J.C	Obollo Afor	[signature]
Ugwuoke Victor	Obollo Afor	[signature]
Ugwu Beneth .O.	Uda Enugu Ezike	[signature]
Oluchukwu ogbo	Uda Enugu Ezike	[signature]
Ezeme Celestine C.	Obollo Afor	[signature]
Mamah Kenneth	Umuunde	[signature]
Odo Norbert	Umunde	[signature]
Obiora mac-collins ogonna	Ezimo – Agu	[signature]
Okechukwu Blessing	Obollo Afor	[signature]
Onah Uchenna	Obollo Afor	[signature]
Onah Hyginus	Ezimo- uno	[signature]
Agbo Matthew	Orba	[signature]
Odo Michael onyedikachi	Obollo – Afor	O.M.O
Odo mercy	Amalla	[signature]
Ugwu Mercy	Amalla	[signature]
Ugwueze Chioma	Imilike – Agu	UFC
Abah Sarah Ngozika	Ezimo Uno	A.S.N

OBINAGU UDI

	NAME	COMMUNITY	SIGN
1	AROH GODWIN - M.	OBINAGU Udi	[signature]
2	ENE MARTIN -I.	obinagu Udi	[signature]
3	OWOH SOLOMON -A.	UDI TOWN	[signature]
4	ENECHI MARTIN OBIORA	UDI TOWN	[signature]
5	ENEH KINGSLEY C.	AMOKWE TOWN	[signature]
6	ONYIBA PASCHAL OBINNA	OBINAGU UDI	[signature]
7	OBELE CHINWE L.	UDI TOWN	[signature]
8	Juliet Ene	UDI TOWN	[signature]
9	Ene Uloma H.	✓ ✓	[signature]
10	Amaka Nebo	✓ ✓	[signature]
11	Chinyere Nebo	UDI TOWN	[signature]
12	Aneke Ugochukwu -C.	Obinagu udi	[signature]
13	ENEH CHIKA GABRIEL	AMOKWE UDI	[signature]
14	ANEKE STANLEY	UMUABI	[signature]
15	Chime John . C.	UDI TOWN	[signature]
16	AGUNWEZE AUGUSTINE	NACHI	[signature]
17	CHIME NKECHI HELEN	UDI TOWN	[signature]
18	Owoh Josephine .N.	Udi town	[signature]
19	Chime Benedette	Udi town	[signature]
20	OZOENEKWE CHIBUEZE . E	UDI TOWN	[signature]
21	ALIO Chimezie C	Obinagu udi	[signature]
22	Ezeh Adaeze . m.	Obinagu	[signature]
23	Chibuake Kingsley C.	Amokwe udi	[signature]

	NAME	COMMUNITY	SIGN
24	Ano Collins	~~Obingu~~ Obinagu	[signature]
25	NEBO Chioma	Udi town	[signature]
26	Aguorie Kenechukwu	umabi	[signature]
27	Onyia Chinonso . A	Udi town	[signature]
28	Aneke Chinedu C.	obinagu	[signature]
29	Aneke Chinweike E.	obinagu	[signature]
30	Agu Chidiebere	Obinagu	[signature]
31	Agu Chigozie	Amokwe	[signature]
32	Onyia Ernest Anayo	Amokwe	[signature]
33	Chime Canice	Udi	[signature]
34	Eneokepie Rosephina	AMOKWE	R.O.E
35	Nebo Modesta	AMOKWE	[signature]
36	Eneh Chibueze	Umuabi	[signature]
37	Owoh Lawrence	Udi Town	[signature]
38	ENEZE KENNETH N	OBINAGU	[signature]
39	Belonwu Ifeanyi Chukwu	Obinagu	[signature]
40	EZEMEKA CHIOMA .M	Obinagu	[signature]
41	OWOH Ifebuche -B.	Udi TOWN	[signature]
42	Ozongwu Patience .I.	Obeleagu	[signature]
43	EZE MICHAEL IZUCHUKWU N	OBINAGU	[signature]
44	Nwani Evelyn Uchechukwu	Udi Town	[signature]
45	ENE THEOPHILUS Obari	Umuabi	[signature]
46	AGU ERIC Onyedikachi	Obinagu	[signature]

SN	NAME	COMMUNITY	SIGN
47	Paul Nwanu	[illegible]	
48	Samuel Duron	[illegible]	
49	Chike Ezeilo	[illegible]	
50	IGBO Chinenye	Udo	
51	OKOLO Enebechi #	OBIAGU	
52	ARINZE ANEKE V	AMOKWE	
53	OGO ANTHONY	OBINAGU	Anthony
54	Chukwu Immanuel - C.	OBINAGU	Immanuel
55	ANEKE KEVIN	OBINAGU	
56	AGU MOSES .A.	Amorise NSUKKA	
57	Onyiba Uloma D	Obinagu	
58	Frank Nwachukwu O	Obinagu	
59	Ebene Raphael onyebuchi	Umuabi	R.O. Ebene
60	Anozie Celestine	Obinagu	
61	Achime Chinaeke me	Obinagu	Ach
62	Amugwu Okechukwu .B.	Amorise	
63	Chibuike Ude	Amokwe	
65	Chidubem onyeka	Amokwe	
66	Ezeoa Uzoma .C.	Umuabi	
67	Achimere Ifeoma	Obinagu	IJ
68	Ene Onyinye Rita	Obinagu	

ENUGU APPEALS ESIA/ESMP PROJECT
COMMUNITY CONSULTATION ATTENDANCE SHEET

VENUE: NGURU NSUKKA DATE: .....

S/N	NAMES	COMMUNITY	SIGN
001	AJIBO STEPHEN Okwudili	EBURUMMIRI NSUKKA	
002	AJIBO IBEBUIKE	EBURUMMIRI NSUKKA	
003	Ugwu Ebere Martha	Nguru NSUKKA	
004	Asogwa Stella N.	Nguru NSUKKA	
005	Asogwa victoria O	Nguru NSUKKA	
006	Asogwa Felicia .O-	Nguru NSUKKA	
007	Ugwu Jeneth	Uguru NSukka	
008	Asogwa Chigozie	Uguru NSukka	
009	Asogwa Florence	Uguru NSukka	
10	Asogwa Emmanuel	Nguru — NSukka	
11	Asogwa Ekene	Patalca Nguru NSukka	
12	EZE Mamji Collins	Obra NSukka	
13	Ekoli Alphens	Obimo NSukka.	
14	[illegible]	[illegible]	
15	Asogwa Chinonso. C	Nguru NSukka	
16	Ugwoke Emmanuel	Asbani Nguru NSC.	
17	Obettah Raphael	Anglican Rel. Nsk	
18	EZEA AMBROSE	NGURU NSUKKA	

SN	NAMES	COMMUNITY	SIGN
1	Omele Livinus Olisaemeka	Obimo	
2	Ezema Sunday Ejike	Edem Ani	
3	Ugwuanyi Emmanuel. S	Nguru	
4	John Chidi Ugwuoke	Eha-ndiagu	
5	Ajibo Clara Onyinye	Edem Ani	
6	Amadi Jude C	~~Nguru~~ Aku	
7	Ajibo Favour	Edem Ani	
8	OBETA JESSICA EZINNE	Nguru	
9	UGWU KENECHUKWU CHRISTIAN	Nguru	
10	Amos Cyriacus Amadi	Umu Lifa	
11	Ezema Anezi	Edem-Ani	
12	ASOGWA CHINONSO	EDEM-ANI	
13	Ugwuanyi Patricia	Nru	
14	Ugwuanyi Sunday S.	Nru	
15	ABUGU KASIEMOBI EUGENE	EZIANI	
16	ONYISHI Johnbosco.	Edem Ani	
17	uGwu martha	nguru	
18	Asogwa Uchechukwu	Nguru	
19	Ezema chidera	Nguru	
20	Ezema Chekwube	Nguru	

SN	NAMES	COMMUNITY	SIGN
1	EZE ONYEKACHI CANDIDUS.	NRU	
2	Mmaede Kelechi elvely	Onuiyi	
3	Mmaede Chukwudi Davidson	Onuiyi	
4	Ezike Uchenna Nichodemus	Onuiyi	
5	ODINKO EBERE .C	Obukpa	
6	Idike Anthony . O	Edem Ani	
7	UBANNA AMARACHI .I.	Onuiyi	
8	UBANNA EJIOFOR .C.	Onuiyi	
9	Okpanaeze SamDavid Amaechi	Nru Nsukka	
10	Ugwu Esther	Ngwuru Nsukka	U.E
11	Mrs Asogwa Cecilia	Ngwuru	A.C
12	Mr. Asogwa Ignatius	Ngwuru	A.I
13	mrs Ifeoma Ugwu I.G.	Ngwuru	M.I. Ugwu.
14	Mr Eze Ikechukwu Patrick	Umakashi Nsukka	
15	ICABUDO LAZARUS .O.	Esuona/Umuamu Leija	
16	Onyishi Titus U	Aguleke up Ofulu RD NSK	
17	Ezema Malachi. C	Agueke up Ofulu RD NSK	
18	Ezema Martins	Nguru Nsukka	
19	Ugwu Christian Chukwunweike	Odoru Nsukka	
20.	Eze Obinna Victor	Edem-Ani	
21	Mbah Victor Igwebuike	Nguru Nsukka	
22	Sylvanus Amene Onyishi	Nguru Nsukka	

ENUGU APPEALS ESIA PROJECT

STAKEHOLDERS CONSULTATION ATTENDANCE SHEET

VENUE: ENUGU APPEALS OFFICE CONFERENCE HALL **DATE: ……………………………….**

S/N	NAME	ORGANISATION	POSITION	SIGNATURE
1	Eze Livinus C	Civil deffence	08037441300	[signature]
2	Godswill-Ebelechukwu Mercy.	Consultant Office	08039470374	[signature]
3	Okwegbube Chukwuemeka (Asst.	Civil Defence	07037858100	[signature]
4	Onyia Ifeoma (Nwaku)	DR. Admi MOA	08037688492	[signature]
5	Ir. M. O. Oru	ENADEP, PM	08033610381	[signature]
6	Joseph Udeh	RIFAN	080 688 44582	[signature]
7.	Ejim Lovelyn Nnenna	RIFAN	07039527992	[signature]
8	Denny Manuel PRO	Civil Defence	08037219270	[signature]
9	Onugwu Chris Nelson	Min of Agric	08037739127	[signature]
10	Ozor Fidelis Chukwuma	✓ ✓	07065125500	[signature]
11	Ene Martin	farming	08069119993	[signature]
12	Ofechukwu Udeh	farming	08102760888	[signature]
13	Christie Okoye	farming	07035749663	[signature]
14	Esther Nwokedi	Cashew	08037467720	[signature]
15	Mbah Benjamin O.	RICE producer	08038773828	[signature]
16-	Enyinnaya Igwe	ESWAMA.	08033168781	[signature]
17	Ezugwu Solomon O	Cashew Market	08179300464 0706	[signature]
18	Okwoh Solomon -	UDI poultry Ass	0810 67741525	[signature]
19	Ivo Theophilus R	APPEALS	APS (08038677549	[signature]
20	Dialoke Emmanuel A.	Appeals	TA 08167373420	[signature]
21	Dr Ossai Jonathan C.	✓	VCF Poultry 08033788088	[signature]
22	Dr Cornel Udeh	[illegible] Farms	Director 08033372052	[signature]

ANNEX 2: SAMPLE COPY OF ADMINISTERED QUESTIONNAIRE

Dear Respondent,

We are conducting Environmental and Social Impact Assessment (ESIA) of Enugu State APPEALS Projectsin your community. Please kindly answer the following questions correctly to enable us achieve this assignment.

SECTION A: BIO-DATA SECTION

1. Name of Respondent: .....
2. Village: .....
3. Community: .....
4. L.G.A / State: .....
5. Phone Number: .....

6	Gender	Tick as applicable
6_1	Male	
6_2	Female	

7	Age range of respondent	Tick only ONE option
7_1	15 years and below	
7_2	16 – 30 years	
7_3	31– 45years	
7_4	46– 60 years	
7_5	61 and years	

8	Marital Status	Tick as applicable
8_1	Single	
8_2	Married	
8_3	Divorced	
8_4	Separated	
8_5	Widow	
8_6	Widower	

9	Level of Education	Tick only ONE option
9_1	Primary	
9_2	Secondary	
9_3	Vocational/Technical	
9_4	Tertiary	

9_5	None	

10	**Religion**	**Tick only ONE option**
10_1	Christianity	
10_2	Islam	
10_3	Traditional practice	
10_4	Others (specify)	

11	**How long have you lived in this community/village**	**Tick only ONE option**
11_1	1 – 10years	
11_2	11 – 20 years	
11_3	21 – 30	
11_4	31 and above	

SECTION B: HOUSEHOLD COMPOSITION

12a. Name of Household Head:.....

12b. Relationship with Household Head:.....

13	**Family Size**	**Tick as applicable**
13_1	1 – 5 persons	
13_2	6 – 10 persons	
13_3	11 – 15 persons	
13_4	16 – 20 persons	

SECTION C: OCCUPATION & SOURCE(S) OF LIVELIHOOD

14	**Activity**	**Tick as applicable**
14_1	Civil Servant	
14_2	Crop Farming	
14_3	Animal Farming	
14_4	Horticulture	
14_5	Trading	
14_6	Artisan	
14_7	Student	
14_8	Agro Processing	
14_9	Transportation	
14_10	Private Sector	
14_11	Professional Discipline (Medical Doctor, Lawyer, Accountant, Engineer etc)	
14_12	Public Servant	
14_13	Retired	
14_14	None	
14_14	Hunting	
14_15	Others (specify)	

15	**Monthly Income Status (₦'000)**	**Tick only ONE option**
15_1	5,000 and below	
15_2	6 – 10	
15_3	11 – 15	
15_4	16 – 20	
15_5	21 – 25	
15_6	Above 25	

15_7	None	

SECTION D: CULTURAL AND HISTORICAL HERITAGES

16	**What are the cultural/historical heritage(s) in the community?**	**Tick as applicable**	
		Yes	**No**
16_1	Shrines		
16_2	Forest Reserve		
16_3	Sacred Grooves		
16_4	Stream		
16_5	Others		

17	**Which of these cultural/historical heritage(s) need to be protected within the project area community**	**Tick as applicable**	
		Yes	**No**
17_1	Shrines		
17_2	Forest Reserve		
17_3	Sacred Grooves		
17_4	Stream		
17_5	Others		

18	**What are the common food in your community**	**Tick as applicable**	
		Yes	**No**
18_1	pounded yam,		
18_2	cassava flour,		
18_3	Okpa (cowpea),		
18_4	Abacha		
18_5	Rice		
18_6	Cocoyam		

18_7	Beans		

SECTION E: PHYSICAL/SOCIAL FACILITIES IN THE COMMUNITY

19	Amenity	I	II	III	IV	V	VI	VII
19_1	**Water**	Pipe borne	Borehole	Rain water	Stream	Spring water	Water vendor	Well
19_2	**Energy**	Electricity	Generator	Gas lamp	Kerosene lamp	Wike Lamp	Solar panel	
19_3	**Roads**	Tarred/ Asphalt	Concrete paved	Graded road	Wide Earth	Foot path	Others	
19_4	**School**	Nursery/Kindergarten	Primary	Secondary	Vocational/ Technical	Tertiary	theological	None
19_5	**Market**	Built lock up stalls	Built open market	Unbuilt/open village market	Others			
19_6	**Health**	Hospital/Health Centre	Private Clinic	Maternity	Dispensary	Traditional Healing home	Patent Medicine Store	None

SECTION F: CONDITIONS OF COMMUNITY FACILITIES

20	**Facility**	**Condition**	
		Good	**Bad**
20_1	**School**		
20_1a	Nursery		
20_1b	Primary		
20_1c	Secondary		
20_1d	Vocational/ Technical		
20_1e	Tertiary		
20_2	**Hospital**		
20_2a	Hospital/Health Centre		
20_2b	Private Clinic		
20_2c	Maternity		
20_2d	Dispensary		
20_2e	Patent Medicine Store		
20_3	**Water**		
20_3a	Pipe borne water		
20_3b	Well		
20_3c	Borehole		
20_4	**Market**		
20_4a	Built lock up stalls		

20_4b	Open market		
20_5	**Recreational**		
20_5a	Town hall		
20_6	**Road**		
20_6a	Tarred		
20_6b	Concrete		
20_6c	Graded		
20_6d	Wide Earth		
20_6e	Foot Path		

SECTION G: BIO-DIVERSITY

21	**Common crops grown in the community**	**Tick as applicable**	
		Yes	**No**
21_1	Cassava		
21_2	Yams		
21_3	Cocoyam		
21_4	Plantain/Banana		
21_5	Vegetables		
21_6	Rice		
21_7	Maize		
21_8	Cashew		
21_9	Pineapple		
21_10	Oil palm		
21_11	Beans		
21_12	Others (specify)		

22	Common Animals found in the community	Tick as applicable	
		Yes	No
22_1	**Avian**		
22_2	Grey Dove		
22_3	Kite		
22_4	Hawk		
22_5	Eagle		
22_6	Pigeon		
22_7	Owl		
22_8	Parrot		
22_9	Bush Fowl		
22_10	**Rodents**		
22_12	Cane Mouse		
22_13	Squirrel		
22_14	Shrew		
22_15	Grasscutter		
22_16	Yellow Antelope		
22_17	**Mammals**		
22_18	Bush Pigs		
22_19	Porcupine		
22_20	Monkey		
22_21	**Cat**		
22_22	Civet Cat		
22_23	**Reptiles & Amphibians**		
22_24	Crocodile		
22_25	Tortoise		

22_26	Monitor Lizard		
22_27	Agama Lizard		
22_28	Snake		

SECTION H: LIFE STYLE AND VALUE

23	**Which of the following life styles are common in your community**	**Tick as applicable**	
		Yes	**No**
23_1	Smoke cigarette		
23_2	Drink alcohol		
23_3	Prostitution/patronize prostitution		
23_4	Drug		
23_5	Smoke marijuana		
23_6	Theft		

SECTION I: GENDER BASED VIOLENCE (GBV) RISK

24	**Indicate the most vulnerable GBV in your community**	**Tick as applicable**
24_1	Women	
24_2	Girls	
24_3	Both	
24_4	None	

25	**Identify type of GBV in your community**	**Tick as applicable**
25_1	Physical abuse	
25_2	Sexual abuse	
25_3	Economic deprivation	

25_4	Threats	

26	**Which of these GBV will be increased/exacerbated by the project**	**Tick as applicable**
26_1	Sexual abuse	
26_2	Physical abuse	
26_3	Threat	
26_4	Economic Deprivation	

27	**How do you deal with GBV incidences**	**Tick as applicable**
27_1	Report to the Law Enforcement Agency	
27_2	Report to the Igwe in-Council	
27_3	Report to the Village Head	
27_4	Report to the Kindred	

SECTION J: HEALTH AND WELLBEING

28	**Did you or any member of your family suffer from any of these diseases in the last 6 months**	**Tick as applicable**	
		Yes	**No**
28_1	Malaria		
28_2	Diarrhea/Dysentery		
28_3	Cough		
28_4	Typhoid		
28_5	Cholera		
28_6	Gastro-enteritis		
28_7	Scabies		
28_8	Chicken Pox		
28_9	Measles		
28_10	Rashes		

28_11	Worm Infestation		
28_12	STD and HIV/AIDS		
28_13	Body pains		
28_14	Joint pains		
28_15	Dizziness		
28_16	Injuries		
28_17	Accidents		
28_18	Cancer		

29	**Which of these health facility do you patronize**	**Tick as applicable**	
		Yes	**No**
29_1	Hospital		
29_2	Drug store		
29_3	Traditional healers		
29_4	Self-medication		

SECTION K: IMPACT OF PROPOSED PROJECT INTERVENTION

30	**IMPACT**	**Tick as applicable**	
		Yes	**No**
30_1	**LAND**		
30_1a	Virgin land		
30_1b	Economic trees		
30_1c	Forest trees		
30_1d	Erosion		
30_1e	Waste generation		

30_1f	Crops & vegetables		
30_1g	Loss of soil nutrient		
30_2	**WATER**		
30_2a	Siltation		
30_2b	Water pollution		
30_2c	Odour		
30_2d	Others		
30_3	**AIR**		
30_3a	Odour		
30_3b	Dust/participate matter		
30_3c	Gas emission		
30_4	**BIO-DIVERSITY**		
30_4a	Loss of flora		
30_4b	Loss of fauna		
30_4c	Migration of animals		
30_4d	Extinction		
30_5	**BENEFITS**		
30_5a	Employment		
30_5b	Source of livelihood		
30_5c	Increase in land value		
30_5d	Availability of food		
30_5d	Increase in income		

Name of Enumerator: …….

ANNEX 3: LIST OF FACILITIES IN PROJECT COMMUNITIES

OBOLLO AFOR			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE**
1	a. Community Primary School Obollo-Afor b. Community Primary School Ohullor c. Community Primary School Amutenyi d. Community Primary School Iheakpu e. Community Primary School Okpulor f. Community Secondary School Umundu g. Community Secondary School Ezimo h. Community Girls Secondary School Iheakpo i. Community Secondary School Amala j. Girls Secondary School Obollo-Afor k. Technical School Umuitodo l. Technical School Igwugwu m. Girls Technical School Obollo-Afor n. Technical School Obollo-Etiti o. Technical School Obollo-Eke	a. Health Centre Obollo-Afor b. Health Centre Ezimo-Agu c. Health Centre Igwugwu d. Health Centre Orba e. Health Centre Imilike-Enu	a. Yam Festivals b. Aja Okike c. Akatakpa (masquerade) d. Omabe
ACHI			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE/FESTIVAL**
2	a. Aham Community Nursery & Primary School b. Umuowuru Community School Enugu Agu c. Community School Adu Achi d. Rainbow Primary School e. Community Ehuhe Achi f. Achi Girls Secondary School g. Anglican Grammer School Achi h. Our Lady Rainbow of Peace Achi i. Corpus Christi College Achi j. Afoc Secondary School Achi k. Model Community Secondary	a. Achi Joint Hospital Isikwe Cottage Hospital b. Adu Health Centre c. Nkpokoro Health Centre d. God's Glory Maternity Isikwe e. Maternity Health Centre Ahani f. Health Centre Amaetiti	a. Ogaga Agwu Agwu b. Nnekeji c. Ahaoha Festivals a. Okekparakpara b. AjahNihe c. Alaenugu d. Achiihi e. Ngene f. Agwuamagu g. Agwueze

	School l. Estach Secondary School m. Technical Secondary School Ahanu		
EHA-ALUMONA			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE/FESTIVAL**
3	**1. PRIMARY SCHOOL** a. Primary School Akwanri **b.** Community Primary School Ehalumona	EhaAlumona Health Center	a. Ekaala b. Iwaji c. Akatakpa (Masqurade) d. OkikeIgbogbo (irijiohuru festival) a. OkikeIgbogbo
OBINAGU UDI			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE/FESTIVAL**
4	a. Central School Obinagu b. Premier Primary School Udi c. Community Primary School Udi d. Hillside Primary School Udi e. Comprehensive High School Udi/Abia f. Mater Dei Secondary School Udi g. Community Secondary School Udi h. Chibugwu Vocational Secondary School Udi i. Udi Technical College j. Road Safety University	a. Udi General Hospital b. Bethany Hospital Udi c. Maternity d. Obinagu Health Centre	a. Ani Udi b. Ojezulu Obinagu c. Aniezi Obinagu d. Eke Amokwe e. Ani Umueze f. OjukwuAmaohia g. Mkpuruani h. Aniobodo
NENWE COMMUNITY			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE/FESTIVAL**
5	a. Ogwu High Schools Nnewe b. Community Primary School UhezeNnewe c. Central School UhezeNnewe d. Community primary School Obeagu Uheze Nnewe e. Community Primary School Ezecho UhezeNnewe	a. Nnewe Health Centre b. Agbada Health Centre c. Emudo Health Centre d. Uleze Health Centre e. Enugu n'ato Primary health Centre f. Cottage Hospital Uleze	a. Yam Festival b. OririAni c. Okokoro Festival d. Ochu Festival e. Echichi f. Mgbudumgbu g. Ajaafo h. Obereehi festival

	f. Community Primary School Umualubuoji UhezeNnewe g. Community Secondary school UhezeNnewe h. Girls High School UhezeNnewe i. Comprehensive Secondary School UhezeNnewe j. Community Secondary School AmorjiNnewe k. St Johnbosco Secondary School Nnewe l. Central School EmudoNnewe m. Community Secondary School EmudoNnewe n. ReginusAdvernial Secondary School Nnewe Kingdom Primary School AgbadaNnewe	g. Our Saving Grace Hospital h. St Peter Hospital Nnewe i. Beacon Hospital AmorjiNnewe j. Primary Health Centre AmaekeOduma k. Basic Health Centre Ezunesi/OhafiaOduma l. St Luke Private Hospital Doc Ken Pharmacy	i. Ochuchuaho festival j. Ofala festival k. AniNnewe l. Eke UkwuNnewe m. Eke UkwuNnewe n. NgeneDibia o. Obena Dike p. AkparataUmewo q. OvuruIkweEzeecho r. NgwuNnewe s. AchiUmuola t. AkpawaAgbada u. AniNgeneAwanta v. Ani ne egbaOduma w. AjanaOhafia x. NgeneigaUmuene y. AniAmagu z. AniUkwuUkete aa. Ajan'ekeOduma
NSUKKA UGWURU			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE/FESTIVAL**
6	a. Agbaningwuru primary school b. Community primary school c. Ogbaegu primary school d. GTC (Government Technical College)	a. Nsukka Health Centre	b. Egbaomabe c. Onwaise d. Egorigo e. Shanjioku (Iwaji)
EHA AMUFU			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE/FESTIVAL**
7	a. Eha Township Primary School b. Ngene-Aguiyi Primary School a. Ogomugo Primary School c. EhaOhalla Primary School b. Federal College of Education d. Ovarel Primary School c. Community Secondary School Eha- Ohalla e. Community Primary School	a. Eha- Amufu Health Center	d. Wrestling e. New Yam festival m. Omeba f. Odoh n. Edenyi g. Ekpe o. Ikpuzo

	Umu-Umuchu f. EhaOhalla Central School g. Emancipation High School h. St. John Secondary School Agumaele i. Divine Secondary School Nursery, Primary & Secondary School j. Community Secondary School Isu k. Union Secondary School Eha-Amufu l. Community Secondary School Ikpakpara		
ADANI			
S/N	**SCHOOL**	**HEALTH**	**CULTURAL HERITAGE/FESTIVAL**
8	a. Martha Comprehensive Primary & Secondary Schools b. Uzo- Uwani Secondary School	a. Help of the sick b. Akwata Memorial Hospital	a. Nnadidiety c. Adoro deity d. Obi-nna stream deity

Source: Field Survey Nov. 2020

ANNEX 4: SUMMARY OF WORLD BANK SAFEGUARDS POLICIES

Use of Country Systems (OP 4.00). The Bank's environmental and social ("safeguard") policies are designed to avoid, mitigate, or minimize adverse environmental and social impacts of projects supported by the Bank. The Bank encourages its borrowing member countries to adopt and implement systems that meet these objectives while ensuring that development resources are used transparently and efficiently to achieve desired outcomes.

Environmental Assessment (OP 4.01). Outlines Bank policy and procedure for the environmental assessment of Bank lending operations. The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of EA process. This environmental process will apply to all sub-projects to be funded.

Natural Habitats (OP 4.04). The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development.

Pest Management (OP 4.09). The policy supports safe, affective, and environmentally sound pest management. It promotes the use of biological and environmental control methods. An assessment is made of the capacity of the country's regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management.

Involuntary Resettlement (OP 4.12). This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by

a The involuntary taking of land resulting in

I Relocation or loss of shelter;

II Loss of assets or access to assets, or

III Loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or

b The involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons. The ESMF and RPF reports discuss the applicability of this policy in detail.

Indigenous Peoples (OD 4.20). This directive provides guidance to ensure that indigenous peoples benefit from development projects, and to avoid or mitigate adverse effects of Bank-financed development projects on indigenous peoples. Measures to address issues pertaining to indigenous peoples must be based on the informed participation of the indigenous people themselves. Sub-projects that would have negative impacts on indigenous people will not be funded

Forests (OP 4.36). This policy applies to the following types of Bank-financed investment projects:

a Projects that have or may have impacts on the health and quality of forests;

b Projects that affect the rights and welfare of people and their level of dependence upon or interaction with forests;

c Projects that aim to bring about changes in the management, protection, or utilization of natural forests or plantations, whether they are publicly, privately, or communally owned. The Bank does not finance projects that, in its opinion,

would involve significant conversion or degradation of critical forest areas or related critical habitats.

Physical Cultural Properties (OP 4.11). Assist in preserving physical cultural resources and avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, religious (including graveyards and burial sites), aesthetic, or other cultural significance.

Safety of Dams (OP 4.37). For the life of any dam, the owner is responsible for ensuring that appropriate measures are taken and sufficient resources provided for the safety to the dam, irrespective of its funding sources or construction status. The Bank distinguishes between small and large dams.

Projects on International Waterways (O 7.50). The Bank recognizes that the cooperation and good will of riparians is essential for the efficient utilization and protection of international waterways and attaches great importance to riparians making appropriate agreements or arrangement for the entire waterway or any part thereof.

Disputed Areas (OP/BP/GP 7.60). Project in disputed areas may occur in the Bank and its member countries as well as between the borrower and one or more neighbouring countries. Any dispute over an area in which a proposed project is located requires formal procedures at the earliest possible stage.

Disclosure Policy (OP 17.50). Supports decision making by the Borrower and Bank by allowing the public access to information on environmental and social aspects of projects. This policy is mandated by six safeguard policies that have specific requirements for disclosure in country (Before project appraisal in local language and in English) and World Bank INFO-Shop (Before project appraisal in English). Documents can be in draft but must meet WB standards).

ANNEX 5:

ESIA STAKEHOLDERS CONSULTATION AT APPEALS CONFERENCE ROOM

S/N	ITEMS	DESCRIPTION
1	Projects	ESIA Stakeholder Consultation
2	Venue	APPEALS Conference Room
3	Date	21st December, 2020
4	Language of Communication	Igbo and English
5	Introduction	The ESIA Draft Report was presented by the Principal Consultant, Green Earth Environmental Consult, Chief Dennis Nebedum. After which, the audience were allowed to comment and ask questions
6	Comments/Concerns	Mrs. Ejim Lovelyn suggested that a portion of land should be mapped out and made available for rice processing this will help reduce the negative impacts associated with rice processing. She also appealed that rice farming should be improved by making seedlings available at the right time. Mr. Denny Emmanuel commended the detailed report put together by the Consultant. He requested for the full implementation of the mitigation measures in the report, to ensure safety of the public. Mr.Enyinnaya Igwe commended the Consultant for his detailed report. He stressed the importance of environmental cleanliness and also that most of the waste generated from the agricultural sector are wealth viz-a-viz poultry droppings, cleared vegetations, rice husk etc. He also acknowledged that the major challenge faced by poultry farmers is marketing and suggested that a poultry marketing board should be constituted. He also emphasized the need for farmers to synergize since they are in need of each other one way or the other. APPEALS Agro Processing Specialist, Mr. Ivo assured the full implementation of the ESIA as recommended and incorporation of the project impact and mitigations in every business plan.
9	Closing	Closing Prayers was said by Dr. Jonathan Ossai at 1.45pm

ANNEX 6: GENERAL ENVIRONMENTAL MANAGEMENT CONDITIONS

This section deals with the purpose and structure of the Contract. It allocates responsibilities and sets up the procedures for making the Contract work. Underlying it are the basic principles of clear definition of roles, responsibility for outcomes, and promoting best practice. The management conditions for construction contracts detailed here have been extracted and modified, as appropriate for the gully erosion intervention project, from the Environmental and Social Management Framework for State and Local Governance Reform (SLOGOR) Project of the Federal Government of Nigeria (2013) and the New South Wales (Australia) Government General Conditions of Contract (GC21; 2013).

General responsibilities to the Contractor must:
Construct the Works in accordance with the Contract; and Perform and observe all its other obligations under the Contract. The Principal (herein also referred to as APPEALS PMU) must: Pay the Contractor the Contract Price for its performance, in accordance with and subject to the Contract; and Perform and observe all its other obligations under the Contract. The APPEALS PMU may give instructions to the Contractor concerning the Works and anything connected with the Works, and the Contractor must comply at its own cost unless the Contract expressly provides otherwise.
Contractor's Authorised Person the Contractor must ensure that, at all times, there is a person appointed to act as the Contractor's Authorised Person. The Contractor's Authorised Person acts with the Contractor's full authority in all matters relating to the Contract. The Contractor must promptly notify the Principal of the name and contact details of the Contractor's Authorised Person and of any change in those details. If the Principal reasonably objects to the Contractor's Authorised Person at any time, the Contractor must replace that person.

Principal's Authorised Person:
The Principal must ensure that, at all times, there is a person appointed to act as the Principal's Authorised Person. The Principal must promptly notify the Contractor of the name and contact details of the Principal's Authorised Person and of any change in those details. The Principal's Authorised Person does not act as an independent certifier, assessor or Valuer. The Principal's Authorised Person acts only as an agent of the Principal. The Principal's Authorised Person may delegate any of its contractual functions and powers to others by written notice to the Contractor. Co-operation the parties must do all they reasonably can to co-operate in all matters relating to the Contract, but their rights and responsibilities under the Contract (or otherwise) remain unchanged unless the parties agree in writing to change them. Duty not to hinder performance each party must do all it reasonably can to avoid hindering the performance of the other under the Contract.

Early warning each party must promptly inform the other if it becomes aware of anything that is likely to affect the time for Completion, or the cost or quality of the Works. The parties must then investigate how to avoid or minimise any adverse effect on the Works and Scheduled Progress. Evaluation and monitoring as the Contract proceeds, regular meetings (usually monthly) allow the parties and selected stakeholders to evaluate performance and identify priorities for improvement. The parties must meet regularly to evaluate and monitor performance of the Contract. The

parties must decide jointly who will participate in the meetings. Participants may include Subcontractors, Suppliers, Consultants and, if appropriate, representatives of government authorities, end users and local communities. Participation in meetings does not give the participants any additional rights or responsibilities. Participants in the evaluation and monitoring meetings must meet their own costs for attendance, and the parties must share equally the other costs. The Contract the Contract is formed by the Principal sending a Letter of Award to the Contractor, unless the Principal requires the Contract to be formed by execution of a formal agreement or deed. The Contract is made up solely of the Contract Documents, which supersede all understandings, representations and communications made between the parties before the Date of Contract in relation to the subject matter of the Contract. The Contract Documents must be read as a whole, and anything included in, or reasonably to be inferred from, one or more documents must be read as included in all other documents, unless the context requires otherwise. The terms of the Contract cannot be amended or waived unless both parties agree in writing. Even where a Letter of Award has been used to form the Contract, the Principal may require the Contractor to execute a formal agreement or deed on terms no different from those contained in the existing Contract Documents. If required, the Contractor must execute and return to the Principal two copies of the agreement or deed within 14 days after the Principal's written request for their execution. The Principal will return an executed copy to the Contractor. Scope of the Works, Temporary Work and work methods The Contractor acknowledges that: it is both experienced and expert in work of the type, complexity and scale of the Works; it has made full allowance in the Contract Price for the matters referred to in the contract document; unless the Contract expressly provides an entitlement to payment, everything required to be done by the Contractor under the Contract is to be done at the Contractor's own cost. The Contractor acknowledges that Variations instructed by the Principal may change the scope of the Works. Unless the Contract specifies, or the Principal instructs, that the Contractor use a particular work method or perform particular Temporary Work, the Contractor is solely responsible for determining the work methods and the requirements for all Temporary Work. If requested in writing by the Principal, the Contractor must, within the time specified in the request, advise the Principal of: its price (excluding all costs of delay or disruption) for any proposal by the Principal to use a particular work method or perform particular Temporary Work proposed by the Principal or to change a work method or Temporary Work specified in the Contract; the anticipated effect of the Principal's proposal on achieving Completion; and the effect of the Principal's proposal on any other matter specified by the Principal. If the parties agree in writing on the effects of the Principal's proposal and the Principal instructs the Contractor to carry out the proposal, any affected Contractual Completion Dates and the Contract Price must be adjusted as agreed. Assignment The Contractor must not assign a right or benefit under the Contract without first obtaining the Principal's written consent. Governing law of the Contract the Contract is governed by World Bank Operational Directives, the laws of Nigeria and Enugu State, and the parties submit to the non-exclusive jurisdiction of the courts of Cross River State. Subcontractor relationships The Contractor is solely responsible for all Subcontractors and is liable for their acts and omissions as if such acts or omissions were those of the Contractor. Subcontracting of any obligation under the Contract does not affect the Contractor's obligations or liability under the Contract. The Contractor indemnifies the Principal against all claims (including Claims), actions, loss or damage and all other liability arising out of any acts or omissions of Subcontractors. The Contractor must include

in every Subcontract details of the Contractor's obligations in connection with the Contract which are to be carried out by the Subcontractor; consent for the Subcontract to be notated to the Principal or its nominee, if required by the Principal; and when possible, a right of termination for convenience.

Contract Provisions for Civil Works:
Environmental and Social Impacts 1:
General Provisions and Precautions The contractor shall take all necessary measure and precautions and otherwise ensures that the execution of the works and all associated operations on the work sites or off site are carried out in accordance with the World Bank's Performance Standards and the requirements of applicable legislation and environmental requirement of Nigeria. The contractor shall take all measures and precautions to avoid any nuisance or disturbance arising from the execution of the work. This shall, wherever possible, be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated. In the event of any soil or debris or silt from the work sites being deposited on any adjacent land, the contractor shall immediately remove all such spoil debris or silt and restore the affected area to its original state to the satisfaction of the responsible authorities.

Water Quality:
The following conditions shall apply to avoid adverse impacts to water quality:
(a) The contractor shall prevent any interference with supply to, or abstraction from, water resources and the pollution of water resources (including underground percolating water) as a result of the execution of theworks.
(b) The contractor shall not discharge or deposit any matter arising from the execution of the work into anywaters except with the permission of the regulatory authorities concerned.
(c) The contractor shall at all times ensure that all existing stream courses and drains within and adjacent tothe site are kept safe and free from any debris and any material arising from the works.
(d) The contractor shall protect all water courses, waterways, ditches, canals, drains, and the like from pollution, silting, flooding or erosion as a result of the execution of the works.

Air Quality:
The following conditions shall apply to avoid adverse impacts to air quality:-
Open burning will be prohibited.
In periods of high wind, dust- generating operations shall not be permitted within 200 meters of residential areas having regard to the prevailing direction of the wind.
Asphalts and hot- mix plants sites shall be located at least 500 meters away from the nearest sensitive receptor (e.g. schools).
Water sprays shall be used during the delivery and handling of materials when dust is likely to be created and to dampen stored materials during dry and windy weather.
Stockpiles of materials shall be sited in sheltered areas or within hoarding, away from sensitive areas. Stockpiles of friable material shall be covered with tarpaulins.
Vehicle with an open load–carrying area used for transporting potentially dust-producing material shall have proper fitting side and tailboards. Materials having the potential to produce dust shall not be loaded to a level higher than the side and tail boards, and shall be covered with a clean tarpaulin in good condition. The tarpaulin shall be properly secured and extend over the edges of the side and tailboards.

In periods of adverse weather adverse, impacts to adjacent residents or site employees during construction will be mitigated by either discontinuing until favourable conditions are restored, or, if warranted, sites may be watered to prevent dust generation.
Machinery and equipment shall be fitted with pollution control devices, which will be checked at regular intervals to ensure that they are in working order. Best available pollution control technologies will be used.

Protection of soils:
Borrow pits:-
The following conditions shall apply to borrow pits:
Borrow areas will be located outside the ROWs.
Pit restoration will follow the completion of works in full compliance of all applicable standards and specification.
The excavation and restoration of the borrow areas and their surroundings, in an environmentally sound manner to the satisfaction of regulatory authorities is required before final acceptance and payment under the terms of contracts.
Borrow pit areas will be graded to ensure drainage and visual uniformity, or to create permanent tanks\dams.
Topsoil from borrow pit areas will be saved and reused in re-vegetating the pits to the satisfaction of regulatory authorities.
Additional borrow pits will not be opened without the restoration of those areas no longer in use.
To avoid potential adverse impacts due to erosion, the contractor shall:-

(a) Line spillage ways with riprap to prevent undercutting.
(b) Provide mitigation plantings and fencing where necessary to stabilize the soil and reduce erosion.
(c) Upgrade and adequately size, line and contour storm drainage to minimize erosion potential.
(d) To avoid erosion and gulling, the contractor should reduce his earthworks during the peak of rainy seasons, use gabions and mitre drains.

Avoidance of Social Impacts:
To avoid adverse social impacts, the Contractor shall:-
Coordinate all construction activities with neighbouring land uses and respect the rights of local landowner. Written agreements with local landowners for temporary use of the property will be required and sites must be restored to a level acceptable to the owner within a predetermined time period.
Maintain and cleanup campsites.
Attend to health and safety of their workers by providing basic emergency health facilities for workers and incorporate programs aimed at the prevention of sexually transmitted diseases as a part of all construction employee orientation Programs.
Obtain approval of all diversions and accommodation of traffic. The Contractor shall provide a written traffic control plan which is to include when and where flagmen shall be employed and when and where traffic cones or other devices such as barricades and \or lights will be used.

Noise:
To avoid adverse impacts due to noise, the contractor shall:-
Consider noise as an environmental constraint in planning and execution of the works.

Use equipment conforming to international standards and directives on noise and vibration emissions.
Take all necessary measures to ensure that the operation of all mechanical equipment and construction processes on and off the site shall not cause any unnecessary or excessive noise, taking into account applicable environmental requirements.
Maintain exhaust systems in good working order; properly design engine enclosures, use intake silencers where appropriate and regularly maintain noise–generating equipment. Schedule operations to coincide with periods when people would least likely be affected and by the contractor having due regard for possible noise disturbance to the local residents or other activities. The contractor must observe statutory requirements which regulate working hours and working days (Construction activities will be strictly prohibited at night).
Incorporate noise considerations in public notification of construction operations and specify methods to handle complaints. Disposal sites and routes will be coordinated with local officials to avoid adverse traffic noise.

Protection of Utilities:
To avoid potential adverse impacts to utilities, the Contractor shall:-
Ascertain and take into account in his method of working the presence of utility services on and in the vicinity of the site.
Take into account the periods required to locate, access, protect, support and divert such services, including any periods of notice required to affect such work in consultation with authorities operating such services.
Assume all responsibility to locate or to confirm the details and location of all utility services on or in the vicinity of the site.
Exercise the greatest care at all times to avoid damage to or interference with services.
Assume responsibility for any damage and\or interference caused by him or his agents, directly or indirectly, arising from actions taken or a failure to take action, and for full restoration of the damage.

Waste Disposal and Hazardous materials:
Water and waste products shall be collected, removed via suitable and properly designed temporary drainage systems and disposed of at a location and in a manner that will cause neither pollution nor nuisance.
Insofar as possible, all temporary construction facilities will be located at least 50 metres away from a water course, stream or canal. The contractor shall not dispose of used cement slurry or material in the bush or road side, nor in water courses or wetlands. Such material shall be utilized or disposed of in places approved by the ENS Min. of Environment and Natural Resources.

Environmental monitoring or direct impact will be carried out by APPEALS and Ministry of Environment and will include, but not restricted to, the following concerns:
Erosion along highway segments and borrow sites during and after construction
Silting and increased sediment loads to streams.
Verification that proper waste disposal at construction sites and base camps is done;
Assurance that construction sites and base camps are cleaned after construction and
Inspection of vegetation covers (removal and re- growth) on the basis of field examinations.

Scheduled Progress

The Contractor must carry out all work in connection with the Contract so as to achieve Scheduled Progress.

Whenever requested, the Contractor must demonstrate to the Principal that it is achieving Scheduled Progress.

Care of people, property and the environment, indemnities and limitations (Obligations of Care)

The Contractor is responsible for all of the following:

Preventing personal injury or death;

Preventing loss or damage to the Site and the Works;

Preventing loss or damage to adjoining and other properties and the environment arising in connection with carrying out the Works;

Locating and caring for existing services;

Repairing or making good loss or damage to the Works and the Site; and bearing the cost of repairing, or making good, loss or damage to adjoining and other properties and the environment arising in connection with carrying out the Works. If, in the opinion of the Principal, urgent action is required to avoid death, injury, loss or damage, and the Contractor does not take the necessary action immediately when the Principal requests it, the Principal may take the action (without relieving the Contractor of its obligations), at the Contractor's cost, and the Principal's costs of doing so will be recoverable as a deduction from the Contract Price.

Indemnities for property, personal injury or death.The Contractor indemnifies the Principal against loss or damage to: the Works, from the date the Contractor begins carrying out the Works; and the Site and anything brought onto the Site for the purposes of the Contract from the date the Contractor is given access to the Site, or the relevant part of the Site, until and including the Actual Completion Date of the whole of the Works except that, in respect of any part of the Works which is occupied or taken into use by the Principal, this indemnity ceases when that part is occupied or taken into use and the indemnity then applies as if the Actual Completion Date had been achieved with respect to that part. After the Actual Completion Date of the whole of the Works, the Contractor indemnifies the principal against loss or damage to the Works, the Site, and anything brought onto the Site for the purposes of the Contract: Arising out of carrying out its obligations under the Contract, including carrying out Variations, making good Defects and removing materials from the Site.

ANNEX 7: PHOTOGRAPHS TAKEN DURING CONSULTATIONS

ENUGU NORTH SENATORIAL ZONE

ENUGU WEST SENATORIAL ZONE

ENUGU EAST SENATORIAL ZONE

STAKEHOLDERS CONSULTATION